



INFRASTRUCTURE PIPING SOLUTION (PIPES & FITTINGS)



HDPE

Technical
Catalogue

A blue-tinted photograph of a construction site. In the foreground, a worker in a high-visibility vest and hard hat is seen from behind. In the background, there is a large piece of machinery, possibly a forklift or loader, and other workers in safety gear. The overall scene is industrial and active.

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Chairman's Message

Roxy for metal and plastic products, a member of Momen Group holding, was established in 2005 due to the tremendous development in the piping industry to cover the needs of national and international markets.

Our main products include UPVC, HDPE, PP and PPR (pipes & fittings) in all types, colors, and different standards (ASTM, DIN, BS, EN, ISO, IQS, AND EGYPTIAN) depending on the client's needs.

Our head office is in Heliopolis, Cairo, Egypt, and our productions facilities and warehouses are in Obour city, and 10th of Ramadan City.

A team of quality assurance specialists in laboratory affairs carry out continuous monitoring processes on the plastic pipes and all the other related parts of the system, such as fittings and related accessories.

We also have a developed quality assurance system that uses a series of advanced devices that allow us to ensure that the production process is up to the international standards and special requirements contracted with our customers.

There is a series of experiments conducted on our plant's production process that include chemical, physical, and mechanical properties.

Adding to that, there is a full range of specialists in the field of plastic pipe installation who are fully equipped to provide our customers with technical advice.

Today **Roxy** is considered as one of the largest market leader companies that produces and processes pipes and its accessories in the Egyptian market as well as the Arab world and Africa.

Our products are accredited in different regions, such as: Egypt, Africa, the Arab world, Europe, and Latin America.

Not only are our distribution channels in Africa and the MENA region, but we have also opened new markets in the last two years in North Asia and South America.



Why Roxy ?



Roxy for Modern water systems

(pipe systems) is an Egyptian company under the umbrella of the holding company Momen Group, which has been established in 1989. One of our several fields of investments is water systems manufacturing.

Our mission is to establish a circle of trust for every client by providing the best quality, service and price. We feel proud to be able to produce Egyptian products with the latest German technologies.

Roxy for metal and plastic products is producing a full complete solution for Non-Metal Piping systems according to all international and national standards such as:

1. HDPE (Drainage, Potable water supply, Irrigation, Fire Fighting, industrial applications, Cable ducting, Marine services, offshore application, oil, and gas applications).
2. UPVC (Pressurized and Non-Pressurized systems), (Infrastructure Application such as Drainage, Water Supply, Irrigation), (Domestic Application such as Soil, Wastewater, Vent and Plumbing Solutions).
3. PP-R & PPR-CT for Potable Water Supply Application.
4. PP for Non-Pressure Drainage Applications.
5. PP-MD for acoustic non-pressure drainage applications (under license REHAU Germany).
6. Gully Traps and Manholes.

RoxyPlast is using German technological innovations in its manufacturing process in addition to the usage of the best European and American materials such as Borealis, Borouge, Basell, Shintech and Topilene.

RoxyPlast is following the continuous developments and changes to improve the quality of its products, due to its laboratories designed with the latest equipment.

RoxyPlast gives a warranty on all its systems for up to 50 years.

RoxyPlast has very large quantities of all produced materials that are suitable for any project, whatever its size, due to the availability of large production capacity in its factories. Such massive production capacity enables us to deliver our products in a very short period of time with the best quality and competing prices. We work on a stock basis, not by order production so we can maintain fast delivery.

RoxyPlast has a large business history and deals with both large and small companies, global and local.

RoxyPlast is the only Egyptian company with Egyptian products in the market that has been able to balance between the quality of its products and competitive pricing, which is why we compete with products that are imported from abroad.

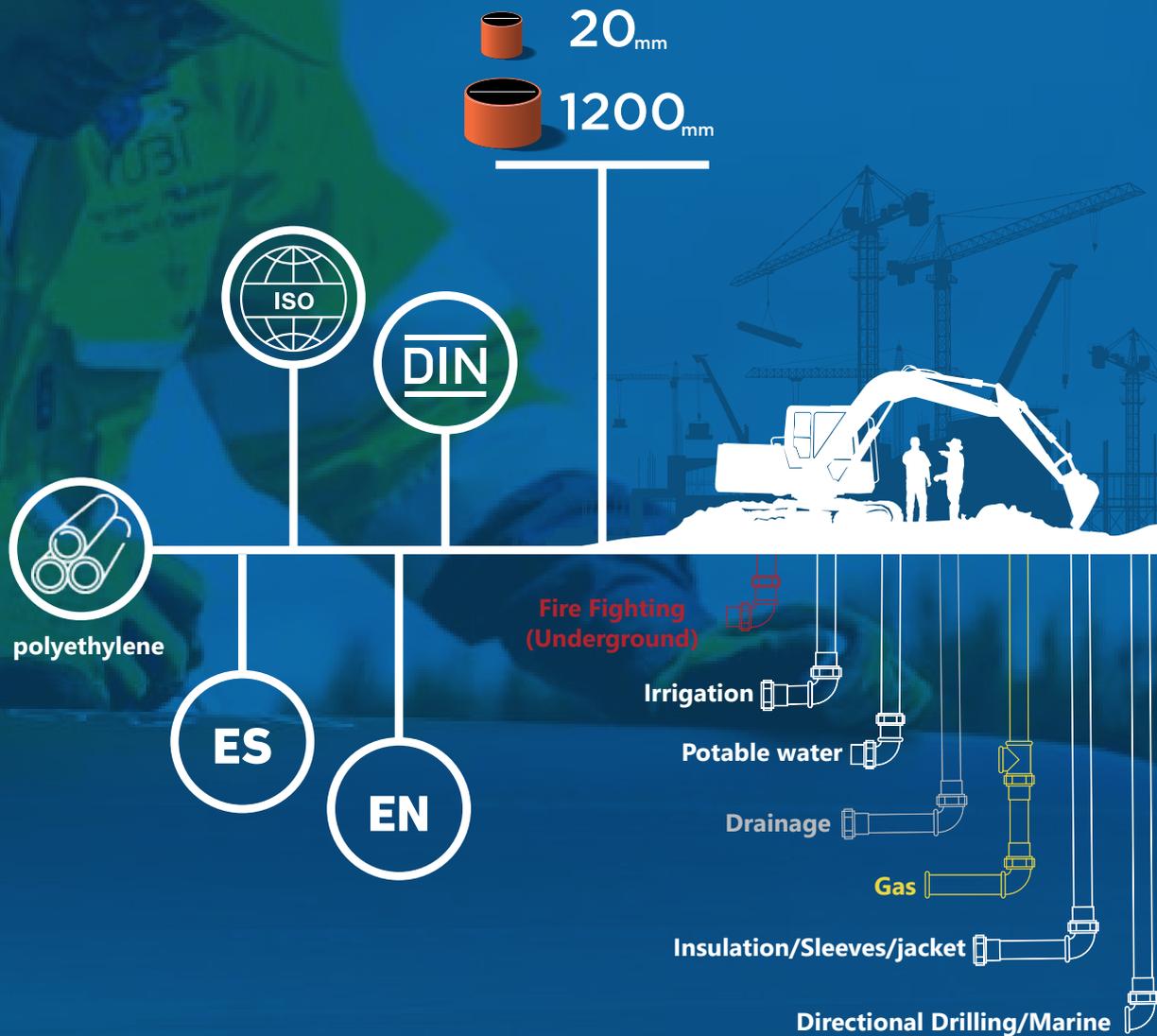


Introduction:

ROXYPLAST PE pipes and fittings are manufactured as per DIN, ISO and ES Standards. Products are required to pass strict quality control procedures, and are rigorously monitored throughout the production process, from the inspection of raw materials to the storage of the finished products, to ensure their compliance with relevant quality standards. Review of existing facilities and continual improvements is always a priority, parallel to the consistent production process.

ROXYPLAST polyethylene pipes and fittings are durable and strong for long life installation. This piping system is an effective solution for municipal, industrial, marine, agricultural and firefighting applications. Its efficiency has been tested and proven for above ground, surface, buried, slip lined, floating and sub-surface applications.

Roxy PE is capable of meeting all your piping requirements.



1. General

The use of plastic piping systems in the most varied applications is continuously increasing. The reason is their incredible versatility and high innovative potential. Thanks to their high resistance against a range of chemicals from acids and alkyls, their good flexibility, low weight, and especially their long service life, plastic piping systems guarantee efficient, economically beneficial and safe long-term solutions.

We recommend ROXYPLAST PE piping solution due to the following characteristics:

1.1 Characteristics



High Impact Resistance

(Also referred to as toughness)

This might be one of the most important properties needed in transferring fluids. It is mainly about how strongly this material can withstand a sudden internal or external hit (normally for a buried pipe, a sudden pressure wave inside pipe).

This property report the amount of energy this material is capable of absorbing before deforming.



Smooth Internal Wall

The PE pipe interior is very smooth and guarantees decent flow.

Not only this, the smoothness lifetime is much larger than that of steel or ductile iron because PE doesn't rust or rot.

The free flow eliminates the possibility of internal deposits which make the inner diameter smaller.



Elasticity

Despite being very rigid, PE stays a polymer material, and this means high degree of elasticity and flexibility.

The implications of this are high impact resistance, flexibility and minimum possibility of damaging PE material because of rough trench conditions or reduction of massive number of bends.

This characteristic also implies that using these flexible pipes is safer especially in applications that need seismic protection.



Wear Resistance:

High yield strength, high toughness, and high tensile stress the PE resists hard ambience. Even if the bedding used for this type of pipes contains large granules of rock and sand, this material can withstand up to granule diameter size of 65 mm which is really superb.



Thermal Resistance

The operational safe temperature range of PE starts in the cold side from -40°C and ends in the hot side at about 80°C , and this range includes most of applications except the heating applications.



Weather Resistance:

This property is an extension of thermal resistance and wear resistance properties, which means it can be left in any weather no matter how hard it is and nothing will happen to it. Roxy PE products are UV stabilized carbon black protected.



Light weight:

The light weight nature of PE pipes and fittings makes it easy for handling and installation in comparison to other materials.



Poor Heat Conductivity:

This is one of the most useful properties of PE that make it suitable for the applications where it necessary to secure absence of heat leakage either in or out, like HVAC applications.



Insulation/ Sleeve:

This is another property that assures it is always very safe to use PE pipes even close to the areas where electric wires may pass or cross. PE is bad conductor for electric current.



Non-Toxic:

This property is inherent from the fact that the PE material is inert so the water inside will always be clean and safe. This is a big advantage when PE is compared to metal pipes for conveyance of potable drinking water.



Homogeneous Welded Joints:

Many technicians always complain that the welding remains a critical process for the metal pipes, because, the rigidity of metal prevents the full homogeneity of the welding area. While with PE, welding is more powerful especially in butt welding that makes the Joints share same properties of the pipe, and even are stronger.



Highly Suitable for Welding:

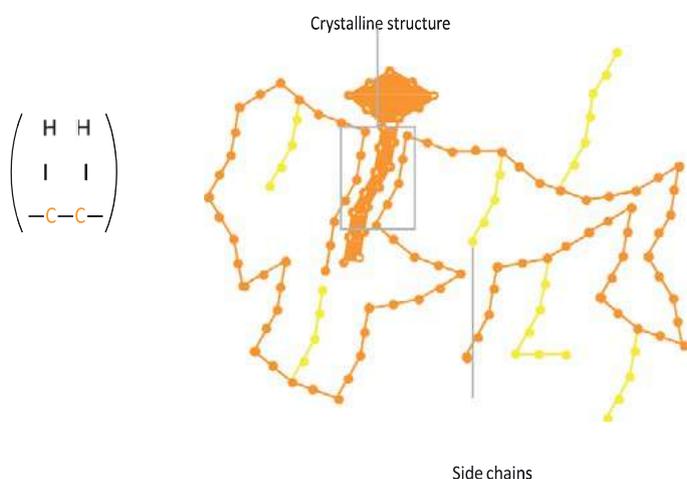
The main process used for manufacturing PE pipes is extrusion which is a hot forming process that ensures high homogeneity for the end product, which leads to homogeneous formation of the molten material at the time of welding.



Pre-Fabrication:

The PE is friendly for pre-fabrication to make customized products, for example segmented fittings can be pre-fabricated from the pipes of same SDR.

1.2 Polyethylene (PE) as a Pipe Material



The material polyethylene consists of long chain molecules which are made up of the base molecule ethylene C₂H₄.

These molecule chains are not exclusively straight-line; the degree of branching significantly affects the properties of the material.

The straight-line sections of the molecule chains form crystalline regions, called crystallites.

These are the parts of the structural make-up responsible for the strength of the material.

The crystallites are bonded with each other through amorphous, i.e. Unordered, structures.

Material properties such as tensile strength and resistance to stress cracking are dependent on the amorphous structures.

Modern PE Classified according to the strength of the material:

PE 80	(= MRS 8.0 N/mm ²)
PE 100-RC&PE100	(=MRS 10.0 N/mm ²)

materials are optimised for use as pressure pipe materials. The various polyethylene piping materials are The designation "RC" (Resistance to Crack) stands for selected PE

The designation PE 100 or PE 100-RC e.g. stands for a material with MRS 10 (Minimum Required Strength), that is, with a minimum strength of 10.0 N/mm². This means that for this material, after a 50 year operating life at a temperature of 20°C with water as a test medium, the time to-rupture curve is crossed by a comparative stress of at least 10.0 .

100 materials with exceptional resistance to stress cracking, which is required for extreme loads such as those that arise during installation without a sand bed or during trenchless installation.

Internal pressure creep strength graphs in accordance with DIN 8075 for PE 100

1.2.1 Distinguishing Features of Different PE Pipe Materials

Property	UNIT	PE 100 PE-HD 003	PE -100RC PE-HD 003
MRS	N/mm ²	10	10
Density	g/cm ³	>0.955	>0.955
Elastic Modulus	N/mm ²	>1000	>1000
Yield Stress	N/mm ²	23	23
Elongation at Break	%	>500	>500
FNCT	h	>300	>8760
Melt Index MFR °190C/5kg	g/10 min	0.3	0.3
Welding Group		003	003
Main Fields of Application		Gas, water, effluent, and industrial pipes	Gas and water supply, pressurized effluent disposal with modern installation methods
Joining Techniques		All commonly used welding methods	All commonly used welding methods

Tab 1-1:

Comparison of PE pipe materials. The values given are averages. Deviations are material dependent.

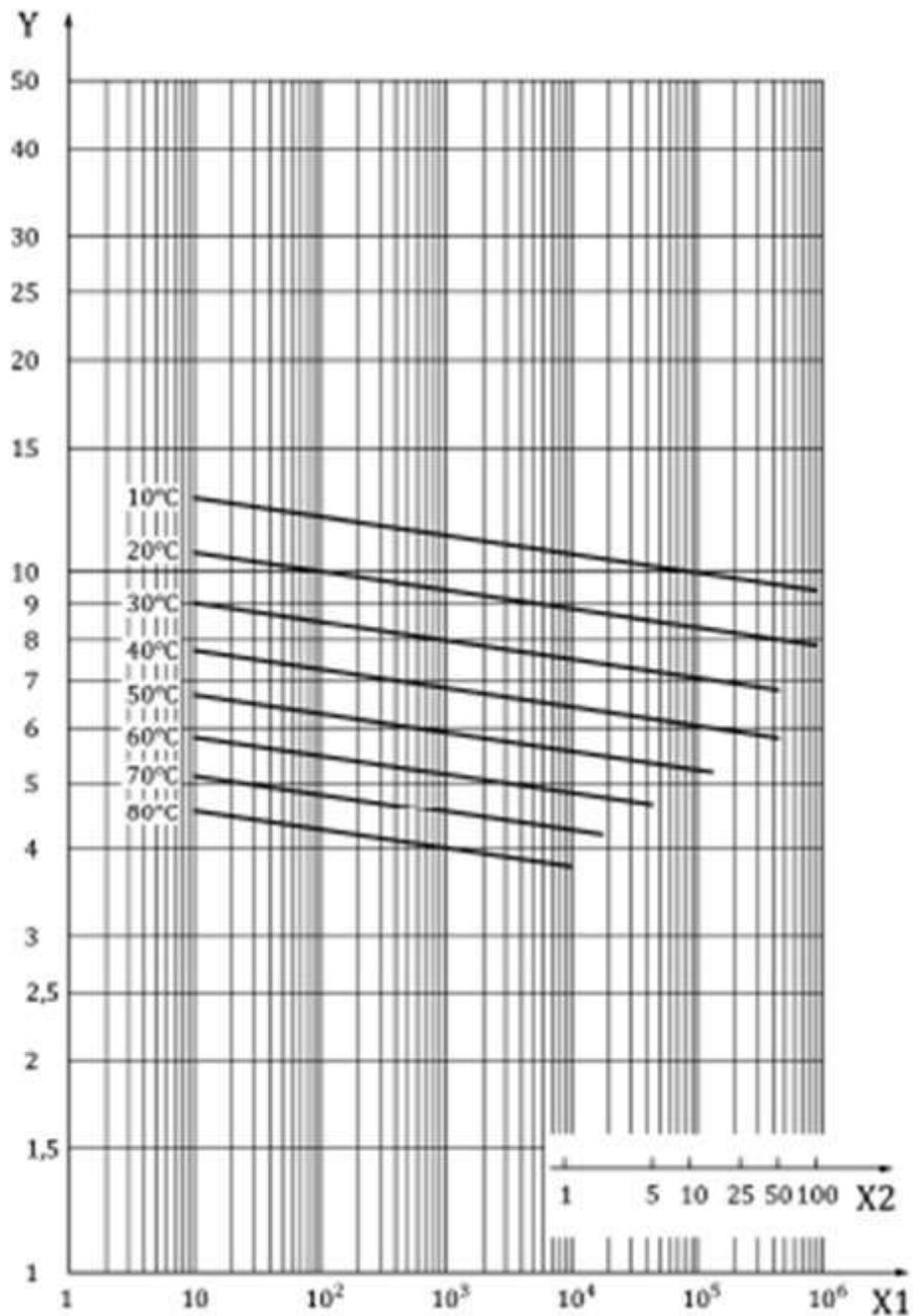
1.2.2 Physical Material Characteristics of Polyethylene

Properties	Test Standard	Test Method Test Specimen	unit	PE-Compound
Mechanical properties				
Density	DIN EN ISO 17855-2& DIN EN ISO 1183-1	method A	kg/m ³	≥ 930
Melt mass	DIN EN ISO 1133-1	MFR 190/5	g/10min.	0.2 -1.4
Tensile test				
— Yield stress	DIN EN ISO 527	Test speed 50 mm/min.	N/mm ²	25
— Elongation at break			%	> 600
Thermal properties				
Crystal melting range		Polarisation microscope	°C	110–140
Mean linear thermal expansion coefficient	DIN 53752& ISO 11359-2)		K ⁻¹ (°C-1)	~ 2 * 10 ⁻⁴
Thermal conductivity	DIN 52612& DIN EN 12664)	Two plate method	W/m • K	~ 0,41
Electrical properties				
Surface resistance	DIN EN 62631-3-1(VDE 0307-3-1))	Electrode A	Ohm	> 10 ¹²
Creepage current resistance	DIN 53480	Method KC	V	600
Other properties				
Fire classification	DIN 4102	Class	B 2	B 2
Chemical resistance	DIN 8075 supplement			Satisfied

Tab 1-2:

The data given are guideline values and can vary depending on processing procedures. The suitability of our products for any particular purpose should be verified by the user.

Internal pressure Creep Strength Graphs According to DIN 8075 :



Key

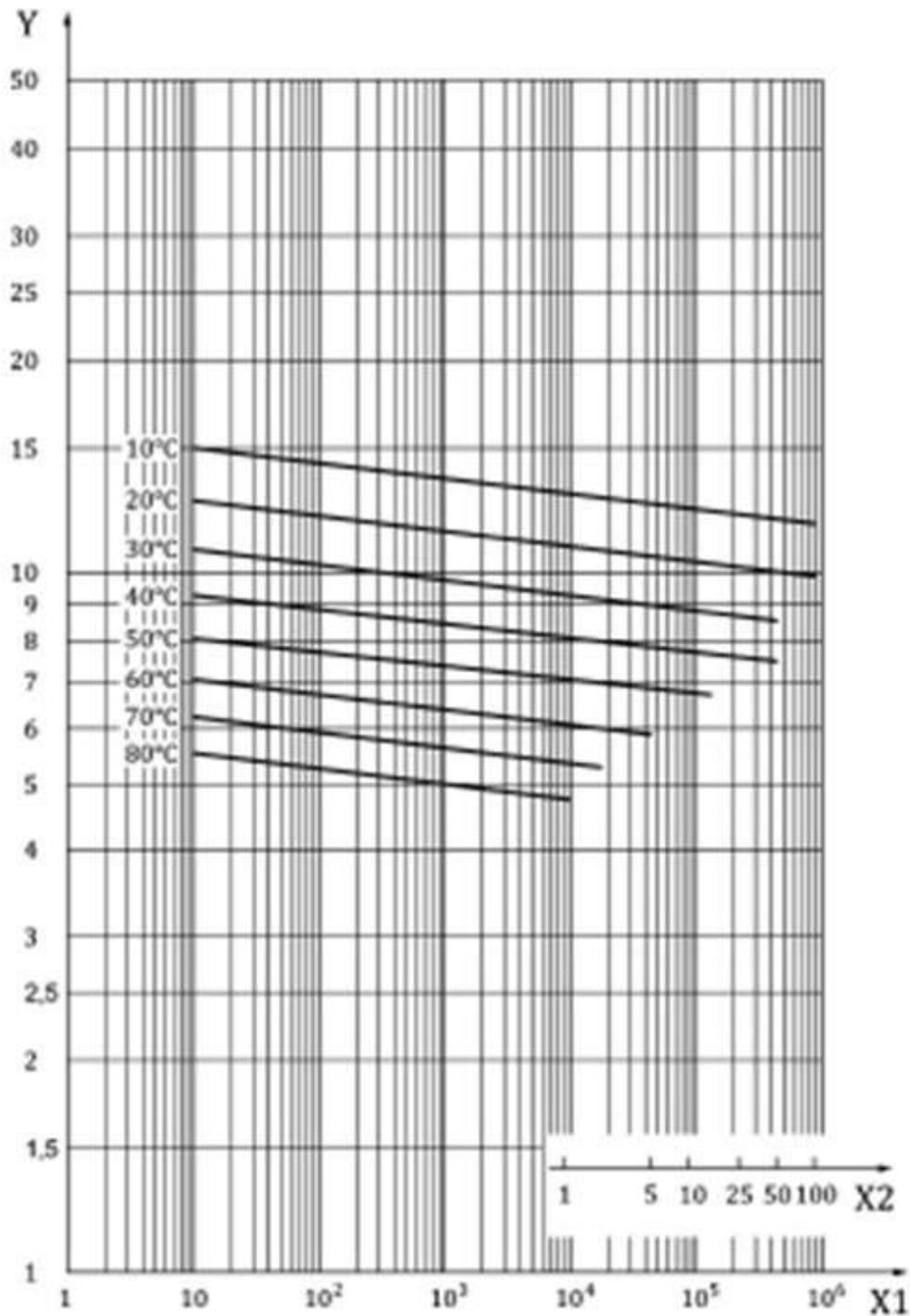
Y Long- Term hydrostatic Strength in MPa

X1 Time to fracture in hours

X2 Time to fracture in Years

Figure A.1 – Reference lines of the long Terms hydrostatic Strength (Minimum lines) of pipes made of PE80

Internal pressure Creep Strength Graphs According to DIN 8075 :



Key

Y Long- Term hydrostatic Strength in MPa

X1 Time to fracture in hours

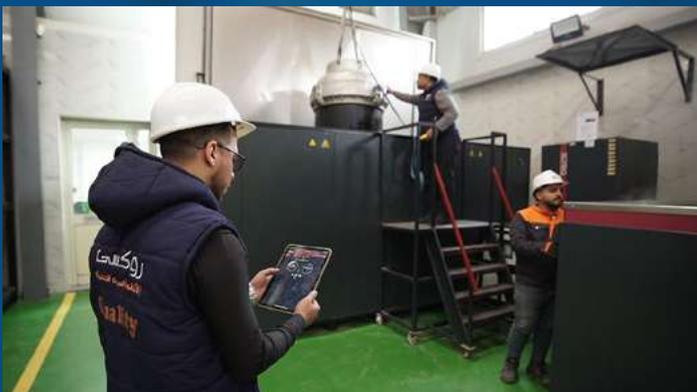
X2 Time to fracture in Years

Figure A.2 – Reference lines of the long Terms hydrostatic Strength (Minimum lines) of pipes made of PE100

Quality Control and Standards Monitoring



2. Quality Control and Standards Monitoring



A-Raw Material Batch Release Testes (Characteristic)

- Visual Inspection
- Melt mass- flow rate (MFR)
- Oxidation induction time (O.I.T)
- Density
- Moisture content
- Carbon Black content

B- final Product Batch Releas tests (Characteristic)

- Surface Finish (Appearance)
- Marking
- Thickness
- Ovality
- Resistance to internal Pressure (Short term)
- Resistance to internal Pressure (Long term)
- Tensile test
- Heat Reversion
- Homogeneity
- Carbon Black content



Additional Testing of the Finished Piping

Property	Requirement	Test Procedure	Frequency
Labelling	As per DVGW GW 335 Part A2 DIN EN 12201-2 DIN EN 1555-2	Visual inspection	Regularly every 2 hours
Texture	As per DVGW GW 335 Part A2	Visual inspection	Regularly every 2 hours
Colour	As per DVGW GW 335 Part A2	Visual inspection	Regularly every 2 hours
Homogeneity	As per DVGW GW 335 Part A2	Visual inspection	1 x per week
Thermal stability	> 20 minutes at 200°C	DIN EN 728	1 x per week
Internal pressure creep test	As per DVGW GW 335 Part A2 DIN EN 12201-2 DIN EN 1555-2, DIN 8074 & DIN 8075	80°C, 165 h; PE 100 s = 5,5 N/mm ²	On every start at least 1 x per week
Melt index	Max. 20% variation from the raw material (as per ,DIN 8074 & DIN 8075 & GIS PL2)	EN ISO 1133:1999 Condition T 5 kg, 190°C 10 minutes	On every change and on every dimension check at least 1 x per week
Hygiene	As per KTW recommendation as well as DVGW GW 335 Part A2	DVGW W 270 / KTW	1 x annually
Slow crack growth	GIS PL2 & DIN EN 1555	FNCT ISO 16770 80°C, N/mm ² , 2% Arkopal	On every start at least 1 x per week

Tab 1-4:
Additional tests on the finished piping

2.7 Chemical Resistance (in accordance with DIN 8075)

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Acetaldehyde	TR	•	Not Tested	Not Tested
Acetic acid (glacial ethanoic acid), aqueous	min. 96%	•	•	Not Tested
Acetic acid methyl ester (methyl acetate) ²	TR	•	•	-
Acetic acid, aqueous	10%	•	•	•
Acetic anhydride (ethanoic anhydride)	TR	•	•	Not Tested
Acetic anhydride (ethanoic anhydride)	TR	•	•	Not Tested
Acetone	TR	•	•	Not Tested
Acetophenone ²	TR	•	-	-
Acrylonitrile ²	TR	•	•	•
Adipic acid	GL	•	•	•
Aeth-, see Eth-				
Air ²	TR	•	•	•
Allyl alcohol (2-propen-1-ol)	TR	•	•	•
Alum (metal (I) metal (III) sulphates)	L	•	•	•
Aluminium chloride	GL	•	•	•
Aluminium fluoride	GL	•	•	•
Aluminium potassium sulphate (potash alum)	L	•	•	•
Aluminium sulphate	GL	•	•	•
Ammonia solution, aqueous (ammonium hydroxide)	33%	•	•	•
Ammonia, gaseous	TR	•	•	•
Ammonia, liquid	TR	•	•	•
Ammonium aluminium sulphate (Ammonium alum)	L	•	•	•
Ammonium carbonate ² and hydrogen carbonate	GL	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Ammonium chloride	GL	•	•	•
Ammonium fluoride	L	•	•	•
Ammonium iron (III) sulphate (iron alum)	L	•	•	•
Ammonium nitrate	GL	•	•	•
Ammonium phosphate ²	GL	•	•	•
Ammonium sulphate	GL	•	•	•
Ammonium sulphide	L	•	•	•
Amyl acetate (isopentyl acetate)	TR	•	•	Not Tested
Amyl alcohols (C5 alkanols)	TR	•	•	Not Tested
Aniline	TR	•	•	Not Tested
Anilinium chloride ² (aniline hydrochloride)	GL	•	•	•
Anisole ²	TR	Not Tested	Not Tested	
Anone ² (Cyclohexanone)	TR	•	Not Tested	Not Tested
Antifreeze (motor vehicle) ²	H	•	•	•
Antimony (III) chloride, aqueous	90%	•	•	•
Apple juice ²	H	•	•	•
Aqua regia (HCl/HNO ₃)	TR	Not Tested	Not Tested	Not Tested
Arsenic acid (arsenic (V) oxide)	GL	•	•	•

B

Barium carbonate	GL	•	•	•
Barium chloride	GL	•	•	•
Barium hydroxide	GL	•	•	•
Barium sulphate	GL	•	•	•
Beer	H	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Beeswax ²	H	•	•	Not Tested
Benzaldehyde	TR	•	•	Not Tested
Benzene	TR	Not Tested	Not Tested	Not Tested
Benzoic acid	GL	•	•	•
Benzoyl chloride ²	TR	Not Tested	Not Tested	Not Tested
Benzyl alcohol ²	TR	•	•	Not Tested
Bleaching liquor ² (sodium hypochlorite solution)	20%	Not Tested	Not Tested	Not Tested
Borax (disodium tetraborate)	GL	•	•	•
Boric acid	GL	•	•	•
Bromine (bromine water) ²	GL	•	-	-
Bromine, gaseous, dry	TR	Not Tested	Not Tested	Not Tested
Bromine, liquid	TR	Not Tested	Not Tested	Not Tested
Bromomethane (methyl bromide) ²	TR	Not Tested	Not Tested	Not Tested
-1,3Butadiene, gaseous ²	TR	Not Tested	Not Tested	Not Tested
Butane, gaseous	TR	•	•	•
-1,2,4Butanetriol	TR	•	•	•
Butanols (-1butanol, -2butanol, tertiary butanol)	TR	•	•	•
-2Butene-1,4-diol ²	TR	•	•	-
-2Butine-1,4-diol ²	TR	•	•	-
Butyl acetates (ethanoic acid butyl esters) ²	TR	Not Tested	Not Tested	Not Tested
Butyl glycol ²	TR	•	-	-
Butyl phenols ²	GL	•	•	•
Butyl phthalate (Dibutyl phthalate) ²	TR	•	Not Tested	Not Tested
Butylene glycol (-1,4butanediol) ²	TR	•	•	•
Butylphenone ²	TR	Not Tested	-	-
Butyric acid and isobutyric acid	TR	•	•	Not Tested

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
C				
Calcium carbonate	GL	•	•	•
Calcium chlorate	GL	•	•	•
Calcium chloride	GL	•	•	•
Calcium hydroxide	GL	•	•	•
Calcium hypochlorite (chloride of lime), aqueous	slurry	•	•	•
Calcium nitrate	GL	•	•	•
Calcium sulphate	GL	•	•	•
Calcium sulphide	VL	Not Tested	Not Tested	Not Tested
Camphor oil ²	TR	Not Tested	Not Tested	Not Tested
Carbon dioxide, gaseous	TR	•	•	•
Carbon monoxide, gaseous	TR	•	•	•
Castor oil ²	TR	•	•	•
Caustic potash (potassium hydroxide solution)	L	•	•	•
Caustic soda (sodium hydroxide solution), aqueous ²	up to 60%	•	•	•
Caustic soda (sodium hydroxide)	up to 60%	•	•	•
Chloral (trichloroacetaldehyde) ²	TR	•	•	•
Chloral hydrate ²	TR	•	•	•
Chloramine ²	•	•	-	-
Chloric acid, aqueous ²	1%	•	•	•
Chloric acid, aqueous ²	10%	•	•	•
Chloride of lime, aqueous	slurry	•	•	•
Chlorine water (chlorine)	GL	•	-	Not Tested
Chlorine, aqueous solution (chlorine water)	GL	Not Tested	Not Tested	Not Tested
Chlorine, gaseous, dry	TR	Not Tested	Not Tested	Not Tested
Chlorine, gaseous, moist ²	0.5%	Not Tested	-	Not Tested

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Chlorine, gaseous, moist ²	1%	Not Tested	Not Tested	Not Tested
Chlorine, liquid ²	TR	Not Tested	Not Tested	Not Tested
Chloroacetic acid, aqueous ²	85%	•	•	•
Chloroacetic acid ²	L	•	•	•
Chlorobenzene ²	TR	Not Tested	-	Not Tested
Chloroethane (ethyl chloride) ²	TR	Not Tested	-	-
-2Chloroethanol (ethylene chlorohydrin) ²	TR	•	•	•
Chloroform	TR	Not Tested	Not Tested	Not Tested
Chloromethane (methyl chloride), gaseous	TR	Not Tested	Not Tested	-
Chlorosulphuric acid (chlorosulphonic acid)	TR	Not Tested	Not Tested	Not Tested
Chrome alum (alums) ²		•	•	•
Chromic acid (chromium (VI) oxide), aqueous	20%	•	•	Not Tested
Chromic acid (chromium (VI) oxide), aqueous	50%	•	Not Tested	Not Tested
Chromic acid / sulphuric acid / water ² (chromosulphuric acid)	15/35/50%	Not Tested	Not Tested	Not Tested
Chromium potassium (III) sulphate (chrome alum)	L	•	•	•
Cider ²	H	•	•	•
Citric acid	GL	•	•	•
Citric acid	GL	•	•	•
Coal gas ²	H	•	-	-
Common salt (sodium chloride)	GL	•	•	•
Copper (II) chloride	GL	•	•	•
Copper (II) nitrate	GL	•	•	•
Copper (II) sulphate	GL	•	•	•
Corn syrup ²	Any	•	•	•
Creosote ²	H	•	-	-

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Cresols ² , aqueous	90%	•	•	•
Cresols ² , aqueous	over 90%	•	•	Not Tested
Crotonaldehyde ² ((E)-2-butenal)	TR	•	-	Not Tested
Cyclohexanol	TR	•	•	•
Cyclohexanone	TR	•	•	•

D

Decalin (decahydronaphthalene)	TR	•	Not Tested	Not Tested
Detergent ²	VL	•	•	•
Dextrin	L	•	•	•
Dextrin ²	L	•	•	•
-1,2Diaminoethane (ethylene diamine) ²	TR	•	•	•
Dibutyl phthalate ² (phthalic acid dibutyl ester)	TR	•	Not Tested	Not Tested
Dichloroacetic acid methyl ester ²	TR	•	•	•
Dichloroacetic acid, aqueous ²	50%	•	•	•
Dichloroacetic acid ²	TR	Not Tested	Not Tested	Not Tested
Dichloroethenes ² (vinylidene chloride and vinylidene dichloride)	TR	Not Tested	-	-
Diesel fuel ²	H	•	Not Tested	v
Diethanolamine ²	TR	•	-	-
Diethyl ether (ethyl ether)	TR	Not Tested	Not Tested	-
Diglycolic acid (oxydiacetic acid)	GL	•	•	•
Diisobutyl ketone-2,6) 2dimethyl-4-heptanone)	TR	•	-	-
Diisooctyl phthalate ²	TR	•	•	Not Tested
Diisopropyl ether ²	TR	•	Not Tested	
Dimethylamine, gaseous	100%	•	•	Not Tested
N,N-Dimethylformamide	TR	•	•	Not Tested
Di-n-butyl ether ²	TR	Not Tested	Not Tested	Not Tested

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Dinonyl phthalate ² (DNP)	TR	•	•	Not Tested
Diocetyl phthalate	TR	•	•	Not Tested
-1,4Dioxane	TR	•	•	•
Dithiocarbonic anhydride (carbon disulphide)	TR	Not Tested		
Drinking water, chlorinated ²	TR	•	•	•

E

Engine lubricating oils ²	TR	•	Not Tested	Not Tested
Ethanol (ethyl alcohol), aqueous	40%	•	•	Not Tested
Ethanol (ethyl alcohol) ²	TR	•	•	•
Ethanol, denatured with 20% toluene ²	96% (Vol.)	•	-	-
Ethyl acetate (acetic acid ethyl ester)	TR	•	Not Tested	Not Tested
Ethyl chloride, gaseous (chloroethane) ²	TR	Not Tested	-	-
Ethylbenzene ²	TR	Not Tested	-	-
Ethylene chlorohydrin (chloroethanol) ²	TR	•	•	•
Ethylene glycol (-1,2ethandiol)	TR	•	•	•
Ethylene oxide, gaseous (oxirane)	TR	•	-	-
Exhaust gases ² and air-gas mixtures				
- carbon dioxide containing	any	•	•	•
- carbon monoxide containing	any	•	•	•
- hydrochloric acid containing	any	•	•	•
- hydrogen fluoride containing	traces	•	•	•
- nitrous (nitrogen oxide) containing	traces	•	•	•
- sulphur dioxide containing	any	•	•	•
- sulphur trioxide (oleum) containing	Traces	Not Tested	Not Tested	Not Tested
	Any	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C

F

Fatty acids (from C2(4	TR	•	•	Not Tested
Fermentation mash ²	H	•	•	•
Fluorine, gaseous	TR	Not Tested	Not Tested	Not Tested
Fluorosilicic acid, aqueous	40%	•	•	•
Formaldehyde, aqueous	40%	•	•	•
Formic acid	TR	•	•	•
Fructose ²	L	•	•	•
Fruit drinks and fruit juices ²	H	•	•	•
Furfuryl alcohol	TR	•	•	?

G

Gelatine ²	L	•	•	•
Glucose (grape sugar)	GL	•	•	•
Glycerine (glycerol)	TR	•	•	•
Glycolic acid	L	•	•	•
Grape sugar (glucose)	GL	•	•	•

H

Heating oil ²	H	•	Not Tested	Not Tested
n-Heptane	TR	•	Not Tested	Not Tested
Hexafluorosilicic acid, aqueous	40%	•	•	•
Hexanes ²	TR	•	Not Tested	Not Tested
1,2,6-Hexanetriol ²	TR	•	•	•
Hydrazine hydrate ²	TR	•	•	•
Hydrobromic acid (hydrogen bromide solution), aqueous	50%	•	•	•
Hydrochloric acid, aqueous	37%	•	•	•
Hydrofluoric acid (hydrogen fluoride solution), aqueous	4%	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Hydrofluoric acid (hydrogen fluoride solution), aqueous	60%	•	•	Not Tested
Hydrogen bromide, gaseous	TR	•	•	•
Hydrogen chloride (hydrochloric acid), moist gas ²	TR	•	•	•
Hydrogen peroxide, aqueous	30%	•	•	•
Hydrogen peroxide, aqueous	90%	•	Not Tested	Not Tested
Hydrogen, gaseous	TR	•	•	•
Hydroquinone	GL	•	Not Tested	Not Tested

I K

Iodine tincture ²	H	•	•	Not Tested
Iron (II) chloride	GL	•	•	•
Iron (III) nitrate	L	•	•	•
Iron (III) sulphate	GL	•	•	•
Iron (III) chloride	GL	•	•	•
Iron (II) sulphate	GL	•	•	•
Isoamyl alcohol	TR	•	•	Not Tested
Isobutanol	TR	•	•	•
Isooctane ²	TR	•	Not Tested	Not Tested
Isopropyl alcohol (-2propanol) ²	TR	•	•	•

L

Lactic acid	TR	•	•	•
Lanolin (wool grease) ²	H	•	Not Tested	Not Tested
Lead (II) acetate	GL	•	•	•
Lead tetraethyl ² (tetraethyl lead)	TR	•	-	-
Linseed oil ²	H	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
M				
Machine oil ²	TR	•	Not Tested	Not Tested
Magnesium carbonate	GL	•	•	•
Magnesium chloride	GL	•	•	•
Magnesium hydroxide	GL	•	•	•
Magnesium nitrate	GL	•	•	•
Maleic acid	GL	•	•	•
Malic acid ²	L	•	•	•
Menthol ²	TR	•	•	Not Tested
Mercury	TR	•	•	•
Mercury (I) nitrate	L	•	•	•
Mercury (II) chloride	GL	•	•	•
Mercury (II) cyanide	GL	•	•	•
Methanol	TR	•	•	•
Methoxybutanol ²	TR	•	•	Not Tested
-2Methyl-2-butanol (tertiary amyl alcohol)	TR	•	•	Not Tested
Methyl acetate (acetic acid methyl ester) ²	TR	•	•	-
Methyl bromide (bromomethane) ²	TR	Not Tested	-	Not Tested
Methyl chloride (chloromethane), gaseous	TR	Not Tested	Not Tested	Not Tested
Methyl ethyl ketone ²	TR	•	•	Not Tested
Methylamine, aqueous ²	32%	•	-	-
Methylbenzoic acids (toluic acids)	GL	Not Tested	Not Tested	-
Methylene chloride (dichloromethane) ²	TR	Not Tested	Not Tested	Not Tested
Milk	H	•	•	•
Mineral fertilisers ²	GL	•	•	•
Mineral oils	H	•	•	Not Tested

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C

Mineral water ²	H	•	•	•
Molasses	H	•	•	•

N

Naphtha ²	H	•	Not Tested	Not Tested
Natural gas ²	TR	•	-	-
Nickel (II) chloride	GL	•	•	•
Nickel (II) nitrate	GL	•	•	•
Nickel (II) sulphate	GL	•	•	•
Nicotinic acid	VL	•	•	-
Nicotinic acid	VL	•	•	-
Nitric acid, aqueous	25%	•	•	•
Nitric acid, aqueous	50%	Not Tested	Not Tested	Not Tested
Nitric acid, aqueous	75%	Not Tested	Not Tested	Not Tested
Nitrobenzene ²	TR	•	Not Tested	Not Tested
-2Nitrotoluene ²	TR	•	Not Tested	Not Tested

O

Oils and fats, edible	H	•	Not Tested	Not Tested
Oleic acid	TR	•	•	•
Oleum (H ₂ SO ₄ + SO ₂ (3	TR	Not Tested	Not Tested	Not Tested
Olive oil ²	TR	•	•	Not Tested
Oxalic acid	GL	•	•	•
Oxygen	TR	•	•	Not Tested
Ozone, gaseous	TR	Not Tested	Not Tested	Not Tested

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
P Q R				
Paraffin emulsions ²	H	•	•	Not Tested
Paraffin oil ²	TR	•	Not Tested	Not Tested
Peanut oil ²	TR	•	•	-
-1Pentanol (n-amyl alcohol)	TR	•	•	Not Tested
-2Pentanol (secondary n-amyl alcohol)	TR	•	•	Not Tested
Peppermint oil ²	TR	•	-	-
Perchloric acid, aqueous	20%	•	•	•
Perchloroethylene (tetrachloroethene) ²	TR	Not Tested	Not Tested	Not Tested
Petrol (petroleum ether and regular petrol, aliphatic carbon hydrides)	H	•	•	Not Tested
Petroleum ether ²	TR	•	Not Tested	Not Tested
Petroleum spirit ²	TR	•	Not Tested	Not Tested
Petroleum ²	TR	•	Not Tested	Not Tested
Phenol	L	•	•	•
Phosgene, gaseous ² (carbonyl chloride)	TR	Not Tested	Not Tested	Not Tested
Phosphates, inorganic ²	GL	•	•	•
Phosphoric acid	50%	•	•	•
Phosphoric acid	95%	•	•	Not Tested
Phosphorus (III) chloride ²	TR	•	•	Not Tested
Phosphorus oxychloride ²	TR	•	•	Not Tested
Phosphorus trichloride	TR	•	•	Not Tested
Photo developer	H	•	•	•
Photo emulsions ²	H	•	•	-
Photo fixers	H	•	•	-
Phthalic acid	GL	•	•	•
Picric acid	GL	•	•	-

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Pine oil ²	H	•	Not Tested	Not Tested
Potassium bromate	GL	•	•	•
Potassium bromide	GL	•	•	•
Potassium carbonate	GL	•	•	•
Potassium chlorate	GL	•	•	•
Potassium chloride	GL	•	•	•
Potassium chromate	GL	•	•	•
Potassium cyanide	L	•	•	•
Potassium cyanide	L	•	•	•
Potassium dichromate	GL	•	•	•
Potassium fluoride	GL	•	•	•
Potassium hexacyanoferrate (II) and (III)	GL	•	•	•
Potassium hydrogen carbonate (potassium bicarbonate)	GL	•	•	•
Potassium hydrogen sulphate (potassium bisulphate)	GL	•	•	•
Potassium hydrogen sulphite (potassium bisulphite)	L	•	•	•
Potassium hypochlorite	•	•	•	Not Tested
Potassium iodide ²	GL	•	•	•
Potassium nitrate	GL	•	•	•
Potassium perchlorate	GL	•	•	•
Potassium permanganate, aqueous	20%	•	•	•
Potassium peroxydisulphate (potassium persulphate)	GL	•	•	•
Potassium phosphate	GL	•	•	•
Potassium sulphate	GL	•	•	•
Potassium sulphide	L	•	•	•
Propane, gaseous ²	TR	•	•	-
1-Propanol ² (propyl alcohol)	TR	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Propargyl alcohol, aqueous ² (2-propyn-1-ol)	7%	•	•	•
Propionic acid	TR	•	Not Tested	Not Tested
Propionic acid, aqueous	50%	•	•	•
Propylene glycols ² (propanediols)	TR	•	•	•
Prussic acid, aqueous	%10	•	•	•
Prussic acid ²	TR	•	•	•
Pyridine	TR	•	Not Tested	Not Tested

S

Salicylic acid	GL	•	•	•
Sea water ²	H	•	•	•
Sea water ²	H	•	•	•
Silicic acid, aqueous ²	Any	•	•	•
Silicone emulsion ²	H	•	•	•
Silicone oil	TR	•	•	•
Silver acetate	GL	•	•	•
Silver cyanide	GL	•	•	•
Silver nitrate	GL	•	•	•
Soda (sodium carbonate) ²	50%	•	•	•
Sodium acetate ²	GL	•	•	•
Sodium benzoate	GL	•	•	•
Sodium benzoate, aqueous ²	35%	•	•	•
Sodium borate - hydrogen peroxide ² (sodium perborate)	GL	•	•	Not Tested
Sodium bromide	GL	•	•	•
Sodium carbonate	GL	•	•	•
Sodium chlorate	GL	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Sodium chloride (common salt)	GL	•	•	•
Sodium chlorite, aqueous ²	2 to 20%	•	Not Tested	Not Tested
Sodium cyanide	GL	•	•	•
Sodium dichromate ²	GL	•	•	•
Sodium fluoride	GL	•	•	•
Sodium hexacyanoferrate (II) (sodium ferrocyanide)	GL	•	•	•
Sodium hexacyanoferrate (III) (sodium ferricyanide)	GL	•	•	•
Sodium hydrogen carbonate (sodium bicarbonate)	GL	•	•	•
Sodium hydrogen sulphite (sodium bisulphite)	L	•	•	•
Sodium hydroxide, aqueous (caustic soda)	40%	•	•	•
Sodium hypochlorite (%15 available chlorine (bleaching liquor))	L	•	•	•
Sodium nitrate	GL	•	•	•
Sodium nitrite	GL	•	•	•
Sodium phosphate	GL	•	•	•
Sodium silicate (water glass) ²	L	•	•	•
Sodium sulphate	GL	•	•	•
Sodium sulphide	GL	•	•	•
Sodium tetraborate (borax)	GL	•	•	•
Sodium thiosulphate ²	GL	•	•	•
Soybean oil ²	TR	•	Not Tested	Not Tested
Spindle oil ²	TR	•	Not Tested	Not Tested
Spirits of ammonia (ammonia water)	GL	•	•	•
Spirits of every type ²	H	•	•	•
Spirits of turpentine ²	TR	Not Tested	Not Tested	Not Tested
Starch ²	any	•	•	•
Succinic acid ²	GL	•	•	•

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Sugar syrup ²	H	•	•	•
Sulfonyl chloride ² (sulfonyl chloride)	TR	Not Tested	Not Tested	Not Tested
Sulphur dioxide, gaseous	TR	•	•	•
Sulphur hydride, gaseous (hydrogen sulphide)	TR	•	•	•
Sulphur trioxide	TR	Not Tested	Not Tested	Not Tested
Sulphuric acid	98%	Not Tested	Not Tested	Not Tested
Sulphuric acid, aqueous	80%	•	•	•
Sulphuric acid, fuming	H	Not Tested	Not Tested	Not Tested
Sulphurous acid, aqueous	30%	•	•	•
T				
Tannic acid (tannin)	L	•	•	•
Tannin (tannic acid)	L	•	•	•
Tartaric acid	L	•	•	•
Tetrachloroethane ²	TR	Not Tested	Not Tested	Not Tested
Tetrachloroethene (perchloroethylene) ²	TR	Not Tested	Not Tested	-
Tetrachloromethane (Carbon tetrachloride)	TR	Not Tested	Not Tested	Not Tested
Tetrahydrofuran ²	TR	Not Tested	Not Tested	Not Tested
Tetrahydronaphthalene (tetralin) ²	TR	Not Tested	Not Tested	Not Tested
Thionyl chloride (sulphinyl chloride)	TR	Not Tested	Not Tested	Not Tested
Thiophene ²	TR	Not Tested	Not Tested	Not Tested
Tin (II) chloride	GL	•	•	•
Tin (IV) chloride	GL	•	•	•
Toluene	TR	Not Tested	Not Tested	Not Tested
Transformer oil (insulating oil) ²	TR	•	Not Tested	Not Tested
Trichloroacetic acid, aqueous	50%	•	•	•
Trichloroethylene (trichloroethene)	TR	Not Tested	Not Tested	Not Tested

Transported Medium	Fraction1	Behaviour at		
		°20C	°40C	°60C
Tricresyl phosphate (phosphoric acid tritoyl ester) ²	TR	•	•	•
Triethanolamine (2,'2,2''-nitrilotriethanol)	•	•	•	Not Tested
Trioctyl phosphate ²	TR	•	•	Not Tested

U V W

Urea	L	•	•	•
Urine		•	•	•
Vaseline oil ²	TR	•	Not Tested	Not Tested
Vinegar (wine vinegar) ²	H	•	•	•
Water	TR	•	•	•
Wine vinegar (edible vinegar)	H	•	•	•
Wines and spirits	H	•	•	•

X Y Z

Xylene	TR	Not Tested	Not Tested	Not Tested
Yeast	L	•	•	•
Zinc carbonate	GL	•	•	•
Zinc chloride	GL	•	•	•
Zinc oxide	GL	•	•	•
Zinc sulphate	GL	•	•	•
Sugar syrup ²	H	•	•	•

The following abbreviations are used for the composition of the transported materials:

- If there is no "(vol.)" annotation after the fraction specification, then the value refers to the mass fraction in % (previously wgt %).

VL: aqueous solution, whose mass fraction is < 10%.

L: aqueous solution, whose mass fraction is > 10%.

GL: saturated (at 20°C), aqueous solution.

TR: transported material is at least commercially pure.

H: commercially usual composition.

1) Volume fraction in % (previously vol. %); this is specially marked with "(vol.)".

The chemical resistance of pipes and pipeline components is generally not reduced for mass or volume fractions and temperatures lower than those given in the table.

2) This information on chemical resistance is not contained in ISO/TR 7474.

3) The chemical resistance is rated to be one group higher in ISO/TR 7474.

The reaction of pipes and pipeline parts with the transported media should be classified in the following groups:

Resistant

The pipe material is generally rated as suitable

Partially resistant

The suitability of the pipe material for the particular application is to be verified; further tests should be carried out if necessary

Not resistant

The pipe material is generally rated as unsuitable

-Information about the chemical resistance is not available

HDPE different Pipes Lines



3.1 HDPE Pipe Dimensions

Dimensions, weights and nominal pressures (PN) for HDPE(PE100) pipes according to DIN8074/8075, EN12201, ISO4427 & ES1832 standards

Pipe series (S)																												
Standard dimension ratio (SDR)																												
Nominal pressure(PN)																												
d _n	25		20		16		12.5		10.5		10		8.3		8		6.3		5		4		3.2		2.5		2	
	51		41		33		26		22		21		17.6		17		13.6		11		9		7.4		6		5	
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		
e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	e _n	Mass	
mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	mm	Kg/m	
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
63	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
180	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
250	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
280	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
450	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
500	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
560	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
630	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
710	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
800	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
900	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
1600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

*Compatible with all applications (Gas, fire fighting, cable ducting irrigation, water supply, drainage and industrial applications).

Dimensions, weights and nominal pressures (PN) for MDPE(PE80) pipes according to DIN 8074, DIN 8075, ISO 4427 & ES 1832 standards

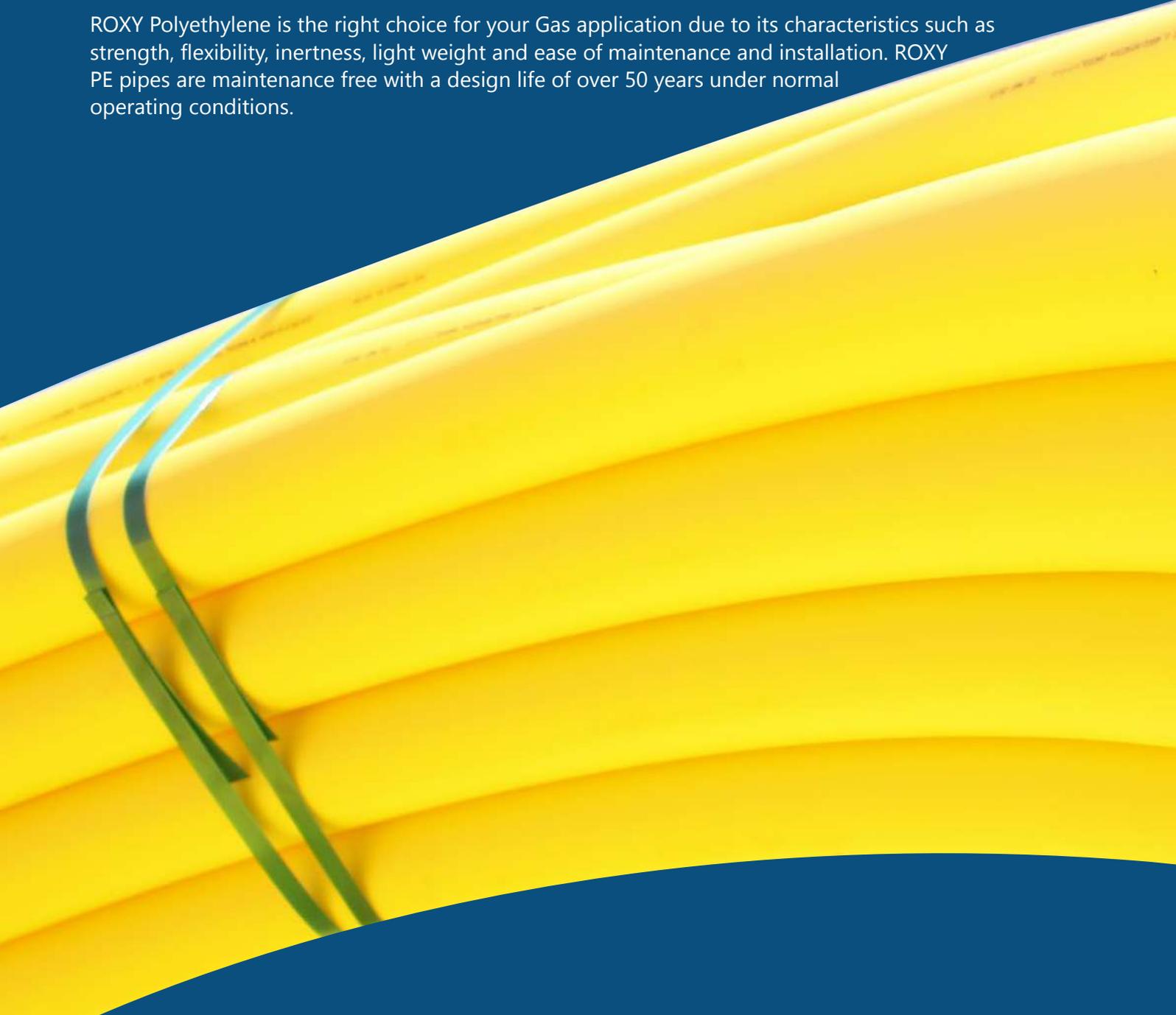
Pipe series (S)																														
25 20 16 12.5 10.5 10 8.3 8 6.3 5 4 3.2 2.5 2																														
Standard dimension ratio (SDR)																														
51 41 33 26 22 21 17.6 17 13.6 11 9 7.4 6 5																														
Nominal pressure(PN)																														
2.5 3.2 4.0 5.0 6.0 6.4 7.4 8.0 10.0 12.5 16.0 20.0 25.0 32.0																														
d _n	2.5		3.2		4.0		5.0		6.0		6.4		7.4		8.0		10.0		12.5		16.0		20.0		25.0		32.0			
	e _n mm	Mass Kg/m																												
10	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8	0.048	2.0	0.052	
12	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.8	0.060	2.0	0.065	2.4	0.075
16	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	0.092	2.3	0.103	3.0	0.125	3.3	0.135	-	-	
20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	0.118	2.3	0.134	3.0	0.164	3.4	0.182	4.1	0.209	-	-
25	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	0.151	2.3	0.173	3.0	0.202	3.5	0.243	4.2	0.281	5.1	0.323	-	-
32	-	-	-	-	-	-	-	-	-	-	-	2.0	0.198	2.0	0.198	2.4	0.235	3.0	0.282	3.6	0.331	4.4	0.390	5.4	0.458	6.5	0.525	-	-	
40	-	-	-	-	-	-	1.8	0.229	1.9	0.240	2.0	0.251	2.3	0.288	2.4	0.299	3.0	0.360	3.7	0.434	4.5	0.514	5.5	0.607	6.7	0.708	8.1	0.818	-	-
50	-	-	-	-	1.8	0.290	2.0	0.317	2.3	0.365	2.4	0.378	2.9	0.445	3.0	0.458	3.7	0.555	4.6	0.673	5.6	0.796	6.9	0.945	8.3	1.10	10.1	1.27	-	-
63	-	-	1.8	0.368	2.0	0.403	2.5	0.500	2.9	0.569	3.0	0.586	3.6	0.695	3.8	0.728	4.7	0.883	5.8	1.06	7.1	1.27	8.6	1.49	10.5	1.74	12.8	2.02	-	-
75	1.8	0.440	1.9	0.462	2.3	0.557	2.9	0.683	3.5	0.816	3.6	0.836	4.3	0.987	4.5	1.03	5.6	1.25	6.8	1.48	8.4	1.78	10.3	2.12	12.5	2.47	15.1	2.85	-	-
90	1.8	0.531	2.2	0.647	2.8	0.800	3.5	0.988	4.1	1.15	4.3	1.20	5.1	1.40	5.4	1.47	6.7	1.79	8.2	2.14	10.1	2.57	12.3	3.03	15.0	3.54	18.1	4.09	-	-
110	2.2	0.795	2.7	0.952	3.4	1.19	4.2	1.45	5.0	1.69	5.3	1.79	6.3	2.10	6.6	2.19	8.1	2.64	10.0	3.18	12.3	3.82	15.1	4.54	18.3	5.29	22.1	6.10	-	-
125	2.5	1.01	3.1	1.25	3.9	1.53	4.8	1.86	5.7	2.19	6.0	2.29	7.1	2.69	7.4	2.79	9.2	3.40	11.4	4.12	14.0	4.92	17.1	5.84	20.8	6.82	25.1	7.87	-	-
140	2.8	1.26	3.5	1.56	4.3	1.90	5.4	2.35	6.4	2.75	6.7	2.86	8.0	3.37	8.3	3.50	10.3	4.26	12.7	5.13	15.7	6.18	19.2	7.33	23.3	8.56	28.1	9.87	-	-
160	3.2	1.65	4.0	2.02	4.9	2.45	6.2	3.08	7.3	3.58	7.7	3.75	9.1	4.40	9.5	4.57	11.8	5.56	14.6	6.74	17.9	8.04	21.9	9.54	26.6	11.2	32.1	12.9	-	-
180	3.6	2.07	4.4	2.51	5.5	3.10	6.9	3.83	8.2	4.52	8.6	4.71	10.2	5.54	10.7	5.77	13.3	7.05	16.4	8.51	20.1	10.2	24.6	12.1	29.9	14.1	36.1	16.3	-	-
315	6.2	6.18	7.7	7.59	9.7	9.47	12.1	11.7	14.4	13.8	15.0	14.3	17.9	16.9	18.7	17.6	23.2	21.5	28.6	25.9	35.2	31.1	43.1	36.9	52.3	43.2	63.2	49.8	-	-
355	7.0	7.81	8.7	9.65	10.9	12.0	13.6	14.8	16.2	17.5	16.9	18.2	20.1	21.4	21.1	22.4	26.1	27.2	32.2	32.9	39.7	39.5	48.5	46.8	59.0	54.8	-	-	-	-
400	7.9	9.92	9.8	12.2	12.3	15.2	15.3	18.8	18.2	22.1	19.1	23.1	22.7	27.2	23.7	28.3	29.4	34.5	36.3	41.7	44.7	50.1	54.7	59.4	66.5	69.6	-	-	-	-
450	8.8	12.4	11.0	15.4	13.8	19.2	17.2	23.7	20.5	28.0	21.5	29.3	25.5	34.3	26.7	35.8	33.1	43.7	40.9	52.8	50.3	63.4	61.5	75.2	-	-	-	-	-	-
500	9.8	15.4	12.3	19.2	15.3	23.6	19.1	29.2	22.8	34.5	23.9	36.1	28.3	42.3	29.7	44.2	36.8	53.9	45.4	65.2	55.8	78.1	68.3	92.8	-	-	-	-	-	-
560	11.0	19.3	13.7	23.9	17.2	29.7	21.4	36.6	25.5	43.2	26.7	45.2	31.7	53.0	33.2	55.4	41.2	67.6	50.8	81.7	62.5	98.0	-	-	-	-	-	-	-	-
630	12.3	24.3	15.4	30.2	19.3	37.5	24.1	46.4	28.7	54.7	30.0	57.0	35.7	67.2	37.4	70.2	46.3	85.5	57.2	103	-	-	-	-	-	-	-	-	-	-
710	13.9	30.8	17.4	38.4	21.8	47.7	27.2	59.0	32.3	69.4	33.9	72.6	40.2	85.3	42.1	89.0	52.2	109	64.5	131	-	-	-	-	-	-	-	-	-	-
800	15.7	39.2	19.6	48.7	24.5	60.4	30.6	74.7	36.4	88.1	38.1	92.0	45.3	108	47.4	113	58.8	138	-	-	-	-	-	-	-	-	-	-	-	-
900	17.6	49.4	22.0	61.3	27.6	76.4	34.4	94.4	41.0	112	42.9	116	51.0	137	53.3	143	66.1	174	-	-	-	-	-	-	-	-	-	-	-	-
1000	19.6	61.1	24.5	75.9	30.6	94.1	38.2	117	45.5	138	47.7	144	56.6	169	59.3	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1200	23.5	87.9	29.4	109	36.7	135	45.9	168	54.6	198	57.2	207	68.0	243	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1400	27.4	120	34.3	149	42.9	184	53.5	230	63.7	160	66.7	281	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Compatible with special applications such as (Gas and drainage applications).

3.2 Gas Line

HDPE Pipe Technical Data as per GIS PL2 :

ROXY Polyethylene is the right choice for your Gas application due to its characteristics such as strength, flexibility, inertness, light weight and ease of maintenance and installation. ROXY PE pipes are maintenance free with a design life of over 50 years under normal operating conditions.



ROXY manufactures PE pipes for GAS service as per GIS PL2 standards which checks throughout the entire production process to ensure their reliability and effectiveness for gas transportation. The preferred series of pipes are SDR 11 and SDR 17.6 for gas applications.

Pipes are available in coils in order to reduce the number of joints to make a cost effective choice for contractors and clients. Pipes are also available in straight lengths of 12 meters. The jointing can be done by Butt-Fusion or Electro-Fusion methods, providing a completely homogeneous leak free system.

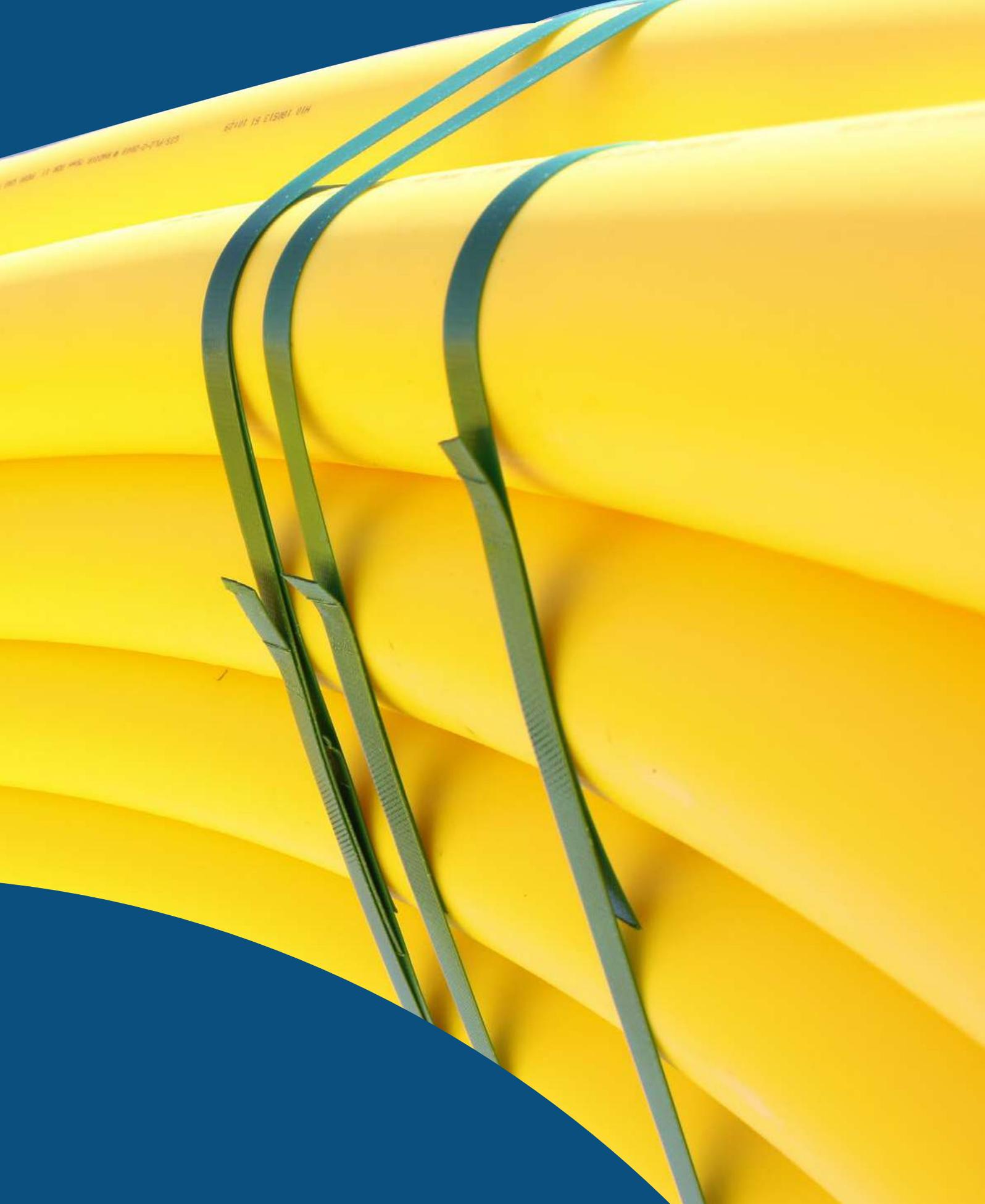


Table -3 Outside Diameter and Wall thicknesses of standard PE 80, Peelable and Multilayer Pipes

Dimensions In Millimeters										
Nominal outside diameter, dn	Mean outside diameter, dem		Wall thickness, e							
	Min.	Max.	SDR11		SDR 17.6		SDR21		SDR26	
			Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
16 a)	16	16.3	2.3	2.7	-	-	-	-	-	-
20 a)	20	20.3	2.3	2.7	-	-	-	-	-	-
25	25	25.3	2.3	2.7	-	-	-	-	-	-
32	32	32.3	3.0	3.4	-	-	-	-	-	-
40	40	40.4	3.7	4.2	-	-	-	-	-	-
50	50	50.4	4.6	5.2	2.9	3.3	-	-	-	-
55	55	55.4	5.1	5.8	-	-	-	-	-	-
63 b)	63	63.4	5.8	6.5	3.6	4.1	3.0	3.4	-	-
75 b)	75	75.5	6.8	7.6	4.3	4.9	3.6	4.1	-	-
90	90	90.6	8.2	9.2	5.2	5.9	4.3	4.9	-	-
110	110	110.7	10	11.1	6.3	7.1	5.2	5.9	-	-
125	125	125.8	11.4	12.7	7.1	8.0	6.0	6.7	-	-
140	140	140.9	12.7	14.1	8.0	8.9	6.7	7.5	5.4	6.1
160	160	161.0	-	-	9.1	10.1	7.6	8.5	6.2	7.0
180	180	181.1	16.4	18.2	10.3	11.5	8.6	9.6	7.0	7.8
200	200	201.2	18.2	20.2	11.4	12.7	9.5	10.6	7.7	8.6
213	213	214.3	-	-	-	-	10.1	11.2	8.2	9.2
225	225	226.4	-	-	12.8	14.2	10.7	11.9	8.6	9.6
250	250	251.5	22.7	25.1	14.2	15.8	11.9	13.2	9.6	10.7
268	268	269.6	-	-	-	-	-	-	10.3	11.5
280	280	281.7	25.4	28.1	15.9	17.6	13.3	14.8	10.7	11.9
315	315	316.9	28.6	31.6	17.9	19.8	15	16.6	12.1	13.5
355	355	357.2	32.3	35.7	20.2	22.4	16.9	18.7	13.7	15.2
400	400	402.4	36.4	40.2	22.8	25.2	19	21.0	15.4	17.1
450	450	452.7	40.9	45.1	25.6	28.3	21.4	23.7	17.3	19.2
469	469	471.8	-	-	-	-	22.3	24.7	-	-
500	500	503.0	45.5	50.2	28.4	31.4	23.8	26.3	19.2	21.3
560	560	563.4	50.9	56.1	31.9	35.2	26.7	29.5	21.5	23.9
630	630	633.8	57.3	63.2	35.8	39.5	30.0	33.1	24.2	26.8
710	710	716.4	64.5	71.1	40.3	44.5	33.9	37.4	27.2	30.1
800	800	807.2	72.6	80.0	45.4	50.1	38.1	42.1	30.6	33.8

Table 3 – outside diameter and Wall thicknesses of standard polyethylene Pipe (SDR11)

Dimensions In Millimeters				
Nominal outside diameter, dn	Mean outside diameter, dem		Wall thickness, e	
	Min	Max	Min	Max
16a	16	16.3	2.3	2.7
20a	20	20.3	2.3	2.7
25	25	25.3	2.3	2.7
32	32	32.3	3.0	3.4
40	40	40.4	3.7	4.2
50	50	50.4	4.6	5.2
55	55	55.4	5.1	5.8
63	63	63.4	5.8	6.5
75	75	75.5	6.8	7.6
90	90	90.6	8.2	9.2
110	110	110.7	10.0	11.1
125	125	125.8	11.4	12.7
140	140	140.9	12.7	14.1
180	180	181.1	16.4	18.2
200	200	201.2	18.2	20.2
250	250	251.5	22.7	25.1
280	280	281.7	25.4	28.1
315	315	316.9	28.6	31.6
355	355	357.2	32.3	35.7
400	400	402.7	36.4	40.2
450	450	452.7	40.9	45.1
500	500	503.0	45.5	50.2
560	560	563.4	50.9	56.1
630	630	633.8	57.3	63.2

3.3 Fire Line

HDPE Pipe Technical Data:

ROXY HDPE pipes are manufactured complying to ISO 4427 (metric)
 ROXY produce and supply segmented fittings as per ISO standard under stringent quality control. Our pipes and fittings are tested at each stage of production to comply with quality and standards.

PE 100 mm	SDR11 PN16		SDR9 PN20		SDR7.4 PN25	
	e-min mm	e-max mm	e-min mm	e-max mm	e-min mm	e-max mm
50	4.6	5.2	5.6	6.3	6.9	7.7
63	5.8	6.5	7.1	8.0	8.6	9.6
75	6.8	7.6	8.4	9.4	10.3	11.5
90	8.2	9.2	10.1	11.3	12.3	13.7
110	10.0	11.1	12.3	13.7	15.1	16.8
125	11.4	12.7	14.0	15.6	17.1	19.0
140	12.7	14.1	15.7	17.4	19.2	21.3
160	14.6	16.2	17.9	19.8	21.9	24.2
180	16.4	18.2	20.1	22.3	24.6	27.2
200	18.2	20.2	22.4	24.8	27.4	30.3
225	20.5	22.7	25.2	27.9	30.8	34.0
250	22.7	25.1	27.9	30.8	34.2	37.8
280	25.4	28.1	31.3	34.6	38.3	42.3
315	28.6	31.6	35.2	38.9	43.1	47.6
355	32.2	35.6	39.7	43.8	48.5	53.5
400	36.3	40.1	44.7	49.3	54.7	60.3
450	40.9	45.1	50.3	55.5	61.5	67.8
500	45.4	50.1	55.8	61.5	-	-
560	50.8	56.0	-	-	-	-
630	57.2	63.1	-	-	-	-

NOTE:

- For installation instructions please refer to our technical guidelines.
- Refer to FM1613 certificates for more details.
- Please contact us for more information.





Hydrant Installation:

Where local soil does not provide the needed support for the PE pipe, heavy thrust blocks or dense concrete mixes can sink. When a large thrust block sinks, it creates excessive bending moment and failure which must be avoided. Where good local soil conditions exist, no thrust block or special bedding is required. If local soil conditions support the use of geo-textile fabrics or stabilized soils offer another way to provide good proper support to pipe and fittings to prevent excessive bending should be used.



UNDERGROUND HDPE FIRE LINE CONNECTED TO ABOVE GROUND STEEL PIPE



3.4 Drainage Line

PE Pipe Technical Data

ROXY also provides an effective and economic alternative to cast iron and other traditional systems for drainage applications. The ROXY PE drainage system is a total solution for all types of drainage requirements, soil and waste include above and below ground, and chemical waste applications. The exceptional performance is the result of versatile characteristics of ROXY PE, which make the system fit for long term solution as compared to cast iron and other traditional systems. Its Corrosion resistance and ability to withstand in different temperature makes it suitable to use in chemical and greasy kitchen waste applications.

What makes ROXY PE Piping System a great alternative solution?

- ✓ Corrosion & Abrasion resistance
- ✓ Chemical resistance
- ✓ Impact resistance
- ✓ Heat Resistance
- ✓ Low weight, flexible and Easy to install
- ✓ Ideal for prefabrication and recyclable.

Areas of application

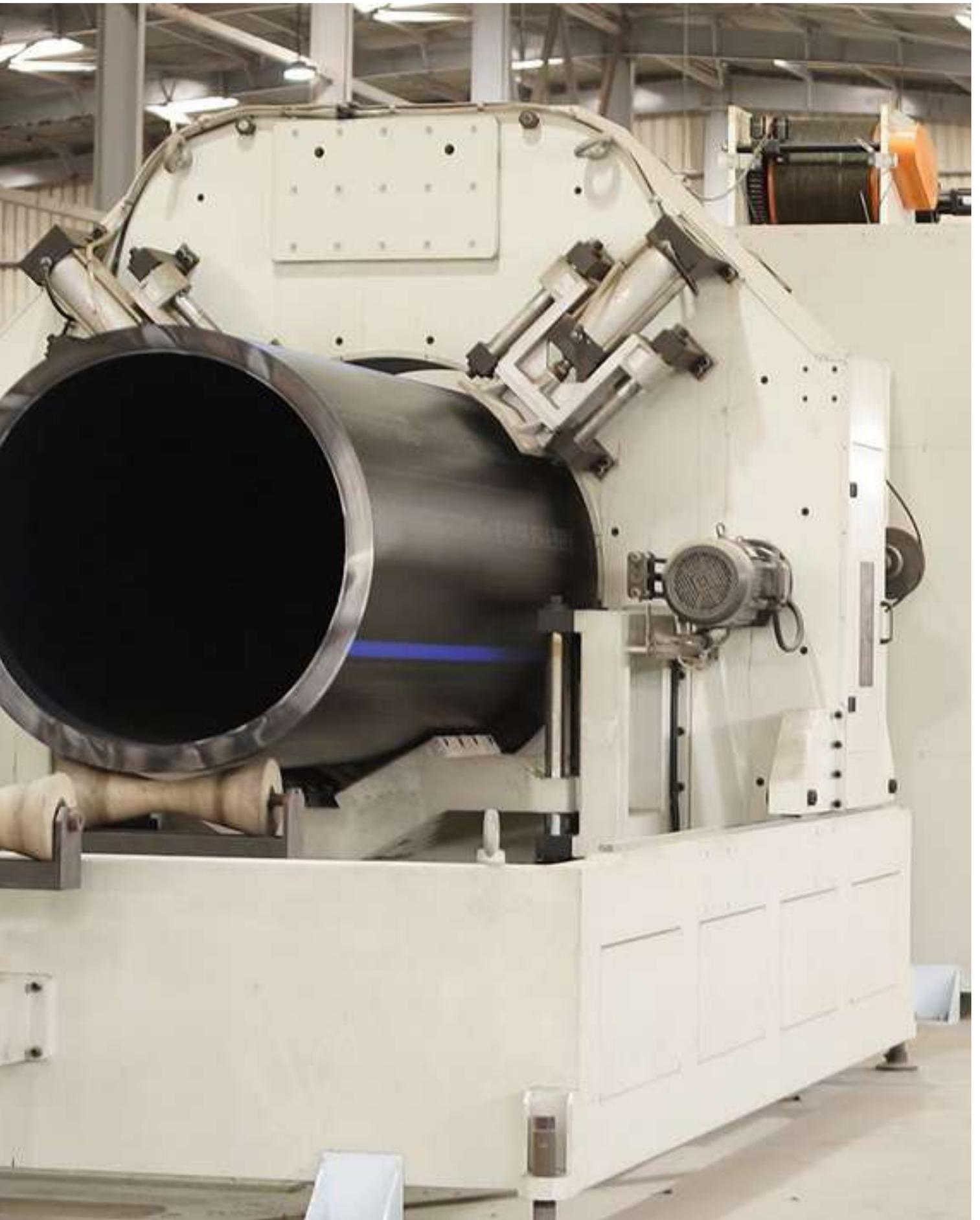
ROXY PE Drainage Pipe is suitable for Laboratories, Factories, Hotels and Domestic/ Commercial/Industrial buildings.

Standards

ROXY PE Drainage Pipe is suitable for Laboratories, Factories, Hotels and Domestic/ Commercial/Industrial buildings.

Dimensions of PE drainage pipes according to DIN 8074, DIN8075&BS EN 1519-1: SD-PEPD





PE Fittings

0

4



4. PE Fittings

Introduction:

ROXYPLAST produced a wide range of segmented/fabricated fittings from the main body of our pipes with the same pressure rating of the main pipe in accordance with German Standard DIN 8074/8075, EN12201, DIN 16963, EN 1519, EN1555 and ISO 4427.

4.1 HDPE PE 100 injection/ molded fittings

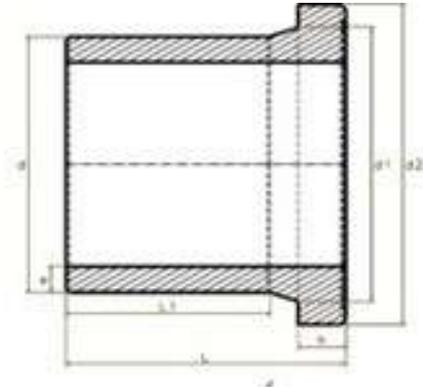
4.2 HDPE PE100 segmented / fabricated fittings

ROXYPLAST fittings are available in segmented. They are manufactured as per ISO standards which are applicable for fire, water & gas applications.



4.1 HDPE PE 100 injection/ molded fittings

INJECTION FLANGE ADAPTER (LONG TYPE) PE100 - SDR 11 - PN16



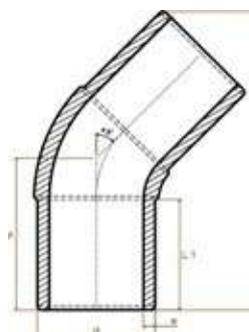
SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	L1 (MM)	H (MM)	D1 (MM)	D2 (MM)	E (MM)
1	971551102	25	PN16	88.40	62.55	11.10	31.64	59.75	2.70
2	971551103	32	PN16	85.20	57.40	10.80	39.75	67.70	3.20
3	972551104	40	PN16	84.86	58.00	13.30	46.55	74.60	4.04
4	972551105	50	PN16	85.68	52.40	16.14	56.25	82.53	5.00
5	972551106	63	PN16	106.00	68.00	16.00	70.70	100.00	6.50
6	972551107	75	PN16	107.30	77.64	20.70	89.30	117.95	7.60
7	972551109	90	PN16	123.60	92.00	20.33	106.00	136.40	9.20
8	972551111	110	PN16	136.90	94.00	19.00	123.00	153.10	11.10
9	972551112	125	PN16	149.00	117.00	26.24	136.00	155.50	12.50
10	972551114	140	PN16	137.70	94.00	26.30	143.50	184.90	14.10
11	972551116	160	PN16	175.26	127.30	29.80	171.50	211.50	16.20
12	972551118	180	PN16	136.90	165.95	28.60	191.12	213.00	17.35
13	972551120	200	PN16	194.00	140.30	33.00	218.20	264.20	18.70
14	972551122	225	PN16	188.10	138.10	36.80	234.00	268.00	21.20
15	972551125	250	PN16	192.22	136.20	34.60	272.00	320.00	24.80
16	972551128	280	PN16	181.20	132.10	36.70	287.00	319.00	26.23
17	972551131	315	PN16	201.60	147.70	40.70	330.00	370.00	24.80
18	972551135	355	PN16	212.40	149.80	46.55	368.00	418.00	33.25

**INJECTION 90 ° ELBOW
PE100 - SDR 11 - PN16**



SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	E (MM)
1	971101003	32	PN16	69.40	53.40	28.50	3.20
2	971101004	40	PN16	106.00	86.00	49.00	4.05
3	971101005	50	PN16	128.00	103.00	61.20	4.65
4	971101006	63	PN16	147.00	115.50	62.80	6.50
5	971101007	75	PN16	167.00	129.50	66.10	7.40
6	971101009	90	PN16	202.00	157.00	85.60	8.60
7	971101011	110	PN16	210.00	155.00	82.40	10.10
8	971101012	125	PN16	240.00	177.50	94.00	12.50
9	971101014	140	PN16	250.00	180.00	95.90	14.10
10	971101016	160	PN16	292.53	210.00	108.00	15.40
11	971101018	180	PN 16	310.00	220.00	108.80	16.60
12	971101020	200	PN16	347.00	247.00	121.00	19.42
13	971101022	225	PN16	378.00	265.00	124.00	21.60
14	971101025	250	PN16	400.00	275.00	127.00	22.80
15	971101028	280	PN16	435.17	295.17	120.00	26.00
16	971101031	315	PN16	50,500	34,750	15,170	30.00

**INJECTION 45 ° ELBOW
PE100 - SDR 11 - PN16**

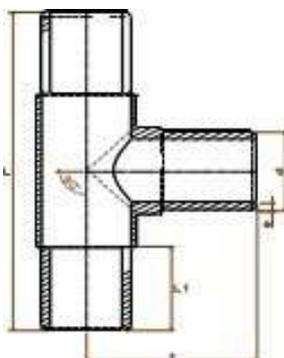


SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	E (MM)
1	971984503	32	PN16	102.37	53.34	40.40	3.10
2	971984504	40	PN16	132.85	69.54	50.10	3.80
3	971984505	50	PN16	152.30	78.86	58.00	5.15
4	971984506	63	PN16	188.30	97.26	68.60	5.80
5	971984507	75	PN16	190.00	95.77	70.00	6.80
6	971,984,509	90	PN16	226.00	113.75	83.00	8.45
7	971984511	110	PN16	255.00	126.59	84.00	10.10
8	971984512	125	PN16	265.00	129.35	87.00	11.70
9	971984514	140	PN16	294.00	143.23	95.20	12.80
10	971984516	160	PN16	330.00	160.17	105.00	14.70
11	971984518	180	PN16	345.00	164.82	110.00	17.40
12	971984520	200	PN16	380.00	181.18	117.00	19.00
13	971984522	225	PN16	400.00	187.72	123.00	21.00
14	971984525	250	PN16	443.00	207.73	133.76	25.00
15	971985528	280	PN16	427,71	187,03	120,00	25,50
16	971985531	315	PN16	508.79	232.80	151.70	30.00

**INJECTION 45 ° ELBOW
PE100 - SDR 11 - PN16**



**INJECTION EQUAL TEE
PE100 - SDR 11 - PN16**

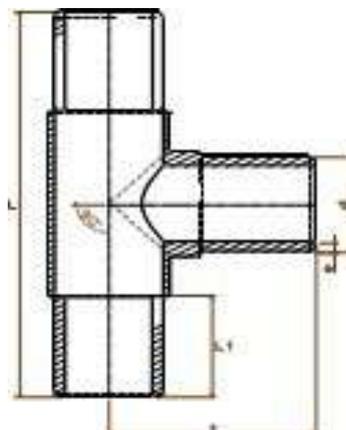


SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	E (MM)
1	973323003	32/32	PN16	173.00	80.00	45.00	3.00
2	973323004	40/40	PN16	186.00	96.30	53.00	4.05
3	973323005	50/50	PN16	214.00	111.20	60.30	4.80
4	973323006	63/63	PN16	247.00	121.90	65.00	6.37
5	973323007	75/75	PN16	277.30	133.30	69.80	7.40
6	973323009	90/90	PN16	288.70	148.00	80.00	9.20
7	973323011	110/110	PN16	343.00	165.90	89.50	10.20
8	973323012	125/125	PN16	374.00	192.50	100.90	12.60
9	973323014	140/140	PN16	358.00	182.00	93.00	13.20
10	972323016	160/160	PN16	485.00	214.00	109.10	14.65
11	972323018	180/180	PN16	515.00	232.00	113.96	16.50
12	973323020	200/200	PN16	505.00	243.00	122.30	18.70
13	973323022	225/225	PN16	533.00	251.50	121.70	20.60
14	973323025	250/250	PN16	583.00	284.00	132.45	23.20
15	973323028	280/280	PN16	590.00	290.00	136.80	25.50
16	973323031	315/315	PN16	715.00	337.50	152.65	31.20

**INJECTION EQUAL TEE
PE100 - SDR 11 - PN16**



INJECTION REDUCED TEE PE100 - SDR 11 - PN16



SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	L2 (MM)	E (MM)	E1 (MM)
1	971004032	40/32	PN16	185,70	115,66	54,90	54,90	4,10	3,00
2	971005032	50/32	PN16	214,00	118,00	60,00	55,70	4,70	3,00
3	971005040	50/40	PN16	214,00	124,30	57,80	58,50	4,90	4,00
4	971006325	63/25	PN16	279,00	153,15	101,10	79,10	6,40	2,70
5	971006332	63/32	PN16	243,00	136,60	62,80	54,00	6,20	3,10
6	971006340	63/40	PN17	247,47	137,20	65,25	56,40	6,30	4,00
7	971006350	63/50	PN16	239,60	143,90	62,40	57,10	6,30	4,70
8	971007532	75/32	PN16	272,50	149,55	67,55	50,00	7,50	3,40
9	971007540	75/40	PN16	276,80	158,50	69,00	60,90	7,60	4,10
10	971007550	75/50	PN16	272,30	163,40	68,00	63,00	7,50	5,20
11	971007563	75/63	PN16	277,25	164,60	69,00	68,00	7,60	6,63
12	971009025	90/25	PN16	283,40	154,40	76,30	36,60	9,10	2,70
13	971009032	90/32	PN16	239,80	162,00	82,70	50,00	9,20	3,40
14	971009040	90/40	PN16	290,00	161,90	80,00	46,00	9,00	4,20
15	971009050	90/50	PN16	288,00	169,00	78,40	58,14	9,20	5,20
16	971009063	90/63	PN16	286,00	180,00	77,30	69,00	9,10	6,30
17	971009075	90/75	PN16	286,00	180,00	70,70	70,00	9,20	7,20
18	971011032	110/32	PN16	348,00	195,00	90,00	68,00	11,10	3,20
19	971011040	110/40	PN16	342,00	185,00	89,10	56,60	10,00	4,10
20	971011050	110/50	PN16	352,00	193,00	92,95	61,00	10,10	5,10
21	971011063	110/63	PN16	340,00	199,00	89,25	68,60	10,20	6,40
22	971011075	110/75	PN16	342,00	206,60	88,80	79,55	10,30	7,50
23	971011090	110/90	PN16	340,00	214,40	88,00	80,34	10,50	8,60
24	971012532	125/32	PN16	365,00	229,40	93,85	53,30	12,70	3,90
25	971012550	125/50	PN16	368,00	229,40	111,50	78,35	12,60	4,40

INJECTION REDUCED TEE
PE100 - SDR 11 - PN16

SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	L2 (MM)	E (MM)	E1 (MM)
26	971012563	125/63	PN16	368.00	228.40	97.00	73.00	12.30	5.90
27	971012575	125/75	PN16	370.00	233.50	96.80	79.90	12.40	7.60
28	971012590	125/90	PN16	372.00	236.00	100.00	78.00	12.30	8.30
29	971125110	125/110	PN16	371.00	246.50	94.30	92.00	12.60	10.80
30	971014050	140/50	PN16	350.00	277.00	87.00	57.00	13.00	5.00
31	971014063	140/63	PN16	351.00	272.75	87.00	59.00	13.70	6.20
32	971014075	140/75	PN16	354.00	225.40	90.00	72.00	13.20	6.90
33	971014090	140/90	PN16	355.00	232.00	89.00	77.77	13.30	8.80
34	971140110	140/110	PN16	355.00	241.30	89.00	83.00	12.90	10.00
35	971140125	140/125	PN16	357.00	239.20	89.00	81.10	13.20	11.90
36	971016032	160/32	PN16	484.00	226.10	106.00	49.00	14.70	3.40
37	971016050	160/50	PN 16	480.00	276.50	106,85	62,35	14,60	5,20
38	971016063	160/63	PN 16	481.00	256.00	106,60	70,00	14,70	5,80
39	971016075	160/75	PN16	480.00	252.00	118,00	72,00	15,00	6,80
40	971016090	160/90	PN16	488.00	277.70	103.30	91.00	15.50	8.70
41	971160110	160/110	PN16	489.00	277.70	108.20	93.00	14.60	11.10
42	971160125	160/125	PN16	480.00	289.65	107.40	102.40	15.10	12.30
43	971160140	160/140	PN16	485.00	285.00	110.00	103.00	16.00	13.00
44	971018090	180/90	PN16	506.00	305.00	114.25	95.40	16.40	8.80
45	971180110	180/110	PN16	517.00	310.00	113.00	100.00	16.40	10.50
46	971180125	180/125	PN16	510.00	307.30	114.80	102.40	16.50	11.50
47	971180140	180/140	PN16	508.00	312.00	112.00	104.00	16.60	13.60
48	971180160	180/160	PN16	508.00	315.00	114.00	110.00	16.90	16.00
49	971020063	200/63	PN16	500.00	390.00	125.25	71.40	19.10	6.00
50	971020075	200/75	PN16	505.00	335.00	120.00	72.00	19.60	7.00
51	971020090	200/90	PN16	501.00	335.00	122.00	101.00	18.70	8.20
52	971200110	200/110	PN16	507.00	331.00	120.00	108.00	18.30	10.00
53	971200125	200/125	PN16	502.00	336.00	120.00	111.86	20.20	11.50
54	971200140	200/140	PN16	500.00	335.00	120.60	115.40	19.60	14.00
55	971200160	200/160	PN16	508.00	335.00	120.00	110.00	20.10	16.10
56	971200180	200/180	PN16	504.00	348.00	121.30	109.50	20.00	16.60
57	971022563	225/63	PN16	534.00	334.50	122.00	85.00	20.90	6.00
58	971022575	225/75	PN16	534.00	337.50	122.00	87.00	21.00	7.20
59	971022590	225/90	PN16	528.00	320.00	120.00	80.80	22.70	9.20
60	971225110	225/110	PN16	540.00	327.50	120.00	87.00	21.20	10.80

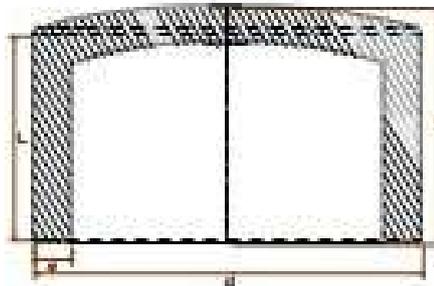
**INJECTION REDUCED TEE
PE100 - SDR 11 - PN16**

SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	L2 (MM)	E (MM)	E1 (MM)
61	971225125	225/125	PN16	528.00	330.00	121.45	91.00	20.50	11.40
62	971225140	225/140	PN16	532.00	349.22	123.23	108.80	20.60	12.90
63	971225160	225/160	PN16	530.00	360.00	120.30	110.00	20.60	15.00
64	971225180	225/180	PN16	538.00	358.50	120.00	112.00	22.70	16.40
65	971225200	225/200	PN16	538.00	360.00	121.55	114.60	20.80	18.60
66	971025090	250/90	PN16	573.00	350.00	134.50	84.70	22.90	8.30
67	971250110	250/110	PN16	575.00	352.00	130.95	90.30	23.20	11.00
68	971250125	250/125	PN16	570.00	365.00	130.00	85.00	24.00	12.10
69	971250140	250/140	PN16	575.00	378.00	131.80	110.00	23.20	13.00
70	971250160	250/160	PN16	570.00	390.00	130.00	110.00	24.10	14.80
71	971250180	250/180	PN16	577.00	400.00	130.00	137.10	24.36	16.60
72	971250200	250/200	PN16	573.00	390.00	130.00	107.65	24.24	18.60
73	971250225	250/225	PN16	570.00	385.00	130.00	114.00	22.70	21.40
74	971028090	280/90	PN16	420.00	383.00	115.00	85.00	25.90	9.00
75	971280110	280/110	PN16	430.00	405.00	114.30	92.20	27.20	10.30
76	971280125	280/125	PN16	428.00	390.00	116.00	90.00	27.10	12.00
77	971280140	280/140	PN16	417.00	390.00	114.00	93.00	26.00	13.40
78	971280160	280/160	PN16	422.00	410.00	114.60	101.50	25.63	16.10
79	971031590	315/90	PN16	485.00	447.50	144.50	115.00	30.00	9.10
80	971315110	315/110	PN16	484.00	447.00	143.65	117.65	28.67	11.10
81	971315125	315/125	PN16	495.00	445.00	110.00	105.00	29.00	12.30
82	971315140	315/140	PN16	483.00	450.00	150.00	120.00	30.20	13.60
83	971315160	315/160	PN16	703.00	482.00	148.30	125.30	30.00	14.75

**INJECTION REDUCED TEE
PE100 - SDR 11 - PN16**

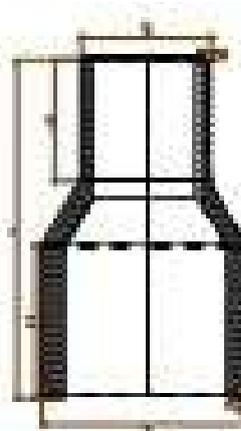


**INJECTION CAP
PE100 - SDR 11 - PN16**



SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	Z (MM)	L (MM)	E (MM)
1	973312002	20	PN16	39.95	36.95	2.30
2	973312002	25	PN16	47.75	43.75	2.70
3	974312003	32	PN16	44.50	37.75	3.40
4	974312004	40	PN16	49.00	42.10	4.20
5	974312005	50	PN16	60.00	54.00	4.60
6	974312006	63	PN16	67.50	64.00	6.50
7	974312007	75	PN16	66.00	63.00	7.30
8	974312009	90	PN16	81.00	77.00	8.80
9	974312011	110	PN16	87.40	77.50	10.20
10	974312012	125	PN16	110.00	100.00	12.20
11	974312014	140	PN16	115.00	106.55	13.20
12	974312016	160	PN16	120.00	106.50	14.60
13	974312018	180	PN16	133.00	119.20	16.40
14	974312020	200	PN16	130.00	118.14	19.30
15	974312022	225	PN16	148.00	137.35	22.70
16	974312025	250	PN16	137.00	129.30	25.00
17	974312028	280	PN16	143.00	139.00	27.20
18	974312031	315	PN16	101.20	93.20	30.20
19	974312035	355	PN16	110.00	90.60	35.60
20	974312040	400	PN16	110.00	98.00	40.00
21	974312050	500	PN16	135.00	111.00	50.10

INJECTION REDUCER PE100 - SDR 11 - PN16



SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	L2 (MM)	E (MM)
1	975604032	40/32	PN16	89,90	42,00	34,09	4,20	3,40
2	975605032	50/32	PN16	110,53	52,28	48,00	5,00	3,40
3	975605040	50/40	PN16	115,80	62,00	49,00	5,20	4,00
4	975606332	63/32	PN16	125,00	63,00	40,00	6,50	3,40
5	975606340	63/40	PN16	134,55	71,07	42,00	6,50	4,15
6	975606350	63/50	PN16	150,20	69,80	63,76	6,50	5,10
7	975607532	75/32	PN16	152,00	74,00	52,00	7,60	3,40
8	975607540	75/40	PN16	152,00	74,00	56,00	7,60	4,20
9	975607550	75/50	PN16	149,80	75,00	58,50	7,60	5,20
10	975607563	75/63	PN16	158,60	80,36	64,15	7,60	5,80
11	975609032	90/32	PN16	152,60	80,00	48,00	9,20	3,40
12	975609040	90/40	PN16	150,00	71,80	56,20	9,20	4,00
13	975609050	90/50	PN16	160,50	80,44	61,40	9,20	5,00
14	975609063	90/63	PN16	167,00	83,00	68,00	9,20	6,20
15	975609075	90/75	PN16	164,60	85,60	72,00	9,20	7,60
16	976611032	110/32	PN16	174,44	86,40	50,90	11,10	3,20
17	975611040	110/40	PN16	176,00	85,60	57,00	11,10	4,08
18	975611050	110/50	PN16	183,30	92,00	59,50	11,10	5,20
19	975611063	110/63	PN16	186,45	90,20	64,00	11,10	6,00
20	975611075	110/75	PN16	187,60	86,70	69,00	11,10	7,60
21	975611090	110/90	PN16	186,00	83,30	80,50	11,10	9,20
22	975612575	125/75	PN16	194,00	105,45	62,00	11,40	6,80
23	975612590	125/90	PN16	181,00	80,70	77,75	11,60	9,20
24	9756115110	125/110	PN16	195,80	89,00	88,60	12,38	11,00
25	975614090	140/90	PN16	216,00	109,50	76,50	14,00	8,90

INJECTION REDUCER
PE100 - SDR 11 - PN16

SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	L2 (MM)	E (MM)
26	975690110	140/110	PN16	220.30	114.00	89.20	13.80	10.70
27	975690125	140/125	PN16	216.44	108.90	99.44	13.00	11.40
28	975616063	160/63	PN16	230.80	110.00	69.60	14.80	6.00
29	975616075	160/75	PN16	230.70	111.35	69.35	14.80	7.60
30	975616090	160/90	PN16	252.36	109.90	95.10	15.70	9.20
31	975689110	160/110	PN16	224.90	102.70	83.90	15.00	11.10
32	975689125	160/125	PN16	245.20	117.20	100.80	15.30	12.60
33	975689140	160/140	PN16	235.60	114.00	102.00	14.60	14.00
34	975618090	180/90	PN16	281.00	129.60	81.70	18.00	9.10
35	975688110	180/110	PN16	252.70	118.00	99.00	18.00	10.80
36	975688125	180/125	PN16	278.40	130.45	94.00	18.20	12.60
37	975688140	180/140	PN16	253.10	121.84	111.60	18.20	14.10
38	975688160	180/160	PN16	251.70	116.80	100.44	17.52	14.60
39	975620090	200/90	PN16	278.56	125.90	98.00	20.20	8.70
40	975699110	200/110	PN16	283.26	131.24	101.30	20.20	10.80
41	975699125	200/125	PN16	281.60	126.40	100.80	20.20	11.50
42	975699140	200/140	PN16	287.00	128.00	113.00	20.20	12.80
43	975699160	200/160	PN16	274.00	127.87	111.00	20.20	15.20
44	975699180	200/180	PN16	278.75	135.76	104.50	19.30	18.00
45	975698110	225/110	PN16	290.60	145.85	100.45	21.20	10.80
46	975698125	225/125	PN16	306.45	151.20	111.00	20.60	12.70
47	975698140	225/140	PN16	301.40	153.20	102.70	21.60	14.10
48	975698160	225/160	PN16	300.00	151.00	106.00	21.50	15.80
49	975698180	225/180	PN16	299.00	150.83	108.90	22.70	16.40
50	975698200	225/200	PN16	302.70	155.10	118.00	20.70	20.50
51	975697110	250/110	PN16	276.40	96.40	114.00	23.20	11.00
52	975697125	250/125	PN16	265.00	95.00	114.00	23.00	12.10
53	975697140	250/140	PN16	267.67	89.12	108.20	23.50	12.90
54	975697160	250/160	PN16	272.00	96.27	111.50	22.70	14.90
55	975697180	250/180	PN16	273.00	96.50	113.80	22.70	16.60
56	975697200	250/200	PN16	263.80	93.70	105.60	22.90	19.00
57	975697225	250/225	PN16	262.80	104.70	115	22.70	21.40
58	975696110	280/110	PN16	204.00	72.00	64.00	27.20	10.30
59	975696125	280/125	PN16	180.00	70.00	65.00	27.00	12.10
60	975696160	280/160	PN16	184.20	70.55	68.20	26.25	14.60

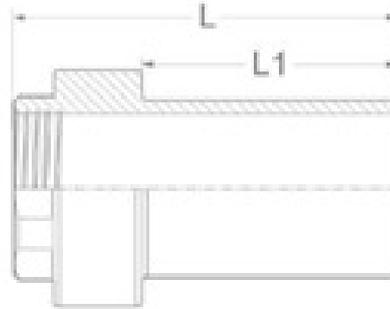
INJECTION REDUCER PE100 - SDR 11 - PN16

SEQ	PRODUCT CODE	SIZE D (MM)	PRESSURE (BAR)	L (MM)	Z (MM)	L1 (MM)	L2 (MM)	E (MM)
61	975696180	280/180	PN16	186.00	73.60	71.30	27.20	17.00
62	975696200	280/200	PN16	181.00	74.00	77.00	28.00	18.20
63	975696225	280/225	PN16	174.60	73.00	71.40	26.50	20.50
64	975696250	280/250	PN16	181.00	73.80	82.00	27.50	25.00
65	975695160	315/160	PN16	235.00	87.50	104.70	30.00	14.75
66	975695200	315/200	PN16	221.40	85.97	86.26	29.25	18.90
67	975695225	315/225	PN16	220.00	85.60	86.50	30.00	21.00
68	975695250	315/250	PN16	214.20	86.20	89.00	30.00	23.00
69	975695280	315/280	PN16	206.00	79.55	92.50	29.20	25.50
70	975694200	355/200	PN16	240.00	88.40	75.00	35.30	18.60
71	975694225	355/225	PN16	240.70	88.80	81.80	33.90	21.20
72	975694250	355/250	PN16	238.24	92.00	76.40	33.30	23.00
73	975694280	355/280	PN16	229.00	96.00	74.00	33.30	26.50
74	975694315	355/315	PN16	115.50	36.24	68.34	32.20	31.00
75	975693280	400/280	PN16	192.00	85.00	54.30	36.80	25.40
76	975693315	400/315	PN16	193.10	90.57	65.00	36.60	29.60
77	975693355	400/355	PN16	190.50	90.20	77.20	36.93	32.70
78	975692250	450/250	PN16	257.00	102.90	87.50	41.50	22.70
79	975692280	450/280	PN16	260.00	104.16	91.10	42.60	26.10
80	975692315	450/315	PN16	220.30	87.40	67.20	42.30	29.30
81	975692355	450/355	PN16	252.00	107.25	90.30	41.00	33.40
82	975692400	450/400	PN16	241.88	96.80	99.90	42.30	36.40
83	975691315	500/315	PN16	233.00	77.45	67.70	46.50	30.00
84	975690500	560/500	PN16	400.00	150.00	150.00	51.00	45.20
85	975689560	630/560	PN16	400.00	150.00	150.00	57.00	50.40
86	975688630	710/630	PN16	160.00	40.00	50.00	64.20	56.80
87	975687710	800/710	PN16	150.00	60.00	60.00	72.50	64.60

INJECTION REDUCER PE100 - SDR 11 - PN16



**PE-BRASS TRANSITION
PE100 - SDR 11 - PN16**

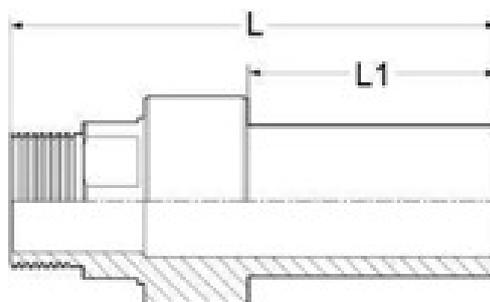


SEQ	PRODUCT CODE	SIZE D (MM)	L (MM)	L1 (MM)
1	977443032	32/1	75.00	40.00
2	977443432	32/*4	75.00	40.00
3	977443040	40/1X	80.00	45.00
4	977443050	50/112	90.00	60.00
5	977443063	63/2	115.00	73.00

**PE-BRASS TRANSITION
PE100 - SDR 11 - PN16**



**PE-BRASS TRANSITION
PE100 - SDR 11 - PN16**



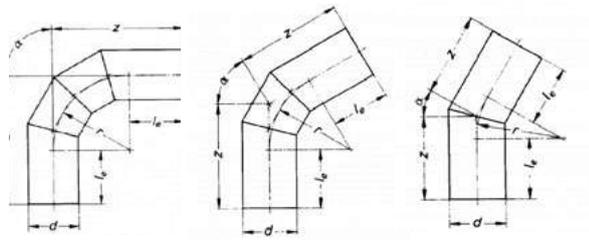
SEQ	PRODUCT CODE	SIZE D (MM)	L (MM)	L1 (MM)
1	977433032	32/1	95.00	47.00
2	977433432	32/3/4	95.00	47.00
3	977433040	40/1 1/4	95.00	47.00
4	977433050	50/1 1/2	110.00	57.00
5	977433063	63/2	135.00	65.00

**PE-BRASS TRANSITION
PE100 - SDR 11 - PN16**



4.2 Segmented Fittings

Segmented Elbow 90°, 60°, 45° and 30°



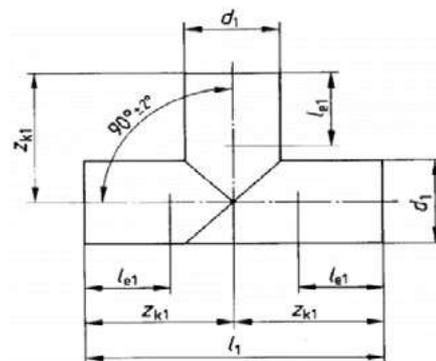
OD(mm)	L_e (mm) min.	r(mm) r=1.5 d	90° ±2 z (mm) min.	60° ±2 z (mm) min.	45° ±2 z (mm) min.	30° ±2 z (mm) min.
110	150	165	315	245	218	194
125	150	188	338	258	228	200
140	150	210	360	271	237	206
160	150	240	390	288	249	214
180	150	170	420	305	262	222
200	150	300	450	323	274	230
225	150	338	488	345	290	241
250	250	375	625	466	412	350
280	250	420	670	492	424	362
315	300	473	773	576	498	428
355	300	533	833	608	520	443
400	300	600	900	646	548	461
450	300	675	975	689	580	481
500	350	750	1100	783	665	551
560	350	840	1190	835	698	575
630	350	945	1295	896	741	603
710	350	1065	1415	965	792	636
800	350	1200	1550	1043	847	672
900	400	1350	1750	1179	960	762
1000	400	1500	1900	1266	1022	802

NOTE:

- All SDR's are available as we manufacture these from our main pipe.



Segmented Equal Tee 90°



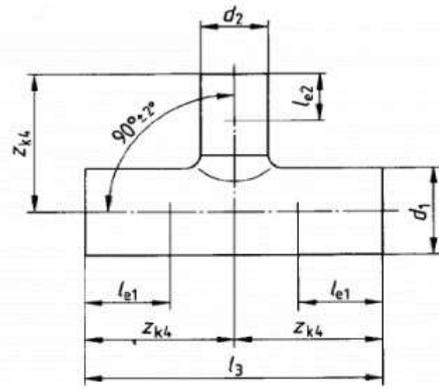
d ₁ (mm)	L _{e1} (mm) min.	90	
		L ₁ (mm) min.	ZK ₁ (mm) min.
110	150	410	205
125	150	430	215
140	150	440	220
160	150	460	230
180	150	480	240
200	150	500	250
225	150	530	265
250	250	750	375
280	250	780	390
315	300	920	460
355	300	960	480
400	300	1000	500
450	300	1050	525
500	350	1200	600
560	350	1260	630
630	350	1330	665
710	350	1410	705
800	350	1500	750
900	400	1700	850
1000	400	1800	900
1200	400	2000	1000

NOTE:

-All SDR's are available as we manufacture these from our main pipe.



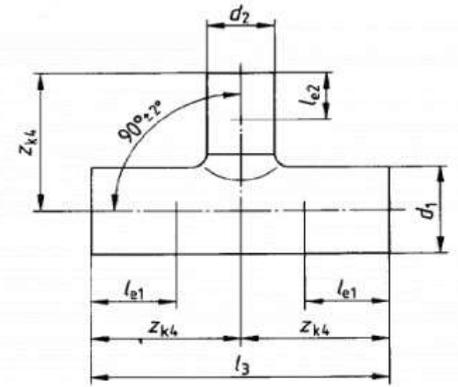
Segmented Reduced Tee 90°



d_1 (mm)	d_2 (mm)	L_{e1} (mm) min.	L_{e2} (mm) min.	L_{e3} (mm) min.	ZK_4 (mm) min.
160	50	150	150	520	160
160	63	150	150	520	160
160	75	150	150	520	160
160	90	150	150	520	160
160	110	150	150	520	160
180	63	150	150	560	280
180	75	150	150	560	280
180	90	150	150	560	280
180	110	150	150	560	280
180	125	150	150	560	280
200	63	150	150	600	300
200	75	150	150	600	300
200	90	150	150	600	300
200	110	150	150	600	300
200	125	150	150	600	300
200	140	150	150	600	300
225	75	150	150	650	325
225	90	150	150	650	325
225	110	150	150	650	325
225	125	150	150	650	325
225	140	150	150	650	325
225	160	150	150	650	325
250	75	250	150	700	350
250	90	250	150	700	350
250	110	250	150	700	350
250	125	250	150	700	350
250	140	250	150	700	350
250	160	250	150	700	350
250	180	250	150	700	350

d_1 (mm)	d_2 (mm)	L_{e1} (mm) min.	L_{e2} (mm) min.	L_{e3} (mm) min.	ZK_4 (mm) min.
280	90	250	150	760	380
280	110	250	150	760	380
280	125	250	150	760	380
280	140	250	150	760	380
280	160	250	150	760	380
280	180	250	150	760	380
280	200	250	150	760	380
315	110	300	150	830	415
315	125	300	150	830	415
315	140	300	150	830	415
315	160	300	150	830	415
315	180	300	150	830	415
315	200	300	150	830	415
315	225	300	150	830	415
355	110	300	150	920	460
355	125	300	150	920	460
355	140	300	150	920	460
355	160	300	150	920	460
355	180	300	150	920	460
355	200	300	150	920	460
355	225	300	150	920	460
355	250	300	250	920	460
400	125	300	150	1000	500
400	140	300	150	1000	500
400	160	300	150	1000	500
400	180	300	150	1000	500
400	200	300	150	1000	500
400	225	300	150	1000	500
400	250	300	250	1000	500
400	280	300	250	1000	500

d_1 (mm)	d_2 (mm)	L_{e1} (mm) min.	L_{e2} (mm) min.	L_{e3} (mm) min.	ZK_4 (mm) min.
450	140	300	150	1100	550
450	160	300	150	1100	550
450	180	300	150	1100	550
450	200	300	150	1100	550
450	225	300	150	1100	550
450	250	300	250	1100	550
450	280	300	250	1100	550
450	315	300	300	1100	550
500	160	350	150	1200	600
500	180	350	150	1200	600
500	200	350	150	1200	600
500	225	350	150	1200	600
500	250	350	250	1200	600
500	280	350	250	1200	600
500	315	350	300	1200	600
500	355	350	300	1200	600
560	180	350	150	1320	660
560	200	350	150	1320	660
560	225	350	150	1320	660
560	250	350	250	1320	660
560	280	350	250	1320	660
560	315	350	300	1320	660
560	355	350	300	1320	660
560	400	350	300	1320	660
630	200	350	150	1460	730
630	225	350	150	1460	730
630	250	350	250	1460	730
630	280	350	250	1460	730
630	315	350	300	1460	730
630	355	350	300	1460	730
630	400	350	300	1460	730
630	450	350	300	1460	730

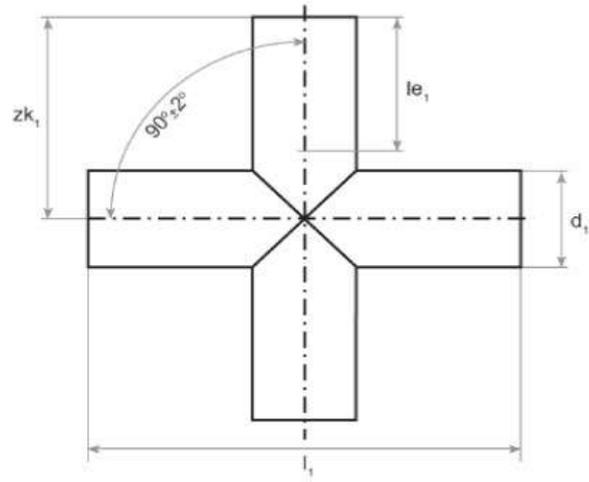


NOTE:

-All SDR's are available as we manufacture these from our main pipe.



Segmented Cross Tee 90°



d_1 (mm)	L_{e1} (mm) min.	L_1 (mm) min.	ZK_1 (mm) min.
110	150	410	205
125	150	430	215
140	150	440	220
160	150	460	230
180	150	480	240
200	150	500	250
225	150	530	265
250	250	750	375
280	250	780	390
315	300	920	460
355	300	960	480
400	300	1000	500
450	300	1050	525
500	350	1200	600
560	350	1260	630
630	350	1330	665
710	350	1410	705
800	350	1500	750

NOTE:

-All SDR's are available as we manufacture these from our main pipe.





Manufacturing Process



6. Manufacturing Process:

ROXYPLAST manufactures Polyethylene Pipes and **Fittings** with a combination of advanced technologies, tested and proven materials and efficient factory production techniques. The facilities are equipped with state of the art technologies, operated by a team of highly skilled personnel.

The manufacturing facilities are being inspected on an ongoing basis, and passes both scheduled and unscheduled inspections. Strict Quality Control procedures are conducted on a routine basis through the entire production cycle from the inspection of the raw materials to the storage of the finished goods to ensure products compliance with the relevant standards.

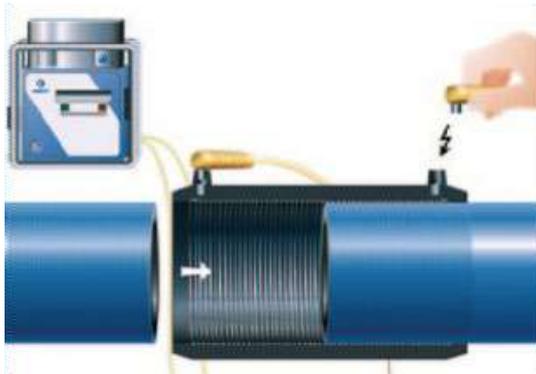
ROXY's high-tech laboratory consists of modern calibrated machines to meet stringent quality standards.

ROXY facilities are equipped with latest tools and technologies which can handle all the related processes of strict quality control which are routinely conducted throughout the production process from the inspection of raw materials to the finished goods. Rigorous quality control procedures are carried throughout the manufacturing process from bringing in the raw material to the delivery & storage of finish products.

Apart from the manufacturing process, ROXY also provides on-site engineering, technical and installation assistance

6.1 Electrofusion Welding Procedure

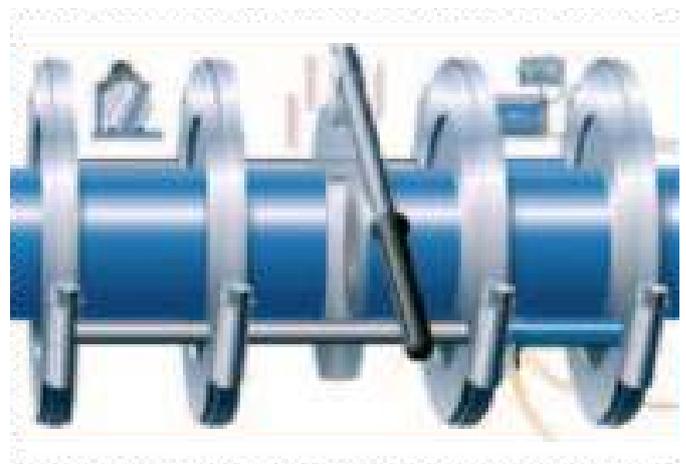
The requirements of DVS Guideline 2207 Part 1 apply for electrofusion welding. The circularity of the pipes is to be ensured using re-rounding clamps if necessary. Ovality up to a maximum of 1.5% of the outer diameter is permitted. In electrofusion, fittings equipped with resistance wires are used for joining. Pipe and fitting are welded together by applying a defined current for a defined time. The welding pressure is generated in the process through the design of the fitting. The manufacturers of the fittings specify the welding parameters. The nominal diameter of the pipe must be existent in the electrofusion area. The welding area is cleaned with lint-free, non-colouring paper and PE cleaning agent. The insertion depth of the fitting is marked on the surface of the pipe, the pipe ends chamfered, and the surface of the pipe in the area of the welding zone machined. After the fitting has been cleaned, the insertion depth is transferred to the pipe for checking purposes, without touching the grease-free surface. The fitting is put on, connected to the contacts of the welding unit, and welded. Misunderstandings are avoided by labelling the weld with the date and the end of the cooling-off period.



6.2 Butt Fusion Welding Procedure

The maximum permissible misalignment of the piping to be welded together in accordance with DVS 2207 Part 1 amounts to less than 10% of the wall thickness. If necessary, the circularity of the pipes is to be ensured using rerounding clamps.

Ovality up to a maximum of 1.5% of the outer diameter is permitted. Specifications regarding the maximally permissible gap widths according to DVS 2207-1 can be found in Table 1-7.





OD ≤ 355 mm	gap widths ≤ 0.5 mm
400 mm ≤ OD < 630 mm	gap widths ≤ 1.0 mm
630 mm ≤ OD < 800 mm	gap widths ≤ 1.3 mm
800 mm ≤ OD ≤ 1000 mm	gap widths ≤ 1.5 mm
OD > 1000 mm	gap widths ≤ 2.0 mm

ab 1-7: Maximally permissible gap widths in accordance with DVS 2207 Part 1

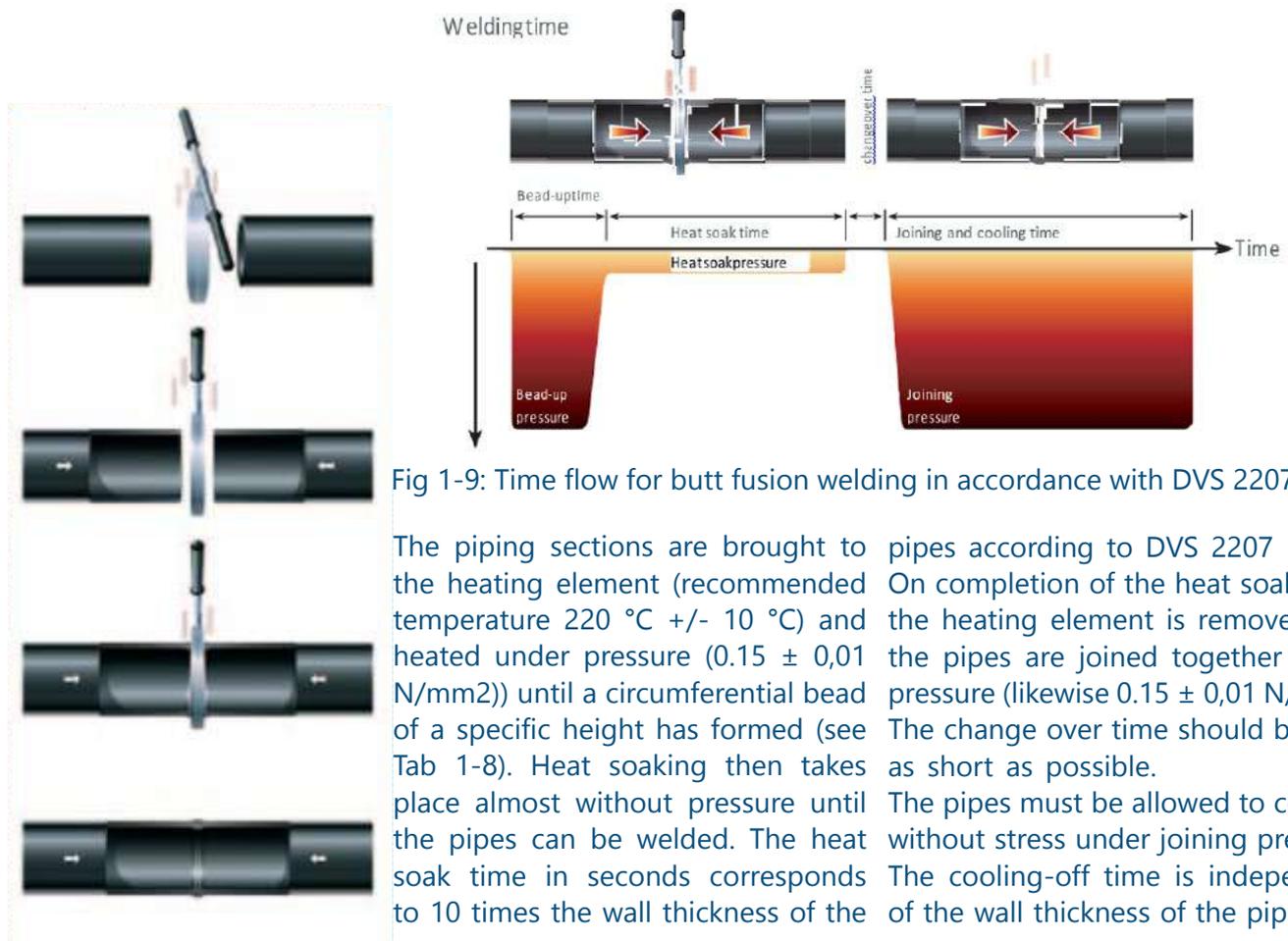


Fig 1-9: Time flow for butt fusion welding in accordance with DVS 2207 Part 1

The piping sections are brought to the heating element (recommended temperature 220 °C +/- 10 °C) and heated under pressure (0.15 ± 0,01 N/mm²) until a circumferential bead of a specific height has formed (see Tab 1-8). Heat soaking then takes place almost without pressure until the pipes can be welded. The heat soak time in seconds corresponds to 10 times the wall thickness of the

pipes according to DVS 2207 Part 1. On completion of the heat soak time, the heating element is removed and the pipes are joined together under pressure (likewise 0.15 ± 0,01 N/mm²). The change over time should be kept as short as possible.

The pipes must be allowed to cool off without stress under joining pressure. The cooling-off time is independent of the wall thickness of the piping.

Guideline values for butt welding of piping and pipeline parts made of HDPE at moderate air movement

Nominal wall thickness s	Bead-Up Bead Height at Heating Element at End of Bead-Up Time (Bead-Up under 0.15 N/mm ² +/- 0.01)	Heat Soaking Heat Soak Time = 10 x Wall Thickness (Heat Soaking p ≤ 0.01 N/mm ²)	Changeover Maximum Time	Joining	Cooling-Off Time under Joining Pressure p = 0.15 ± 0,01 N/mm ²
	Minimum Values			Joining Pressure Build-Up Time s	Minimum Values
mm	mm	Seconds	Seconds	Seconds	Minutes
up to 4.5	0.5	up to 45	5	5	see table 9-1
4.5...7	1.0	45...70	5...6	5...6	
7...12	1.5	70...120	6...8	6...8	
12...19	2.0	120...190	8...10	8...11	
19...26	2.5	190...260	10...12	11...14	
26...37	3.0	260...370	12...16	14...19	
37...50	3.5	370...500	16...20	19...25	
50...70	4.0	500...700	20...25	25...35	
70...90	4.5	700...900	25...30	35	
90...110	5.0	900...1100	30...35	35	
110...130	5.5	1100...1300	max. 35	35	

Cooling-off times of pipes and pipeline parts made of HDPE dependent upon the ambient temperature

Nominal wall thickness s [mm]	Cooling-off time (minimal values) under joining pressure p = 0.15 ± 0,01 N/mm ² depending on the ambient temperature [min]		
	up to 15 °C	15 °C ... 25 °C	25 °C ... 40 °C
up to 4.5	4.0	5.0	6.5
4.5...7	4.0...6.0	5.0...7.5	6.5...9.5
7...12	6.0...9.5	7.5...12	9.5...15.5
12...19	9.5...14	12...18	15.5...24
19...26	14...19	18...24	24...32
26...37	19...27	24...34	32...45
37...50	27...36	34...46	45...61
50...70	36...50	46...64	61...85
70...90	50...64	64...82	85...109
90...110	64...78	82...100	109...133
110...130	78...92	100...118	133...157

A blue-tinted photograph of a construction site. In the foreground, several workers wearing hard hats and safety vests are working in a trench. In the background, a large piece of heavy machinery, possibly a drilling rig or a crane, is visible. The scene is dimly lit, suggesting dusk or dawn. The image is overlaid with a large white graphic element on the right side, consisting of a horizontal bar and a large number '7' shape.

Installation methods

7. Installation methods

7.1 Open trench installation in a sand bed

When installation takes place using an open trench construction method with sand bed, the pipeline zone is precisely defined and the pipe is laid in a protective sand bed. The surface levels must then be restored.

DIN 4124 "Excavations and trenches" applies among other things with respect to execution of the pipe trench, and precisely stipulates how the working space width and shoring are to be achieved. The pipe must be free from scoring and scratches; the ground surrounding the pipe is then prepared so that the pressurebearing medium pipe is protected from external influences. DIN EN 805 and the DVGW directive W 400-2 prescribe embedding the pipe in sand or fine gravel.

DVGW Code of Practice W 400-2 permits maximum particle sizes of 22 mm for rounded material and up to 11 mm for a mix of crushed sand and stone chippings. Their construction therefore excludes point loads and linear loads to the pipeline.

Open trench installation in a sand bed

when installation takes place using an open trench construction method without sand bed the pipe is directly laid in pipe trenches. The surface levels must then be restored.

Growing cost pressures force several utility companies to question whether the time-consuming embedding of the new pipeline in sand is necessary. If the excavated soil can be compressed it may be used as backfill material instead of sand.

The prerequisite for these installation conditions is a pipe system that is capable of withstanding the increased strain arising here. Dispensing with the sand bed may result in stones causing point loads or linear loads to the pipe over a larger period of time, which is in addition to the operating strains such as internal pressure, soil or traffic strain.

If the protection of a sand bed is dispensed with, the selected pipe system must be able to withstand the typical surface damage caused by scratches and in particular point loads so that these do not lead to stress cracks.

One of the main advantages is the cost reduction because soil replacement in the area of the embedment is not necessary.

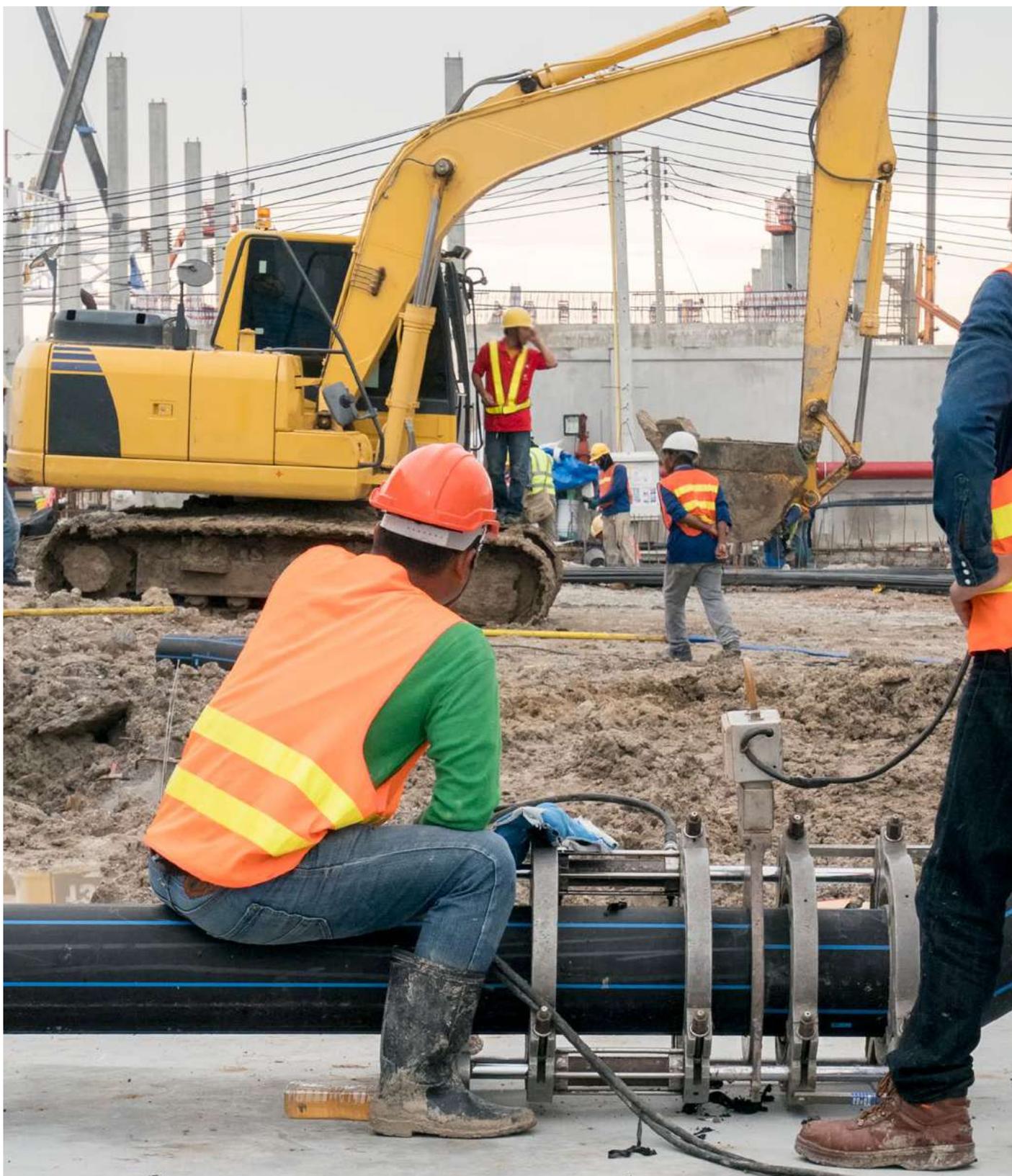
Open trench installation without sand bed



Fig 2-2: Standard pipes are installed in a sand bed



Fig 2-3: When installation is not executed in a sandbed, pipes with integrated protective layers are recommended to be used.



7.2 PE Reduction Method

The outer diameter of the PE pipe is chosen just a little too large to fit into the old pipeline. It is then pulled into the old pipe through a die, using the reversible and visco-elastic properties of PE. The new pipe is constantly under tension during this installation process. As soon as the pipe tension is relaxed once the pipe is in place, it will adhere "close fit" to the old pipe; the annular gap is closed.

Pipe Planning



8. Pipe Planning

8.1 Pipe Series Overview

The new specifications for safety coefficients and the graduation of the PE types into different MRS (minimum required strength) classes yield different permissible

Working pressures for the same outer diameter wall thickness ratios.

**Tabelle A.2 — Zulässige Betriebsüberdrücke für
Rohre aus PE 80, Durchflussmedium Wasser,
Gesamtbetriebs(berechnungs-)koeffizient C = 1,25**

**Table A.2 — Allowable working pressure for
pipes made of PE 80, conveying water,
overall service (design) coefficient C = 1,25**

Temperatur Temperature °C	Betriebs- jahre Years of service	Rohrserie S Pipe series S													
		25	20	16	12,5	10,5	10	8,3	8	6,3	5	4	3,2	2,5	2
		Durchmesser/Wanddicken-Verhältnis SDR Standard dimension ratio SDR													
		51	41	33	26	22	21	17,6	17	13,6	11	9	7,4	6	5
Zulässiger Betriebsüberdruck Allowable working pressure bar															
10	5	3,2	4,0	5,1	6,4	7,7	8,1	9,7	10,1	12,8	16,1	20,3	25,6	32,2	40,5
	10	3,1	4,0	5,0	6,3	7,6	8,0	9,5	10,0	12,6	15,9	20,0	25,2	31,8	40,0
	25	3,1	3,9	4,9	6,1	7,4	7,8	9,3	9,8	12,3	15,5	19,5	24,6	31,0	39,0
	50	3,0	3,8	4,7	6,0	7,2	7,6	9,1	9,5	12,0	15,1	19,0	24,0	30,2	38,0
	100	2,9	3,7	4,7	5,9	7,2	7,5	8,9	9,4	11,8	14,9	18,8	23,7	29,8	37,5
20	5	2,7	3,4	4,2	5,4	6,5	6,8	8,1	8,5	10,7	13,5	17,0	21,5	27,0	34,0
	10	2,6	3,3	4,1	5,2	6,3	6,6	7,9	8,3	10,4	13,1	16,5	20,8	26,2	33,0
	25	2,5	3,2	4,1	5,1	6,2	6,5	7,7	8,1	10,3	12,9	16,3	20,5	25,8	32,5
	50	2,5	3,2	4,0	5,0	6,0	6,4	7,4	8,0	10,0	12,5	16,0	20,0	25,0	32,0
	100	2,4	3,1	3,9	4,9	5,9	6,2	7,4	7,8	9,8	12,3	15,5	19,6	24,6	31,0
30	5	2,2	2,8	3,5	4,5	5,4	5,7	6,8	7,1	9,0	11,3	14,3	18,0	22,6	28,5
	10	2,2	2,8	3,5	4,4	5,3	5,6	6,7	7,0	8,8	11,1	14,0	17,7	22,2	28,0
	25	2,1	2,7	3,4	4,3	5,2	5,5	6,5	6,9	8,7	10,9	13,8	17,3	21,8	27,5
	50	2,1	2,7	3,4	4,2	5,1	5,4	6,4	6,7	8,5	10,7	13,5	17,0	21,4	27,0
	100	2,0	2,6	3,3	4,2	5,1	5,4	6,4	6,7	8,5	10,7	13,5	17,0	21,4	27,0
40	5	1,9	2,4	3,0	3,8	4,7	4,9	5,8	6,1	7,7	9,7	12,3	15,4	19,5	24,5
	10	1,9	2,4	3,0	3,8	4,6	4,8	5,7	6,0	7,6	9,5	12,0	15,1	19,1	24,0
	25	1,8	2,3	2,9	3,7	4,5	4,7	5,6	5,9	7,4	9,3	11,8	14,8	18,7	23,5
	50	1,8	2,3	2,9	3,6	4,4	4,6	5,5	5,7	7,2	9,1	11,5	14,5	18,3	23,0
	100	1,7	2,2	2,8	3,6	4,4	4,6	5,5	5,7	7,2	9,1	11,5	14,5	18,3	23,0
50	5	1,6	2,1	2,6	3,3	4,0	4,2	5,0	5,2	6,6	8,3	10,5	13,2	16,7	21,0
	10	1,6	2,0	2,5	3,2	3,9	4,1	4,9	5,1	6,4	8,1	10,2	12,9	16,3	20,5
	15	1,6	2,0	2,5	3,2	3,9	4,1	4,9	5,1	6,4	8,1	10,2	12,9	16,3	20,5
60	5	1,4	1,8	2,3	2,9	3,5	3,7	4,4	4,6	5,8	7,3	9,2	11,7	14,7	18,5
70	2	1,3	1,6	2,0	2,6	3,1	3,3	3,9	4,1	5,2	6,5	8,2	10,4	13,1	16,5

**Tabelle A.5 — Zulässige Betriebsüberdrücke für
Rohre aus PE 100, Durchflussmedium Wasser,
Gesamtbetriebs(berechnungs-)koeffizient C = 1,25**

**Table A.5 — Allowable working pressure for
pipes made of PE 100, conveying water,
overall service (design) coefficient C = 1,25**

Temperatur Temperature °C	Betriebs- jahre Years of service	Rohrserie S Pipe series S													
		25	20	16	12,5	10,5	10	8,3	8	6,3	5	4	3,2	2,5	2
		Durchmesser/Wanddicken-Verhältnis SDR Standard dimension ratio SDR													
		51	41	33	26	22	21	17,6	17	13,6	11	9	7,4	6	5
Zulässiger Betriebsüberdruck 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	37,8	47,6
	100	3,7	4,6	5,8	7,3	8,7	9,3	11,1	11,7	14,7	18,6	23,5	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	35,5
	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
	100	2,6	3,3	4,2	5,3	6,3	6,7	8,0	8,4	10,5	13,2	16,7	21,0	26,5	33,4
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
	100	2,2	2,8	3,6	4,5	5,4	5,7	6,8	7,2	9,0	11,2	14,1	17,8	22,4	28,2
50	5	2,1	2,6	3,3	4,2	4,9	5,3	6,3	6,6	8,3	10,5	13,3	16,7	21,0	26,5
	10	2,0	2,6	3,2	4,1	4,8	5,2	6,2	6,5	8,2	10,3	13,0	16,4	20,7	26,0
	15	2,0	2,6	3,2	4,1	4,8	5,2	6,2	6,5	8,2	10,3	13,0	16,4	20,7	26,0
60	5	1,8	2,3	2,9	3,6	4,3	4,6	5,5	5,7	7,2	9,1	11,5	14,5	18,3	23,0
70	2	1,6	2,1	2,6	3,3	3,9	4,2	5,0	5,2	6,6	8,3	10,5	13,2	16,7	21,0

Tabelle A.7 — Zulässige Betriebsüberdrücke für
Rohre aus PE 100, Durchflussmedium Wasser,
Gesamtbetriebs(berechnungs-)koeffizient C = 2,0

Table A.7 — Allowable working pressure for
pipes made of PE 100, conveying water,
overall service (design) coefficient C = 2,0

Temperatur Temperature °C	Betriebs- jahre Years of service	Rohrserie S Pipe series S													
		25	20	16	12,5	10,5	10	8,3	8	6,3	5	4	3,2	2,5	2
		Durchmesser/Wanddicken-Verhältnis SDR Standard dimension ratio SDR													
		51	41	33	26	22	21	17,6	17	13,6	11	9	7,4	6	5
Zulässiger Betriebsüberdruck Allowable working pressure bar															
10	5	2,5	3,1	3,9	5,0	6,0	6,3	7,5	7,8	9,9	12,5	15,6	19,5	25,0	31,3
	10	2,5	3,1	3,8	4,9	5,9	6,2	7,4	7,7	9,8	12,3	15,4	19,2	24,6	30,8
	25	2,4	3,0	3,8	4,8	5,8	6,1	7,3	7,6	9,6	12,1	15,1	18,9	24,2	30,3
	50	2,4	3,0	3,7	4,8	5,7	6,0	7,2	7,4	9,4	11,9	14,9	18,6	23,8	29,8
20	100	2,3	2,9	3,7	4,7	5,6	5,9	7,0	7,3	9,3	11,7	14,6	18,3	23,4	29,3
	5	2,1	2,6	3,3	4,2	5,0	5,3	6,3	6,6	8,3	10,5	13,1	16,4	21,0	26,3
	10	2,1	2,6	3,3	4,2	5,0	5,2	6,3	6,5	8,3	10,4	13,0	16,3	20,8	26,0
	25	2,0	2,6	3,2	4,1	4,9	5,1	6,1	6,4	8,1	10,2	12,8	15,9	20,4	25,5
30	50	2,0	2,5	3,0	4,0	4,8	5,0	6,0	6,3	8,0	10,0	12,5	15,5	20,0	25,0
	100	2,0	2,5	3,0	4,0	4,7	5,0	6,0	6,2	7,9	9,9	12,4	15,5	19,8	24,8
	5	1,8	2,3	2,8	3,6	4,3	4,5	5,4	5,6	7,1	9,0	11,3	14,1	18,0	22,5
	10	1,8	2,2	2,8	3,5	4,2	4,4	5,3	5,5	7,0	8,8	11,0	13,8	17,6	22,0
40	25	1,7	2,2	2,7	3,4	4,1	4,3	5,2	5,4	6,8	8,6	10,8	13,4	17,2	21,5
	50	1,7	2,1	2,7	3,4	4,0	4,3	5,1	5,3	6,7	8,5	10,6	13,3	17,0	21,3
	5	1,5	1,9	2,4	3,1	3,7	3,9	4,6	4,8	6,1	7,7	9,6	12,0	15,4	19,3
	10	1,5	1,9	2,4	3,0	3,6	3,8	4,6	4,8	6,0	7,6	9,5	11,9	15,2	19,0
50	25	1,5	1,9	2,3	3,0	3,5	3,7	4,5	4,6	5,9	7,4	9,3	11,6	14,8	18,5
	50	1,5	1,8	2,3	2,9	3,5	3,7	4,4	4,6	5,8	7,3	9,1	11,4	14,6	18,3
	5	1,3	1,7	2,1	2,7	3,2	3,4	4,0	4,2	5,3	6,7	8,4	10,5	13,4	16,8
	10	1,3	1,7	2,1	2,6	3,1	3,3	4,0	4,1	5,2	6,6	8,3	10,3	13,2	16,5
60	15	1,3	1,6	2,0	2,6	3,1	3,3	3,9	4,1	5,2	6,5	8,1	10,2	13,0	16,3
	5	1,2	1,5	1,8	2,4	2,8	3,0	3,6	3,7	4,7	5,9	7,4	9,2	11,8	14,8
70	2	1,1	1,3	1,7	2,1	2,5	2,7	3,2	3,3	4,2	5,3	6,6	8,3	10,6	13,3

Tabelle A.4 — Zulässige Betriebsüberdrücke für
Rohre aus PE 80, Durchflussmedium Wasser,
Gesamtbetriebs(berechnungs-)koeffizient C = 2,0

Table A.4 — Allowable working pressure for
pipes made of PE 80, conveying water,
overall service (design) coefficient C = 2,0

Temperatur Temperature °C	Betriebs- jahre Years of service	Rohrserie S Pipe series S													
		25	20	16	12,5	10,5	10	8,3	8	6,3	5	4	3,2	2,5	2
		Durchmesser/Wanddicken-Verhältnis SDR Standard dimension ratio SDR													
		51	41	33	26	22	21	17,6	17	13,6	11	9	7,4	6	5
Zulässiger Betriebsüberdruck Allowable working pressure bar															
10	5	1,9	2,5	3,1	3,9	4,7	5,0	5,9	6,2	7,9	9,9	12,5	15,8	19,9	25,0
	10	1,9	2,5	3,1	3,9	4,7	5,0	5,9	6,2	7,9	9,9	12,5	15,8	19,9	25,0
	25	1,9	2,4	3,0	3,8	4,5	4,8	5,7	6,0	7,6	9,5	12,0	15,1	19,1	24,0
	50	1,8	2,3	2,9	3,7	4,4	4,7	5,6	5,9	7,4	9,3	11,8	14,8	18,7	23,5
20	100	1,8	2,3	2,9	3,7	4,4	4,7	5,6	5,9	7,4	9,3	11,8	14,8	18,7	23,5
	5	1,6	2,1	2,6	3,3	4,0	4,2	5,1	5,2	6,6	8,3	10,5	13,2	16,7	21,0
	10	1,6	2,0	2,5	3,2	4,0	4,1	5,1	5,1	6,4	8,1	10,2	12,9	16,3	20,5
	25	1,6	2,0	2,5	3,1	3,9	4,0	4,9	5,0	6,3	8,0	10,0	12,6	15,9	20,0
30	50	1,6	2,0	2,5	3,0	3,8	4,0	4,8	5,0	6,3	8,0	10,0	12,5	16,0	20,0
	100	1,5	1,9	2,4	3,0	3,8	3,9	4,8	4,9	6,1	7,7	9,7	12,3	15,5	19,5
	5	1,4	1,8	2,2	2,8	3,4	3,6	4,3	4,5	5,7	7,1	9,0	11,3	14,3	18,0
	10	1,3	1,7	2,2	2,7	3,3	3,5	4,1	4,4	5,5	6,9	8,7	11,0	13,9	17,5
40	25	1,3	1,7	2,1	2,7	3,2	3,4	4,0	4,2	5,3	6,7	8,5	10,7	13,5	17,0
	50	1,3	1,6	2,0	2,6	3,1	3,3	3,9	4,1	5,2	6,5	8,2	10,4	13,1	16,5
	5	1,1	1,5	1,8	2,3	2,8	3,0	3,5	3,7	4,7	5,9	7,5	9,4	11,9	15,0
	10	1,1	1,5	1,8	2,3	2,8	3,0	3,5	3,7	4,7	5,9	7,5	9,4	11,9	15,0
50	25	1,1	1,4	1,8	2,3	2,7	2,9	3,4	3,6	4,5	5,7	7,2	9,1	11,5	14,5
	50	1,1	1,4	1,8	2,3	2,7	2,9	3,4	3,6	4,5	5,7	7,2	9,1	11,5	14,5
	5	1,0	1,3	1,6	2,0	2,4	2,6	3,1	3,2	4,1	5,1	6,5	8,2	10,3	13,0
	10	1,0	1,3	1,6	2,0	2,4	2,6	3,1	3,2	4,1	5,1	6,5	8,2	10,3	13,0
60	15	0,9	1,2	1,5	1,9	2,3	2,5	2,9	3,1	3,9	4,9	6,2	7,9	9,9	12,5
	5	0,9	1,1	1,4	1,8	2,1	2,3	2,7	2,8	3,6	4,5	5,7	7,2	9,1	11,5
70	2	0,7	1,0	1,2	1,5	1,8	2,0	2,3	2,5	3,1	3,9	5,0	6,3	7,9	10,0

8.2 Permissible Operating Pressures

Pipe formula

The permissible MOP (maximum operating pressure) is calculated (among others) according to DIN EN 12201:

$$MOP = \frac{20 \cdot MRS}{C \cdot (SDR-1)}$$

$$C_{\text{Water}} = 1.25$$

$$C_{\text{Gas}} = 2.0$$

$$MRS : PE 100 = 10$$

The maximum operating pressures (MOP) listed below can be used according to the DVGW:

Gas and water distribution – SDR ranges – permissible operating pressures		
SDR	Gas	Water
	PE 100	PE 100
7.4	-	-
11.0	10 bar	16 bar
17.6	-	-
17.0	5 bar	10 bar

Tab 2-2: Sources: DVGW G 472; DVGW GW 335-A2; DVGW W 400-1.

8.3 Thermal Elongation and Contraction

Changes in length due to temperature must be taken into account when cutting PE pipes to size. When the temperature increases or decreases, 1m of PE pipe elongates or contracts.

Example:

A PE pipeline of 100 m length warms during the day from 8°C in the morning to 48°C at midday.

Accordingly by 0.2 mm ($\Delta 1^\circ\text{C} = 1 \text{ K}$).

This change in length is relevant for pipelines that are free to move (e.g. those running above ground). Pipelines made of PE that are compressed by their surroundings are fixed to the circumjacent ground by shear forces.



This results in:

$$DJ = 48^\circ\text{C} - 8^\circ\text{C} = 40\text{K}$$

a change of length of:

$$DJ = 48^\circ\text{C} - 8^\circ\text{C} = 40\text{K}$$

$$DL = L \cdot DJ \cdot 0.2 \frac{\text{mm}}{\text{mK}} \text{ [mm]}$$

DL = change in length in [m]

DJ = temperature difference [K]

$0.2 \frac{\text{mm}}{\text{mK}}$ = median expansion coefficient of polyethylene

Selected median length expansion coefficients of different materials:

Material	mm/mK
Iron	0.012
Steel, ferrite	0.011 – 0.015
Steel, austenitic	0.022 – 0.025
PE	0.2
PP	0.16

The image shows a person in safety gear, including a helmet and a harness, against a blue background. A large white number '9' is overlaid on the bottom right. The text 'Health & Safety' is centered in the lower half of the image, underlined.

Health & Safety

9. Health & Safety



Polyethylene pipes and fittings have been used safely and effectively throughout the world, in a wide variety of installation conditions for almost 40 years and shall continue to do so in the future.

At all times, the health and safety of operatives and other people involved in the processing, handling, jointing, installation, testing and end user of PE piping systems has been of most importance to Roxy.

To achieve and maintain these objectives, good working practice is essential. The guidelines for the usage of polyethylene piping systems have been published by several regulatory bodies and they should always be strictly followed.

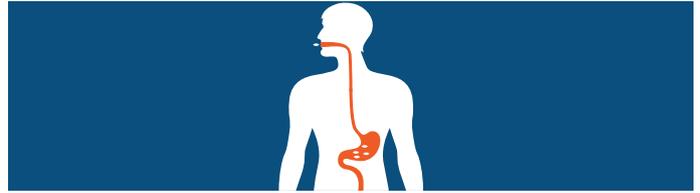
The Material:

Polyethylene is chemically non-reactive and generally regarded as biologically inert. It is not classified as dangerous product (EEC).



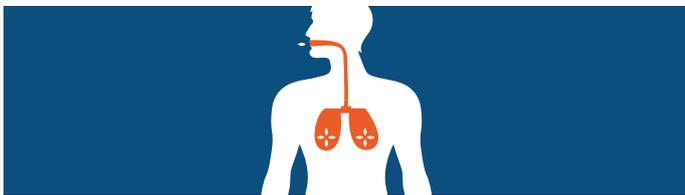
Ingestion:

Ingestion of polyethylene in any form should be avoided



Inhalation:

Inhalation of PE dust can irritate the respiratory system. Wherever possible, when cutting or scrapping HDPE pipes, operatives should work in the open air or in well ventilated areas with proper Personal Protective Equipment (PPE).



Physical Contact:

Polyethylene is not regarded to be a skin irritant. When cutting or scrapping PE pipes or fittings, HDPE dust particles may cause eye irritation and it is recommended that protective eyewear must be used.



Recycling:

The product is suitable for recycling using modern methods of shredding and cleaning. In-house production waste should be kept clean to facilitate direct recycling.



Disposal of Waste Material:

Surplus or waste PE material can be reprocessed for new pipes or other products. Alternatively the disposal should be as per the standard local regulations



Fire Hazards:

Polyethylene burns, but it is not classified as flammable. It has a flash point of 360°C approx. Above 300°C, PE will degrade to produce carbon monoxide, water and small amounts of various hydrocarbons and aldehydes. Avoid the accumulation of PE dust particles as they could give a potential risk of dust explosion. All electrical equipment in the area should be carefully earthed. In the vent of fire involving PE materials, apply water in a spread jet. Dry chemical, foam and carbon dioxide can also be used.

NOTE:

- Drawings are for illustration purpose only.
- This is only a general information and qualified medical attention should be obtained as soon as practically possible.

First Aid:

The following are recommendations for immediate first aid to be applied in the event of an accident involving polyethylene products.

Ingestion: Wash the mouth with clean water.

Inhalation: Move the affected person into fresh air situation. If in distress, apply oxygen or artificial respiration.

Eye Injury: If PE particles get into the eyes, immediately flush with clean water, repeating as necessary.

Burns: If molten PE material comes into contact with skin, cool the affected area immediately by flow of cold water. DO NOT attempt to remove the PE material from the skin. Seek medical attention as quickly as possible, even for the smallest burn.



Handling:

PE pipes and fittings should be handled and moved in accordance with the instructions detailed in the manuals of regulatory bodies and in the Handling and Storage section of this publication.

Particular care should be taken while handling large diameter pipes.

Safety clothing and equipment should be used at all times when handling and moving PE pipes.

When transporting, handling and releasing coils of HDPE pipes, extreme caution should be taken, particularly with pipes 90 mm and above, dispensing trailer must be used and the details in Handling and Storage section must be strictly followed.



The Environment:

High Density Polyethylene is not considered dangerous for the environment.



Joining:

Butt fusion or Electro-Fusion joining of HDPE pipes and fittings should always be carried out in well ventilated areas. The fusion process is a high temperature operation and fumes are generated around the joining area. Inhalation of the fumes should be avoided.

During the butt-fusion operation, molten PE is formed. This should not be allowed to come into contact with the skin as it will adhere strongly and cause severe burns. Protective gloves should be worn during the joining process and when using the heater plates of the welding machinery.

During the Electro-Fusion process, care should be taken to prevent the ejection of molten material from the joint. Protective clothing including gloves and safety eyewear should be worn during the joining process.



DISCLAIMER

This technical product guide should only be used as a reference and for any clarification, refer to the relevant standards for further information.

NOTE:

- Drawings are for illustration purpose only.
- This is only a general information and qualified medical attention should be obtained as soon as practically possible.

SHIELD reserves the right to change the contents without notice.

A person is shown from the chest up, wearing a green safety vest over a blue shirt. They are also wearing a blue seatbelt. The background is a dark blue, textured surface. A large white number '10' is overlaid on the bottom left of the image. The text 'Handling & Storage' is centered in the middle of the image, underlined.

Handling & Storage

10. Handling & Storage

10.1 General Handling:

Although relatively lightweight, polyethylene pipe products should be treated with a similar level of caution as for heavier metallic pipe products. Whilst polyethylene is a robust and resilient material, care should be taken not to cause excessive scuffing or gouging of the surface. Surface damage may occur during handling, storage and installation, but providing the depth, value should not be more than 10% of the wall thickness, only then the service performance of the pipe or fitting will not be affected. Further guidance regarding handling and storage of PE pipes and fittings is given by various industry bodies, including the following:

HSE Guidance - Avoidance of danger from overhead power lines (HS GS 6); Protect yourself, protect the load; The lifting operations and lifting equipment regulations (LOLER); The provision and use of work equipment regulations (PUWER).

Department of Transport - Safety of loads on vehicles. WRc - Polyethylene Pipe Systems For Water Supply (version 01/02). IGEM/G/8 Handling, Transport and Storage of PE Pipes and Fittings.



10.2 Factors of Safe Lifting & Loading:

In lifting operations, where either manual or mechanical effort is involved in moving a load, the following factors are common to all situations and provide the basis on which the selection of the appropriate type of lifting equipment can be made:





10.3 Rules of Handling & Storage



Never drag or roll individual pipes or bundles



Never throw or drop pipe and fittings from vehicle



Never use metal hooks, slings or chains when handling pipes - fittings



Never stack pipe bundles more than 3 meters or 3 bundles high



Never place pipes/fittings in contact with lubricating or hydraulic oil, gasoline, solvent, or other aggressive materials



Never stack coils more than 2 meters high



Never store pipes and fittings near sharp objects



Always store pipes/fittings on flat, firm ground, able to withstand the weight of the material and lifting apparatus



Always use non-metal slings when handling pipes/fittings (e.g. nylon or polypropylene)



Always exercise special care when handling pipes in wet or frosty conditions, since they may become slippery



Always keep protective packaging (battens, shrink-wrap, pallets, strapping, etc.) intact until pipes/fittings are required to be used.



Always store pipes/fittings away from intense heat



Always allow some bending deflection when pipes are loaded and unloaded



Always protect pipes/fittings with opaque sheeting or tarpaulin

10.4 Delivery & Unloading at Customer Sites:

The Plastic Pipe Industry - Recommended Guidelines for the Safe Delivery and Unloading of Plastic Pipes to Customer's Site (Health & Safety Charter) has been developed by industry stakeholders to provide a risk-based framework to assist with the safe delivery and off-loading of plastic pipe products. This document has been recommended by the HSE and Roxy formally adopted these guidelines.

Deliveries should not be made to unmanned sites.

Length & Bundles:

It is the responsibility of the Site In-charge to ensure that the site is safe to accept pipe deliveries. The area where the delivery vehicle is to be stopped shall be safe and the location for storage shall be on firm level ground, which is free from damaging material.

Polyethylene pipe products should be off-loaded in a controlled manner. All polyethylene pipe products shall be mechanically off-loaded and if there is no suitable mechanical off-loading equipment available on-site then an on-board crane vehicle shall be requested. It is the responsibility of the on-board crane operator to off-load polyethylene pipes and he is the only person authorised to access the trailer for this purpose. It is important to maintain an exclusion zone with all personnel and vehicular traffic kept at a safe distance.

Coils:

The delivery driver is responsible for undoing the load securing devices, which should only be removed from the product that is to be imminently off-loaded. The driver is the only person authorised to access the trailer and if off-loading is to be carried out by fork-lift then the driver should be escorted to a safe zone away from the off-loading area by the Site In-charge.

It is the responsibility of the person operating the fork-lift to ensure that the off-loading process is carried out safely. If off-loading is to be carried out by the driver using the on-board crane, then the procedures for handling lengths and bundles should be followed.

Larger coils 90mm-180mm pipe will require lifting by a fork-lift ensuring that the tines are covered to protect the coils from damage. It is recommended to use anti-slip protective fork covers, which are readily available.





Site/Depot Handling:

A flat-bed vehicle, free from sharp objects and projections should be used for transporting pipes. When lifting pipe bundles by crane, wideband slings of polypropylene, nylon or similar material is recommended. Do not use chains, hooks or hawsers.

Where large diameter coils are to be stored vertically at depots, the coils must be secured with purpose built racking with protective matting positioned underneath, and facilities for safe lifting, movement and loading must be available.

Fittings:

Boxed fittings and pre-fabricated fittings may be stacked on pallets for transport which should be adequately secured. They should be stacked, secured and transported such that no loads are imparted to the fittings. Never use hooks to lift fittings.



Pipes:

The on site storage facilities will vary depending upon factors such as the available space, location, size and nature of the project etc.

The storage may range from a secure central storage compound, localised storage points close to the laying operation, to stringing the pipes along the planned route. In all cases careful consideration should be given to the following aspects:



Security of all materials and equipment from theft, vandalism, accidental damage or contamination (Pipe-end caps, intended to prevent ingress, should be kept in place during storage).

- Safety of the general public, especially, the elderly and disabled.
- The movement of traffic, construction equipment, farm machinery and animals.
- All pipe store locations should be on suitably firm, level ground, free from damaging material with adequate access for construction vehicles and/or lifting equipment.
- Badly stacked pallets, coils or bundles may slip or collapse, which will cause injury to personnel or damage to the pipe.

Pipe lengths stored individually should be stacked in a pyramid not more than one metre of height, with the bottom layer fully restrained by wedges. Where possible, the bottom layer of pipes should be laid on timber battens. On site, pipes may be laid out individually in strings. (Where appropriate, protective barriers should be placed with adequate warning signs and lamps.)

Bundled packs of pipe should be stored on clear, level ground, with the battens supported from the outside by timbers or concrete blocks. For safety, bundled packs should not be stacked more than three metres of height.



Large Coils:

Coiled pipe should be stored flat, especially during periods of warm weather, and on firm level ground, which has suitable protection for the bottom coil. Where space is limited and coils are to be stacked, the height of stacked coils should be such that the stack is stable and the uppermost coil can be safely handled. The height of the stack should not exceed 2.0 meters under any circumstance.

Wedged-end wooden battens placed below the bottom coil and used as spacers between each layer will facilitate easy access for slinging.

When the need for transportation is required, it should only be carried out by trained operatives.

Batches of coils delivered on pallets must remain secured to the pallet and only to be cut at the time of use.

Coil Dispensing:

Safety first: Pipe held in coils, is under tension and is strapped accordingly. Coils may be hazardous if released in the incorrect manner — particularly if the end of the pipe is not kept restrained at all times. It is most important to read and understand the following guidelines before attempting to untie coils.

Coils are secured by one of two methods depending on the pipe's diameter:

01. Outer bands with additional strapping of individual layers (63mm to 110mm)

Do not remove any of these bands until pipe is required for use. Remove them carefully, from the outermost layer first, so that only the length of pipe needed immediately is released. Successive layers can be released by removing band as the pipe is drawn away from the coil.

02. Wrapped coils

Pipe sizes in 32mm and below are protected with the film-wrap, enabling the free end of the pipe to be taken out from the coil. Take the only sufficient pipe for immediate use from the coil and on no account, should remove the outer wrapping until the coil is almost fully unwound.

Coils of pipe should only be dispensed in the field from proprietary trailers.

NOTE:

Drawings are for illustration purpose only. Roxy reserves the right to change the contents without prior notice.



Fittings:

Electro-Fusion fittings should be stored under cover in dry conditions, preferably on racking. They should be kept in their boxes/packaging until ready for use.

Other fittings may be stored outdoors, as long as they are protected against damage and prolonged direct sunlight.



Storage Outside:

Black polyethylene material contains ultraviolet stabilizer to provide excellent protection against degradation due to UV radiation.

The maximum recommended storage outside is 12 months. Product to be stored outside for periods in excess of this, should be covered with polyethylene sheet or stored under cover.

Additional precautions may be required, where polyethylene pipes are stored outdoor in regions of high solar radiation.



Approvals

11



الهيئة القومية لمياه الشرب والصرف الصحي
إدارة الاختبارات والرقابة على الصناعة



وزارة الإسكان والمرافق والمجمعات العمرانية
Ministry of Housing, Utilities & Urban Communities

ساري
١٠/١١/٢٠٢٥

شهادة اعتماد منشأة إنتاجية

(مواسير HDPE)

اسم المنشأة: مصنع روكسي للمنتجات المعدنية والبلاستيكية (محمد محمود مؤمن وشركاه).

عنوان الإدارة: ٢٩ش مراد بك ميدان الاسماعيليه - مصر الجديدة - القاهرة .

عنوان المصنع: قطعة رقم ١٢٢ المنطقة الصناعية (A4) مدينة العاشر من رمضان - الشرقية .

السجل التجاري: ١٤١٢٢ مكتب سجل تجارى : استثمار القاهرة محافظة : القاهرة .

ب-ض رقم تسجيل ضريبي: ٣٦٤٦٥٧٤٦٢ مأمورية: الاستثمار محافظة : القاهرة .

سجل صناعي رقم: ٩٢١٠٢٠٩٠١٠٠٥٨٩٢ سنة الإصدار: ٢٠٢١ نوعية الصناعة : كيمائية .

رخصة: ٩٢١٠٢٠٩٠٢٠١١٦١٢ (مدينة): محافظة الشرقية .

المنتجات المعتمدة لدى الهيئة:-

* مواسير بولي ايثيلين عالي الكثافة HDPE حتى قطر ١٢٠٠مم بضغط مختلفه للاستخدام فى

مشروعات مياه الشرب والصرف الصحي .

• طبقا للمواصفات القياسية المصرية والعالمية المتبعة فى هذا الشأن

• يتم الالتزام بتعليمات الادارة و الموضحة خلفه وفي حاله مخالفتها يعتبر لاقى

• شهادة الاعتماد لا تستخدم كيديل لشهادات اختبار الهيئة التى تصدر لكل امر توريد على حد

المدير العام
٥/١٤
"سميه محمد محمد نخله"

مهندسة /



صادر في
ساري حتى ٢٠٢٥/١٠/١

(لحين تجديد شهادات المعايرة + السجل التجارى)

ALaa



A0000271

Approval Number 2303539
Test Report: J-00439069



Water Regulations Approval Scheme Ltd.
Unit 15,
Willow Road,
Pen y Fan Industrial Estate,
Crumlin,
Gwent,
NP11 4EG

13th April 2023
Roxy For Metal And Plastic Products
29 Mourad Bek St.,
Ismaelia Sq.,
Heliopolis,
Cairo,
Egypt

**WATER REGULATIONS APPROVAL SCHEME LTD. (WRAS)
MATERIAL APPROVAL**

The material referred to in this letter is suitable for contact with wholesome water for domestic purposes having met the requirements of BS6920-1:2000 and/or 2014 'Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water'.

The reference relates solely to its effect on the quality of the water with which it may come into contact and does not signify the approval of its mechanical or physical properties for any use.

POLYETHYLENE - COMPONENTS.

5240

'Roxy For Metal And Plastic Products Pipe'. Black coloured (with blue external stripes), extruded HDPE pipe. For use with water up to 23°C.

APPROVAL NUMBER: 2303539

APPROVAL HOLDER: ROXY FOR METAL AND PLASTIC PRODUCTS

The Scheme reserves the right to review approval.
Approval 2303539 is valid between March 2023 and March 2028

An entry, as above, will accordingly be included in the Water Fittings Directory on-line under the section headed, 'Materials which have passed full tests of effect on water quality'.

The Directory may be found at: www.wrasapprovals.co.uk/approvals-directory/

Yours Faithfully

Ian Hughes
WRAS Approvals Manager



Unit 30 | Fern Close | Pen-Y-Fan Ind Est | Osedale | Gwent | NP11 3EH | UK
Tel: +44 (0) 1495 236260 wales@nsf.org | www.nsf.org

TEST REPORT

Customer: C0721843

Roxy For Metal And Plastic Products
29 Mourad Bek St
Ismaelia Sq
Heliopolis
Cairo
Egypt

Result This product has satisfied the criteria set out in BS 6920: Part 1: 2014 "Specification" and thus is suitable for use with cold water but not hot water.

Customer Name	Roxy For Metal And Plastic Products
Product	Roxy for Modern Water Systems (Pipe System) HDPE
Test Undertaken	BS 6920: 2014 - Suitability of non-metallic products for use in contact with water intended for human consumption with regard to their effect on the quality of the water
Job Number	J-00439069
Work Order Number	W0792290

Thank you for having your product tested by NSF Wales Ltd.

Please contact your Account Manager if you have any questions or concerns pertaining to this report.

Report Date 15-MAR-2023

Report Authorisation

Michael Bustin - Materials Testing Manager



F10230315122515

J-00439069

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This report is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This report shall not be reproduced, except in its entirety, without the written approval of NSF Wales Ltd. This report does not represent NSF Certification or authorisation to use the NSF Mark. Authorisation to use the NSF Mark is limited to products appearing in the Company's Official NSF Listing (www.nsf.org). The results relate only to those items tested, in the condition received at the laboratory.

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CERTIFICATE OF REGISTRATION

This is to certify that the management system of:

Roxy for metal and plastic products

Main Site: Obour City – Industrial Zone B,C- Plot 3 - Block 270011 - Egypt
See appendix for additional sites and additional site scopes
has been registered by Intertek as conforming to the requirements of:

ISO 14001:2015

The management system is applicable to:
Producing of U-PVC ,PP, PE and PP-R pipes , fitting and accessories

Certificate Number:
0117608
Initial Certification Date:
13 September 2021
Last Certificate Expiry Date:
12 September 2024
Date of Last Recertification Audit:
25 August 2024
Certification Cycle Start Date:
08 October 2024
Issuing Date:
08 October 2024
Valid Until:
12 September 2027



Calin Moldovean
President, Business Assurance
Intertek Certification Limited, 10A Victory Park, Victory Road, Derby DE24 8ZF, United Kingdom
Intertek Certification Limited is a UKAS accredited body under schedule of accreditation no. 014.



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Roxy for metal and plastic products

Main Site: Obour City – Industrial Zone B,C- Plot 3 - Block 270011 - Egypt
See appendix for additional sites and additional site scopes
has been registered by Intertek as conforming to the requirements of:

ISO 9001:2015

The management system is applicable to:
Producing of U-PVC ,PP, PE and PP-R pipes , fitting and accessories

Certificate Number:
0117610
Initial Certification Date:
13 September 2021
Last Certificate Expiry Date:
12 September 2024
Date of Last Recertification Audit:
25 August 2024
Certification Cycle Start Date:
08 October 2024
Issuing Date:
08 October 2024
Valid Until:
12 September 2027



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Roxy for metal and plastic products

Main Site: Obour City – Industrial Zone B,C- Plot 3 - Block 270011 - Egypt
See appendix for additional sites and additional site scopes
has been registered by Intertek as conforming to the requirements of:

ISO 45001:2018

The management system is applicable to:
Producing of U-PVC ,PP, PE and PP-R pipes , fitting and accessories

Certificate Number:
0117609
Initial Certification Date:
13 September 2021
Last Certificate Expiry Date:
12 September 2024
Date of Last Recertification Audit:
25 August 2024
Certification Cycle Start Date:
08 October 2024
Issuing Date:
08 October 2024
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Certificate of Compliance

This certificate is issued for the following:

Polyethylene (PE) Pipe for Underground Fire Protection Service

SDR 11 Pipe

Prepared for:

Roxy for Metal and Plastic Products 10th Ramadan City
Industrial Zone 3
Plot 32, Cairo
Egypt

Approval Standard: FM 1613 (October 2022)

Approval Identification: PR464182

Approval Granted: 9 October 2025

To verify the availability of the Approved product, please refer to www.approvalguide.com

Said Approval is subject to satisfactory field performance, continuing Surveillance Audits, and strict conformity to the constructions as shown in the Approval Guide, an online resource of FM Approvals.



A handwritten signature in black ink, appearing to read 'D. B. Fuller'.

David B. Fuller
VP, Manager – Fire Protection
FM Approvals
One Technology Way
Norwood, MA 02062





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Cable Ducting Line

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Factory 3 : 10th of Ramadan City, Industrial Zone, El Sharkia - Egypt
Central stores : EL Obour City, Industrial Zone, Cairo - Egypt
info@roxyplast.com - www.roxyplast.com

Customer Service

0100 5800 220

HOT LINE : 15579



A MEMBER OF ROXY FOR METAL
AND PLASTIC PRODUCTS



SGS



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