AB HAYAT IND. Group

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Preface:

1- Solid wall polyethylene pipes (water supply)
- History of the use of polyethylene in the pipe industry
- Compare the characteristics of polyethylene pipes with other types of pipes
- Types of polyethylene used in the pipe industry
- PE100 advantages to PE80
- Poly ethylene pipe manufacturing and production standards
- polyethylene pipes bending (elbow)
- Polyethylene pipe based on customers' needs
- A: productions with various temperature ranges
- B: pipes based on pressure demand
- C: pipe based on longering needed for PE pipe
- claculate the pipe diameter according to the desired pump and flow rate
- PE pipe and fittings installation

2- Gas supply pipes

- Gas pipe advantages

3- sewage pipes and products

A) Double wall PE pipes

-profile wall design

-sewage pipe advantages

Sewage products

B) Manhole

-comparison various Manholes

C) PE tanks

-tanks application

-tanks advantages

D) Septic

-comparison of septic type

-Advantages of double-wall prefabricated polyethylene septic

E) Drainpipe

- Polyethylene advantages as drainpipe

4- Polyethylene fittings

A) Mechanical joints (threaded joints)
- Connection method

B) Flanged fittings

- Connection method

C) Welded joints

C-1) Butt fusion
- Connection method
- Technical points
- C-2) Electrofusion
- Technical point
- 5-Irrigation
- Drip irrigation pipes
- Types of Drip irrigations
- Irrigation systems
- Pressurized irrigation goals
- Sprinkler irrigation equipments

6- Fiber glass pipe and fittings

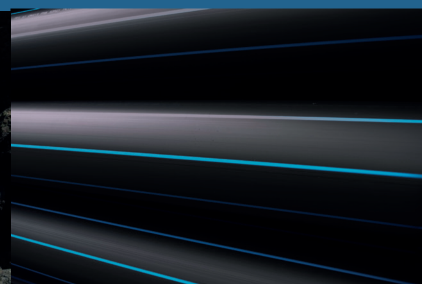
A)Fiber glass pipes
- History of Fiber glass pipes
- Features of Fiber glass pipes
- Applications of Fiber glass pipes
- Specifications
- B) Fiber glass Fittings

1-Solid wall polyethylene pipes (water supply)
History of polyethylene use in pipe industries

Pressurized plastic pipes have been used since about 1955 for applications such as water transfer, chemical fluids, refrigerants, and slurry heaters and gas. Ten years after the event, the first generation of single-wall polyethylene pipes with PE63 grade was exploited. The unique characteristics of polyethylene pipes, compared to other types of pipes, have led to a much higher rate of growth in the use of this product in global transmission and distribution networks of fluids than in other cases. This factor led to the production and delivery of two new generations of polyethylene materials by the name of PE80 and PE100 in the 1975 and 1990. Today, with the development of technical know-how, the production of this product allows the production of tubes with a tolerance of between 2 to 40 times with different diameters and a lifespan of 100 years.

POLY ETHYLENE PIPE






Compare the characteristics of polyethylene pipes with other types of pipes

Pipes used for transporting and distributing water, except polyethylene, are made of various materials, such as asbestos iron castings and reinforced plastics. Advantages of using polyethylene are summarized .as follows

1-Proper mechanical strength while low density
2-High chemical resistance and abrasion
3-longevity
4-Sanitary & health and non-toxicity
5-Easy transport and handling
6-Low cost after installation
7-Recycling ability
8-Low roughness coefficient
9-Low thermal conductivity coefficient
10-High abrasion resistance
11-Easy connection
12-Saving water due to less damage
13-Non-Corrosion and Rust
14-Low weight
15-Environmentally friendly

Types of polyethylene	MRS	Design tension	Application
PE 80	8 MPa	6.4 MPa	Water, sewage and gas supply
PE 100	10 MPa	8 MPa	Water, sewage and gas supply

Table 1: Comparison between PE100 and PE80

Types of polyethylene used in pipe industries

Generally PE80 and PE100, are used in polyethylene pipe production MRS is specific number for row material which shows product resistance after 50 years on 20 centigrade temperature that can be seen in table above and two materials have been compared in permissible tension in application (design tension) and application type According to this table, it can be understood with high MRS the quality will be better. based onthis case many countries have tried to substitute PE100 for PE80

Advantages of PE100 to PE80

1-Having higher resistance at high working pressures and similar external diameters(table 2)
2-Having higher resistance and lower thickness despite the same outer diameter in the same work presses (table 3)
3-Cost savings due to lower weight at similar work pressures (table 3)
4-The ability to transfer a higher volume of fluid due to the more cross-sectional flow area in the same outer diameter

On this basis, it can be said that although the price of the PE100 raw material is more than other two types, but with regard to the features and possibilities offered by the properties of this product, the desired output can be gained per pipe meter at the same price and with superior quality.
At the back cover of this catalog, standard table of the production of polyethylene pipes based on a temperature of 20 ° C for two types PE80 and PE100 tubes is presented.

Types of polyethylene / Pipe specification	PE 80	PE 100
Outer Diameter	500 mm	500 mm
Thickness	45.4mm, SDR 11	45.4mm, SDR 11
Nominal and work pressure	PN 12.5 bar	PN 16 bar

Table 2: Advantages of PE100 to PE80

Types of polyethylene / pipe specification	PE80	PE100
Nominal pressure	PN16	PN16
Outer diameter	500 mm	500 mm
Work pressure	16 bar	16 bar
Thickness	55.8 mm, SDR 9	45.4 mm, SDR 11
Unit weight of pipe length	95.38 kg/m	79.17 kg/m
Cross section flow	118,480 mm2	131,510 mm2

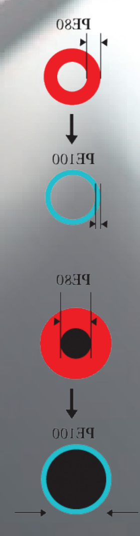


Table 3: Advantages of PE100 to PE80

Polyethylene pipe manufacturing and Production standards

All water pipes are in the AB-HAYAT industry group have been prepared according to the ISO 4427, Din 8074 and INSO14427 standards. AB-HAYAT industry group has laboratories equipped with polyethylene pipe testing equipments, all of their products are carefully examined and then, in order to ensure the quality of the products, that gain technical competence as a accredited laboratory makes us able to produce valid technical results and Calibration, the products will revised.

POLY ETHYLENE PIPE

Polyethylene Pipes Bending (elbow)

Cold bending: Due to the flexibility of low diameter polyethylene pipes, it is not possible to change the direction or angle of the pipeline without using the knee. The knee that comes from bending a piece of the tube should be without cracking or bulge. The bending location should be at least 10 times the diameter of the pipe, and same distance far from the adjacent valves and accessories. The journal 303 announced the minimum bending diameter of about 24 to 40 times the diameter of the pipe. (by the way base on standard, bending diameter shouldn't be less than 60 centimeter).

Polyethylene pipes based on customers' needs

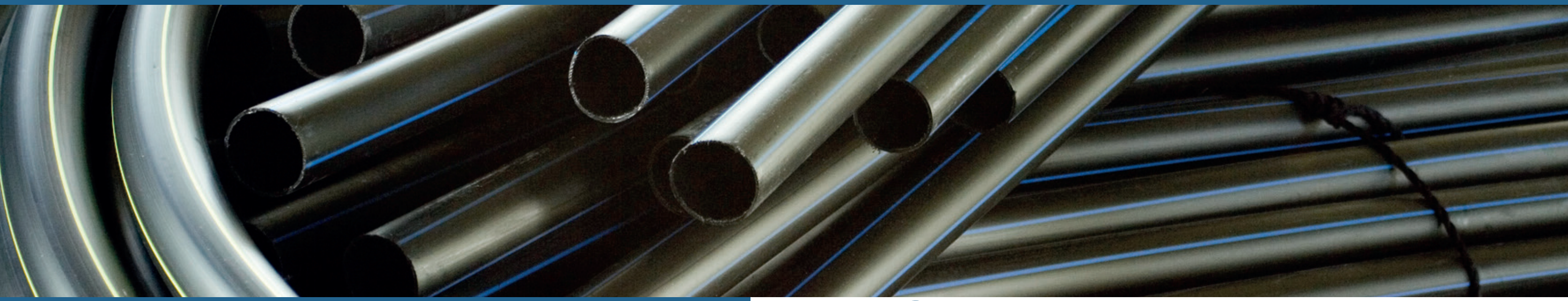
In the second decade of activities based on organizati based on organizational strategy, the AB-HAYAT industry group has tried to move toward delivering products which meet local and regional needs, and declares that it will meet all of its production constraints to deliver products tailored to customers' needs. It is prepared and ready for submission to its stakeholders. More information is given to familiarity with the activities in this series to achieve this strategy.

Celsius Temperature	Life expectancy	Pipe Series													
		25	20	16	12.5	10.5	10	8.3	8	6.3	5	4	3.2	2.5	2
		Standard Dimension Ratio(SDR)													
		51	41	33	26	22	21	17.6	17	13.6	11	9	7.4	6	5
		Allowable Working Pressure(bar)													
10	5	3.9	5.0	6.3	7.9	9.3	10.0	11.9	12.5	15.8	19.9	25.1	31.6	39.8	50.1
	10	3.9	4.9	6.1	7.7	9.1	9.8	11.7	12.3	15.5	19.5	24.6	30.9	39.0	49.1
	25	3.8	4.8	6.0	7.6	8.9	9.6	11.5	12.0	15.2	19.1	24.1	30.3	38.2	48.1
	50	3.7	4.7	5.9	7.5	8.9	9.5	11.3	11.9	15.0	18.9	23.8	30.0	37.6	47.6
	100	3.7	4.6	5.8	7.3	8.7	9.3	11.1	11.7	14.7	18.5	23.3	29.4	37.0	46.6
20	5	3.3	4.2	5.3	6.6	7.8	8.4	10.0	10.5	13.3	16.7	21.0	26.5	33.4	42.0
	10	3.3	4.1	5.2	6.5	7.7	8.3	9.9	10.4	13.1	16.5	20.8	26.2	33.0	41.5
	25	3.2	4.0	5.1	6.4	7.5	8.1	9.7	10.1	12.8	16.1	20.3	25.6	32.2	40.5
	50	3.2	4.0	5.0	6.3	7.4	8.0	9.6	10.0	12.5	16.0	20.0	25.0	32.0	40.0
	100	3.1	3.9	4.9	6.1	7.3	7.8	9.4	9.8	12.3	15.5	19.5	24.6	31.0	39.0
30	5	2.8	3.5	4.4	5.6	6.6	7.1	8.5	8.9	11.2	14.1	17.8	22.4	28.2	35.0
	10	2.7	3.5	4.4	5.5	6.5	7.0	8.3	8.8	11.0	13.9	17.5	22.1	27.8	35.0
	25	2.7	3.4	4.3	5.4	6.4	6.9	8.2	8.6	10.9	13.7	17.3	21.8	27.4	34.5
	50	2.7	3.4	4.2	5.4	6.3	6.8	8.1	8.5	10.7	13.5	17.0	21.5	27.0	34.0
40	5	2.4	3.0	3.8	4.8	5.7	6.1	7.3	7.6	9.6	12.1	15.3	19.2	24.2	30.5
	10	2.3	3.0	3.7	4.7	5.6	6.0	7.1	7.5	9.5	11.9	15.0	18.9	23.8	30.0
	25	2.3	2.9	3.7	4.6	5.5	5.9	7.0	7.4	9.3	11.7	14.8	18.6	23.4	29.5
	50	2.3	2.9	3.6	4.6	5.4	5.8	6.9	7.3	9.1	11.5	14.5	18.3	23.0	29.0

Table 4: relationship between temperature, length, life, pressure and SDR pipes PE100 With safety factor of 1.25

A: products in varios temperature renges

According to the statistics published by the Meteorological Organization, the temperature difference in temperature in the highest mountain in the country in contrast to the most desert area within a time reaches to 50 ° C.
it is clear the longevity of the pipe and specification varies in this areas. Since, the purchase of polyethylene pipe is based on standard table in which the fluid temperature is 20 centigrade and fixed. Customers in some areas, including desert areas, unintentionaly are buying tubes that do not fit into the environment, much lower life expectancy than expected.
To solve this problem, the quality and properties of manufactured products should be designed in accordance with the climate and ambient temperature. For all kinds of polyethylene products, tables and standards are tailored to this issue that can be made available to customers and consultants related to the AB-HAYAT. Table 4, is sample of this standards and show relation of temperature, longevity, pressure and SDR of PE100 pipes with safety factor of 1.25. For instance in 30 centigrade if longevity of pipe is 50 years and 6.3 pressures, it should be used SDR22. In market standard table, temperature is 20 centigrade so SDR 26 is used. This difference; decrease longevity of pipe in form 50 years to 5 years.



POLY ETHYLENE PIPE

B: pipe based on pressure demand

The presentation of the production order based on the work pressures presented in the standards table for polyethylene pipes is not only the actual need extracted by the consultant, but also one of the limitations that customers and contractors in the water supply affairs face to use for polyethylene pipes. Now in projects with which pipe with 7.1 bar of pressure is needed, pipe with 10 bar pressure is purchased. This cause more weight of pipe and more budged for pipe purchasing. AB-HAYAT industrial group concerning newest technologies in polyethylene pipe production and know how knowledge in this industry let all contractors and consultant to choose their own pipe based on their work pressure need and budget.

C: Pipe base on longevity needed for polyethylene pipes

Creating a good relationship between product quality, longevity and price is one of the problems that customers face with polyethylene products. Tubes are available on the market either from standard materials and with an undesirable process, or nonstandard raw materials and a desirable process is produced, which are both low in life and cost.
Based on the evaluation of many projects, customers are losing financially by choosing either of these options. Because, on the one hand, there are a number of projects lasting between 15 and 20 years old and, on the other hand, trust in non-quality pipes will lead to disastrous consequences. The technical and productive life of AB-HAYAT has now made it possible for its customers to come up with an ideal quality product and life span in the best condition. This while safeguarding the financial interests of the companies and brings them the credibility of a reputable corporate brand.

Calculate the pipe diameter according to the desired pump and flow rate

All pumps have a like the following diagram, in which dash line is used for calculation. • Calculations are divided into two categories.1- Pressure and size calculation of pipe inside the well 2- pressure and size calculation of pipe form wellhead. To do the calculations, first we find the numerical value of the output from the pump in the horizontal graph, and follow the arrow in the direction of the arrow based on the below table to read the numerical value in the left. (This number is known as head or pump highet and shown with "h") it is possible to be in the right hand of graph. Note: this quantity should be calculated by meter value; otherwise it should be change to meter value.

1-Pressure of pipe inside the well=number obtained from figure * 10

2-Pressure of pipe from well head=(number obtained from figure – well height) * 10

3-Inner diameter = 35.69*(ouyput(lit/s))$^{0.5}$

•Note: calculate the Square root output and put it in formula

4-Chose size from AB-HAYAT catalogue concerning diameter and pressure calculated as mentioned.

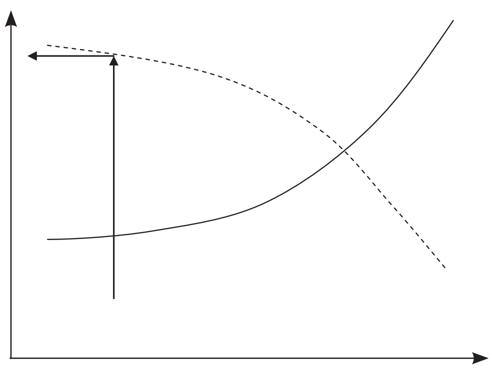


Figure 1

polyethylene pipe and fittings Installation

Preface

One of the most important issues discussed in the pipelines is how to install and operate them in the ground, or, in other words, buried them. The use of underground transmission lines can include the transfer of water, oil, gas, and the transfer and collection of sewage which, depending on the pipeline's use, can have a under pressure stream or gravity flow.

Method and Tips

On a buried pipeline, a various force acting, some of which, such as the force generated by the ground weight , the buoyancy force, by groundwater(if present), internal pressure (in stressed stream) and traffic forcesare specific and measurable; In general, there are two main instructions in the world that the other methods and instructions are derived from. ATV-A129 instruction and AASHTOM252, M294 instruction; the most important issue in the handling of buried pipes is the interconnection of pipe and soil in relation to each other. In fact, the soil pipe system acts like a composite structure in which the properties of the system are existed in addition to the average properties of the operation, and the following can be mentioned:

Trench

-The width of the trench is a function of the diameter of the pipe, the method of knocking the ease and the soil of the backing. The width of the trench is at least to the extent that it is enough to work and install and pour the soil under and around the pipe.

-The minimum width of the trench should be less than the largest of either of the following values according to the 303 jurnal by the Planning and Budget Organization:

1-uter diameter of pipe + 400 mm

2-1.25 times of outer diameter +300 mm

-Moistening the trench during the installation of the pipes should be severely prevented. As long as there is water inside the trench of pipelines, it is necessary to avoid doing the embankment work on the pipe. It should also prevent the entry of surface water into the trench.

-The backfill soil should be well tapped so that the hardness of the soil rises. The better the soil tapping the better behavior of pipe under the outside external load.

-In Figure 2, different parts of trench are shown.

Bedding

-The bed is keeping the transmission line in its place and it is sometimes smooth support for the pipe.
-Do not use any hard materials such as concrete and cement to make it.
-The grain diameter of the soil should not exceed than 32 mm.
-The height of the bed should be about 10 cm and the percentage of its knocking should be at least 90%.
-The pipe is partlybedded, which is determined by the angle of the alpha. The higher the angle, the greater the safety of the installation operation; But it should be noted that its increase due to practical conditions is limited. In general, in practical applications, this angle is selected between 30 to 90 degrees

Embankment

-The main task of the backside is withstanding the vertical forces caused by the soil and traffic load.
-The height of the backfill should be up to the middle of the pipe (50 to 70% of the diameter of the pipe). The soil used in the backfill is more granular than the substrate and should be tapped at least 90%.

Levee

The ditch protects the pipe from rocks and other destructive components.
The initial embankment height is at least 300 mm above the crown of the pipe and for pipes with a diameter of over 600 mm; it can be more than 300 mm in accordance with the design instructions. The rest of the trench space is known as the final levee, which continues to the surface of the natural land. It is suggested that the height of the total embankment (Total height of the primary and final embankment) is between 1 and 1.8 meters.
The soil of the embankment should preferably be coarse grains.
The height of the embankment must be large enough on one side to propagate forces such as traffic loads known as "live forces" and, on the other hand, they must be as low as possible, so that the forces caused by the weight of the soil to which they are "dead bodies" Are also said to be less than the resistance of the pipe.

It should be noted that the following two cases are necessary before the final final backfill is laid:
1- Hydrostatic test of installed lines
This test ensures required pressure is maintained by all sections of the pipeline against the design pressure and the non-leakage of water in excess of the permissible value is necessary.
2- Test and disinfect the pipeline
This operation ensures the passage of water without any contamination. This is done by adding a certain amount of chlorine to the water during a specific operation. If you need more information, see 303 journal.

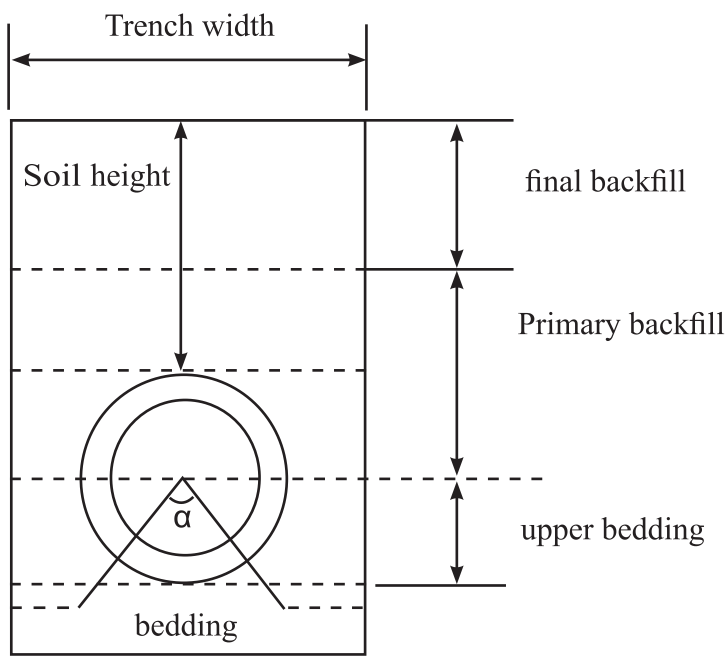
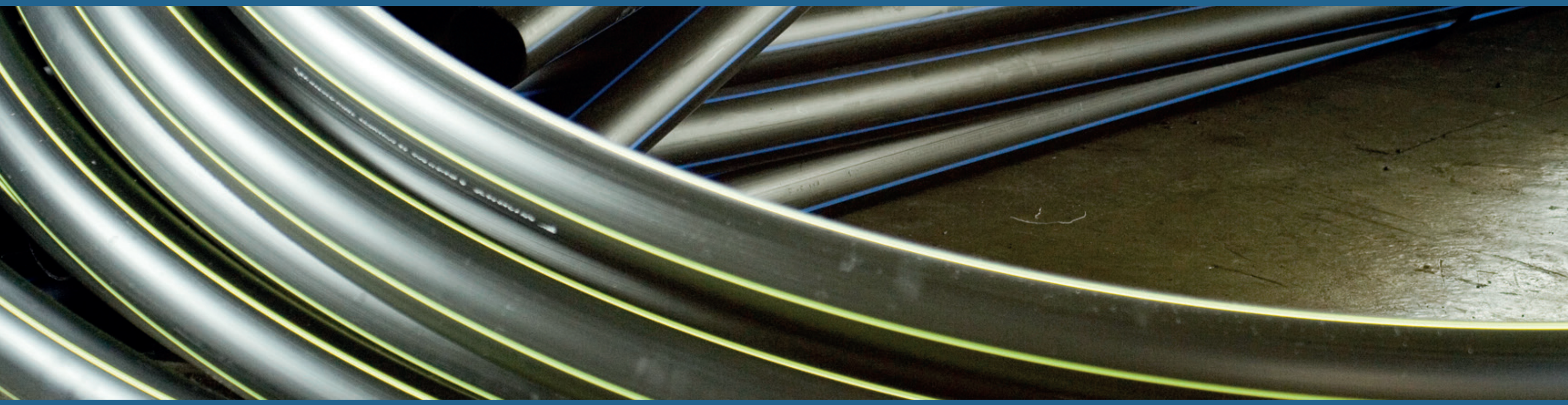


Figure 2: Different parts of the trench

Gas Supply pipes

One of the first applications of polyethylene (high density) was in the field of gas transmission, which has been used since 1960. Currently, more than 90 percent of the US and Canadian gas pipelines are made from plastics, 99 percent of which are made from polyethylene in gas transmission networks not only in North America, but also across the globe.



Advantages of using polyethylene pipes

1-Easy to connect: Polyethylene pipes are able to connect through welds, so that the connections are not only the size of the pipe itself, but also in some cases, more robust from the pipe itself. As the main disadvantage of lines under pressure is the location of joints, it can be concluded that polyethylene joints are more stable than other materials.
2-Flexibility: polyethylene pipes are flexible up to 25 times of outer diameter. This does not require the use of fittings in many cases to change the angle of the pipeline. Polyethylene flexibility, on the other hand, is justified in areas where there is no solid structure, such as earthquake areas.
3-Advantages of installation: Unique installation methods are available because of the flexibility and non-leakage connections of polyethylene pipes that justify the use of these pipes economically and technically compared to steel pipes and cause a lot of save money and time.
4-Resistance to corrosion and the effect of chemicals: Polyethylene pipes have excellent chemical resistance and are highly resistant to active compounds of gas and other chemical compounds.
5-Long service life, durability and cost reduction: life expectancy of polyethylene pipes is estimated to be between 50 and 100 years. And this means reducing the cost of commission, replacement and maintenance for a long time. On the other hand, the cost of installing and maintaining this product is highly justifiable and low in contrast with other products.

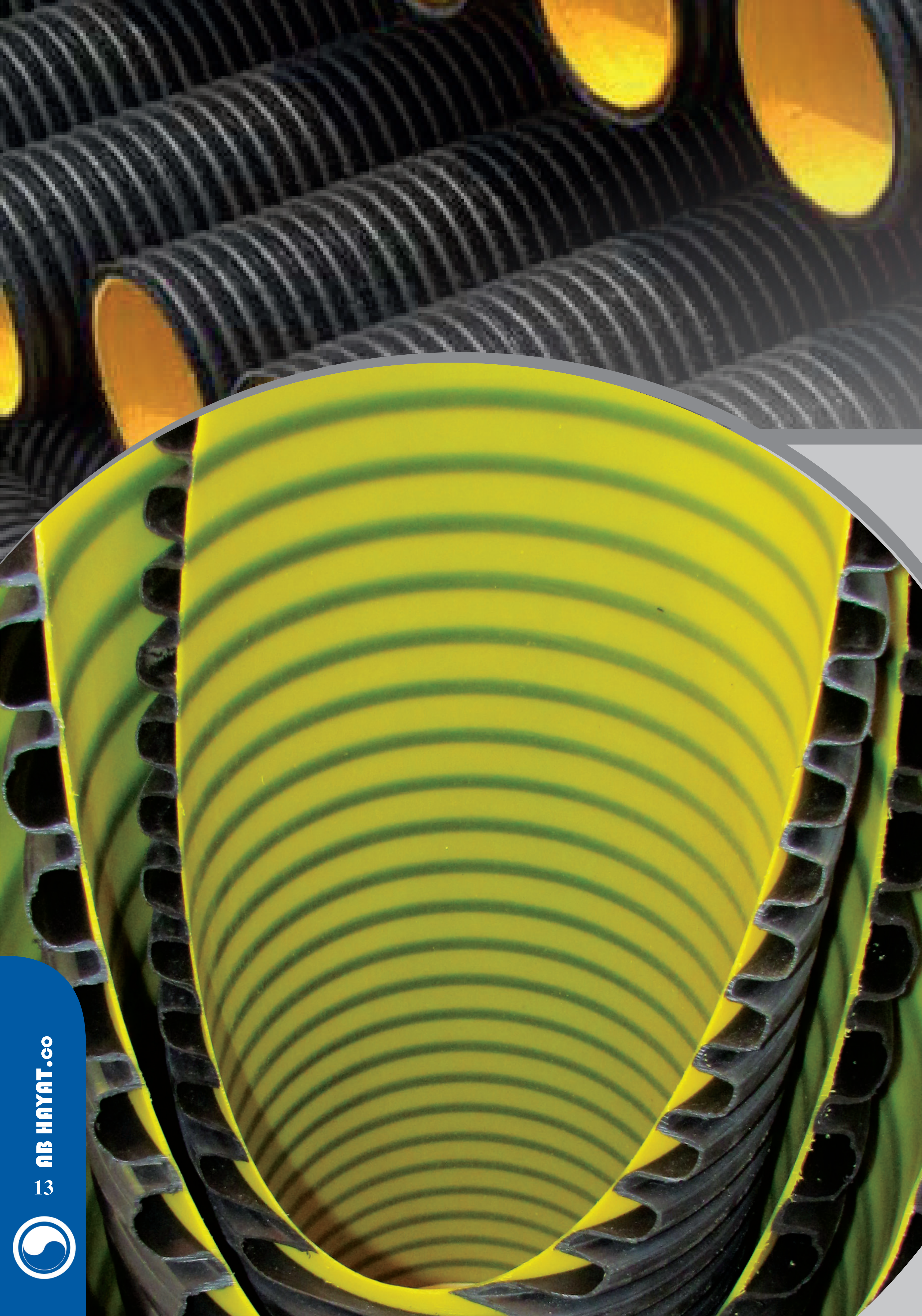
Gas supply pipelines are currently produced with PE80 and PE100 materials with a standard dimension ratio of 11 and 13.6. Producers of polyethylene pipes should be approved by the National Iranian Gas Company to produce gas products.

AB-HAYAT INDUSTRIAL GROUP IS HONOR WITH APPROVAL OF IRANIAN GAS COMPANY.

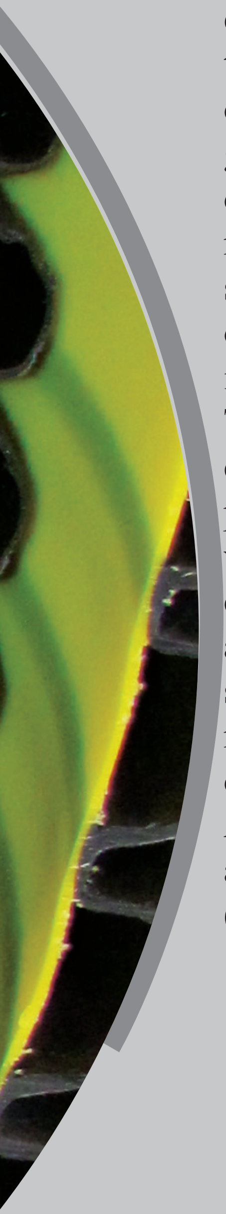
GAS DISTRIBUTION PIPE

Nominal size DN/OD (mm)	Maximum Mean Outside diameter (mm)	Maximum Mean Outside diameter (mm)	Maximum out-of-roundness (mm) (straight pipe)	Wall thickness tolerances				PIPE LENGTH (m)	Dimensions OF Strips for polyethylene	
				MIN.W.T (mm)		Tolerance on wall thicknesses				
				SDR 11	SDR 13.6	PLUS Tolerance SDR 11	PLUS Tolerance SDR 13.6	Coil STRAIGHT	WIDTH (mm)	DEPTH(mm)
25	25.0	25.3	1.2	3		0.4		100 (COIL)	3-5	
32	32.0	32.3	1.3	3		0.4		100 (COIL)	3-5	
63	63.0	63.4	1.5	5.8	4.7	0.7	0.6	100 (COIL)	3-5	
90	90.0	90.6	1.8	8.2	6.7	1.0	0.8	50 (COIL)	5-10	MAX 10% OF W.T
110	110.0	110.7	2.2	10	8.1	1.2	1.0	50 (COIL) or 12 (STRAIGHT)	5-10	
125	125.0	125.8	2.5	11.4	9.2	1.3	1.1	12 (STRAIGHT)	5-10	
160	160.0	161.0	3.2	14.6	11.8	1.6	1.3	12 (STRAIGHT)	5-10	
200	200.0	201.2	4.0	18.2	14.7	2.0	1.6	12 (STRAIGHT)	5-12	
225	225.0	226.4	4.5	20.5	16.6	2.2	1.8	12 (STRAIGHT)	5-12	

Table 5: Standard Dimensions of Gas Pipelines



sewage pipes and products



Sewage disposal from the human environment has always been one of the most important challenges facing different communities. Due to the great potential of these cases in the development of various diseases, it is necessary for human to transfer the sewage generated to an environment outside his area of life and to collect it to purify and repel it.

Today, sewage transfer systems consist of manhole pipelines, purification reactors, and etc. whose sewage and their activity is composed of corrosive and harmful and suffucating oddor compounds such as hydro sulfuric gas, which necessitates a precise engineering design for sewage transfer lines.

A: Double wall PE pipes (corrugated and spiral)

(gravity) and have a maximum design pressure of 1.5 bars. while these pipes have been created with loop resistance (one of the most important design parameters in buried and under load pipes) they have lower weight comparing solid wall pipes.

profile wall design:

Since the loop resistance is a function of the shape of the pipe wall, the design of the wall is done in two ways:

1-Double-walled corrugate pipe: A corrugated pipe is sorrounded by ridges and furrows om its surface; due to the in creased cross section ,nasistance increased . Due to the production process, now it is possible to produce up to 800 mm in size

2-Double spiral tube: The design of the wall is a rectangular intersection, which increases the loop resistance. Due to the special technology, these pipes can be produced up to 3000 mm in size.

Sewage pipes advantages:

1-Lightweight of Pipes
2-Flexibility
3-Resistance of the pipes to The loads
4-Easy implementation
5-Installation
6-Lower raugness coefficient
7-Chemicals Resistance
8-Life
9-A wide variety of
10-Non-toxic (Eco-friendly)

Concrete	Bribe	Poly ethylene	Types of attributes / Manhole
×	×	✓	No leakage from the walls
✓	×	✓	No leakage from pipe connection to manhole
×	×	✓	Low roughness at the bottom of the duct
×	×	✓	Resistant to corrosive materials
×	×	✓	Resistant to factors such as earthquakes
×	×	✓	The lack of construction constraints in various dimensions
×	✓	✓	Ease of implementation
×	×	✓	Low weight components
×	×	✓	Long expectancy
✓	×	✓	High strength
✓	×	✓	Availability in prefabricated

Table 6: comparison among 3 types of manhole, polyethylene, concrete and brick

Sewage products

B)Manhole

Manhole is a hole that connects underground facilities (such as sewage networks, telecommunication cables, etc.) to the ground. Allowing accessing the facility for any operation; this pit should be large enough to allow the movement of a human within it.

The most important use of manhole can be the establishment of access points to various points of the collection and transfer network of sewage, which allows for inspection of lines, provision of natural and also maintenance of sewage lines.

The most common types of manholes are polyethylene manholes that are used in applications such as:

-Sewage transfer

-Collection and transfer of surface water of contaminated areas

-Use in chemical units

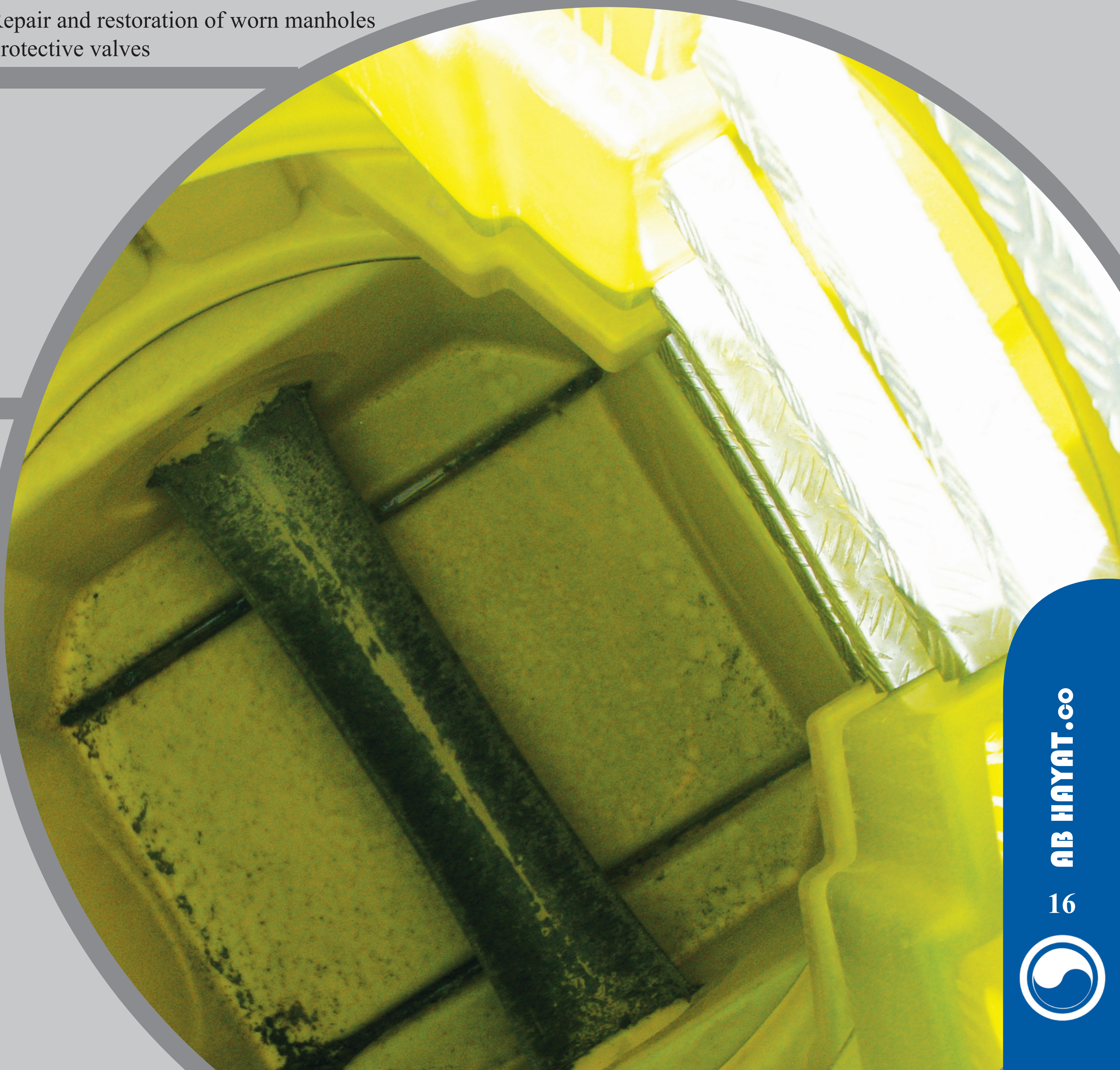
-Repair and restoration of worn manholes

-Protective valves

Comparison various manholes

Generally, there are three types of manholes based on material; Brick, concrete and polyethylene. Today, due to its unique properties, of polyethylene manholes are used in most cases. Table 6 shows comparisons between these three types of manholes.

This group, having the largest manhole manufacturing plant in the country, and capable of manufacturing all kinds of single-wall manholes and double wall polyethylene manholes; (special, non special, ordinary, premade and etc).



C)Polyethylene storage Tanks

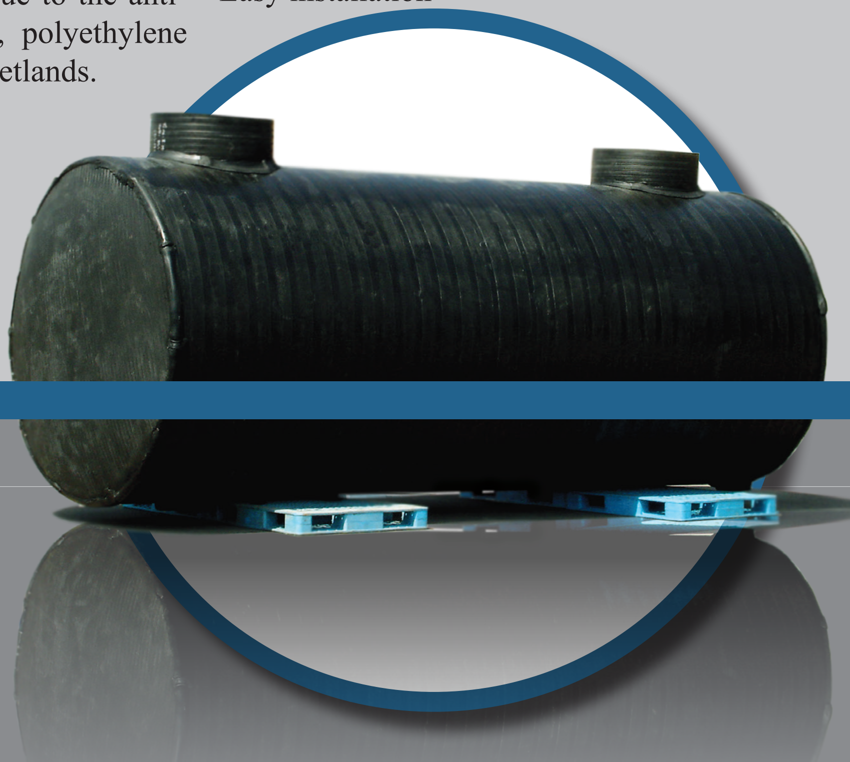
Polyethylene is a chemical that is inactive and does not react with other materials. This feature will be the best option for keeping materials such as drinking water, where health and environmental issues such as taste, smell and properties (over time) are important for them to keep unchanged, polyethylene tanks are the best option. Polyethylene tanks are highly durable due to their excellent resistance to weathering and flexibility and have a relatively long useful life. Especially when there is a need to bury the tanks, (such as septic tanks), the flexibility of the polyethylene increases its resistance to stresses and applied forces. In addition, due to the anti-corrosion effect of polyethylene, polyethylene septic tanks are very durable in wetlands.

:Tanks Application

Drinking Water storage Tanks-
Petroleum storage tanks-
Chemical storage tanks-
(Household sewage tanks (septic tanks-

Advantages of polyethylene tanks

The suitable price
High corrosion resistance
Sanitarian
Productivity with different transparency
Durability and long life
No leakage
Various production capabilities
Easy installation



POLY ETHYLENE SEPTIC TANK

D) SEPTIC

Septic is the simplest type of single-unit refinery that is used for mechanical and biological treatment with the help of an aerobic bacterium. After entering the tank, the sewage loses its flow vebaty part of the suspended material as a result of flow rate, leaving the storage on the other side.

Comparison of Septic Types:

Septic tanks are made of various materials such as brick, block, concrete, prefabricated materials, fiberglass and polyethylene. The following table summarizes the advantages and disadvantages of each method:
According to table 7, polyethylen septics provied the lowest purchase price, installation and mantenance cost; and do not require any kind of sealing or insulating.

total cost	Installation costs	Need to insulate	Possible corrosion from inside to outside	Need sealing	Installation time	Execution time	Septic Type
Low	....	√	√	√	....	Too much	Brick or cement block
Medium	....	√	√	√	....	Too much	Concrete in place
Much	Too much	√	√	√	Medium	....	Prefabricated concrete
Much	Low	....	√	....	Low	....	Fiberglass
Medium	Low	....	....	....	Low	....	Poly ethylene

Table 7: The advantages the disadvantages of septic type

Advantages of Permanent Polyethylene Septic:
1. prepared system
2. Simple installation
3. Permanent refine
4. Complete sealing
5. Have a healthy and hygienic environment
6. No damage in events such as earthquakes

E) Drain

The drain is a tunnel under the roads, bridges, railways, etc., so that the flow of water can pass from one side to the other. in many cases, the drainage itself is a bridge, which its use is vital in the deep and Flood region. For over forty years, the use of double-wall polyethylene pipes has grown as a drain and bridge across the globe, and only in special cases he other types such as steel, and concrete. are used The use of these polyethylene drains and bridges can be mentioned:

- Temporary drain to dewatering and dispose of water collected in an area temporarily and quickly
- Repair and restoration of old drains that have been warn out
- Use in areas that are hard and hard to access.
- Use in sloping areas

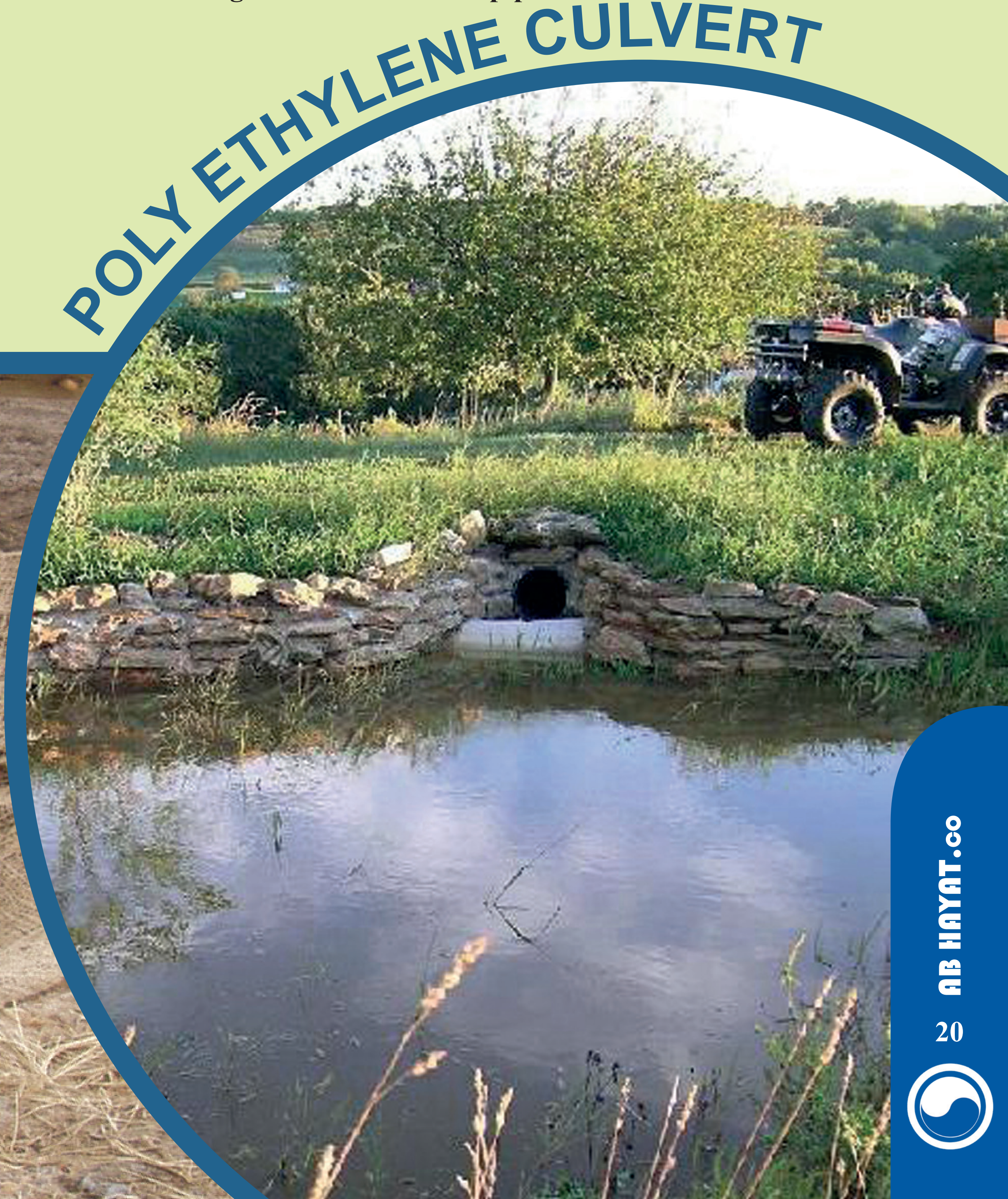
Advantages of polyethylene as a drain:

- Increase the speed of drain installation significantly
- Reduced installation and maintenance costs
- No need for additional materials
- Ability to produce in proportion to the width of the road
- The suitable price
- Ability to install in hard conditions
-flexibility
- Durability and long life
- Variety of production
- Easy transfer of fluid
- High corrosion resistance
- Low weight production in various diameters

Specifications of bridges with double-wall pipes

Description	Quantity	The unit
Manning Roughness coeffcient	N=0/012	----
Maximum water	6	m/s
Minimum slope of bridges	Fits the diameter of the bridges from 0.05 to 0/37	Percent
Short term polyethylene elasticity	110.000	PSI
Long elasticity of polyethylene (50 years)	22.000	PSI
Short term tensile strength	3.000	
Long term tensile strength (50 years)	900	PSI
Maximum Tolerant Temperature (Short Term)	80	°c
Maximum Tolerant Temperature (Long Term)	45	°c
Coeffcient of expansion and contraction	0/2	mm/m°c
Chemical resistance	1/5-14	PH
Lifespan with raw materials PE80 at 20 ° C	50	Year
Flexibility	with Radius 30 Equals bridge Diameter Ability to bend has it	
Heat transfer coeffcient	0/4	λ[w/m.k]
Fire function	Heat is more than 340°c	Centigrade

Table 8: Specifications of bridges with double-wall pipes

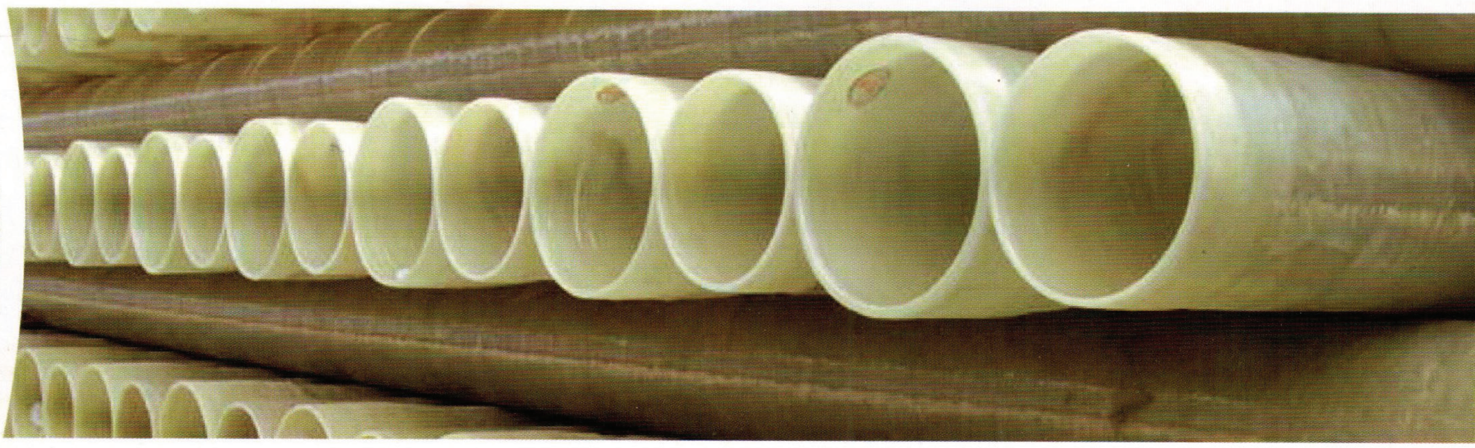


6- Fiber Glass Pipes and Fitting

Fiber Glass pipes

History of Fiber Glass Pipes

Fiberglass pipes were in troduced since 1948. The first application of the fiberglass plumbing system, which is still one of the broadest applications of this type of pipe, is the oil industry. The choice of fiberglass pipe as a cost-effective, corrosion-resistant material is a better option than steel-coated pipes, stainless steel or other types of metals. Production lines quickly developed for high pressure applications, thinner walls, and increased fitting connectivity. In the late 1950s, pipes with larger diameters entered the market, and the fiberglass pipe was used in the chemical industry because of its high resistance to corrosion in the chemical industry. From 1960 to 1990, fiberglass pipes were used for municipal water and sewage. Due to its useful life, strength and corrosion resistance, fiberglass pipes eliminated internal and external coatings or cathodic protection. Fiberglass pipes are flexible in design and are used in a wide range of standard diameters.



FIBERGLASS PIPE (GPR)

Features of Fiberglass pipes

1. Corrosion resistance
2- Strength to Weight ratio
3. Low weight
4. Electrical properties
5. Dimensional stability
6. Low maintenance cost
7. Smooth internal surface
8- Pressure bearing
9. Flexible production process
10. Special application
11. Variety in installation

Applications of fiberglass pipes

Due to the characteristics of fiberglass pipes, there are various applications for them, some of which are:

-Transmission lines and distribution networks for raw and drinking water
-Transmission lines and sewage collection networks
-Irrigation networks and drainage plans in closed (pipe) and open (half pipe)
-Open and closed surface water collection networks
-Water and wastewater treatment plants (reservoirs)
-Sea water transfer
-Desalting systems
-Chemical, oil, gas and petrochemical industries
-Urban installation tunnel
-Cooling, heating and fire fighting systems
-Use in piping designs (pipe jacking)
-Repair and replace old pipelines

Specification

Nominal diameter (DN): The nominal diameter of the manufactured pipes is as shown in the table below

Nominal diameter mm	Internal diameter range		Tolerance declared from diameter mm
	The least	the most	
200	196	204	±1.5
250	245	255	±1.5
300	296	306	±1.5
400	396	408	±1.8
500	496	510	±2.4
600	595	612	±3
700	695	714	±3.6
800	795	816	±4.2
900	895	918	±4.2
1000	995	1020	±4.2
1200	1195	1220	±4.2
1400	1395	1420	±4.2
1600	1595	1620	±5
1800	1795	1820	±5
2000	1995	2020	±5
2200	2195	2220	±6
2400	2395	2420	±6
2600	2595	2620	±6
3000	2995	3020	±6

Table 9: The nominal diameter of the manufactured pipes

•**Nominal length**: Pipes are produced in twelve-meter length, and can be produced in the shorter length, but within a standard range.

Nominal Pressure (PN) Based on load	(2.5)	(4)	6	(9)	10	(12)	(15)	16	(18)	(20)	25	32

Table 10: Nominal length

•**Nominal Pressure: The pressure classes of this unit are according to the following table. The values in brackets are non-preferential values, and other variables are common values in the consumer market.**

•**Nominal stiffness:** The nominal stiffness of the pipe produced by this unit is shown in the following table.

The values in brackets are non-preferential and other variables are common values in the consumer **market.**

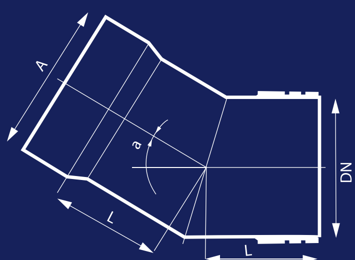
Nominal Pressure (PN) according Pascal load	(500)	600	(1000)	(1250)	(2000)	2500	(4000)	5000	(8000)	10000

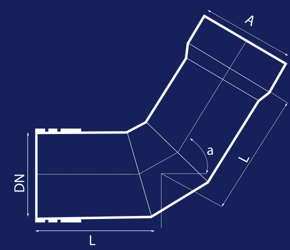
Table 11: Nominal Pressure

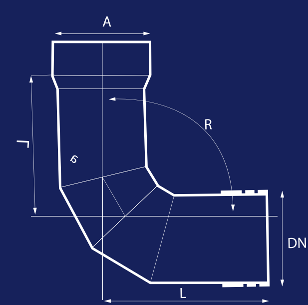
B) Fiber glass fittings:

This unit produces any type of fiberglass connection that can be manufactured according to customer's order. The connection of pipes produced by this unit is Bell and Spigot. Also, special connections for the connection of fiberglass pipe can be provided with different types of pipe, where the joint is bounded by two O-ring of EPDM materials and is sealed.

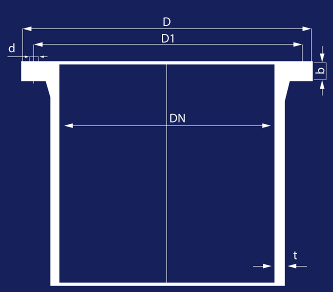
- **Elbow :**



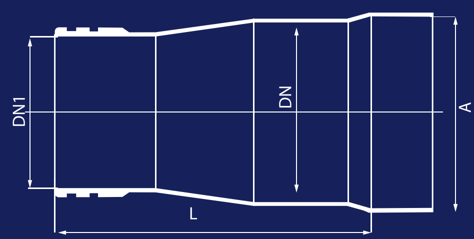


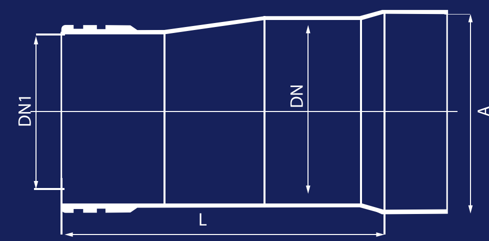


- **Flange :**

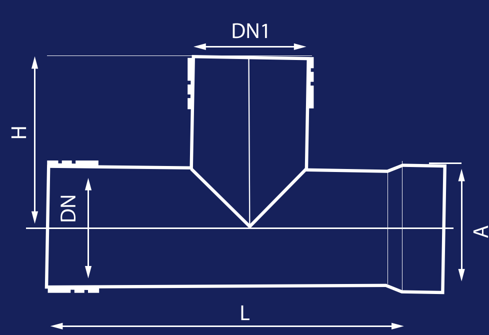


- **Reducer :**





- (Tee) :



POLY ETHYLENE FITING

4-POLY ETHYLENE FITTING

One of the most important advantages of producing polyethylene pipes is its easy connection . Fittings in cases such as changing the angle of the pipeline, changing diameter, Connecting pipe pieces and etc. are applicable. water suply polyethylene fittings, fall into two catgories, mechanical and welded joints. Here's a look at each of these.

A)Mechanical joints (threads fitting)

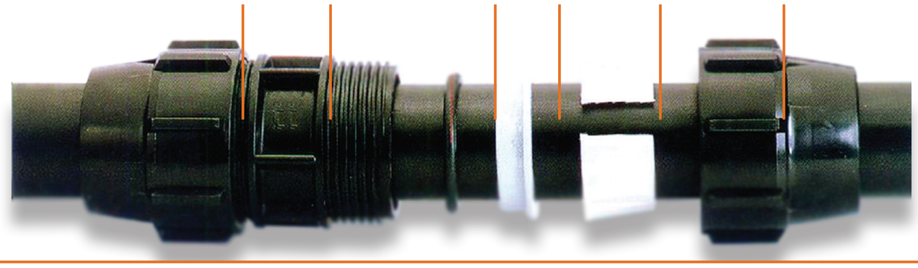
One of the most important advantages of polyethylene pipes is its easy connection in contrast with other types of pipes. Connections are applicable in some cases, such as changing the angle of the pipeline route, changing the diameter, connecting the pipe parts, and so on. In various applications, polyethylene pipes include screw connections, saddles, gear connections, high pressure polyethylene joints, butt welds, welded polyethylene sewage joints, fusion joints and mitering.

Connections method:

The threaded joints which are special for polyethylene pipes are usually composed of three pieces. A middle piece threaded on both sides, and two pieces on the sides, which are in the form of a nut; and the heads that are supposed to be connected; they are placed inside the beads. By closing the nuts to the middle piece and twisting it, the connection is established. Because the pipe head is soft, it can be drawn to the end of the middle piece and by twisting, the connection is made.

Because the pipe head is soft, it can be drawn to the end of the middle piece and, by twisting the nut, the smooth head of the tube can be fused to the end of the mid-section, and by tighten the nut, the head of the tube and the middle piece tighten and sealed. To make this kind of fitting suitable for polyethylene pipes, in addition to the three above-mentioned parts, it is necessary to use a special conical gaskets. It is located between the body of the vertebrae and the head of the pipe and the fastening of the vertebrae are compressed and sealed.

Due to the fact that the outer diameter of the polyethylene pipes with a certain tolerance should be appropriate to the thread diameter of the inner thread, and because in the hard polyethylene pipes the thickness of the wall of the pipes of the various factories is not necessarily the same, so if it is intended to connect pipes with Screw connection. This type of connection should be made by the manufacturer of the pipe, so that the connection can be made.



POLY ETHYLENE FITTING






90° Tee | 90° Reduced Tee | 90° Tee | End Plug | Comprission Flange | Saddle Single






Saddle Single | Comprission Flange | Male Adaptor | Female Adaptor | Reducing Coupling | 90° Elbow




90° Elbow | Saddle Single out let | 90° Tee Male | 90° Elbow male

B)Flanged fittings

This kind of connection is used to connect the polyethylene to galvanized steel pipes or cast iron or to the connection to the pipes and joints of which the flange connection is used. This connection is made of a polyethylene adapter, one of which is simple in the form of a flange, and the other is a perforated metal ring. The diameter and hole of this ring must be in accordance with the standard flanges of pipes or valves.

Connection method:

To create flange connection, you should place a perforated metal ring on the ends of the pipes that are supposed to be flanged, and then weld it to the head of polyethylene pipe,The turning axis and the pipe must be drawn along the same direction. After the completion of the drill, the perforated metal ring should be turned to the flange so that it is placed in front of the flanges of the valves or flanges, with the flange holes opposite each other. The two flanges can be connected to several bolts and nuts. By threading the nuts, the flange can be transformed into polyethylene flanges for valves or components and fully compressed fittings to provide sealing.

POLY ETHYLENE FLANGE

C)welded joints

C-1) Butt fusion

Butt weld is one of the most important types of plastic pipe welding that is high strength and up to a diameter of 1600 mm can be done. This method of connecting steel pipes is also of high relevance. The limitation of this method is that only the completely similar pipes in terms of type, diameter, and thickness can be welded. of this kind This connection method is done according to DVS2212-1 Standard.

Connection method

In the butt welding, the two pipes we want to connect together are placed on a hot plate with a specified temperature under a specific pressure and after a certain period of time the hot plate is separated and the two pipes, while fully adjacent, are connected to each other. And they are under pressure at this stage. When the fusion point is cooled, the pressure is removed from the pipes and the two pipes are fully connected. At the welding site, there are bumps at the place where the pipes connect.

Technical points:

In the buttwelding operation, the following points are required.

1-Specifications for welding such as temperature, pressure and time of each operation are related to dimensions and specifications of the pipe. Therefore, before any welding operation or with changing conditions, the above parameters must be specified.

2-Welding machines, tightening clamps of pipe head, cutting machines and other devices should be of good quality and kept in good condition.

3- Before the start of operation, atmospheric conditions must be checked. Welding operations are not allowed at ambient temperatures of less than 3 ° C and in snow, and rain without umbrellas and shields.

4-At the time of welding, until welding is complete, the fusion pipes shall not be subjected to any force (except for pressure force).

5-Welding at bending place is not allowed.

6- Do not weld the tubes of different thicknesses into the weld.

7- The tube head should not be wet or dirty

90° Elbow

90° Elbow

Cap

Reducer

Reducer

45° Elbow

Flange

Long expansion

Syphon

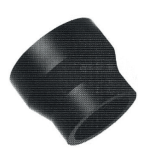
Clean out

Syphon

90° Elbow

90° Elbow

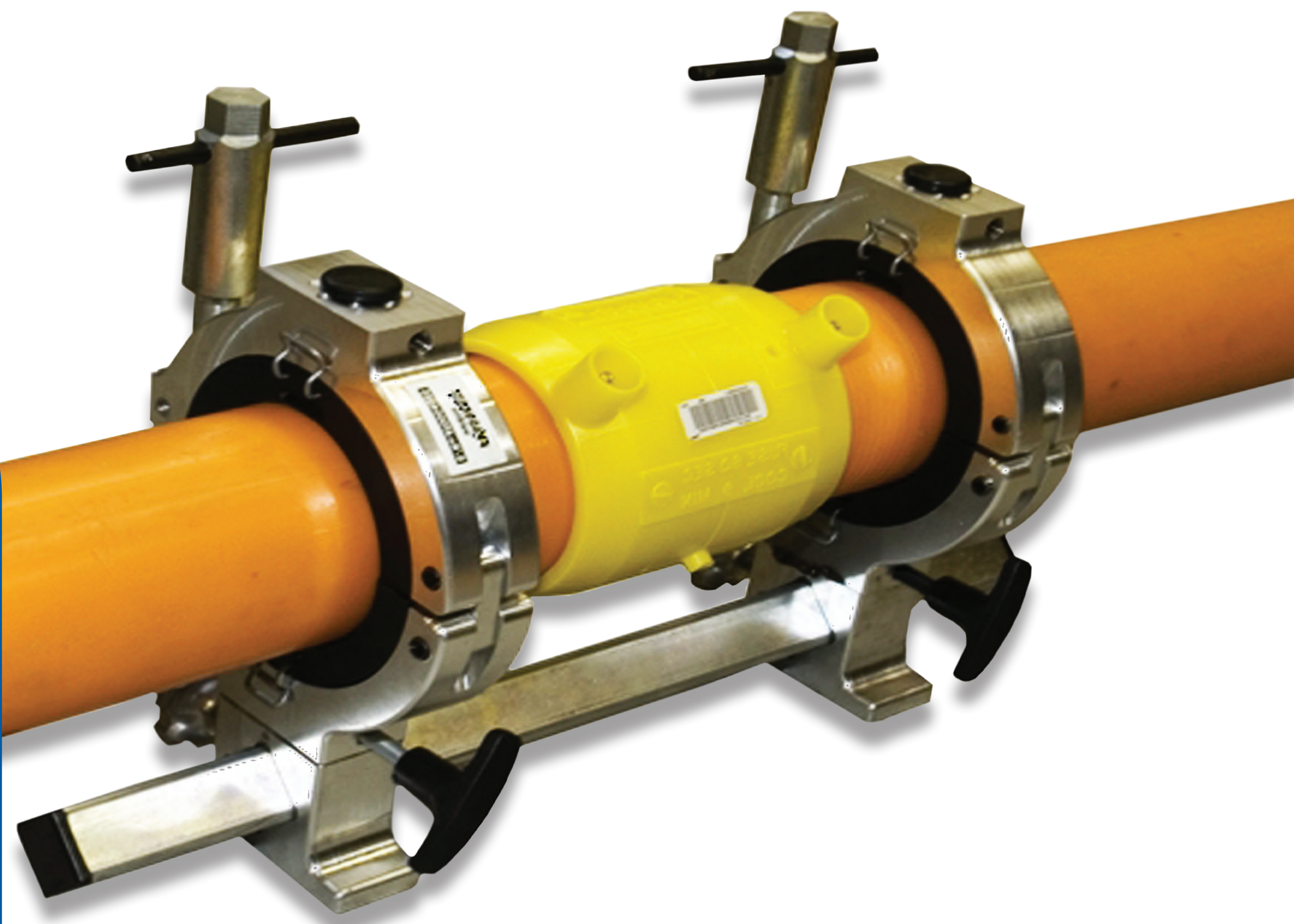
45° Tee



Reducer

C-2) electrofusion

Electricfusion is a type of fitting that can be used in gas and water pipelines. In this connection, the heating method is different from the relatively old welding methods and the electricity is used to generate heat. Due to its high safety, this method is the only standard connection type for IGS for gas transmission lines. Using this method, various connections such as pipe-pipe, pipe-elbow, pipe -coupling (for example, in changing the diameter of the pipeline), etc. can be created. Therefore, the limitation of the butt welding method different to the connection of pipes of the same size does not apply. Also, the experience has shown that connecting pipes of different polyethylene types is also possible in this way. In addition to its safety, the other advantages of this method are con-,nection speed and cleanliness and on the other hand, the limitation of this method at high cost and maximum diameter of the pipe can be connected with this method. In this type of connection, a variety of connectors (couplers) are used. The couplers are, in fact, polyethylene pieces in the form of pipes or connectors, in which the thermal element (conductive material) is located and the head of the element is specified for power connection. The couplers, like a double-head coupler, connect to the electricity stream and melt the rubber. The created heat melts the both side connection; eventually the couplers form a double-headed casing. After the connection is cooled, the coupler metal clips are removed from the pieces.



Technical points

In the electrical welding operation, the following points are required.

1- Spread the heat uniformly during welding.

2. The temperature and pressure of the melted part must be carefully controlled.

3- Damage to coil couplers should be prevented.

4. Protection before, during and after the interconnection is necessary.

5. Consider the time to electro fusion.

6. The pipe is cut vertically to its axis and the roughness is smooth and dusted

7. Clean any dirt from the pipe.

8. Make a connection piece in place and inspected for cleanliness.

9 - The shaved part of the pipe should be cleaned with suitable materials (such as isopropanol)

10. For each connection of this type, the use of the clamp is essential for maintaining the connection layer.

11- Due to the characteristics required of welding time and voltage, the necessary control should be done.

12 - The connection system will remain in the clamp until it remains fully seamless.

POLY ETHYLENE ELECTROFUSION FITTING


Coupling


90° Tee


Reducer


45° Elbow


Saddle Single out let


Reducer


90° Tee


90° Tee


Coupling


Saddle Single out let


Saddle Single out let


Saddle Single out let


Tee


Saddle Single out let


Coupling


90° Reduced Tee


45° Elbow


90° Reduced Tee

IRRIGATION SYSTEM

5-Irrigation system



Drip Irrigation pipes

Drip irrigation is a very general term, any system that can at certain times produce water for a plant or distribute it at a specific location, is called Drip irrigation.

Types of Irrigation:

Drip irrigation systems can be divided into four groups according to the method of water output:

Dripper

-Sub-surface irrigation

-Bubble Irrigation

-Watering irrigation

Irrigation systems:

After water reaches the beginning of the farm, various water distribution systems are used to provide water to the plant more efficiently. In other words, the irrigation systems are referred to the set of methods and facilities that water is provided to the plant.

Pressurized irrigation goals

Irrigation is to bring enough water to the soil to provide the necessary moisture for plant growth, or in a more comprehensive definition for irrigation, in addition to supplying sufficient water to the soil, the following targets are also considered: management and increase the productivity, increase in yield Improvement of land and plant growth environment, reducing the impact of droughts, self-sufficiency and national security

Sprinkler irrigation equipments

-Water supply sources

-Central control system

-Water pumping system

-Valves (flange, pressure drop, one way and air discharge)

-Main and secondary pipes

-Polyethylene fittings

-Auto Valve and Riser

-Sprinkler

B)Irrigation Fittings

Tape valve | Tape valve | Tape valve | Tape valve | Tape valve | Tape valve

Tape to 1/2 coupling | Tape valve | Tape valve | Tape valve | Tape valve | Tape valve

coupling | Elbow | Tee | Tape valve | Tape valve | Tape to Threaded coupling

Male adaptor | Start connector | Tape to 5/8 coupling | plug for layflat offtake | plug | Tape coupling

IRRIGATION SYSTEM

Babler | End Pluge | Pluge | Tape Coupling | Redusing Coupling | Nipple

Tape valve | Tape valve | Tape valve | Tape valve | Butterfly punch

Driling tool offtake | Tape valve | Tape valve | Tape valve | Tape valve

Drippor | Line dripper | Redusing Coupling

AB HAYAT IND. Group

PIPE SERIES	20		16		12.5		10		8		6.3		5		4		3.2		2.5	
SDR	41		33		26		21		17		13.6		11		9		7.4		6	
PE80	PN 3.2		PN 4		PN 5		PN 6		PN 8		PN 10		PN 12.5		PN 16		PN 20		PN 25	
PE100	PN 4		PN 5		PN 6		PN 8		PN 10		PN 12.5		PN 16		PN 20		PN 25		---	
d mm	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}	e_{min}	e_{max}
16	---	---	---	---	---	---	---	---	---	---	---	---	---	---	2.0(1)	2.3	2.3(1)	2.7	3.0(1)	3.4
20	---	---	---	---	---	---	---	---	---	---	---	---	2.0(1)	2.3	2.3	2.7	3.0(1)	3.4	3.4	3.9
25	---	---	---	---	---	---	---	---	---	---	2.0(1)	2.3	2.3	2.7	3.0(1)	3.4	3.5	4.0	4.2	4.8
32	---	---	---	---	---	---	---	---	2.0(1)	2.3	2.4	2.8	3.0(1)	3.4	3.6	4.1	4.4	5.0	5.4	6.1
40	---	---	---	---	1.8(1)	2.1	2.0(1)	2.3	2.4	2.8	3.0(1)	3.5	3.7	4.2	4.5	5.1	5.5	6.2	6.7	7.5
50	---	---	1.8(1)	2.1	2.0	2.3	2.4	2.8	3.0	3.4	3.7	4.2	4.6	5.2	5.6	6.3	6.9	7.7	8.3	9.3
63	1.8(1)	2.1	2.0	2.3	2.5	2.9	3.0	3.4	3.8	4.3	4.7	5.3	5.8	6.5	7.1	8.0	8.6	9.6	10.5	11.7
75	2.0(1)	2.3	2.3	2.7	2.9	3.3	3.6	4.1	4.5	5.1	5.6	6.3	6.8	7.6	8.4	9.4	10.3	11.5	12.5	13.9
90	2.2	2.6	2.8	3.2	3.5	4.0	4.3	4.9	5.4	6.1	6.7	7.5	8.2	9.2	10.1	11.3	12.3	13.7	15.0	16.7
110	2.7	3.1	3.4	3.9	4.2	4.8	5.3	6.0	6.6	7.4	8.1	9.1	10.0	11.1	12.3	13.7	15.1	16.8	18.3	20.3
125	3.1	3.6	3.9	4.4	4.8	5.4	6.0	6.7	7.4	8.3	9.2	10.3	11.4	12.7	14.0	15.6	17.1	19.0	20.8	23.0
140	3.5	4.0	4.3	4.9	5.4	6.1	6.7	7.5	8.3	9.3	10.3	11.5	12.7	14.1	15.7	17.4	19.2	21.3	23.3	25.8
160	4.0	4.5	4.9	5.5	6.2	7.0	7.7	8.6	9.5	10.6	11.8	13.1	14.6	16.2	17.9	19.8	21.9	24.2	26.6	29.4
180	4.4	5.0	5.5	6.2	6.9	7.7	8.6	9.6	10.7	11.9	13.3	14.8	16.4	18.2	20.1	22.3	24.6	27.2	29.9	33.0
200	4.9	5.5	6.2	7.0	7.7	8.6	9.6	10.7	11.9	13.2	14.7	16.3	18.2	20.2	22.4	24.8	27.4	30.3	33.2	36.7
225	5.5	6.2	6.9	7.7	8.6	9.6	10.8	12.0	13.4	14.9	16.6	18.4	20.5	22.7	25.2	27.9	30.8	34.0	37.4	41.3
250	6.2	7.0	7.7	8.6	9.6	10.7	11.9	13.2	14.8	16.4	18.4	20.4	22.7	25.1	27.9	30.8	34.2	37.8	41.5	45.8
280	6.9	7.7	8.6	9.6	10.7	11.9	13.4	14.9	16.6	18.4	20.6	22.8	25.4	28.1	31.3	34.6	38.3	42.3	46.5	51.3
315	7.7	8.6	9.7	10.8	12.1	13.5	15.0	16.6	18.7	20.7	23.2	25.7	28.6	31.6	35.2	38.9	43.1	47.6	52.3	57.7
355	8.7	9.7	10.9	12.1	13.6	15.1	16.9	18.7	21.1	23.4	26.1	28.9	32.2	35.6	39.7	43.8	48.5	53.5	59.0	65.0
400	9.8	10.9	12.3	13.7	15.3	17.0	19.1	21.2	23.7	26.2	29.4	32.5	36.3	40.1	44.7	49.3	54.7	60.3	66.5	73.3
450	11.0	12.2	13.8	15.3	17.2	19.1	21.5	23.8	26.7	29.5	33.1	36.6	40.9	45.1	50.3	55.5	61.5	67.8	---	---
500	12.3	13.7	15.3	17.0	19.1	21.2	23.9	26.4	29.7	32.8	36.8	40.6	45.4	50.1	55.8	61.5	68.3	75.3	---	---
560	13.7	15.2	17.2	19.1	21.4	23.7	26.7	29.5	33.2	36.7	41.2	45.5	50.8	56.0	62.5	68.9	---	---	---	---
630	15.4	17.1	19.3	21.4	24.1	26.7	30.0	33.1	37.4	41.3	46.3	51.1	57.2	63.1	70.3	77.5	---	---	---	---
710	17.4	19.3	21.8	24.1	27.2	30.1	33.9	37.4	42.1	46.5	52.2	57.6	64.5	71.1	79.3	87.4	---	---	---	---
800	19.6	21.7	24.5	27.1	30.6	33.8	38.1	42.1	47.4	52.3	58.8	64.8	72.6	80.0	89.3	98.4	---	---	---	---
900	22.0	24.3	27.6	30.5	34.4	38.3	42.9	47.3	53.3	58.8	66.1	72.9	81.7	90.0	---	---	---	---	---	---
1000	24.5	27.1	30.6	33.5	38.2	42.2	47.7	52.6	59.3	65.4	73.4	80.9	90.8	100.0	---	---	---	---	---	---

The calculated value of e_{min} according to iso 4065 is rounded up to the nearest values of rither 1/8, 2/0, 2/3, 3/0. as Rounded

ATT: Temperature at 20 °c and year of service for 50
SDR: Standard Dimension Ratio
Safety Factor 1.25
PN: Nominal Pressure

d: Nominal Dia
emin: Min Thichness
Semax: Max Thichness

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