

NETBOR
Türkiye'nin Borusu...

Product Catalogue



NETBOR | NETGRUP



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NETGRUP

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NETBOR

Türkiye'nin Borusu...

PRODUCT CATALOGUE



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Established in 2003, NETBOR Plastic Joint Stock Company started production of Polyethylene waste water pipes in 2004 in a closed area of 4.000 m. since 2008, our company has been making indoor plumbing pipes since 2008 and started to manufacture only PE100 irrigation, drinking water and network pipes in 6.000 meters closed and 23.000 meters open area.

With the new production line, which is included in the production of PE pipes, NETBOR reached a production capacity of 15.00 tons in 2009 and 25.000 tons in 2012 respectively and started production with a diameter of 800 mm. As of 2017, it has reached a production capacity of 50,000 tons with a diameter of 1200 mm in a closed area of 10,000 meters, open area of 65,000.

Our company has moved its domestic network abroad by acting with the policy of Önce Quality First 'and became a trademark in export. It has been extremely successful with many public institutions such as the Bank of Provinces, Special Provincial Administrations and Big City Municipalities. It is a manufacturer of PE100 Pipes approved by DSI General Directorate and has received international validity in the quality tests of pipes produced by TURKAK accredited laboratories.

Our company in line with increasing demands by increasing production diversity; Polyethylene Clean Water Pipes (PE100), Natural Gas Pipes (PE80) and Corrugated Pipes started production. Our company aims to be the leader in the sector, Sivas Organized Industrial Zone in the second part of the infrastructure sector is a "World Brand" targets.

Our company produces PE80 and PE100 pipes as well as PE100 network pipes. Our company has been the partner of numerous projects in the Middle East, Turkish Republics and African market in Turkey and abroad.

Our vision:

We want to be a leader in every field we serve, and to make its productivity, customer satisfaction and quality sustainable thanks to its pioneering strategies and common mind.

Our mission:

Our R & D activities focused on strengthening the innovation strategy NETB produce patented products, " Turkey's Pipe " is to be.



Our Quality Policy

All employees with customer satisfaction based on quality magnifies their goals every year and never accordance with environmental regulations without compromising the quality of the goals is to become a brand and pipes in Turkey's vision of zero accidents.

Our Integrated Management System Policy:

As Netbor Plastic Pipe Joint Stock Company, it is our policy to provide sensitivity to society, environment, customer and quality.

In line with production targets, it is our company's principle to use the most environmentally compatible materials and technologies, to use our resources in a way that will minimize wastage, and to prevent the unconscious use of the resources.

It is our company policy to prevent work accidents by applying advanced technology and methods to ensure worker health and safety, to make error-free manufacturing in line with customer requests and expectations, and to organize a continuous training program for our employees.

Our Understanding of Quality



The quality control process in Netbor laboratories consists of three stages.

1. Introduction to quality control process
2. Intermediate quality control process
3. Final quality control process

Introduction to Quality Control Process

Any raw material from our suppliers must comply with the input control plan specified by Netbor. Samples taken from each of the raw materials and auxiliaries coming from our suppliers in lots in the scope of sampling are obliged to obtain suitable for production on approval by passing all physical and chemical tests according to the input quality plan in the Netbor Netlab Conformity Assessment Laboratory.

Intermediate Quality Control Process

In the production process made with the raw material that is approved for production, the samples taken on the production lines, at the time of production and immediately after production are passed through the tests determined by national standards in accredited Netbor Netlab Conformity Assessment Laboratory and recorded. In addition, every pipe is meticulously checked by our production personnel during the production process.

During the interim control process, thickness measurements are made automatically by ultrasonic measuring devices located on the production lines simultaneously with the production. Our products must receive "quality approval".

Final Quality Control Process

Our products, which have been approved for quality, are approved for identification, labeling, stacking, geometric and visual conformity after being checked.

Our accredited Netbor Netlab conformity assessment laboratory from TURKAK is audited by TURKAK. Our products and quality system are inspected by TSE at least once a year.





Our Environmental Awareness

Netbor Plastic Pipe EN ISO 14001 environmental management system certificate has been approved at national and international level.

Environmental management programme prepared by quality assurance unit and environmental accident clearance team and projects aimed at protecting environmental health Netbor Plastic Pipe is implemented within the body. It transforms its environmental awareness into an environmental policy and shares it with its neighbors, suppliers and customers.

Our natural resources are decreasing day by day due to the increase in world population and changing consumption habits. Urbanization, population growth and welfare increase lead to an increasing amount of waste production. Therefore, it is necessary to allocate waste to be recyclable. As a result of using our natural resources in the production process, glass, metal, plastic and paper packages are obtained. Recycling of the packages that are placed on the market after they become waste has a positive effect on the national economy.

Dear Business Partners,

You can reach the nearest packaging waste collection points by classifying the packaging we have used in the products according to their characteristics for recycling. If you do not have a collection point close to you and your municipality does not work in this direction, you can apply to our municipality. In this context, it will be appropriate to classify the glass, plastic, metal, paper and wood wastes as a result of usage in their source and give them to the licensed recycling companies closest to you. You can reach the licensed recycling companies by the T.C Ministry of Environment and Urbanization <http://waste.management.cevreorman.gov.tr>.

Netbor Plastic Pipe is proving its environmental sensitivity with the environmental management system since it established in 2009

Our Environmental Awareness



Netbor Plastic products consist of recycled material. The waste is sent to the recycling facilities of the Ministry of Environment and Forestry. Netbor Plastic, which undertakes to comply with all national and international environmental regulations, fulfills all legal obligations.

Netbor Plastic has established an environmental management system that covers all activities and meets the requirements of ISO 14001 standard. It manages the issues with high environmental risk as a result of the evaluation of environmental elements within this system.

Human freedom is the fundamental right to live in an environment of equality and prosperity. Man has to protect and develop the environment for future generations. Therefore, we invite you to have the necessary awareness and sensitivity.

Dear Business Partners,

We kindly request that the products of Netbor Plastic be sent to the recycling and recycling facilities of the Ministry of Environment and Forestry according to the life cycle after the expiration date.

Best Regards
NETBOR PLASTIC PIPE

Plastik malzemelerin kalorifik değerleri de oldukça yüksektir.

Plastikler	Kkal/kg
Polietilen (PET)	11060
Polipropilen (PP)	11030
Polistiren (PS)	9900
Lastik	9900
Gazete	4800
Deni	4000
Odun	3750
Ort. Çöp	2500
Yard Atığı	1700
Gıda Atığı	1450
Fuel-oil	11600
Uyut Kömürü	5330



PRODUCT LIFE CYCLE

INPUTS

Raw Material
Chemical Substance
Energy
Water
Work Force



LIFE CYCLE PROCESS

Design
Raw Material Supply
Production
Labelling
Shipment
Usage
End of Life
Disposal



OUTPUTS

Waste Water
Solid Waste
Emission
Dangerous Waste
Product
Metal Scrap Waste

The main material used in the products is polyethylene material and when it is evaluated in terms of its life cycle, it is obtained from sources that are in compliance with legal and customer requirements. Netbor produced and sent products are processed and put into use. End of life polyethylene pipes should not be left open in the environment. These products must be sent for recycling.



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PE 100

What is Polyethylene?

What is PE Pipe?

General Features

Size / Weight Table

Product Data Sheet

What is Polyethylene?

Polyethylene is a type of large molecular mass polymer formed by covalent bonding of small molecular mass ethylene monomers.

Polyethylene is classified into various categories based on density and chemical properties. Mechanical properties depend on molecular weight, crystal structure and branching type.

UHMWPE (ultra high molecular weight PE)
HDPE (high density PE)
HDXLPE (high density cross-linked PE)
PEX (cross- linked PE)
MDPE (middle density PE)
LDPE (low density PE)
LLDPE (linear connected low density PE)
VLDPE (very low density PE)



It is possible to divide polyethylene into three classes: HDPE, MDPE and LDPE. The major feature that distinguishes low density polyethylene from high density polyethylene is the amount of branching in the chains.

What is PE Pipe?

Polyethylene is a thermoplastic used in a wide variety of products.

It is named after monomer ethylene.

In the plastics industry it is often referred to as PE.

Polyethylene is classified into various categories based on density and chemical properties.

HDPE is a high density polyethylene material obtained from petroleum.

It is the acronym for high density polyethylene, which is the English equivalent.

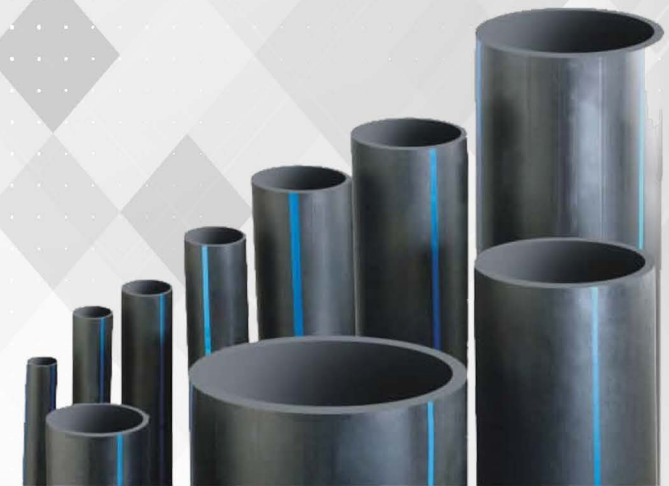
Approximately 1.75 kg of crude oil is obtained from 1 kg of HDPE.

HDPE is resistant to water and chemicals.

Its mechanical properties are very good and they are especially resistant to impact and shrinkage.

Normally the tensile strength is around 225-350 kgf.

Temperature resistance up to 50°C



General Characteristics of PE Pipe

HDPE 100 pipes stand out with their high quality. Our PE 100 drinking water pipes are manufactured from the 3rd generation HDPE products, which is the latest technology.

HDPE pipes, namely high-density polyethylene, emerged in 1950.

While the environmental stress values of PE pipes initially pointed to 3.2 mpa, this product developed over time increased to 6.3-8.0 and 10.0 mpa.

As Netbor, we closely follow the developments in our quality laboratory. Our PE 100 pipes are produced with the highest quality up to 16-1600 mm.

Thanks to its polyethylene properties, it is the best alternative among the pipe types used in pressurized clean water systems. It is used in under ground and above ground pressure water network lines, marine discharge projects and fish breeding farm production cages.



Size/ Weight Table

PN4 (4 atm) - PN32 (32 atm) In the pressure range from 16 millimeters to 1600 millimeters in diameter, up to 110 millimeters (not including 110) can be manufactured as coils or lengths on request. Those with a diameter greater than 110 mm are generally produced in lengths of 13.5 meters and optionally 6 and 12 meters.

The oxidation of the environmental stress value of the PE 100 product to the value of 0.0 results in a stronger raw material. The increase in this value indicates that the strength increases, which means that the wall thickness is thinner for the same pressure class. This means that the inner diameter value of PE 100 pipe increases with raw material saving. Improvements in these values offer a cost advantage over alternative products, increasing market share.

Product Data Sheet

Sample Name	Experiments	Experiment Standarts	Unit	Required Features	Experiment Results
High Density Polyethylene Pipe	Appearance and colour	TS EN 12201-2+A1 ISO 4427-2	Visual Observation Without Magnification	When the pipes are inspected without using a magnifying glass, the inner and outer surfaces should be smooth and there should be no pit or crack defects. Pipe ends should be cut perpendicular to the pipe axis. The pipes should be blue or black with blue stripes.	suitable
	Size	TS EN ISO 3126	mm	Size TS EN 12201-2 And it must be suitable To ISO 4427-2	suitable
	MFR (190C/5,0kg)	ISO 1133-1	Gr/10 min	The difference between raw material and pipe should be %20	suitable
	Density	TS EN ISO 1183-1	Gr/cm3	≥ 0,930	≥ 0,930
	OIT (200C)	ISO 11357-6	minute	≥ 20	≥ 20
	Determination of Tensile Properties	ISO 6259-1-3	%	≥ 350	≥ 350
	Determination of Resitance To internal Pressure (80C 165 hours)	TS EN ISO 1167-1-2	bar	No damage	No damage
	Amount of Carbon black By colcination and pyrolysis	TS ISO 6964	%	2-2,5	2-2,5
	Pigment or Carbon black Dispersion	TS ISO 18553 BS2782-8: Method 823A	degree	≤ degree 3	≤ degree 3
	Reinstate	TS EN ISO 2505	%	≤ 3	≤ 3

HEALTY

PE100 pipes are dirt-free, non-toxic and resistant to microorganisms and are compliant with the Ministry of Health Foodstuffs Regulation.

LONG LASTING

Long life, stainless, non-rot, strong and corrosion resistant.

EASE

Easy and quick to install. assembled inside and outside the duct during assembly.

ECONOMIC

It is much more economical compared to metal materials.

WELDING FEATURE

Due to its excellent welding properties, it provides precise sealing which will not come off and break under pressure



JOINING METHODS IN PE PIPES

Butt Welding

Butt Welding Parameters

Coupling Couplings

Elektrofusion

Butt Welding

Polyethylene pipes can be produced to be joined by butt welding method according to the characteristics of the project to be applied, but there are technical limitations for both welding diameter and wall thickness.

With this welding method, the jointing is done from 50 millimeters diameter to 1600 millimeters diameter and 100 millimeters wall thickness with minimum 5 millimeters wall thickness depending on the diameters. butt welding is done according to DVS 2207 standards



Points to be considered when joining PE pipes with butt welding:

- + The temperature of the medium to be welded should not be below 5 °C
- + If the wall thickness of the pipes to be joined should be equal, the wall thickness difference of the two pipes shall not exceed a maximum of 10%.
- + Butt welding machine to be used in welding must be certified. Before starting the welding process, the welding surfaces should be shaved and oxidized and the welding faces should be completely in contact with each other.
- + The surface to be welded must be prevented from being soiled after shaving for any reason. If there is re-contamination, the trimming must be performed again. The surface to be welded must be cleaned with pure alcohol before being heated with an iron.
- + Welding ironing temperature is between 200-250 °C but the pipe is produced according to the raw material and application standards should be determined.

Butt Welding

+ For pipes with low wall thickness, upper heat values should be selected for pipes with high heat values.

+ After the welding process starts, the joint pressure values of the pipes should be kept equal during the welding cooling process.

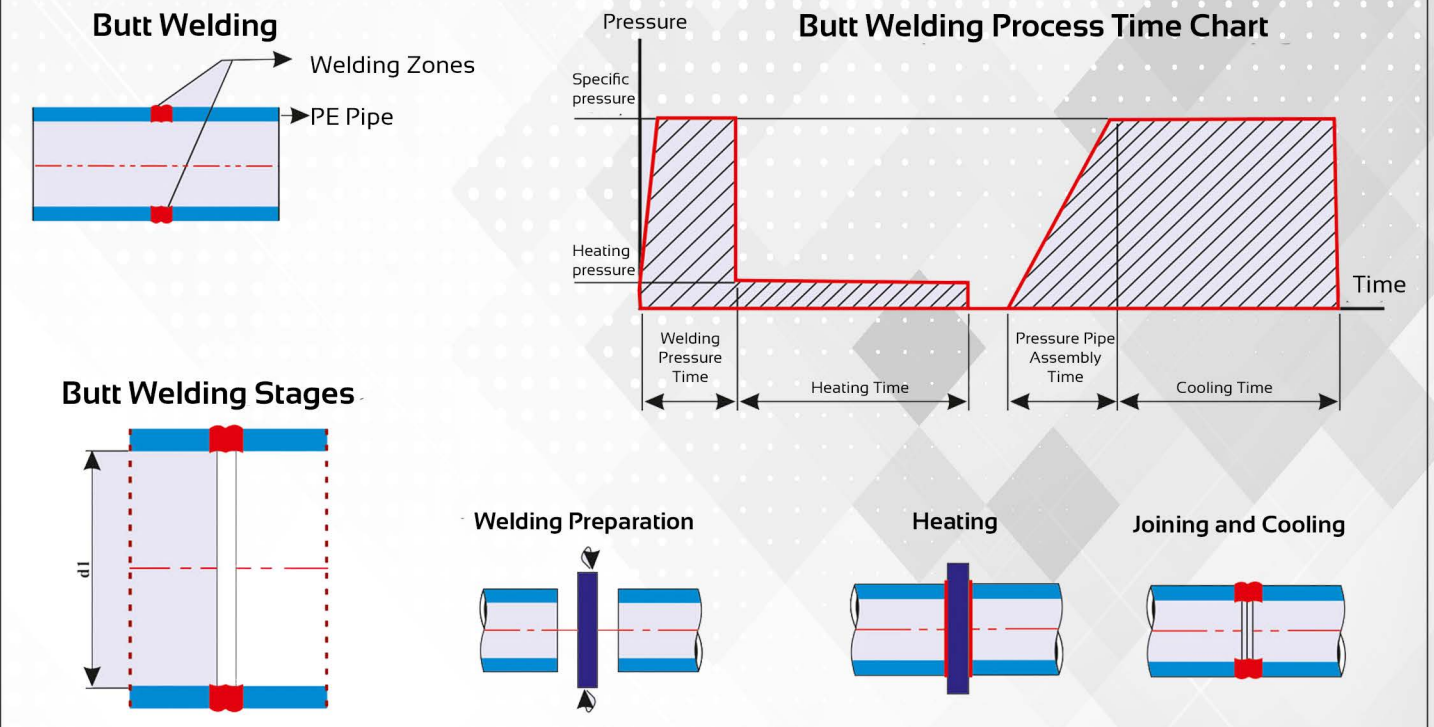
+ One end of the pipes should be closed during welding as the air circulated in the pipe accelerates the cooling process unbalanced.

+ Before starting the welding process, the machine's temperature values should be checked and welding should be started 5 minutes after the desired temperature value is reached.

+ The ironing part of the machine and the part of the pipe to be welded should be cleaned before welding.

+ Welding pressure test for pressurized drinking water pipes according to DIN4270 standards.

BUTT WELDING METHOD AND STAGES



Butt Welding Parameters

MALZEME / MATERIAL PE 100 PN 4									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
75	1,8	0,6	0,2	22	4	5	3	3	
90	2,3	1	0,3	28	4	5	3	4	
110	2,7	1,5	0,3	32	4	5	4	5	
125	3,1	1,75	0,4	37	4	5	5	5	
140	3,5	2	0,4	42	4	5	5	6	
160	4	7	0,5	48	5	5	6	7	

MALZEME / MATERIAL PE 100 PN 6									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
50	1,8	0,5	0,2	22	4	5	3	3	
63	2,4	0,6	0,3	29	4	5	4	4	
75	2,7	1	0,3	32	4	5	4	5	
90	3,3	1,5	0,4	40	4	5	5	6	
110	4	2	0,2	48	4	5	6	7	
125	4,5	2,5	0,5	54	4	5	7	8	
140	5,1	7,5	0,6	61	4	5	8	9	
160	5,8	12,5	0,7	70	5	5	9	10	

MALZEME / MATERIAL PE 100 PN 10									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
40	2,4	0,5	0,3	29	4	5	4	4	
50	3	0,6	0,4	36	4	5	5	5	
63	3,8	1	0,5	46	4	5	6	7	
75	4,5	1,5	0,5	54	4	5	7	8	
90	5,4	2	0,6	65	4	5	8	9	
110	6,6	7,5	0,8	79	4	5	10	11	
125	7,4	12,5	0,9	89	4	5	11	13	
140	8,3	20	1	100	4	5	12	14	
160	9,5	27,5	1,1	114	5	5	14	16	

MALZEME / MATERIAL PE 100 PN 16									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
40	3,7	0,6	0,4	44	4	5	6	6	
50	4,6	1	0,6	55	4	5	7	8	
63	5,8	1,5	0,7	70	4	5	9	10	
75	6,8	2	0,8	82	4	5	10	12	
90	8,2	7,5	1	98	4	5	12	14	
110	10	20	1,2	120	4	5	15	17	
125	11,4	25	1,4	137	4	5	17	20	
140	12,7	30	1,5	152	4	5	19	22	
160	14,6	40	1,8	175	5	5	22	25	

MALZEME / MATERIAL PE 100 PN 25									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
40	5,5	1,5	0,7	66	4	5	8	10	
50	6,9	2	0,8	83	4	5	10	12	
63	8,6	7,5	1	103	4	5	13	15	
75	10,3	20	1,2	124	4	5	15	18	
90	12,3	25	1,5	148	4	5	18	21	
110	15,1	40	1,8	181	4	5	23	26	

MALZEME / MATERIAL PE 100 PN 5									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
63	0,2	0,7	0,2	24	4	5	3	4	
75	2,3	1	0,3	28	4	5	3	4	
90	2,8	1,3	0,3	34	4	5	4	5	
110	3,4	1,5	0,4	41	4	5	5	6	
125	3,9	2	0,5	47	4	5	6	7	
140	4,3	2,5	0,5	52	4	5	6	7	
160	4,9	12,5	0,6	59	5	7	7	8	

MALZEME / MATERIAL PE 100 PN 8									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
50	2,4	0,4	0,3	29	4	5	4	4	
63	3	0,7	0,4	36	4	5	5	5	
75	3,6	1	0,4	43	4	5	5	6	
90	4,3	1,5	0,5	52	4	5	6	7	
110	5,3	2	0,6	64	4	5	8	9	
125	6	2,5	0,7	72	4	5	9	10	
140	6,7	3	0,8	80	4	5	10	12	
160	7,7	12,5	0,9	92	5	5	12	13	

MALZEME / MATERIAL PE 100 PN 12.5									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
40	3	0,7	0,4	36	4	5	5	5	
50	3,7	1	0,4	44	4	5	6	6	
63	4,7	1,5	0,6	56	4	5	7	8	
75	5,6	2	0,7	67	4	5	8	10	
90	6,7	2,5	0,8	80	4	5	10	12	
110	8,1	12,5	1	97	4	5	12	14	
125	9,2	20	1,1	110	4	5	14	16	
140	10,3	25	1,2	124	4	5	15	18	
160	11,8	35	1,4	142	5	5	18	20	

MALZEME / MATERIAL PE 100 PN 20									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
40	4,5	1	0,5	54	4	5	7	8	
50	5,6	1,5	0,7	67	4	5	8	10	
63	7,1	2	0,9	85	4	5	11	12	
75	8,4	7,5	1	101	4	5	13	14	
90	10,1	20	1,2	121	4	5	15	17	
110	12,3	25	1,5	148	4	5	18	21	
125	14	35	1,7	168	4	5	21	24	
140	15,7	40	1,9	188	4	5	24	27	

MALZEME / MATERIAL PE 100 PN 32									
D Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Diameter: Wall	Thickness	Welding Pressure	Thickness	dk / sn	sn	sn	dk	Total	dk
mm	mm	(40-160) mm	mm	min/sec	sec	sec	min	min	
40	6,7	2	0,8	80	4	5	10	12	
50	8,3	5	1	100	4	5	12	14	
63	10,5	20	1,3	126	4	5	16	18	
75	12,5	25	1,5	150	4	5	19	21	
90	15	40	1,8	180	4	5	23	26	

Butt Welding Parameters

MALZEME / MATERIAL PE 100 SDR 41 PN 4 Silindir alanı / Cylinder area 23.06 cm²									
Dış Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Outer Dia.	Wall Thickness	Welding Pressure	Thickness	dk/min	sn/sec	sn/sec	dk/min	dk/min	
mm	mm	P1=PS(BAR)	mm	dk/min/sn/sec	sn/sec	sn/sec	dk/min	dk/min	
180	4,4	1,5	0,9	55sn/sec	5	10	7	8	
200	4,9	2	1,0	1dk/min	5-6	10	7	9	
225	5,5	2,5	1,1	1.10min/sec	5-6	10	8	10	
250	6,2	3	1,1	1.15min/sec	5-6	10	9	11	
280	6,9	4	1,2	1.20min/sec	5-6	10	10	12	
315	7,7	5	1,3	1.30min/sec	6-8	10	12	14	
355	8,7	6	1,4	1.45min/sec	6-8	10	13	15	
400	9,8	8	1,5	2dk/min	6-8	10	15	17	
450	11,0	10	1,6	2.15min/sec	6-8	10	17	19	
500	12,3	13	1,7	2.30min/sec	8-10	10	18	21	
560	13,7	15	1,8	2.45min/sec	8-10	10	21	24	
630	15,4	20	1,9	3dk/min	8-10	10	23	27	
710	17,4	25	1,9	3.80min/sec	8-10	10	26	30	
800	19,6	30	1,9	4dk/min	10-12	10	29	34	

MALZEME / MATERIAL PE 100 SDR 26 PN 6 Silindir alanı / Cylinder area 23.06 cm²									
Dış Çap	Et Kalınlığı	Kaynak Basıncı	Dudak	t2	t3	t4	t5	Toplam	
Outer Dia.	Wall Thickness	Welding Pressure	Thickness	dk/min	sn/sec	sn/sec	dk/min	dk/min	
mm	mm	P1=PS(BAR)	mm	dk/min/sn/sec	sn/sec	sn/sec	dk/min	dk/min	
180	6,5	2	1,2	1.20min/sec	5-6	10	10	11	
200	7,2	3	1,2	1.30min/sec	6-8	10	11	13	
225	8,2	4	1,3	1.40min/sec	6-8	10	12	14	
250	9,1	5	1,4	1.50min/sec	6-8	10	14	16	
280	10,1	6	1,5	2dk/min	6-8	10	15	18	
315	11,4	7	1,6	2.20min/sec	6-8	10	17	20	
355	12,9	10	1,8	2.35min/sec	8-10	10	19	22	
400	14,5	12	2,0	3dk/min	8-10	10	22	25	
450	16,3	15	2,1	3.15min/sec	8-10	10	24	28	
500	18,1	20	2,3	3.40min/sec	8-10	10	27	31	
560	20,3	25	2,5	4dk/min	10-12	10	30	35	
630	22,8	30	2,9	4.35min/sec	10-12	10	34	39	
710	22,5	35	3,4	5.10min/sec	10-12	10	39	44	
800	29,0	45	3,9	5.50min/sec	12-16	10	44	50	

Coupling With Coupling Sets

In the combination of PE diameters of 20-125 millimeters, mechanical couplings are sometimes used. This method is preferred because it can be easily done with the help of conventional hand tools, also it can be applied to wet pipe surfaces and there is no need for a welding machine, electricity. However, this method does not provide sealing as high as a welding method.



Implementation :

For joining, the areas of the pipes are broken with a cutter.

The coupling face of the coupling fitting to be used in the joint is loosened.

The pipe coupling is pushed into the fitting with larger diameters of the pipe surface to be slidable. Fitting of the pipe into the coupling fitting is ensured.

The clamping rings are tightened by hand and wrench in small diameters. In large diameters, the chain is tightened with a wrench.

It is tested, the joint is completed if sealing is provided.



Elektrofusion Welding

EF welding is one of the joining methods of PE pipes. Cuffs or fittings with copper belts are used for welding.



Preparation for Welding :

Before welding, the length of the pipe entering the EF fitting is measured with the aid of 1 tape measure. This distance is then marked on the pipe with a marker pen. then the outer surface of the PE pipes is scraped with a sandpaper to remove the oxide layer. then both the scraped surfaces and the inner surface of the EF fitting are wiped with an alcohol swab.

The aim is to remove oil and dirt residues on pe surfaces

Welding Process:

The prepared pipes are inserted into EF fittings. Then the cables of the special machine made for EF welding are connected to the plugs located outside the fitting to apply current to the EF fitting copper belts. Then EF bar is read to the barcode readers of these special welding machines. EF fitting is introduced to the machine.

The information displayed on the machine screen is checked and, if correct, the machine is started. The machine applies the current and cuts the current at the end of time. The joint cannot be moved during the cooling of the heated surfaces. Welding is finished.



RESISTANCE TO CHEMICALS

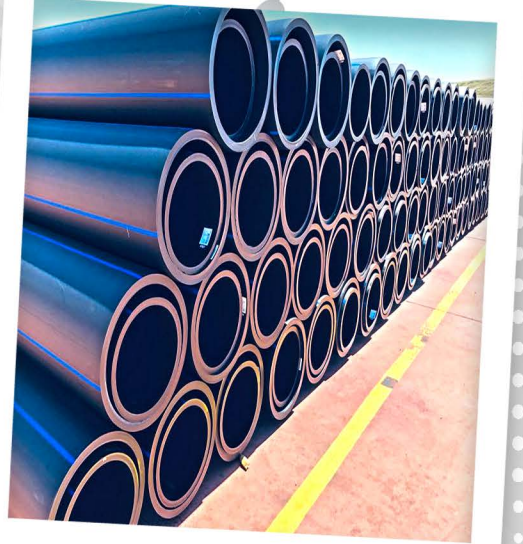
PE Chemical Resistance Table

PE Chemical Resistance Table

Name OF CHEMICAL	%Konst.	T(C")	LDPE	HDPE
Adipic Acid	Saturation resolution %1.4	20 60	D D	D D
Allil Alcohol	ts-s	20 60	SD DZ	D D
Aluminum Hydroxide	suspension	20 60	D D	D D
Ammonia Dry Gas	ts-g	20 60	D D	D D
Amonnia,Aqueous	Saturation resolution	20 60	D D	D D
Amonnia,Liquid	ts-g	20 60	SD SD	D D
Ammonium chloride	Saturation resolution	20 60	D D	D D
Ammonium sulfate	Saturation resolution	20 60	D D	D D
Aniline	Saturation resolution	20 60	DZ DZ	
Acetic acid	50	20 60	D	D
Acetic acid,Donor	<96	20 60	SD DZ	D SD
Nail polish remover	ts-s	20 60	SD DZ	SD SD
Virgin (II) sulfate	Saturation resolution	20 60	D D	D D
Benzene	ts-s	20 60	DZ DZ	SD SD
Gasoline (fuel)	Working solution	20 60	SD DZ	D SD
Beer	Working solution	20 60	D D	D D
Vegetable oils	ts-s	20 60	D SD	
Butane, gas	ts-g	20 60		D D
Mercury	ts-s	20 60	D D	D D
İron(II) and (III) chloride	Saturation resolution	20 60	D D	D D
Ethanol	40	20 60	D SD	D SD
Ethylene glycol	ts-s	20 60	D D	D D
Phenol	Solution	20 60	SD DZ	D D
Formaldehyde	30-40	20 60	D D	D D
Glycerine	ts-s	20 60	D D	D D
Air	ts-g	20 60	D D	D D
Hydrogen	ts-g	20 60	D D	D D
Hydrogen peroxide	30	20 60	D SD	D D
Hydrochloric Acid	30 conc	20 60	D D	D D
Pee		20 60	D D	D D
Iodine in alcohol	Working solution	20 60	DZ DZ	DZ DZ
Calcium carbonate	suspension	20 60	D D	D D

PE Chemical Resistance Table

Name OF CHEMICAL	%Konst.	T(C")	LDPE	HDPE
Calcium chloride	Saturation resolution	20 60	D D	D D
Carbon dioxide gas	ts-g	20 60	D D	D D
Carbon monoxide gas	ts-g	20 60	D D	D D
Carbon monorloride	ts-s	20 60	DZ DZ	SD SD
Chlorine(dry gas)	ts-g	20 60	DZ DZ	SD DZ
Chlorinated water	Saturation resolution	20 60	DZ DZ	SD DZ
Chloroform	ts-s	20 60	DZ DZ	DZ DZ
Lead acetate	Saturation resolution	20 60	D D	D D
Sulfur dioxide dry gas		20 60	D D	D D
Methyl alcohol	ts-s 10	20 60 20 60	D SD D D	D D D D
Nitric acid	25 >50	20 60 20 60	D DZ DZ DZ	D DZ DZ DZ
Fuming nitrous oxide		20 60	DZ DZ	DZ DZ
Oxygen gas	ts-g	20 60	D D	SD D
Potassium hydroxide	Solution Up to 50	20 60 20 60	D D D D	D D D D
Cyclohexanol	ts-k	20 60		D D
Sodium biarbonate	Saturation resolution	20 60	D D	D D
Vinegar	Working solution	20 60	D D	D D
Sodium hydroxide	Solution 40	20 60 20 60	D D D D	D D D D
Sodium carbonate	Saturation resolution Up to 50	20 60 20 60	D D D D	D D D D
Sodium chloride	Saturation resolution	20 60	D D	D D
Sodium sulfate	Saturation resolution	20 60	D D	D D
Water distilled sea		20 60	D D	D D
Water,use,mineral(mine)	Working solution Eki.30	20 60 20 60	D D D D	D D D D
Sulfuric acid	50 98 Smoky	20 60 20 60 20 60	D SD DZ DZ DZ DZ	D D DZ DZ DZ DZ
Milk	Working solution	20 60	D D	D D
Wine	Working solution	20 60	D D	D D
Toluene	ts-s	20 60	DZ DZ	SD DZ
Trichlorethylene	ts-s	20 60	DZ DZ	DZ DZ
Urea	Solution	20 60	D D	D D
Oils(herbal and animal)	ts-s	20 60	SD DZ	D SD



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LOADING AND PACKING

Coil Sizes

Loading Capacities

Telescopic Loading

Packing Types

Coil Sizes

Coil pipes are not broken, crushed, impact resistant, weather resistant, flexible tunnel formwork and other construction systems can be used easily. Resistant polyethylene coils are produced in nominal diameters of Ø16-Ø125 mm.

Since the production of polyethylene pipes is made in length and coil, it provides advantages such as saving labor and using minimum additional parts

MEASUREMENTS OF COIL PIPES						
PIPE DIAMETER	PRESSURE	FEATURE	WINDING	IN. DIAMETER/MM	WIDTH/MM	OUTSIDE DIAMETER
20 MM	PN 16	100	13	620	273	770
25 MM	PN 16	100	11	620	290	850
32 MM	PN 10	100	10	800	340	1070
40 MM	PN 10	100	7	900	290	1160
50 MM	PN 10	100	6	1200	310	1400
63 MM	PN 10	100	6	1230	390	1700
75 MM	PN 10	100	4	1850	310	2400
90 MM	PN 10	100	4	1800	380	2600
110 MM	PN 10	100	5	2000	600	2600



- + Long lasting.
- + It is flexible
- + Lightweight and easy to assemble.
- + It has anti corrosion properties.
- + Shock resistant.
- + Clean and hygiene feature.
- + Resistant to freezing.
- + It is economical.

Loading Capacities

Coil Pipes Truck Loading Capacities

DIAMETER	TRUCK HEIGHT (270 CM)	TRUCK HEIGHT (280 CM)	CONTAINER DC	CONTAINER HIGH CUBE	UNIT METER	TOTAL METER	TOTAL METER2	TOTAL METER3	TOTAL METER4
	CLOSE TRUCK	OPEN TRUCK	40	40		CLOSE TRUCK	OPEN TRUCK	CONTAINER DC	CONTAINER HC
Ø20 MM	501	0	360	405	100	50.100	0	36.000	40.500
Ø25 MM	382	0	234	312	100	38.200	0	23.400	31.200
Ø32 MM	170	140	144	166	100	17.000	14.000	14.400	16.600
Ø40 MM	160	140	160	180	100	16.000	14.000	16.000	18.000
Ø 50 MM	140	120	86	94	100	14.000	12.000	8.600	9.400
Ø 63 MM	80	63	49	56	100	8.000	6.300	4.900	5.600
Ø 75 MM	48	43	30	35	100	4.800	4.300	3.000	3.500
Ø 90 MM	30	34		24	100	3.000	3.400	0	2.400
Ø 110 MM	20	22		16	100	2.000	2.200	0	1.600

Length Pipes Truck Capacities

DIAMETER	TRUCK HEIGHT (270 CM)	TRUCK HEIGHT (280 CM)	CONTAINER DC	CONTAINER HIGH CUBE	PIECE	TOTAL METER	TOTAL METER2	TOTAL METER3	TOTAL METER4
	CLOSE TRUCK	OPEN TRUCK	40	40		CLOSE TRUCK	OPEN TRUCK	CONTAINER DC	CONTAINER HC
Ø110 MM	506,0	550,0	492,0	533,0	PIECE	6.831,0	7.425,0	5.805,6	6.289,4
Ø125 MM	399,0	437,0	368,0	420,0	PIECE	5.386,5	5.899,5	4.342,4	4.956,0
Ø 140 MM	323,0	357,0	295,0	341,0	PIECE	4.360,5	4.819,5	3.481,0	4.023,8
Ø 160 MM	247,0	261,0	216,0	257,0	PIECE	3.334,5	3.523,5	2.548,8	3.032,6
Ø 180 MM	207,0	220,0	175,0	213,0	PIECE	2.794,5	2.970,0	2.065,0	2.513,4
Ø 200 MM	161,0	173,0	137,0	158,0	PIECE	2.173,5	2.335,5	1.616,6	1.864,4
Ø 225 MM	126,0	137,0	114,0	124,0	PIECE	1.701,0	1.849,5	1.345,2	1.463,2
Ø 250 MM	99,0	108,0	85,0	102,0	PIECE	1.336,5	1.458,0	1.003,0	1.203,6
Ø 280 MM	80,0	88,0	68,0	83,0	PIECE	1.080,0	1.188,0	802,4	979,4
Ø 315 MM	63,0	63,0	52,0	59,0	PIECE	850,5	850,5	613,6	696,2
Ø 355 MM	46,0	53,0	39,0	44,0	PIECE	621,0	715,5	460,2	519,2
Ø 400 MM	39,0	44,0	32,0	36,0	PIECE	526,5	594,0	377,6	424,8
Ø 450 MM	30,0	34,0	23,0	27,0	PIECE	405,0	459,0	271,4	318,6
Ø 500 MM	24,0	27,0	18,0	21,0	PIECE	324,0	364,5	212,4	247,8
Ø 560 MM	20,0	23,0	16,0	18,0	PIECE	270,0	310,5	188,8	212,4
Ø 630 MM	15,0	16,0	12,0	13,0	PIECE	202,5	216,0	141,6	153,4
Ø 710 MM	12,0	12,0	9,0	11,0	PIECE	162,0	162,0	106,2	129,8
Ø 800 MM	9,0	10,0	7,0	9,0	PIECE	121,5	135,0	82,6	106,2

Telescopic Loading

Pipes to be transported over long distances can be shipped nested one in another to reduce transport costs.



Telescopic (Example of Nesting)

Packing Types

1.Length Pipe:

In our production, PE 100 pipes are produced as 13,5 m as standard and can be produced in various lengths upon request or project basis.



2. Coil Pipe;

The coil pipes in our production are produced between 16 mm and 125 mm diameters as 100 m. Depending on the demand and the project, longer quantities can be produced according to the capacity of the coil winding machine.



3. Optional (Wooden Frame);

Pipes which will send long-distance will be shipped according to the request, the way of packaging with wooden frames are made.



FIELD APPLICATIONS IN PE PIPES

Lowering of Pipes

On-Site Storage

Pipe Laying and Trench Excavation

Joining Of Pipes

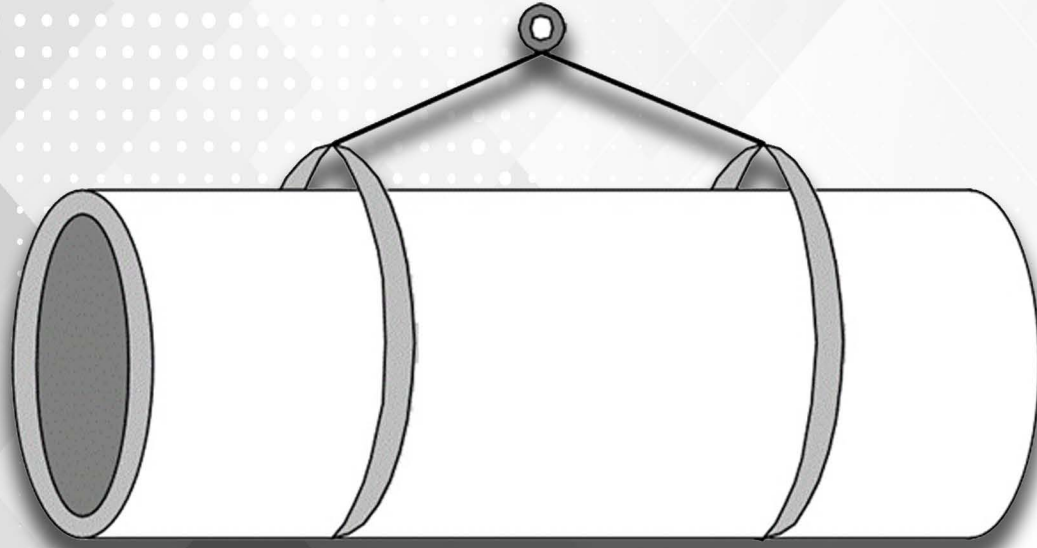
Lowering Of Pipes

Sealing Test

Lowering The Pipes

HDPE 100 pipes should be taken to the appropriate stock area which will be least affected by the weather conditions depending on the time it takes until they are laid.

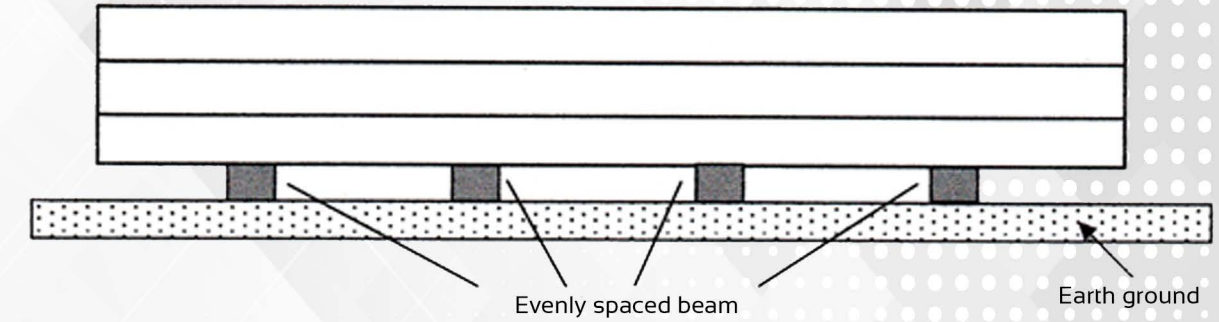
It is recommended to use cloth rope ropes with suitable strength considering the weight of the suspended pipe when lowering the pipes in the stock area. Chain or steel rope should not be used during the lowering.



Shape-1: Cloth rope (belt sling) suspended from 2 points and lower

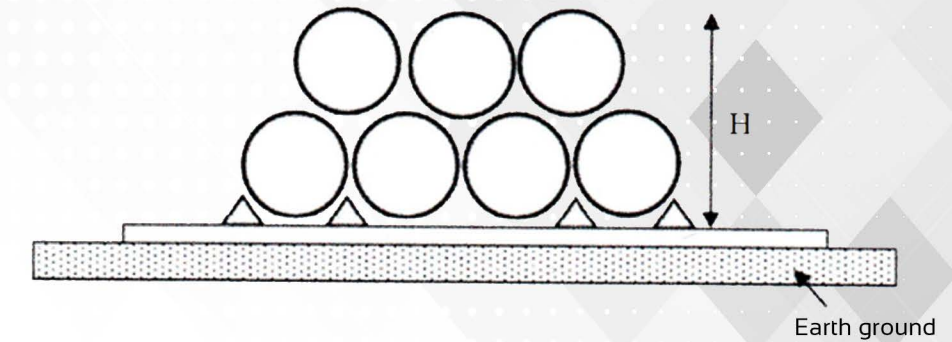
Field Storage

In order to prevent surface drawings of the pipes in the area where water is collected, the floor should be leveled and stacked on 4 5 rows of timber (10x10) at equal intervals depending on the diameter and load to be arranged.



Shape-2: Pipe stacking on the plank

Pile height (H) should be between 1.5 meters and 2.5 meters, depending on the pipe pressure class (wall thickness) and residence time. for irrigation purposes, it is recommended that the heap height does not exceed 1.5 meters in pressure classes PN6-PN8. higher pressure classes are governed by management specifications.

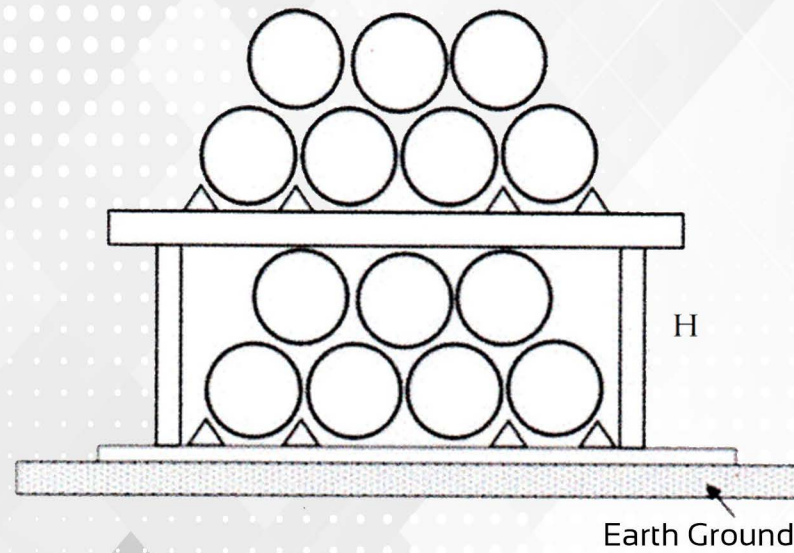


Shape-3: Stack Height (H) of Pipes

Field Storage

When stacking, the wedge supports must be exited with horizontal planks to prevent pipe welds. If there is any gaps that may slip during the base after the pipe is removed from the stack, the wedge supports should be updated.

If the pipe heap height (H) exceeds the limits and there is space shortage, the 2nd Floor can be formed by supporting the ground between 2 heaps in stocking. however, it is not recommended unless it has to be well supported against slippage and collapse.



Shape-4: Creating Stacked Stack

Pipes should be prevented from dropping on the ground, suddenly being left on the ground or on the pile when lifting and protected against impacts.

Pipe Line Laying And Excavation

Pipes should not be dragged during laying in the field, should not be pulled in contact with the ground when welding on the edge of the trench and lowered into the trench, and appropriate transport and towing vehicles should be used.

The pipes are firstly laid on the edge of the trench in accordance with the project in open land pavements such as irrigation and drinking water transmission lines. The lined pipes are welded to each other by the selected welding method.



Image-1: Welding the pipes arranged on the trench route to each other with Butt Welding.

Pipe Line Laying And Excavation

In practice, according to the availability of terrain, pipes may be welded to the edges of the excavated trench.



Image-2: Arrangement and welding of pipes on the edge of excavated trench



Image-3,4,5: Trench Excavation

Connection Of Pipes (Butt Welding)



Image-6: Pipe welding for quick field work a backhoe-loader to accompany the team.

The combination of PE100 pipes is mostly done by butt welding in the field. The welding of the pipe is done by heating the pipe areas with the help of a heating iron, melting and pushing each other under pressure. The entire butt welding process must be carried out according to **ISO 21307** or equivalent standards.



Image -7,8,9: Installation and fixing of pipes in welding machine

When welding the pipes, necessary precautions should be taken in order not to be affected by the external conditions (rain dust, etc.). Ironing teflon surfaces should not be worn, scratched or damaged. welding on a damaged teflon surface (no uniform melting on the welding) or defective thermocouple (since the welding temperature can never be known correctly) will eventually cause problems.

ISO 21307 : 2017 *Plastics pipes and fittings -- Butt fusion jointing procedures for polyethylene (PE) pipes and fittings used in the construction of gas and water distribution systems*

Piping Down and Laying of Pipes

The trench should be opened in accordance with the condition of the trench floor and necessary support measures should be taken. In weak soils, depending on the depth of the trench, bonding and support measures should be taken and slope angles should be given.

For other types of soils, the management specifications should be adhered to depending on the depth and characteristics of the trench. Floor water should be drained, if any, during laying at the bottom of the trench. The pipes are completely flattened to the trench floor, additional cushion material should be laid and compacted and placed in the trench.



Piping Down and Laying of Pipes



The operations are as follows;

- 1- The trench floor is prepared,
- 2 -Trench floor flattened,
- 3 -Stone dust is laid on the bottom of the trench (H = 15cm),
- 4- Base stone powder compacted,
- 5- Cushion material is compressed,
- 6- Laying / lowering the pipe on cushion materials,
- 7- Filling on pipes.

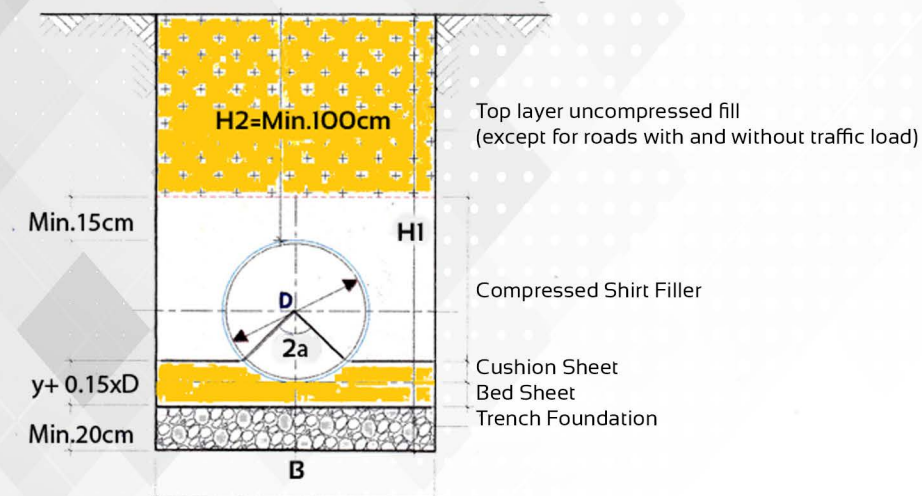
Piping Down and Laying of Pipes

If a smooth surface cannot be formed on decayed soils with poor trench foundation, foundation improvement should be performed. A ditch foundation should be formed by not less than $h = 20$ cm by pressing air and rock crumb under the bed layer. Filling material should be placed into the trench without any spaces.

NOMİNAL DIAMETER	MIN. TRENCH WIDTH	DISTANCE BETWEEN TWO PIPES SINGLE DITCH
DN (mm)	B (mm)	C (mm)
110-500	DN+300	150
500-1600	DN+600	300

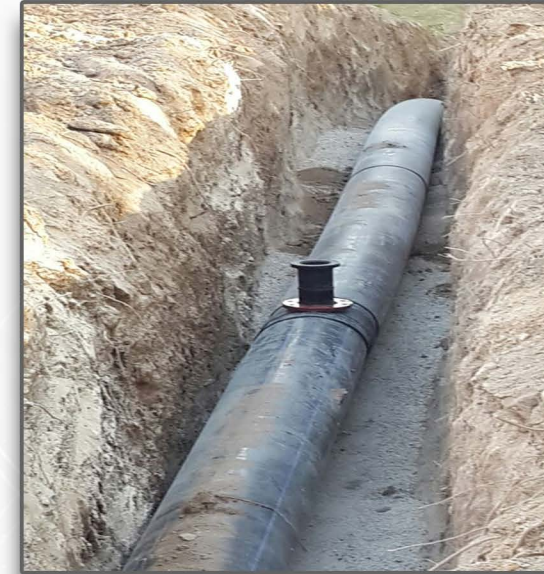
Table 1: Min. Trench widths (excluding points requiring welding in trench)

If the trench depth is more than 150 cm, the minimum trench width should be 80 cm.



Shape - 5: Trench Type Section

Piping Down and Laying of Pipes



8. Suction cup connection to prevent air pocket from peaks where slope changes in line direction.

9. Preventing the entry of dirt, dust into the pipe at the welded pipe fittings.



A small section from the stock area of pipes prepared for shipment in the factory

Leakage Test

If the pipeline to be tested is too long, it is divided into sections to allow the test to be carried out in a controlled manner and for the rapid detection of leaking points. The installation of the shipowner (valve, suction cup, pump, etc.) on the line is completed (flanges are tightened by tighten-

The test line is filled with water from a suitable point. For a successful sealing test, ensure that the air in the line is completely vented when filling water.

For accurate determination of the pressure reached during the test, the manometer should be placed in the lowest point (the static pressure will be the highest).

The leakage test shall be carried out according to the nominal pressure of the pipe and the specification of the administration.

After the line is completely filled with water, the outlet valves are closed and the line is pressurized to the pipe nominal pressure for 10 minutes. some administrations may require that the value of this pressure be increased to a value between 10-50% above the rated pressure. however, this surplus pressure demand is reduced by multiplying this reduction factor when using air as a test fluid, when the line is open and if it is exposed to sun for a long time.

After the pipe has reached the rated pressure, the pump is continued to run for 10 minutes to stabilize the pressure. The pumping process is then stopped and the pipeline is monitored for 30 minutes. In case of a drop in pressure, water pressure is added to reach the nominal pressure value. the line is considered leak-proof if there is less than 5% deviation of the rated pressure for 90 minutes.

During the test, on the line, welds flange connections water leakage, dripping and so on. If it is seen, the test is interrupted. Leaks are tightened by repairing or leaking shipowner connections and then restarted in the test.

Testing with air is not recommended due to safety reasons. (the potential of throwing the top, edge filling on the tube in exploding parts) Because the temperature of the compressed air increases by +30 - 35 degrees and given without cooling in the line, even the increase in the temperature of the pipe at the air inlet points and the reduction of the pipe pressure resistance at the point.





NETLAB





QUALITY CONTROL

Determination of Resistance to Internal Pressure

Determination of Tensile Properties

Mass Melt Flow Rate Determination (MFR)

Determination of Carbon Black by Calcination and Pyrolysis

Determination of Oxidation Induction Time (OIT)

Determination of Degree of Pigment or Carbon Black Distribution

Density Determination

Determination of Volatile Substance Content

Determination of Restore as Length

Determination of Dimensions

**Test Method TS EN ISO 1167-1 /
TS EN ISO 1167-2**

It is a test that examines the behavior of pipes against pressure over time considering the ambient conditions. It is aimed to observe the changes that can be achieved in a 50 year pipe by applying pressure conditions determined according to PN value and desired temperature to the pipes.

It is a test method in which the working life of pipes is determined under accelerated test conditions. The pipe should not explode at the end of the test period when exposed to internal hydrostatic pressure under a given temperature, ambient stress and time given in the standards of the pipes.

Internal pressure tests on PE pipes vary depending on the material class, diameter, pressure class, wall thickness of the PE pipe to be tested.

In general, test pressure (p test) calculation;

$$P_{test} = \frac{20 \cdot \sigma}{SDR - 1} \text{ (bar)}$$

	σ (20 °C, 100h)	σ (80 °C, 165h)	σ (80 °C, 1000h)
PE40	7,0 Mpa	2,5 Mpa	2,0 Mpa
PE63	8,0 Mpa	3,5 Mpa	3,2 Mpa
PE80	10,0 Mpa	4,5 Mpa	4,0 Mpa
PE100	12,0 Mpa	5,4 Mpa	5,0 Mpa



**Test Method : TS-EN ISO 6259-1
TS-EN ISO 6259-3**

It is the test in which the amount of elongation in the breaking area of the material is determined as %. The tensile elongation test with the universal tensile device is carried out at a constant speed by pulling the specimen to the point of break. The amount of elongation is automatically measured by the extensometer on the device.

Experimental Procedure :

Samples cut from the right piece are cut in the spoon sample preparation apparatus.

The extrusion device is clamped between the jaws and subjected to elongation.

Result :

TS EN 12201 – 2+A1 elongation according to standards should be minimum %350.



Test Method : TS-EN ISO 1133-1 (Metot A)

It is made to examine the behavior of the material against temperature before processing. The samples obtained from the test with mfr device are weighed with analytical balance and the results are determined in gr / 10 min.

Experimental Procedure:

- The device is heated to 190 degrees
- The pieces of material to be tested (approx. 3-5 g) are discharged into the steel cylinder in the device.
- Weigh out 5 pieces except the 1-2 pieces cut, averaged and re place the formula given in the standard and find the MFR value in g / 10 minutes.

Result:

TAAccording to the standards of TS EN 12201 2 + A1, deviation in the MFR value of raw material and produced pipe should not exceed 20%.



Determination of Carbon Black by Calcination and Pyrolysis

Test Method : TS ISO 6964

It is the test in which the amount of C atoms in elementary state is determined. Carbon black, also known as black land, is one of the main raw materials of the tire industry. The main purpose of HDPE pipes is used as three stabilizers as well as coloring.

The amount of carbon black between 2.5% and 2.5% by weight provides the most effective protection against UV radiation in sunlit pipes in aboveground applications.

It is made in order to determine the amount of carbon contained in the structure in% in order to provide UV resistance of the pipe body.

The amount of carbon which is the non-combustible portion of the sample burned in the blast furnace with nitrogen gas is calculated in %.

Experimental Procedure :

- + The device is heated to 550 °C
- + Nitrogen gas is opened to the desired flow rate.
- + 1 gram of material is weighed into the porcelain boat and put into the heating zone. Wait for about 45 minutes.
- + Porcelain boat is removed and weighed and desiccated.
- + The device is heated to 900 °C.
- + The boatman is put back in the device and the material is black carbon black.
- + Porcelain vessel is removed and left in desiccator until constant weighing is then weighed



Result :

According to TS EN 12201-2 + A1 standards, the amount of carbon black should be 2-2.5% by mass.

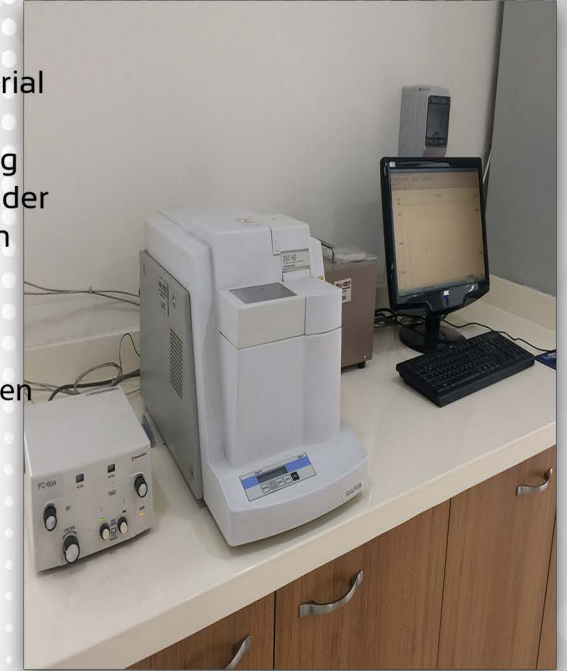
Determination of Oxidation Induction Time (OIT)

Test Method : TS EN ISO 11357-6

Thermal stability is the period in which the antioxidant additive in the PE material prevents the material from oxidizing under high temperature conditions. This test is a measure of how good the material is in manufacturing, welding and long term strength conditions. If the material does not stabilize, deterioration will begin in exusion, welding or high temperature applications. By giving oxygen to the material under high temperature, shock conditioning is determined and deterioration time is determined.

Experimental Procedure :

- + Place a test piece into the test cup. There must be a steady contact between the test piece and the container.
- + If the test pieces are cut off from the inner or outer surface of the pipe or fitting, this surface shall be placed with the surface facing upwards.
- + An open or ventilated aluminum container containing the part and an empty aluminum reference container.
- + Nitrogen flow at 50% / min with 10 % speed is provided in DSC device. When switching from nitrogen to oxygen, it is checked whether the gas passes through the same flow.
- + Oxygen in the system is removed by giving nitrogen to the furnace of the device for 3 minutes. The device is heated from an initial ambient temperature of 50 °C to a constant test temperature of 200 °C. It is left to stabilize at this temperature. A thermogram in which the energy flow difference or temperature difference is plotted against time and it is started to be recorded and the time at the 200 °C temperature reached is recorded as t0.
- + Exactly 3 minutes after + t0, oxygen is passed through the device and this point is marked as point t1 on the thermogram. This is continued until the sample fails.
- + Corruption time is recorded.



Result :

According to TS EN 12201-2 + A1 standards O.I.T should be 20 minutes

If the carbon black is not distributed homogeneously in the material, some areas will be vulnerable to environmental conditions such as solar radiation and heat.

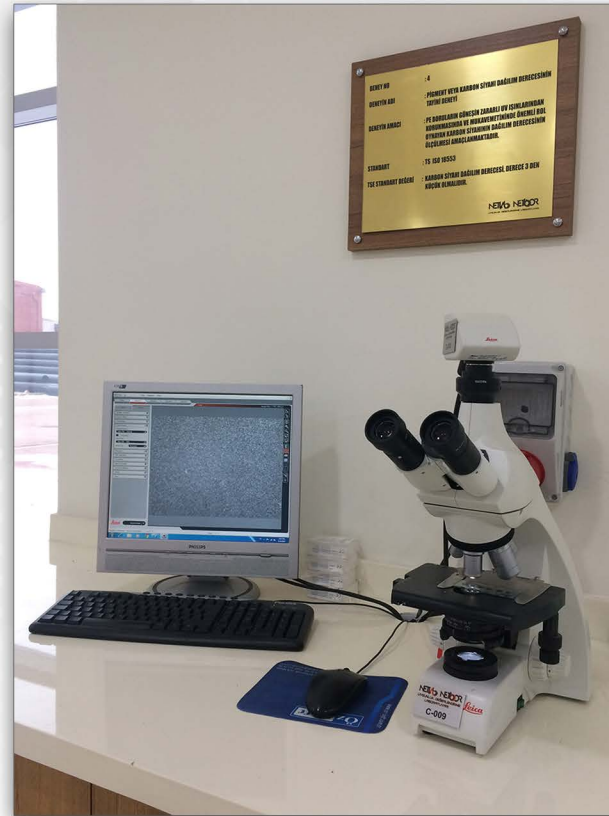
Unprotected areas are weak points, where the material will deteriorate much faster than other locations. In addition, the material is loose and forms a starting point for cracking. therefore, homogeneous distribution of the material is vital.

Experimental Procedure :

The material to be controlled is made into a thin film and examined under a microscope

Result :

According to TS EN 12201-2 + A1 standards, the degree of distribution should be less than grade 3.



It is made in order to determine the weight of the material in the unit volume. The density is calculated by analytical balance by weighing the material first in the air and then the density in the previously known liquid.

Experimental Procedure:

- + The prepared samples are not weighed less than 1 gram.
- + The test sample and the immersion liquid are expected to reach ambient temperature of the ambient liquid. the ambient temperature and the temperature of the immersion liquid are measured.
- + The concentration of immersion fluid to + ambient temperature is measured with a pycnometer.
- + The sample to be weighed should be placed in the middle of the precision scale cage.
- + The prepared sample is weighed on a precision balance.
- + Immersion container is filled with immersion liquid and placed in the balance. The scale weight value is reset.
- + The weighed sample is weighed by placing the sample into the immersion liquid in the balance. check for air bubbles in the sample immersion fluid. Wait until the changing weight remains constant in the balance display.
- + All measured weights are made in the direction of 0.1 mg

Density Calculation:

$\rho_S = mS, A \times \rho_{IL} / mS, A - mS$ are calculated in g / cm^3 by IL formula.

ρ_S : Sample Density

mS, A : Density of Immersion Fluid

ρ_{IL} : Weight of the sample placed on the top of the scale (weight in air)

mS, IL : Weight in immersion fluid

Result:

It is requested to be $0.930 g / cm^3$ according to TS EN 12201-2 + A1 standard



Test Method : TS EN 12099

The material content of 105 ° C of PE pipe materials is determined.

Experimental Procedure:

- The container and lid are cleaned and brought to constant weighing and kept in a desiccator at room temperature for at least 30 minutes.
- + Remove the weighing vessel and paper from the desiccator to determine the masses, mO, with a 0.1 mg approach. The cover is placed in the desiccator.
- + Approximately 25 grams of sample is placed in the cabinet and the mass of the container, lid and test sample, m1, is determined together.
- + Weighing container (105 +2) is placed in an oven at C temperature.
- After + (65 + 5) minutes, the weighing container is removed from the oven and placed in the desiccator and left for at least 1 hour at room temperature.
- + The container of the container is sealed and the mass, m 2, is determined by the approach of 0.1 mg with the substance content in it

Calculation of Volatile Substance Content:

The volatile content, mv, of the mass under test is calculated using the equation given below

$$m_v = \frac{m_1 - m_2}{m_1 - m_0} \times 10^3$$

- mv: Volatile content (105 -/+ 2) at C, mg / kg
- mO: Mass of empty weighing container with lid, g
- m1: Mass of container and test specimen with lid, g
- m2: (105 -) C after storage in the oven, the closed mass container and the remaining mass content of the total mass,g



Result:

TS EN 12201-2 + A1 Standards ≤350 mg / kg is required to be added.



Test Method : TS EN ISO 2505

This standard specifies a method applied in air for the determination of the ability of thermoplastic tubes to be restored. For pipes with wall thicknesses greater than 16 mm, it is not appropriate to measure the recovery rate. A piece of pipe of a certain length is placed in the air-heated oven where it is held for a certain time at a certain temperature. The length of the marked portion of this part is measured before and after heating under the same conditions. It is the ratio of change in length to provincial length and is given as a percentage.

Experimental Procedure:

- + The test pieces are suspended in the air circulating oven so that they can move freely. The test pieces in this position must not touch each other, the side or bottom of the oven.
- + The test piece is kept in the position it has placed for the following time. It is ensured that the portion of the test piece between the two circles remains at the specified temperature.

- e ≤ 8 için 60 dakika
- 8 < e ≤ 16 için 120 dakika

The test pores are taken out of the oven and suspended in the same position to be released. (23 +2) After cooling to C, the distance L between the marked portions is measured taking into account the surface curvatures.

Calculation:

$$R_L = \frac{\Delta L}{L_0} \times 100 \quad \Delta L = L_0 - L$$

LO: distance measured between the marks along the main axis of the pipe before being placed in the oven, mm L: distance between marks after removal from oven and ambient condition, mm

Result:

Ts small according to EN 12201-2 + A1 standards. 3%



Test Method : TS EN ISO 3126

This standard specifies a method for determining the dimensions of thermoplastic pipes and fittings. Diameters, lengths, wall thicknesses, ovalities, stitches and geometric limits of pipes and fittings are measured with suitable measuring equipment.

Measurement of Wall Thickness:

The accuracy of the measuring instruments used and the measurement results must comply with the following table

Wall Thickness	Accuracy of the device for the measurement result	Nearest Arithmetic Mean Value
≤ 10	0,03	0,05
> 10 ve ≤ 30	0,05	0,1
> 30	0,1	0,1

Maximum and Minimum Wall Thickness:

Measurements are made and recorded by observing the maximum and minimum wall thicknesses in the sections to be measured.

Average Wall Thickness:

The average wall thickness is the average of measurements made at six points marked at equal intervals on the section. The measured value is rounded according to the table above.

Outer Diameter Measurement:

The accuracy of the measuring instruments used and the measurement results must comply with the following table.

Nominal Diameter DN	Accuracy of the device for the measurement result	Nearest Arithmetic Mean Value
≤ 600	0,1	0,1
$600 < DN \leq 1600$	0,2	0,2
> 1600	1	1

Maximum and Diameter Measurement:

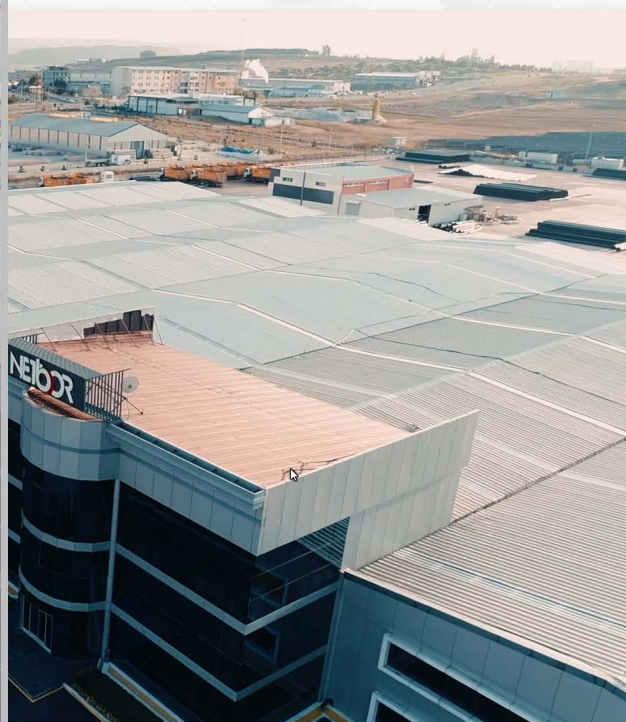
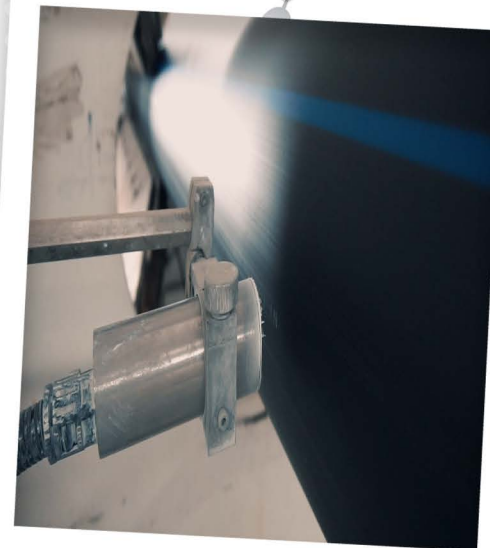
By moving the measuring device on the section, the maximum and minimum diameters are found and recorded.

Average Outer Diameter Measurement:

The average outer diameter is calculated from pi by direct measurement.

Nominal Size of Pipe or Part	Diameter Measurements
≤ 40	4
> 40 ve ≤ 600	6
> 600 ve ≤ 1600	8
> 1600	12







NATURAL GAS PIPE (PE80 / PE100)

Production Features

General Features

Size Weight Table

Product Data Sheet

Production Features

PE80 Natural Gas Pipes; Extruder line is produced in the group of machines called. Pipe production weight is 25-500 mm. Electrofusion fittings are molded and produced by injection molding machines.

Placing copper in the electrofusion fittings makes the fitting complex. The fact that the wire does not touch each other is very important for welding.

After the oxide layer on the outer surface of the pipes is removed, the fittings are passed over the pipe. The welding machine cables are attached to the metal pin on the fittings. After reading with barcode, welding is done according to the welding parameters in the machine's memory.

The swelling of polyethylene from the gaps near the pin indicates that the rock is healthy. It is the safest and the most expensive welding method with no process to be left to the worker and the width of the welding zone.

Advantages;

- + It is not affected by earthquake due to its elastic structure.
- + Maintains elastic properties when temperatures drop to -40 ° C.
- + Can be used as a coil on the construction site.
- + High resistance to chemicals.
- + No corrosion due to the fluid structure inside and outside soil structure.
- + It is 8 times lighter than steel since its density is 0,940 gr / cm³.
- + Merge outside the channel is done, then the channel is left.
- + Reduces the amount of excavation.
- + No need for precise excavation of ground grade.



General Features

PE80 Natural gas pipes: It is used in the parts of the natural gas lines with 4 bar pressure. Natural gas lines consist of 20 bar steel pipe, 4 bar intermediate line and 0.4 bar indoor lines.

Composite structure polyethylene has been used for trial purposes in 20 bar sections. With the establishment of standards, its use will become widespread. Works on composite pipes which are not affected by fire in the building are ongoing.

Natural Gas Pipes are in PE80 class. The medium density achievable environmental stress is now 8.0 MPa. As this value increases, wall thickness will decrease and the amount of fluid passing through will increase.

Since PE80 pipes are of SDR11 class, they can be used with PN 12.5 bar pressure when they are used for water and they can be used with 4 bar pressure in natural gas line with the safety coefficient being 2.5 instead of 1.25. Since the polymer chain is affected by hydrocarbon structures, the safety coefficient has been chosen as high.

By means of ultrasonic measurement control and adjustment equipment, it is ensured that natural gas pipes are continuously measured and that the pipe remains within the tolerance of the meter. The process which connects the raw material from the input quality control continues until the delivery to the customer after production, laboratory tests and final control.

Since pipes are produced as coils, they provide great ease in laying. As the amount of welding decreases, short lines can be installed and they provide fitting and labor saving



Size Weight Table

PE 80 YELLOW NATURAL GAS MEAT THICKNESS AND GRAPHIC TABLE								
SDR 17			SDR 11			SDR 9		
DN	e _{min}	Unit (Weight)	DN	e _{min}	Unit (Weight)	DN	e _{min}	Unit (Weight)
mm	mm	kg/m	mm	mm	kg/m	mm	mm	kg/m
20			20	3,0	0,17	20		
25			25	3,0	0,22	25	3,0	0,22
32	2,3	0,21	32	3,0	0,29	32	3,6	0,34
40	2,4	0,31	40	3,7	0,44	40	4,5	0,53
50	3,0	0,47	50	4,6	0,69	50	5,6	0,81
63	3,8	0,75	63	5,8	1,09	63	7,1	1,3
75	4,5	1,05	75	6,8	1,51	75	8,4	1,82
90	5,4	1,51	90	8,2	2,20	90	10,1	2,63
110	6,6	2,24	110	10,0	3,25	110	12,3	3,91
125	7,4	2,86	125	11,4	4,22	125	14,0	5,05
140	8,3	3,59	140	12,7	5,27	140	15,7	6,35
160	9,5	4,68	160	14,6	6,90	160	17,9	8,27
180	10,7	5,91	180	16,4	8,71	180	20,1	10,45
200	11,9	7,29	200	18,2	10,75	200	22,4	12,94
225	13,4	9,25	225	20,5	13,61	225	25,2	16,37
250	14,8	11,33	250	22,7	16,80	250	27,9	20,15
280	16,6	14,23	280	25,4	21,03	280	31,3	25,31
315	18,7	18,02	315	28,6	26,67	315	35,2	32,03
355	21,1	22,94	355	32,2	33,80	355	39,7	40,70
400	23,7	29,00	400	36,3	42,93	400	44,7	51,65
450	26,7	36,75	450	40,9	54,42	450	50,3	65,38
500	29,7	45,42	500	45,4	67,11	500	55,8	80,60
560	33,2	56,87	560	50,8	84,12	560	62,2	100,72
630	37,4	72,07	630	57,2	106,54	630		

Product Data Sheet

Sample Name	Experiments	Experiment Standards	Unit	Required Features	Experiment Results
P80 Natural Gas Pipe	Appearance and colour	TS EN 1555-2	Visual Observation Without Magnification	When the pipes are inspected without using a magnifying glass, the inner and outer surfaces should be smooth and there should be no pit or crack defects. Pipe ends should be cut perpendicular to the pipe axis. The pipes should be yellow or black with yellow stripes.	suitable
	Size	TS EN ISO 3126	mm	Size TS EN 1555-2	suitable
	MFR (190C/5,0kg)	ISO 1133-1	Gr/10 min	The difference between raw material and pipe should be %20	suitable
	Density	TS EN ISO 1183-1	Gr/cm ³	≥ 0,930	≥ 0,930
	OIT (200C)	ISO 11357-6	minute	≥ 20	≥ 20
	Determination of Tensile Properties	ISO 6259-1-3	%	≥ 350	≥ 350
	Determination of Resistance To internal Pressure (80C 165 hours)	TS EN ISO 1167-1-2	bar	No damage	No damage
	Pigment or Carbon black Dispersion	TS ISO 18553 BS2782-8: Method 823A	degree	≤ degree 3	≤ degree 3
	Reinstate	TS EN ISO 2505	%	≤ 3	≤ 3
	Environmental recovery of pipes	TS EN 1555-2 TS EN ISO 1167-1-2	mm	The outer diameter measurement before and after conditioning must comply with TS EN 1555-2.	suitable
	Determination of resistance to internal pressure after compression	TS EN 1555-2 EN 12106	bar	No damage	No damage



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CORRUGATED INFRASTRUCTURE PIPE

What is Corrugated Pipe?

Advantages of Corrugated Pipes

Telescopic - HDPE Corrugated

Telescopic Loading Advantages of
HDPE and Corrugated

What is Corrugated Pipe?

Waste water removal systems are very important for both human health and nature. Therefore it is very important to use the right materials for both operating and construction costs. HDPE based Corrugated Sewer Pipes are the best pipes for waste water removal systems.

Waste water removal systems made with HDPE based corrugated pipes have a longer life and easier operation. In addition, transportation costs are much lower than concrete pipes.

Production Classes : SN4 – SN8

HDPE Based Corrugated Pipe Standards : EN 13476 – 3 / TS EN 13476 – 3

Multiplier:

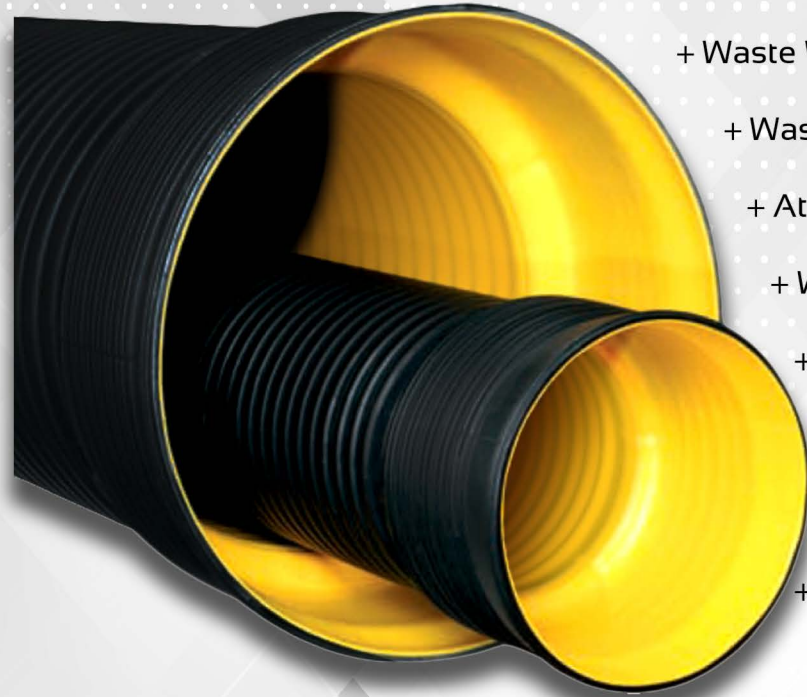
100 mm – 150 mm – 200 mm

250 mm – 300 mm – 400 mm – 500 mm

600 mm – 800 mm – 1000 mm

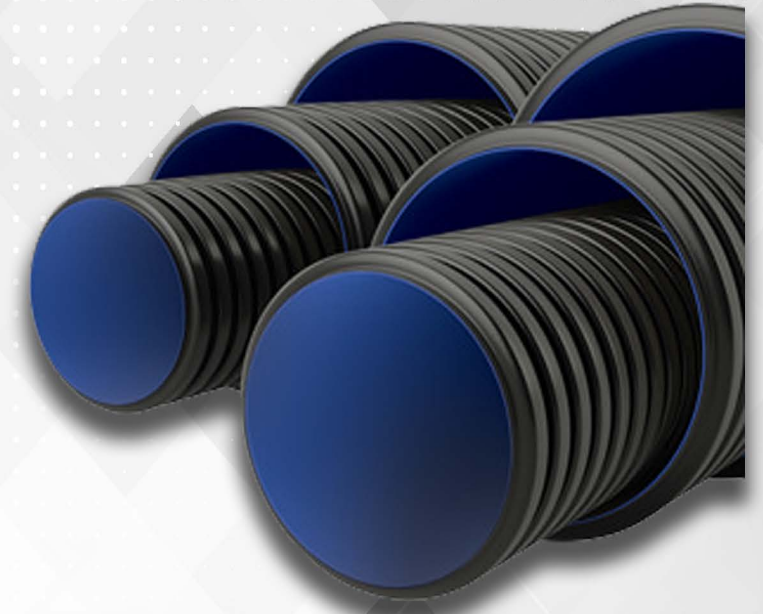
Usage Places ;

- + Sewer Lines
- + Waste Water Drainage Lines
- + Waste Water Discharge Lines
- + Attractive Irrigation Lines
- + Waste Water Treatment Plant Unpressurized Lines
- + Sewer Network Lines
- + Rain Water Lines
- + Culvert Pipe
- + Main Collector Lines



Advantages of Corrugated Pipe

- + High flow performance is achieved. Since the internal roughness coefficient is low, it is possible to achieve the same flow rate with lower diameter pipes.
- + Not affected by chemicals in waste water.
- + High resistance against corrosion.
- + Resistant to heavy traffic and soil loads.
- + Runs smoothly for at least 50 years.
- + It is the material with the highest abrasion resistance.
- + Easy to transport since it can be nested.
- + Operating costs are lower than other systems.
- + 100% sealing is provided.
- + Provides the opportunity to work without waste.
- + Easy to repair and maintain.
- + Plant and tree roots cannot enter the pipe



Advantage of Telescopic Loading of HDPE and Corrugated Pipes

Lightweight polyethylene pipes make it easier to transport.

Furthermore, the light weight during loading and transport allows telescopic loading.

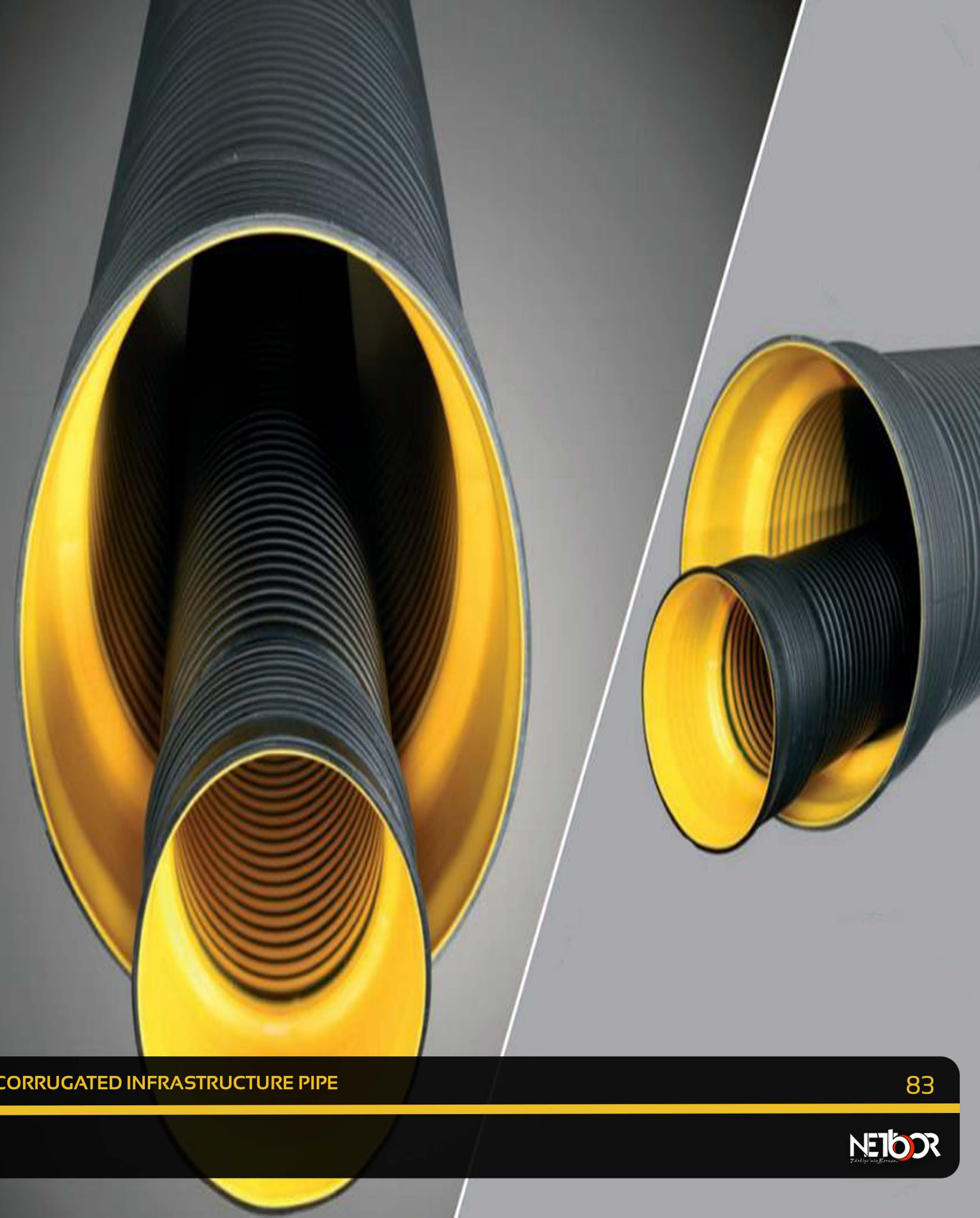
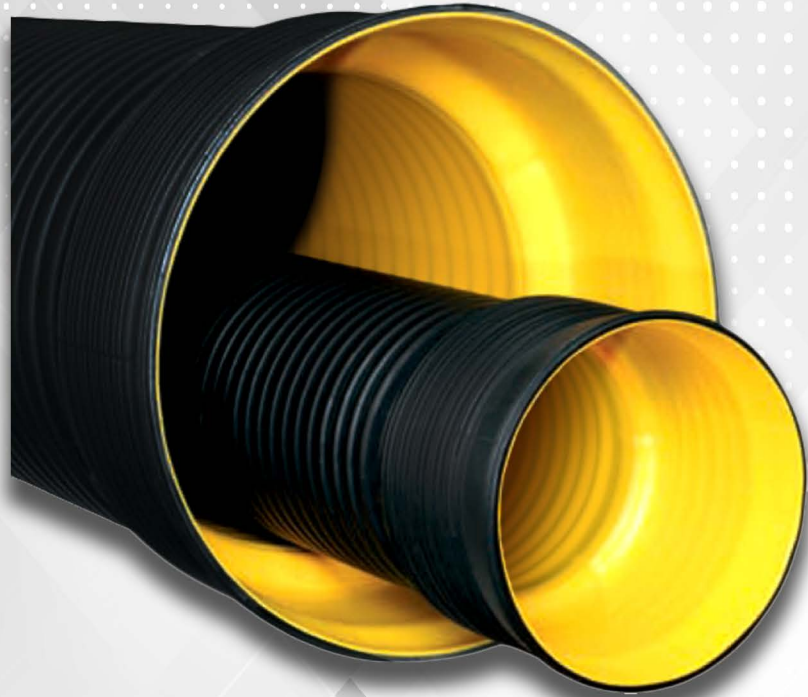
In this loading, loading is made by placing the ones with the smaller diameter, respectively, into the largest diameter pipe.

Since polyethylene pipes are lightweight, maximum number of pipes can be nested without exceeding the tonnage limits.

The telescopic loading enables PE delivery at maximum quantities per truck.

Because the pipes are light, even very close diameters can be nested.

Since the inner surfaces are smooth, they can easily be removed from each other.



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DRAINAGE PIPE

What is Drainage Pipe?

Drainage Pipe Advantages

Drainage Pipe Usage Areas

What is Perforated Drainage Pipes?

What is Drainage Pipe?

It is one of the pipe types which has the highest resistance to polyethylene chemicals (acids, bases, salts, etc.). In addition, it is the most preferred infrastructure pipe in special field applications due to its flexibility, high impact resistance, easy joining (welding) and sealing joint combination.



Increasing environmental awareness brought about significant changes in landfill areas in our country after developed countries such as Europe and America. Over the last 20 years, many municipalities have landfills. The leakage water of the garbage, which weighs tons on it, is removed from the sealed floors formed in these sites by means of HDPE (High Density Polyethylene) pipes. Particularly used are the HDPE type PE100 due to effective internal diameter presentations.

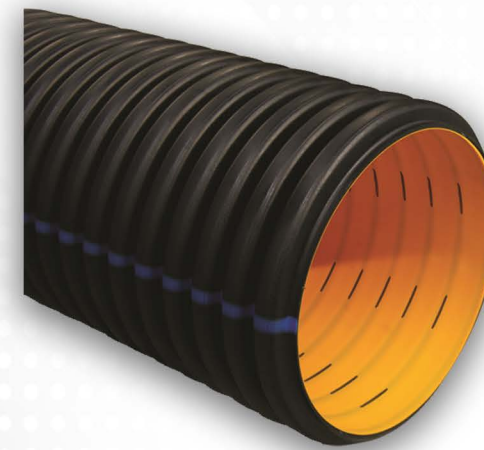
Drainage Pipe Advantages

Drainage pipes are circular pipes which are made of material which is used for removal of stagnant harmful water from under ground and above ground. It is used to transport the incoming water to the places such as drainage channel, stream or river with the help of collector pipes.



Advantages:

- + It's under ground life is 50 years and easy to transport and laying.
- + As the holes on the pipe are opened to the inner surface of the wall rings, they cannot clog.
- + There is no neglect of wastage.
- + It is used in sandy trays without the need of filter material.
- + It can also be produced without holes.

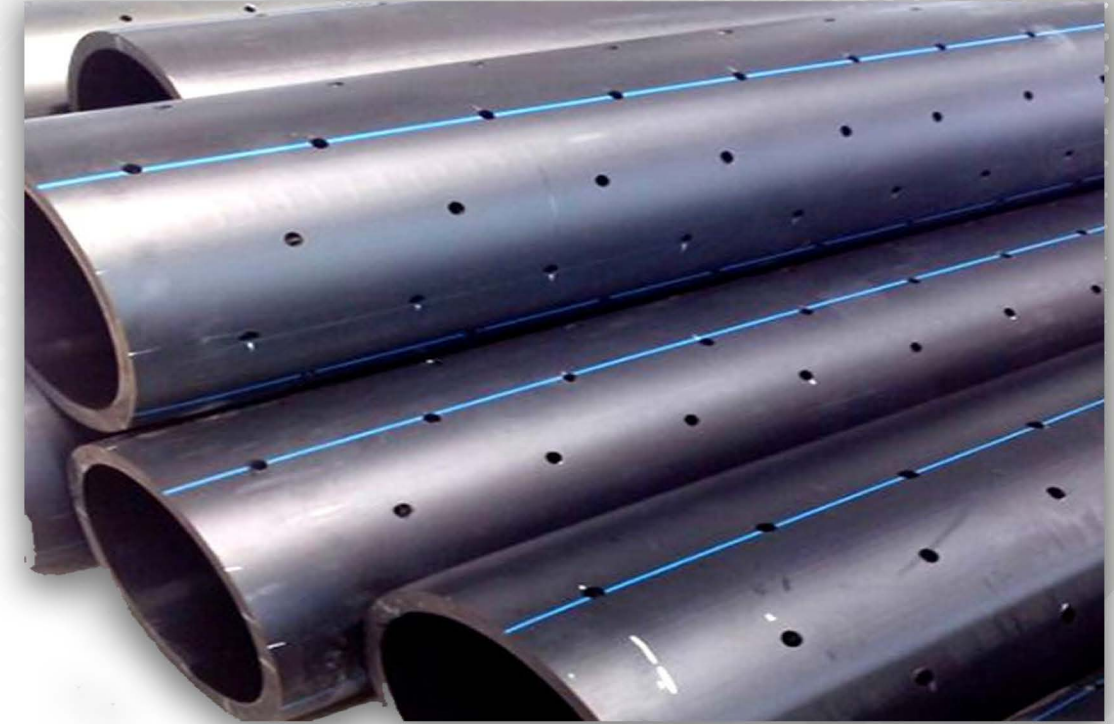


- + It is used to remove harmful water from agricultural lands.
- + Used for basic drainage of construction area.
- + It is used for breeding muddy and muddy lands.
- + Used in highways banquet breeding.
- + It is used to remove water in structures with water at the base



The wall of the pipe wall thickness is made by drilling perforations with frequent spacing in small diameters (10-20mm) depending on the project. PE100 pipes are intended to filter leachate. The circumferential perforation can be between 220-360 ° C. Selection criteria are leachate flow rate, carrier pipe diameter, laying slope, over-pipe storage height.

In addition to modern landfills, PE100 pipes for perforated drainage are also used in metal mining operations. It is used in special metal mine washing sites against the risk of chemicals used in gold mine operation to enter the soil. These chemicals are collected through drainage PE100 pipes (perforated) and removed for reuse.



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**SOME OF OUR
REFERENCES**

YIL	KURUM	BÖLGE	PROJE ADI	ÜRÜN YELPAZESİ	BASINÇ SINIFI ARALIĞI	MİKTARI
2013	Devlet Su İşleri Genel Müdürlüğü	Sivas	Hafik Su Şebekesi	110-400	PN5-PN12,5	90 km
2013	Devlet Su İşleri Genel Müdürlüğü	Sivas	Yıldızeli Halkaçağı Gölleti Sulaması	560-110	PN6-4	12 km
2013	Devlet Su İşleri Genel Müdürlüğü	Sivas	Merkez Tutamaç Gölleti Sulaması	630-110	PN4	8 km
2013	Devlet Su İşleri Genel Müdürlüğü	Sivas	Ulaş Kardeş Gölleti Sulaması	560-110	PN6-4	6 km
2013	Devlet Su İşleri Genel Müdürlüğü	Sivas	Yıldızeli Çağlayan Gölleti Sulaması	560-110	PN8-4	12 km
2013	Devlet Su İşleri Genel Müdürlüğü	Samsun	Amasya Taşova Destek Gölleti Sulaması	400-110	PN12,5-5	19 km
2014	Devlet Su İşleri Genel Müdürlüğü	Sivas	Kangal Mühürkulak Sulaması	560-110	PN6-5	19 km
2014	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Bayburt Merkez Sarayık Sulaması	560-110	PN10-4	16 km
2014	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Bayburt Merkez Sakızlı Sulaması	710-110	PN10-4	25 km
2014	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Bayburt Merkez Konursu Gölleti Sulaması	630-110	PN12,5-4	18 km
2014	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Bayburt Çayırıyolu Aydıntepe Projesi Demirözü Barajı Sulaması	630-110	PN10-5	103 km
2014	Devlet Su İşleri Genel Müdürlüğü	Samsun	Ladik Gölleti Sulaması	800-110	PN10-4	23 km
2014-15	Devlet Su İşleri Genel Müdürlüğü	K.Maraş	Afşin İçme Suyu Şebekesi	110-560	PN10-PN25	87 km
2014-15	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Demirözü Gölleti Sulama Şebekesi	110-630	PN5-PN10	120 km
2015	Devlet Su İşleri Genel Müdürlüğü	Sivas	Hafik Pusat Özen Sulama Şebekesi 3.Aşaması	110-630	PN5-PN10	65 km
2016	Devlet Su İşleri Genel Müdürlüğü	Ankara	Çankırı Kurşunlu İçme Suyu Hattı	400-710	PN8	50 km
2016	Devlet Su İşleri Genel Müdürlüğü	Aydın	Denizli Honaz Pınarbaşı Sulama Şebekesi	110-630	PN6-10	30 km
2016-17	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Sadak Barajı Sulama Şebekesi 1-2 Aşaması	110-560	PN6-PN12,5	214 km
2016-17	Devlet Su İşleri Genel Müdürlüğü	Sivas	Nevruz Gölleti Sulama Şebekesi 1-2 Aşaması	110-560	PN6-PN10	81 km
2016-17	Devlet Su İşleri Genel Müdürlüğü	Urfa	Viranşehir Pompa Sulama Şebekesi 2.Aşaması	110-560	PN6-PN10	180 km
2016-17	Devlet Su İşleri Genel Müdürlüğü	Sivas	Kocakurt Sulama Şebekesi	110-560	PN6-PN8	45,5 km
2016-17	Devlet Su İşleri Genel Müdürlüğü	Sivas	Güneykaya Gölleti Sulama Şebekesi	110-630	PN4-PN10	133 km
2017	Devlet Su İşleri Genel Müdürlüğü	Van	PAY Sulama Şebekesi	110-560	PN6-PN12,5	88,5 km
2017	Devlet Su İşleri Genel Müdürlüğü	Isparta	Afyon Çay Selevir Sulama Şebekesi	110-800	PN6-PN10	75,5 km
2017	Devlet Su İşleri Genel Müdürlüğü	Urfa	Viranşehir Pmp. Sulama Şebekesi 1-2 Aşaması	110-630	PN6-PN8	121,5 km
2017	Devlet Su İşleri Genel Müdürlüğü	Kayseri	Bünyan Karadayı Sulama Şebekesi	110-630	PN6-PN8	47 km
2017-18	Devlet Su İşleri Genel Müdürlüğü	Sivas	5 Baraj Sulama Şebekesi için Toplu Alım	110-560	PN6-PN8	84,5 km
2017-18	Devlet Su İşleri Genel Müdürlüğü	Kars	Arpaçay Koçköy Gölleti Sulama Şebekesi	110-630	PN6-PN16	53,5 km



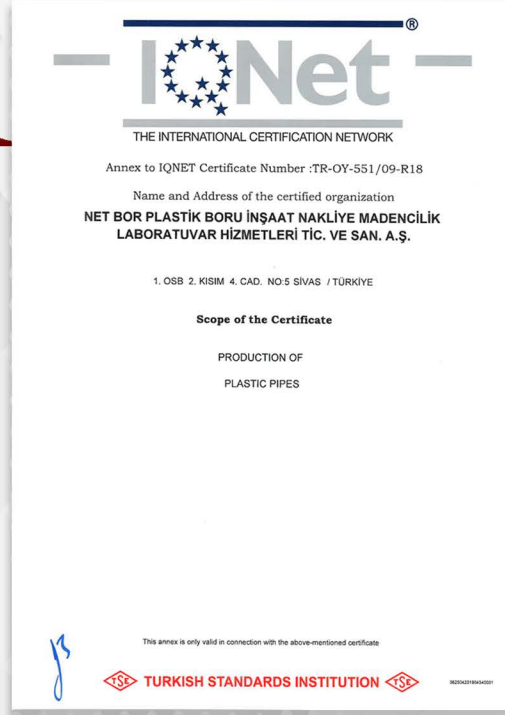
YIL	KURUM	BÖLGE	PROJE ADI	ÜRÜN YELPAZESİ	BASINÇ SINIFI ARALIĞI	MİKTARI
2017-18	Devlet Su İşleri Genel Müdürlüğü	Diyarbakır Batman Sağ Akım Sulama Şebekesi Bölüm 2		110-560	PN6-PN8	136 km
2017-18	Devlet Su İşleri Genel Müdürlüğü	Erzurum	6 Havuz Sulama Şebekesi için Toplu Alım	110-630	PN6-PN12,5	82,5 km
2017-18	Devlet Su İşleri Genel Müdürlüğü	Diyarbakır Dicle, Kralıkızı P-3 Pompalama Sulama Şebekesi		110-560	PN6-PN8	121 km
2017-18	Devlet Su İşleri Genel Müdürlüğü	Ankara	3 Havuzlu Toplu Alım Irr.Network Bala	110-710	PN6-PN12,5	99 km
2017-18	Devlet Su İşleri Genel Müdürlüğü	K.Maraş	Kılavuzlu Göllet Sulama Şebekesi 3.Aşama	110-560	PN6-PN8	47,5 km
2018	Devlet Su İşleri Genel Müdürlüğü	K.Maraş	Kılavuzlu Göllet Sulama Şebekesi 2.Aşama	110-710	PN6-PN8	92,5 km
2018	Devlet Su İşleri Genel Müdürlüğü	Elazığ	Bingöl Yedisu Deresi Düzenleyici Şebekesi	110-1000	PN6-PN8	30 km
2018	Devlet Su İşleri Genel Müdürlüğü	Trabzon	Giresun Alucra Gölleti Sulama Şebekesi	110-800	PN6-PN12,5	45 km
2018	Devlet Su İşleri Genel Müdürlüğü	Isparta	Afyon Asarcık Göllet Sulama Şebekesi	110-1000	PN6-PN8	44 km
2018	Devlet Su İşleri Genel Müdürlüğü	Balıkesir	Bigadiç İlyaslar Ovası Sulama Şebekesi	110-560	PN6-PN12,5	51,5 km
2018	Devlet Su İşleri Genel Müdürlüğü	Erzurum	Çoruh Havzası Sulama Şebekesi	110-500	PN6-PN12,5	125 km
2016-17	İller Bankası A.Ş.	Ankara	Kırıkkale Bahşili İlçesi İçme Suyu Şebekesi	90-280	PN10-20	89 km
2016-17	İller Bankası A.Ş.	Kayseri	Akkışla İlçesi İçme Suyu Şebekesi	90-280	PN10	20 km
2017	İller Bankası A.Ş.	Van	Hakkari Yüksekova İçme Suyu Şebekesi	110-400	PN10-PN16	122 km
2013	Sivas Belediyesi	Sivas	İçme Suyu Borusu Mal Alım İhalesi	63-20	PN10	25 km
2013	Ordu Belediyesi	Ordu	İçme Suyu Borusu Mal Alım İhalesi	355-75	PN10	4 km
2013	Amasya Belediyesi	Amasya	İçme Suyu Depoları Arası Bağlantı	355	PN20	1 km
2013	Gürün Belediyesi	Sivas	İçme Suyu Borusu Mal Alım İhalesi	200	PN10	1 km
2013	Sivas İl Özel İdaresi	Sivas	İçme Suyu Borusu Mal Alım İhalesi	63	PN10	80 km
2013	Giresun İl Özel İdaresi	Giresun	Hark ve Maksutlu Köyleri İçme Suyu	110-40	PN25-16	16 km
2014	Giresun İl Özel İdaresi	Giresun	Köylere İçme Suyu Götürme	75-40	PN20-10	19 km
2014	Bayburt İl Özel İdaresi	Bayburt	Köylere İçme Suyu Götürme	160-110	PN10	11 km
2016-17	Antalya Su ve Atıksu İdaresi (ASAT)	Antalya	Finike Bölgesi İçme Suyu Şebekesi	110-450	PN16	81 km
2013	Ankara Su ve Kanalizasyon İdaresi (ASKİ)	Ankara	Caddelere İçme Suyu Döşenmesi	315-90	PN10	18 km
2014	Ankara Su ve Kanalizasyon İdaresi (ASKİ)	Ankara	Kazan İlçesi Caddelere İçme Suyu Döşenmesi	160-110	PN10	23 km



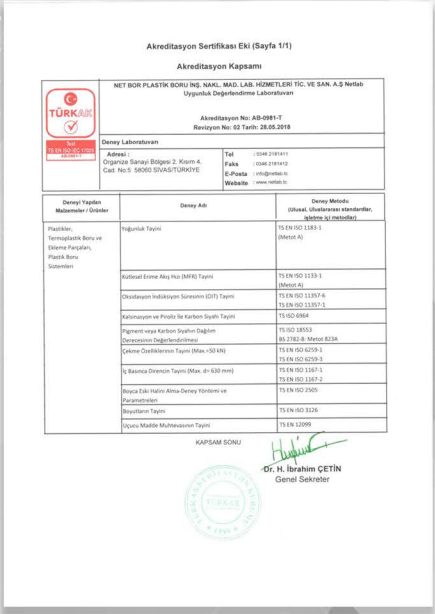
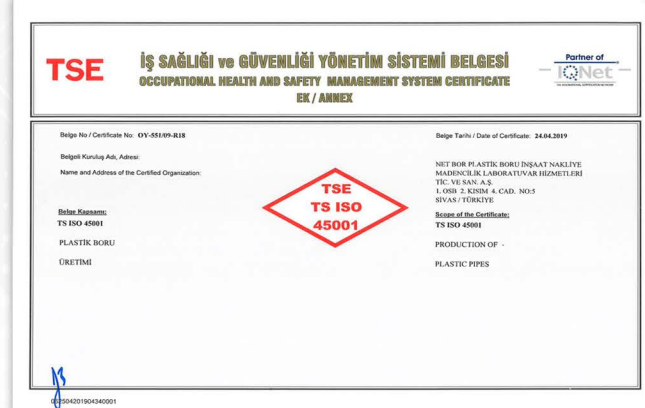
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