HDPE PIPES PRODUCT CATALOG

Combined Cooperation Company

Kuwait

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WHY HDPE PIPES?

EXCELLENT PERFORMANCE

HDPE is characterized by the combination of superior performance for the production of pipes with a good long term strength and long life which makes it the best for transportation of water and gaseous fuels.

RESIST TO ENVIRONMENTAL VARIATIONS

This property is one of the most important properties of HDPE, for this it can be used safely to transport drinking water without any side effects, corrosion is one of the most dangerous phenomenon accompanied with transportation of water in steel pipes, but in the case of HDPE Pipes this phenomenon disappear. Another property in the field of environmental variations is the soil movement, because the great flexibility of HDPE Pipes it resist the soil movement.

HDPE PIPES IS A COMPETITIVE PIPES

HDPE Pipes is a competitive pipe because it is characterize by light, stable, weather–resistant, water proof and easy to handle. HDPE Pipe installations are the most competitive by key advantages.

- Ease of handling due to flexibility and light weight.
- Leak–tight installation due to excellent fusion–welding possibilities.
- Long life with low operational cost.
- Capability for relining pipelines.
- Possibility for on–site extrusion, alternative installations.
- No limitations to pH–value of the water (no corrosion)
- Taste and odor neutral
- Bacteriologically neutral
- Chemical resistance

FIELDS OF APPLICATION

HDPE PIPES

Non toxic HDPE pipes will not affect the taste, color or smell of drinking water.

HDPE pipes shows superior resistance to most chemicals which qualify it to used for transporting fuels at elevated pressures.

HDPE pipes are ideal for agricultural irrigation and sprinkler systems.

HDPE pipes are used for underground drainage systems, waste discharge systems, drainage soil.

MANUFACTURING STANDARDS

DIN 8074	Polyethylene (PE) – Pipes PE 80, PE 100 – Dimensions
DIN 8075	Polyethylene (PE) – Pipes PE 80, PE 100 – general quality requirements, testing
ISO 4427	Plastic piping systems – Polyethylene (PE) pipes and fittings for water supply
ISO 4437	Platic piping systems for the supply of gaseuos fuels –Polyethylene (PE)
AWWA C906	Polyethylene (PE) Pressure Pipe and Fittings, 4 In. thru 65 In. (100 mm Through 1650 mm), for Waterworks
EN 122101	Plastics piping systems for water supply, and for drainage and sewerage under pressure. Polyethylene (PE)
SASO ISO 4427	Plastics piping systems – Polyethylene (PE) pipes and fittingd for water supply

RAW MATERIAL

Material Data Sheet

Material Data Sheet of High Density Polyethylen

Property	PE 100	PE 80	Unit	Test Method
Density (Compound)	959	956	Kg/m³	ISO 1183
Melt Flow Rate (MFR) 190 ℃ / 2.16 kg	<0.1	<0.1	g/10 min	ISO 1133
Melt Flow Rate (MFR) 190 ℃ / 5.0 kg	0.25	0.3	g/10 min	ISO 1133
Tensile Stress at Yield 50mm/min	25	22	Mpa	ISO 527-2
Elongation at Break	>600	>600	%	ISO 527-2
Tensile Modulus 50mm/min	900	800	Mpa	ISO 527-2
Charpy Impact Notched at (0 °C)	16	14	Kj/m²	ISO 179/1eA
Hardness, Shore D	60	59	-	ISO 868
Carbon Black Content	2 - 2.5	2 - 2.5	%	ASTM D 1603
Carbon Black Dispersion	≤Grade 3	≤Grade 3	-	ISO 18553
Brittleness Temperature	<- 70	<- 70	℃	ASTM D 746
ESCR (10% Lgepal), F50	>10000	>10000	h	ASTM D 1693-A
Thermal Stability (210 °C)	>20	>20	min	EN 728
Total Volatiles	≤350	≤350	mg/kg	EN 12009
Water Content	≤300	≤300	mg/kg	EN 12118
Coeffecient of Linear Thermal Expansion	2.0 x 10-4	2.0 x 10-4	mm/mm/℃	ASTM D 696
Thermal Conductivity	0.41	0.41	W/km	DIN 52612

MINIMUM REQUIRED STRENGTH: MRS

Material Designation	MRS Mpa
PE 100	10.0
PE 80	8.0
PE 63	6.3

WATER QUALITY

Our HDPE pipes are suitable for drinking water. Due to the high quality of our HDPE pipes. It has no effect on water taste, odor, appearance of water and growth of aquatic micro-organisms.

UV RESISTANCE

HDPE 80 and HDPE 100 materials are compounded with special additional including UV stabilizers, which protect the pipe from degradation caused by intensive ultra violet light. For specific applications, such as pipework above the ground, where it is known that the pipe will be subjected to UV light, the material can be compounded with carbon black which provides additional long-term protection.

CHEMICAL RESISTANCE:

Our HDPE pipes are generally resistant to the chemicals commonly used for water treatment and disinfection. Our HDPE pipes have excellent resistance to naturally occuring chemicals found in the soil. For industrial purposes our HDPE 100 pipes have excellent resistance to different media.

Maximum Operating Temperature for PE 100 in different media:

Medium		Maximum operating temperature °C PE 100
Sulphuric Acid	30%	60
Hydrochloric Acid	20%	60
Phosphoric Acid	85%	60
Nitric Acid	30%	40
Chromic Acid	20%	20
Hydrofluoric Acid	40%	40
Formic Acid	50%	40
Caustic Soda Solution	30%	60
Acetone	Technical Grade	40
Ethanol	96%	60

DESIGN

LIFETIME:

HDPE Material has a 50 year life time at 20 °C, but for example PE 100 has actual strength greater than the design strength and hence the expected resulting service lifetimes are greatly in excess of the nominal 50–year requirement when the pipe is operating within its design envelope.

Allowable Working Pressure for Pipes Made of PE 100, Conveying water

Temperature °C	Years of service	Pipe series (S)						
		20	12.5	8.3	8	6.3	5	4
		Standard dimension ratio (SDR)						
		41	26	17.6	17	13.6	11	9
		Allowable working pressure (Bar)						
10	5	5.0	7.9	11.9	12.5	15.8	19.9	25.1
	10	4.9	7.7	11.7	12.3	15.5	19.5	24.6
	25	4.8	7.6	11.5	12.0	15.2	19.1	24.1
	50	4.7	7.5	11.3	11.9	15.0	18.9	23.8
	100	4.6	7.3	11.1	11.7	14.7	18.5	23.3
20	5	4.2	6.6	10.0	10.5	13.3	16.7	21.0
	10	4.1	6.5	9.9	10.4	13.1	16.5	20.8
	25	4.0	6.4	9.7	10.1	12.8	16.1	20.3
	50	4.0	6.3	9.6	10.0	12.5	16.0	20.0
	100	3.9	6.1	9.4	9.8	12.3	15.5	19.5
30	5	3.5	5.6	8.5	8.9	11.2	14.1	17.8
	10	3.5	5.5	8.3	8.8	11.0	13.9	17.5
	25	3.4	5.4	8.2	8.6	10.9	13.7	17.3
	50	3.4	5.4	8.1	8.5	10.7	13.5	17.0
40	5	3.0	4.8	7.3	7.6	9.6	12.1	15.3
	10	3.0	4.7	7.1	7.5	9.5	11.9	15.0
	25	2.9	4.6	7.0	7.4	9.3	11.7	14.8
	50	2.9	4.6	6.9	7.3	9.1	11.5	14.5
50	5	2.6	4.2	6.3	6.6	8.3	10.5	13.3
	10	2.6	4.1	6.2	6.5	8.2	10.3	13.0
	15	2.6	4.1	6.2	6.5	8.2	10.3	13.0
60	5	2.3	3.6	5.5	5.7	7.2	9.1	11.5
70	2	2.1	3.3	5.0	5.2	6.6	8.3	10.5

Safety factor C = 1.25
Reference DIN 8074: 2011–12

Allowable Working Pressure for Pipes Made of PE80, (S) Conveying Water

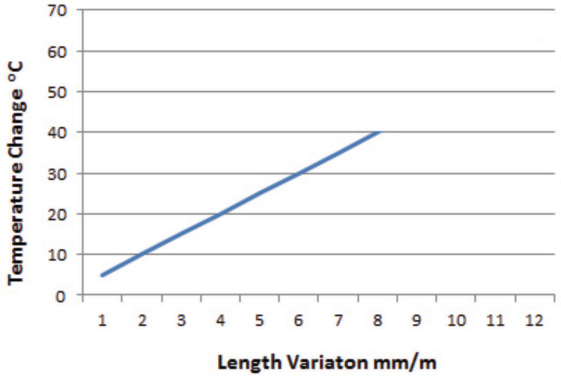
Temperature ℃	Years of service	Pipe series (S)										
		25	20	16	12,5	10.5	10	8.3	8	6.3	5	4
		Standar Dimension Ratio (SDR)										
		51	41	33	26	22	21	17.6	17	13.6	11	9
		Allowable Working Pressure (bar)										
10	5	3.2	4.0	5.1	6.4	7.7	8.1	9.7	10.1	12.8	16.1	20.3
	10	3.1	4.0	5.0	6.3	7.6	8.0	9.5	10.0	12.6	15.9	20.0
	25	3.1	3.9	4.9	6.1	7.4	7.8	9.3	9.8	12.3	15.5	19.5
	50	3.0	3.8	4.7	6.0	7.2	7.6	9.1	9.5	12.0	15.1	19.0
	100	2.9	3.7	4.7	5.9	7.2	7.5	8.9	9.4	11.8	14.9	18.8
20	5	2.7	3.4	4.2	5.4	6.5	6.8	8.1	8.5	10.7	13.5	17.0
	10	2.6	3.3	4.1	5.2	6.3	6.6	7.9	8.3	10.4	13.1	16.5
	25	2.5	3.2	4.1	5.1	6.2	6.5	7.7	8.1	10.3	12.9	16.3
	50	2.5	3.2	4.0	5.0	6.0	6.4	7.4	8.0	10.0	12.5	16.0
	100	2.4	3.1	3.9	4.9	5.9	6.2	7.4	7.8	9.8	12.3	15.5
30	5	2.2	2.8	3.5	4.5	5.4	5.7	6.8	7.1	9.0	11.3	14.3
	10	2.2	2.8	3.5	4.4	5.3	5.6	6.7	7.0	8.8	11.1	14.0
	25	2.1	2.7	3.4	4.3	5.2	5.5	6.5	6.9	8.7	10.9	13.8
	50	2.1	2.7	3.4	4.2	5.1	5.4	6.4	6.7	8.5	10.7	13.5
40	5	1.9	2.4	3.0	3.8	4.7	4.9	5.8	6.1	7.7	9.7	12.3
	10	1.9	2.4	3.0	3.8	4.6	4.8	5.7	6.0	7.6	9.5	12.0
	25	1.8	2.3	2.9	3.7	4.5	4.7	5.6	5.9	7.4	9.3	11.8
	50	1.8	2.3	2.9	3.6	4.4	4.6	5.5	5.7	7.2	9.1	11.5
50	5	1.6	2.1	2.6	3.3	4.0	4.2	5.0	5.2	6.6	8.3	10.5
	10	1.6	2.0	2.5	3.2	3.9	4.1	4.9	5.1	6.4	8.1	10.2
	15	1.6	2.0	2.5	3.2	3.9	4.1	4.9	5.1	6.4	8.1	10.2
60	5	1.4	1.8	2.3	2.9	3.5	3.7	4.4	4.6	5.8	7.3	9.2
70	2	1.3	1.6	2.0	2.6	3.1	3.3	3.9	4.1	5.2	6.5	8.2

Safety factor C = 1.25
Reference DIN 8074: 2011-12

HDPE pipe length variation due to temperature change (°C)

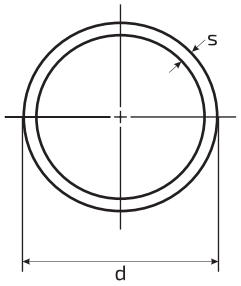
Temperature Change (℃)	Length Variation mm/meter
5	1
10	2
15	3
20	4
25	5
30	6
35	7
40	8

mm/m/ °C 0.2 = Coefficient of thermal expansion



PRESSURE

Maximum Sustained Temperature, (°C)	Multiply working pressure at (20 °C) by these factors
20	1
25	0.92
30	0.84
35	0.78
40	0.72

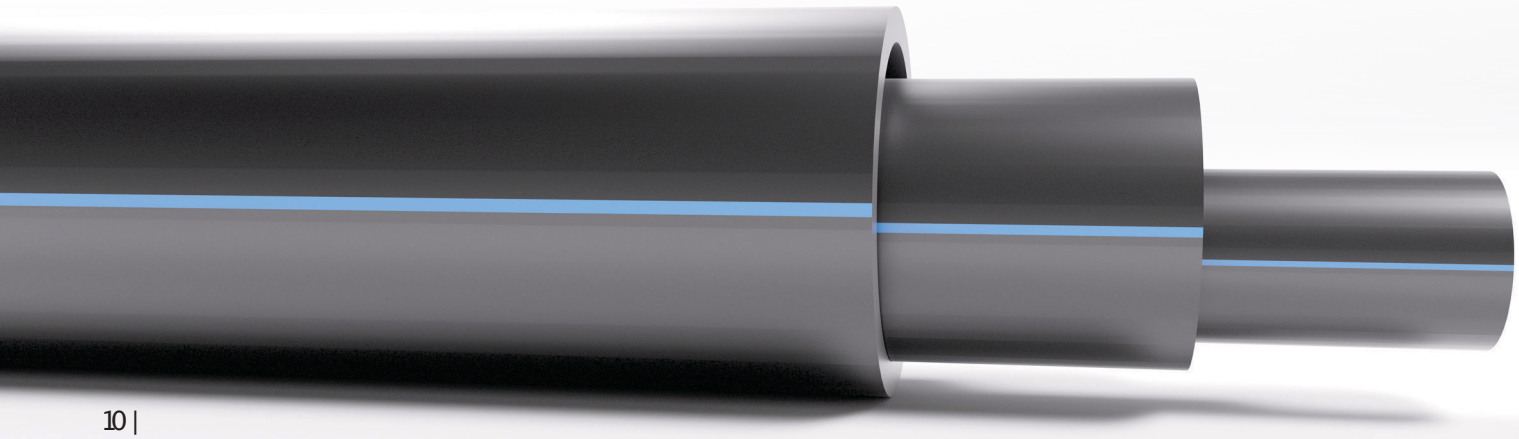


Maximum operating pressure (MOP) $= \frac{20 \times MRS}{C \times (SDR-1)}$ where C is design safety factor

STANDARD DIMENSION: SDR

Relationship between the admissible nominal pressure PN, SDR and Performance classes PE 80, PE 100 (for water 20 °C, 50 years service Life and C = 1.25).

Nominal Pressure PN (Bar)	SDR PE 80	SDR PE 100
3.2	41	–
4	33	41
5	26	33
6	22	–
6.3	21	26
8	17	21
10	13.6	17
12.5	11	13.6
16	9	11
20	7.4	9
25	6	7.4



QUALITY CONTROL

RAW MATERIAL INSPECTION

- Density
- Melt Flow Rate (MFR)
- Volatile Content
- Moisture Content
- Carbon Black Content
- Carbon Black Dispersion
- Oxidation Induction Time (OIT)

IN PROCESS INSPECTION

All visual inspection and dimension measurements are conducted during pipe manufacturing.

LABORATORY TESTING

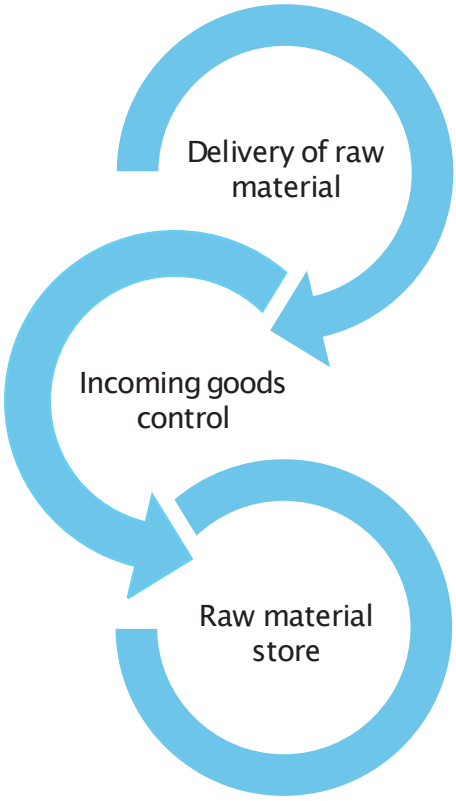
All physical and mechanical properties of product are conducted

- Hydrostatic Strength
- Melt Flow Rate
- Longitudinal Reversion Test
- Tensile Properties
- Oxidation Induction Time

FINAL INSPECTION

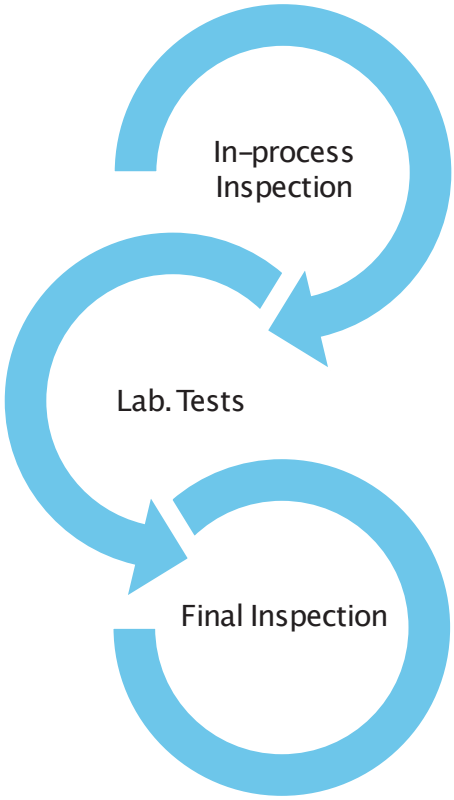
Final inspection conducted to pipes dispatching to the customer to be sure that they are free from visual physical damages:

Raw Material Inspection Process



- Density
- MFR
- Volatile content
- Moisture content
- Carbon black content
- Carbon black dispersion
- OIT

Final Product Inspection Process

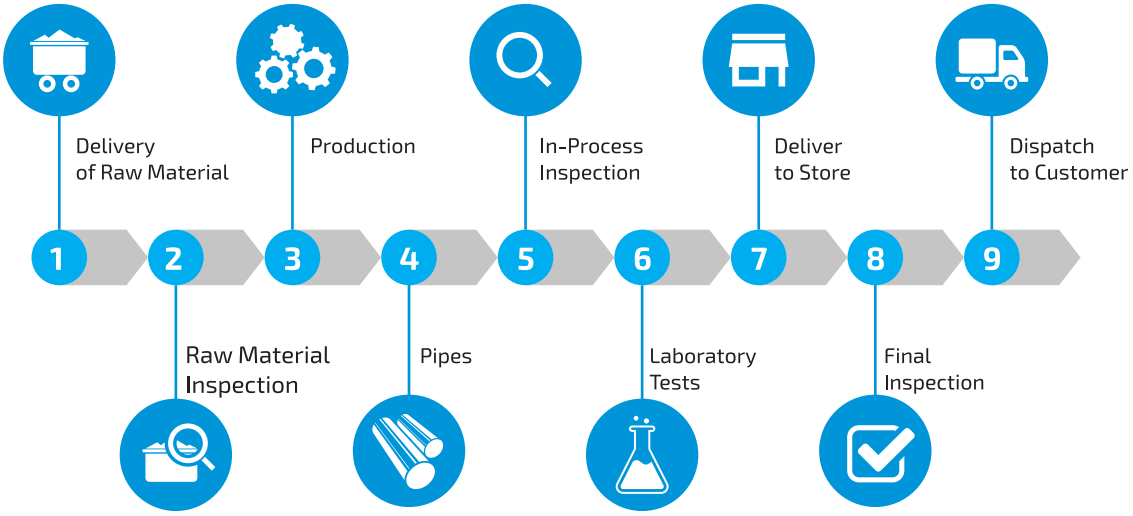


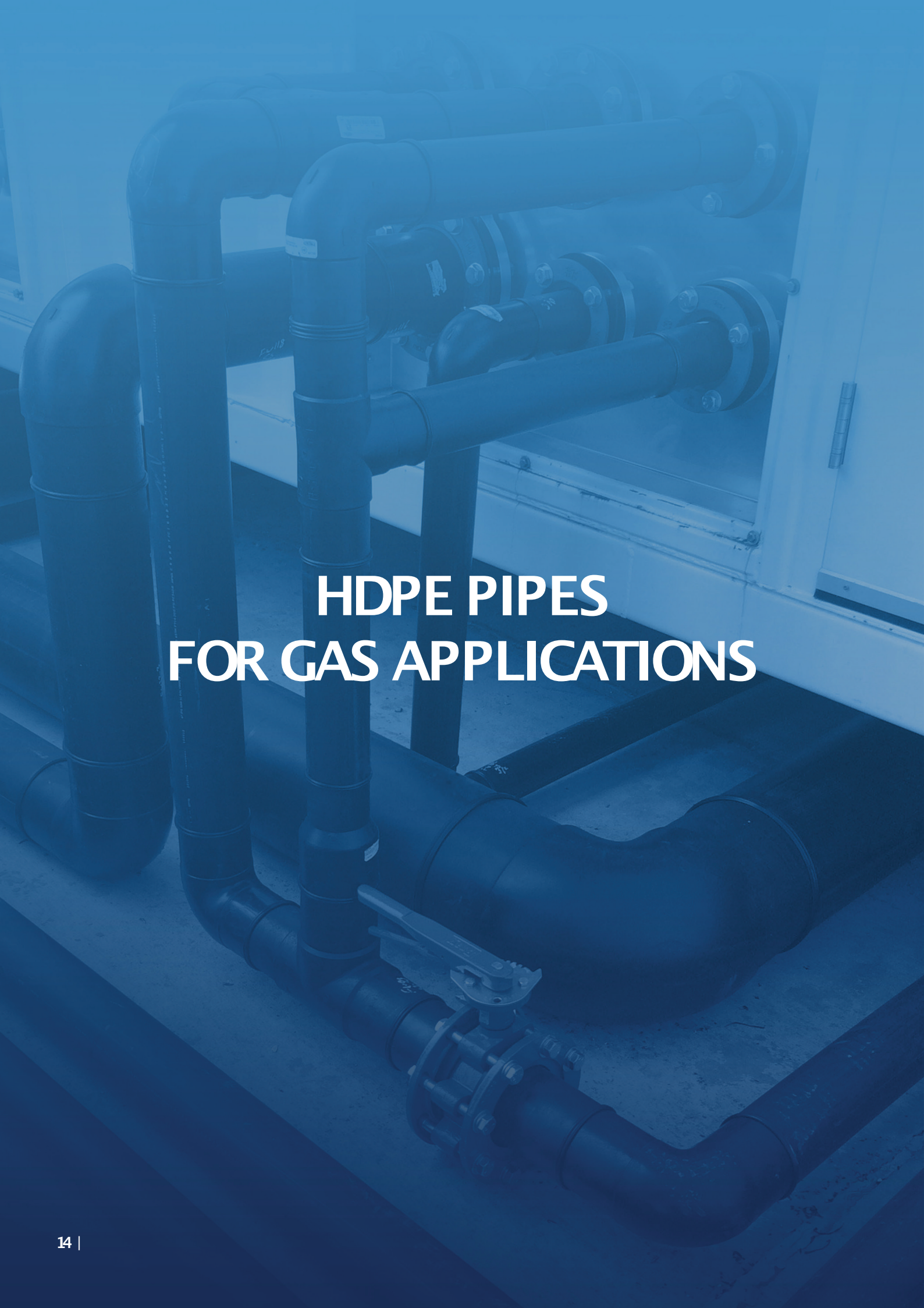
- Visual inspection
- Measurement of dimensions

- Physical Properties
- Mechanical Properties

- Visual Inspection

PRODUCTION FLOW CHART



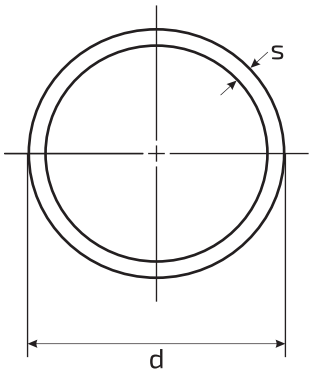


HDPE PIPES FOR GAS APPLICATIONS

PE 100 and PE 80 pipes for the transportation of GASEOUS FUELS according to ISO 4437

Nominal Outside Diameter (mm)	SDR 17.6 PE 100 PN 6 PE 80 PN 4.8		SDR 11 PE 100 PN 10 PE 80 PN 8	
	Minimum Wall Thickness (mm)	Weight (kg/m)	Minimum Wall Thickness (mm)	Weight (kg/m)
16	2.3	0.10	3.0	0.12
20	2.3	0.13	3.0	0.16
25	2.3	0.17	3.0	0.21
32	2.3	0.22	3.0	0.28
40	2.3	0.36	3.7	0.43
50	2.9	0.46	4.6	0.67
63	3.6	0.69	5.8	1.06
75	4.3	0.98	6.8	1.50
90	5.2	1.40	8.2	2.14
110	6.3	2.09	10.0	3.17
125	7.1	2.68	11.4	4.10
140	8.0	3.36	12.7	5.15
160	9.1	4.38	14.6	6.71
180	10.3	5.51	16.4	8.47
200	11.4	6.83	18.2	10.45
225	12.8	8.60	20.5	13.22
250	14.2	10.62	22.7	16.31
280	15.9	13.27	25.4	20.44
315	17.9	16.80	28.6	25.86
355	20.2	21.29	32.3	32.80
400	22.8	27.03	36.4	41.63
450	25.6	34.16	40.9	52.69
500	28.4	42.12	45.5	64.95
560	31.9	53.10	50.9	81.55
630	35.8	67.20	57.3	102.90

Material	:	PE 100
Minimum required strength	:	MRS = 10.0 MPa
Design stress	:	$\sigma s = 5.0$ Mpa
Design safety factor	:	C = 2.0 for gas
Material	:	PE 80
Minimum required strength	:	MRS = 8.0 Mpa
Design stress	:	$\sigma s = 4.0$ Mpa
Design safety factor	:	C = 2.0 for gas
Color	:	Black or Yellow
Length	:	Sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.



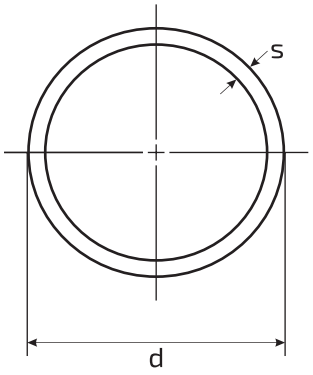
$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

HDPE PIPES FOR WATER

PE 100, PE 80 pressure pipes for water supply according to ISO 4427–2

	SDR 41	SDR 26	SDR 17	SDR 13.6	SDR 11	SDR 9
	S 20	S 12.5	S 8	S 6.3	S 5	S 4
	Nominal pressure (PN)					
PE 80	PN 3.2	PN 5	PN 8	PN 10	PN 12.5	PN 16
PE 100	PN 4	PN 6	PN 10	PN 12.5	PN 16	PN 20
Nominal Outside Diameter (mm)	Wall Thickness (mm)	Wall Thickness (mm)	Wall Thickness (mm)	Wall Thickness (mm)	Wall Thickness (mm)	Wall Thickness (mm)
16	–	–	–	–	–	2.0
20	–	–	–	–	2.0	2.3
25	–	–	–	2.0	2.3	3.0
32	–	–	2.0	2.4	3.0	3.6
40	–	–	2.4	3.0	3.7	4.5
50	–	2.0	3.0	3.7	4.6	5.6
63	–	2.5	3.8	4.7	5.8	7.1
75	–	2.9	4.5	5.6	6.8	8.4
90	–	3.5	5.4	6.7	8.2	10.1
110	–	4.2	6.6	8.1	10.0	12.3
125	–	4.8	7.4	9.2	11.4	14.0
140	–	5.4	8.3	10.3	12.7	15.7
160	–	6.2	9.5	11.8	14.6	17.9
180	–	6.9	10.7	13.3	16.4	20.1
200	–	7.7	11.9	14.7	18.2	22.4
225	–	8.6	13.4	16.6	20.5	25.2
250	–	9.6	14.8	18.4	22.7	27.9
280	–	10.7	16.6	20.6	25.4	31.3
315	7.7	12.1	18.7	23.2	28.6	35.2
355	3.5	13.6	21.1	26.1	32.2	39.7
400	9.8	15.3	23.7	29.4	36.3	44.7
450	11.0	17.2	26.7	33.1	40.9	50.3
500	12.3	19.1	29.7	36.8	45.4	55.8
560	13.7	21.4	33.2	41.2	50.8	62.5
630	15.4	24.1	37.4	46.3	57.2	70.3
710	17.4	27.2	42.1	52.2	64.5	79.3
800	19.6	30.6	47.4	58.8	72.6	89.3
900	22.0	34.4	53.3	66.2	81.7	–
1000	24.5	38.2	59.3	72.5	90.2	–
1200	29.4	45.9	67.9	88.2	–	–
1400	34.3	53.5	82.4	102.9	–	–
1600	39.2	61.2	94.1	117.6	–	–

Material	:	PE 100	PE 80
Minimum required strength	:	MRS = 10.0 Mpa	MRS = 8.0 Mpa
Design stress	:	σs = 8.0 Mpa	σs = 6.4 Mpa
Design safety factor	:	C = 1.25 for water	C = 1.25 for water
Color	:	Black	Black
Length	:	sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 160mm are available in coils of 100 meters. larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.	

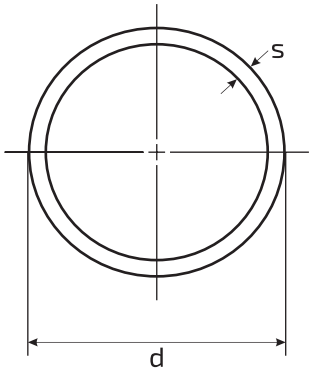


$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

PE 100 pressure pipes for water supply according to DIN 8074/8075

Nominal Outside Diameter (mm)	SDR 41 S 20 PN 4		SDR 26 S 12.5 PN 6.3		SDR 17 S 8 PN 10		SDR 13.6 S 6.3 PN 12.5		SDR 11 S 5 PN 16		SDR 9 S 4 PN 20	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	–	–	–	–	–	–	2.0	0.092
20	–	–	–	–	–	–	–	–	2.0	0.118	2.3	0.134
25	–	–	–	–	–	–	2.0	0.151	2.3	0.173	3.0	0.202
32	–	–	–	–	2.0	0.198	2.4	0.235	3.0	0.282	3.6	0.331
40	–	–	1.8	0.229	2.4	0.299	3.0	0.360	3.7	0.434	4.5	0.514
50	–	–	2.0	0.317	3.0	0.458	3.7	0.555	4.6	0.673	5.6	0.796
63	1.8	0.368	2.5	0.500	3.8	0.728	4.7	0.883	5.8	1.06	7.1	1.27
75	1.9	0.462	2.9	0.683	4.5	1.03	5.6	1.25	6.8	1.48	8.4	1.78
90	2.2	0.647	3.5	0.988	5.4	1.47	6.7	1.79	8.2	2.14	10.1	2.57
110	2.7	0.952	4.2	1.45	6.6	2.19	8.1	2.64	10.0	3.18	12.3	3.82
125	3.1	1.25	4.8	1.86	7.4	2.79	9.2	3.40	11.4	4.12	14.0	4.92
140	3.5	1.56	5.4	2.35	8.3	3.50	10.3	4.26	12.7	5.13	15.7	6.18
160	4.0	2.02	6.2	3.08	9.5	4.57	11.8	5.56	14.6	6.74	17.9	8.04
180	4.4	2.51	6.9	3.83	10.7	5.77	13.3	7.05	16.4	8.51	20.1	10.2
200	4.9	3.08	7.7	4.74	11.9	7.12	14.7	8.65	18.2	10.5	22.4	12.6
225	5.5	3.90	8.6	5.96	13.4	9.03	16.6	11.0	20.5	13.3	25.2	15.9
250	6.2	4.88	9.6	7.38	14.8	11.1	18.4	13.5	22.7	16.3	27.9	19.6
280	6.9	6.04	10.7	9.20	16.6	13.9	20.6	16.9	25.4	20.5	31.3	24.6
315	7.7	7.59	12.1	11.7	18.7	17.6	23.2	21.5	28.6	25.9	35.2	31.1
355	8.7	9.65	13.6	14.8	21.1	22.4	26.1	27.2	32.2	32.9	39.7	39.5
400	9.8	12.2	15.3	18.8	23.7	28.3	29.4	34.5	36.3	41.7	44.7	50.1
450	11.0	15.4	17.2	23.7	26.7	35.8	33.1	43.7	40.9	52.8	50.3	63.4
500	12.3	19.2	19.1	29.2	29.7	44.2	36.8	53.9	45.4	65.2	55.8	78.1
560	13.7	23.9	21.4	36.6	33.2	55.4	41.2	67.6	50.8	81.7	62.5	98.0
630	15.4	30.2	24.1	46.4	37.4	70.2	46.3	85.5	57.2	103	–	–
710	17.4	38.4	27.2	59.0	42.1	89.0	52.2	109	64.5	131	–	–
800	19.6	48.7	30.6	74.7	47.4	113	58.8	138	–	–	–	–
900	22.0	31.3	34.4	94.4	53.3	143	66.1	174	–	–	–	–
1000	24.5	75.9	38.2	117	59.3	176	–	–	–	–	–	–
1200	29.4	109	45.9	168	–	–	–	–	–	–	–	–
1400	34.3	149	53.5	230	–	–	–	–	–	–	–	–
1600	39.2	194	61.2	298	–	–	–	–	–	–	–	–

Material : PE 100
Minimum required strength: : MRS = 10.0 Mpa
Design stress : $\sigma s = 8.0$ Mpa
Design safety factor : C = 1.25 for water
Color : Black
Length : sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. Larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.

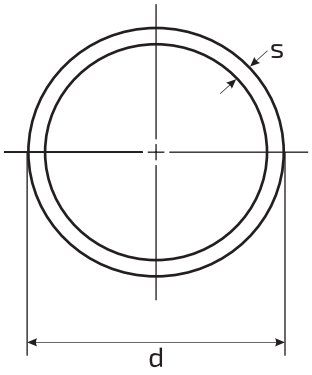


$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

PE 100 pressure pipes for water supply according to DIN 8074/8075

Nominal Outside Diameter (mm)	SDR 41 S 20 PN 3.2		SDR 33 S 16 PN 4		SDR 13.6 S 6.3 PN 9.9		SDR 11 S 5 PN 12.5		SDR 9 S 4 PN 15.6		SDR 7.4 S 3.2 PN 19.2	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	–	–	–	–	2.0	0.092	2.3	0.103
20	–	–	–	–	–	–	2.0	0.118	2.3	0.134	3.0	0.164
25	–	–	–	–	2.0	0.151	2.3	0.173	3.0	0.202	3.5	0.243
32	–	–	–	–	2.4	0.235	3.0	0.282	3.6	0.331	4.4	0.390
40	–	–	–	–	3.0	0.360	3.7	0.434	4.5	0.514	5.5	0.607
50	–	–	1.8	0.290	3.7	0.555	4.6	0.673	5.6	0.796	6.9	0.945
63	1.8	0.368	2.0	0.403	4.7	0.883	5.8	1.06	7.1	1.27	8.6	1.49
75	1.9	0.462	2.3	0.557	5.6	1.25	6.8	1.48	8.4	1.78	10.3	2.12
90	2.2	0.647	2.8	0.800	6.7	1.79	8.2	2.14	10.1	2.57	12.3	3.03
110	2.7	0.952	3.4	1.19	8.1	2.64	10.0	3.18	12.3	3.82	15.1	4.54
125	3.1	1.25	3.9	1.53	9.2	3.4	11.4	4.12	14.0	4.92	17.1	5.84
140	3.5	1.56	4.3	1.09	10.3	4.26	12.7	5.13	15.7	6.18	19.2	7.33
160	4.0	2.02	4.9	2.45	11.8	5.56	14.6	6.74	17.9	8.04	21.9	9.54
180	4.4	2.51	5.5	3.10	13.3	7.05	16.4	8.51	20.1	10.2	24.6	12.1
200	4.9	3.08	6.2	3.88	14.7	8.65	18.2	10.5	22.4	12.6	27.4	14.9
225	5.5	3.90	6.9	4.82	16.6	11.0	20.5	13.3	25.2	15.9	30.8	18.8
250	6.2	4.88	7.7	5.98	18.4	13.5	22.7	16.3	27.9	19.6	34.2	23.3
280	6.9	6.04	8.6	7.47	20.6	16.9	25.4	20.5	31.3	24.6	38.3	29.2
315	7.7	7.59	9.7	9.47	23.2	21.5	28.6	25.9	35.2	31.1	43.1	36.9
355	8.7	9.65	10.9	12.0	26.1	27.2	32.2	32.9	39.7	39.5	48.5	46.8
400	9.8	12.2	12.3	15.2	29.4	34.5	36.3	41.7	44.7	50.1	54.7	59.4
450	11.0	15.4	13.8	19.2	33.1	43.7	40.9	52.8	50.3	63.4	61.5	75.2
500	12.3	19.2	15.3	23.6	36.8	53.9	45.4	65.2	55.8	78.1	68.3	92.8
560	13.7	23.9	17.2	29.7	41.2	67.6	50.8	81.7	62.5	89.0	–	–
630	15.4	30.2	19.3	37.5	46.3	85.5	57.2	103	–	–	–	–
710	17.4	38.4	21.8	47.7	52.2	109	64.5	131	–	–	–	–
800	19.6	48.7	24.5	60.4	58.8	138	–	–	–	–	–	–
900	22.0	61.3	27.6	76.4	66.1	174	–	–	–	–	–	–
1000	24.5	75.9	30.6	94.1	–	–	–	–	–	–	–	–
1200	29.4	109	36.7	135	–	–	–	–	–	–	–	–
1400	34.3	149	42.9	184	–	–	–	–	–	–	–	–
1600	39.2	194	49.0	241	–	–	–	–	–	–	–	–

Material	:	PE 100
Minimum required strength	:	MRS = 10.0 Mpa
Design stress	:	$\sigma s = 6.25$ Mpas
Design safety factor	:	C = 1.6 for water
Color	:	Black
Length	:	sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.

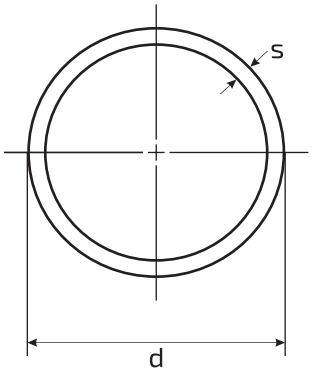


$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

PE 80 pressure pipes for water supply according to DIN 8074/8075

Nominal Outside Diameter (mm)	SDR 41 S 20 PN 4		SDR 33 S 16 PN 4		SDR 22 S 10.5 PN 6		SDR 13.6 S 6.3 PN 10		SDR 11 S 5 PN 12.5		SDR 9 S 4 PN 16	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	–	–	–	–	–	–	1.8	0.084
20	–	–	–	–	–	–	1.8	0.107	1.9	0.112	2.3	0.133
25	–	–	–	–	–	–	1.9	0.144	2.3	0.171	2.8	0.200
32	–	–	–	–	–	–	2.4	0.232	2.9	0.272	3.6	0.327
40	–	–	–	–	1.9	0.238	3.0	0.356	3.7	0.430	4.5	0.509
50	–	–	1.8	0.287	2.3	0.361	3.7	0.549	4.6	0.666	5.6	0.788
63	1.8	0.364	2.0	0.399	2.9	0.563	4.7	0.873	5.8	1.05	7.1	1.26
75	1.9	0.457	2.3	0.551	3.5	0.807	5.6	1.24	6.8	1.47	8.4	1.76
90	2.2	0.643	2.8	0.791	4.1	1.14	6.7	1.77	8.2	2.12	10.1	2.54
110	2.7	0.943	3.4	1.17	5.0	1.67	8.1	2.62	10.0	3.14	12.3	3.78
125	3.1	1.23	3.9	1.51	5.7	2.16	9.2	3.37	11.4	4.08	14.0	4.87
140	3.5	1.54	4.3	1.88	6.4	2.72	10.3	4.22	12.7	5.08	15.7	6.11
160	4.0	2.0	4.9	2.42	7.3	3.54	11.8	5.50	14.6	6.67	17.9	7.96
180	4.4	2.49	5.5	3.07	8.2	4.47	13.3	6.98	16.4	8.42	20.1	10.1
200	4.9	3.05	6.2	3.84	9.1	5.57	14.7	8.56	18.2	10.4	22.4	12.4
225	5.5	3.86	6.9	4.77	10.3	7.00	16.6	10.9	20.5	13.1	25.2	15.8
250	6.2	4.83	7.7	5.92	11.4	8.59	18.4	13.4	22.7	16.2	27.9	19.4
280	6.9	5.98	8.6	7.40	12.8	10.8	20.6	16.8	25.4	20.3	31.3	24.3
315	7.7	7.52	9.7	9.37	14.4	13.6	23.2	21.2	28.4	25.6	35.2	30.8
355	8.7	9.55	10.9	11.8	16.2	17.3	26.1	26.9	32.2	32.5	39.7	39.1
400	9.8	12.1	12.3	15.1	18.2	21.9	29.4	34.1	36.3	41.3	44.7	49.6
450	11.0	15.3	13.8	19.0	20.5	27.7	33.1	43.2	40.9	52.3	50.3	62.7
500	12.3	19.0	15.3	23.4	22.8	34.2	36.8	53.3	45.4	64.5	55.8	77.3
560	13.7	23.6	17.2	29.4	25.5	42.8	41.2	66.9	50.8	80.8	62.5	97.0
630	15.4	29.9	19.3	37.1	28.7	54.1	46.3	84.6	57.2	102	–	–
710	17.4	38.0	21.8	47.2	32.3	68.7	52.2	107	64.5	130	–	–
800	19.6	48.1	24.5	59.7	36.4	87.2	58.8	136	–	–	–	–
900	22	60.9	27.6	75.6	41	110	66.1	172	–	–	–	–
1000	24.5	75.2	30.6	93.1	45.5	136	–	–	–	–	–	–
1200	29.4	108	36.7	134	54.6	196	–	–	–	–	–	–
1400	34.4	147	42.9	183	63.7	267	–	–	–	–	–	–
1600	39.2	192	49	238	–	–	–	–	–	–	–	–

Material	:	PE 80
Minimum required strength	:	MRS = 8.0 Mpa
Design stress	:	$\sigma s = 6.4$ Mpa
Design safety factor	:	C = 1.25 for water
Color	:	Black
Length	:	Sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. Larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.

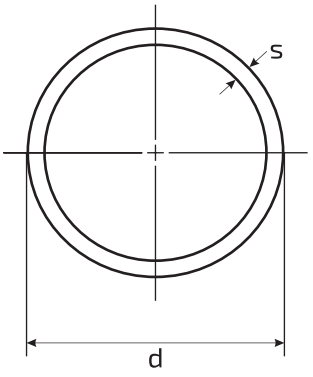


$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

PE 80 pressure pipes for water supply according to DIN 8074/8075

Nominal Outside Diameter (mm)	SDR 33 S 16 PN 3.1		SDR 26 S 12.5 PN 4		SDR 17.6 S 8.3 PN 6		SDR 11 S 5 PN 10		SDR 9 S 4 PN 12.5		SDR 7.4 S 3.2 PN 15.3	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	–	–	–	–	1.8	0.084	2.2	0.099
20	–	–	–	–	–	–	1.9	0.112	2.3	0.133	2.8	0.154
25	–	–	–	–	–	–	2.3	0.171	2.8	0.200	3.5	0.240
32	–	–	–	–	1.8	0.179	2.9	0.272	3.6	0.327	4.4	0.386
40	–	–	1.8	0.227	2.3	0.285	3.7	0.430	4.5	0.509	5.5	0.600
50	1.8	0.287	2.0	0.314	2.9	0.440	4.6	0.666	5.6	0.788	6.9	0.936
63	2.0	0.399	2.5	0.494	3.6	0.688	5.8	1.05	7.1	1.26	8.6	1.47
75	2.3	0.551	2.9	0.675	4.3	0.966	6.8	1.47	8.4	1.76	10.3	2.09
90	2.8	0.791	3.5	0.978	5.1	1.39	8.2	2.12	10.1	2.54	12.3	3.0
110	3.4	1.17	4.2	1.43	6.3	2.08	10.0	3.14	12.3	3.78	15.1	4.49
125	3.9	1.51	4.8	1.84	7.1	2.66	11.4	4.08	14.0	4.87	17.1	5.77
140	4.3	1.88	5.4	2.32	8.0	3.34	12.7	5.08	15.7	6.11	19.2	7.25
160	4.9	2.42	6.2	3.04	9.1	4.35	14.6	6.67	17.9	7.96	21.9	9.44
180	5.5	3.07	6.9	3.79	10.2	5.48	16.4	8.42	20.1	10.1	24.6	11.9
200	6.2	3.84	7.7	4.69	11.4	6.79	18.2	10.4	22.4	12.4	27.4	14.8
225	6.9	4.77	8.6	5.89	12.8	8.55	20.5	13.1	25.2	15.8	30.8	18.6
250	7.7	5.92	9.6	7.30	14.2	10.6	22.7	16.2	27.9	19.4	34.2	23.0
280	8.6	7.40	10.7	9.10	15.9	13.2	25.4	20.3	31.3	24.3	38.3	28.9
315	9.7	9.37	12.1	11.6	17.9	16.7	28.6	25.6	35.2	30.8	43.1	36.5
355	10.9	11.8	13.6	14.6	20.1	21.2	32.2	32.5	39.7	39.1	48.5	46.3
400	12.3	15.1	15.3	18.6	22.7	26.9	36.3	41.3	44.7	49.6	54.7	58.8
450	13.8	19.0	17.2	23.5	25.5	34.0	40.9	52.3	50.3	62.7	61.5	74.4
500	15.3	23.4	19.1	28.9	28.4	42.0	45.4	64.5	55.8	77.3	68.3	91.8
560	17.2	29.4	21.4	36.2	31.7	52.5	50.8	80.8	62.5	97.0	–	–
630	19.3	37.1	24.1	45.9	35.7	66.5	57.2	102	–	–	–	–
710	21.8	47.2	27.2	58.4	40.2	84.4	64.5	130	–	–	–	–
800	24.5	59.7	30.6	73.9	45.3	107	–	–	–	–	–	–
900	27.6	75.6	34.4	93.4	51	136	–	–	–	–	–	–
1000	30.6	93.1	38.2	115	56.7	167	–	–	–	–	–	–
1200	36.7	134	45.9	166	68	241	–	–	–	–	–	–
1400	42.9	183	53.5	226	–	–	–	–	–	–	–	–
1600	49	238	61.2	295	–	–	–	–	–	–	–	–

Material	:	PE 80
Minimum required strength	:	MRS = 8.0 Mpa
Design stress	:	$\sigma s = 5.0$ Mpa
Design safety factor	:	C = 1.6 for water
Color	:	Black
Length	:	sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. Larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.

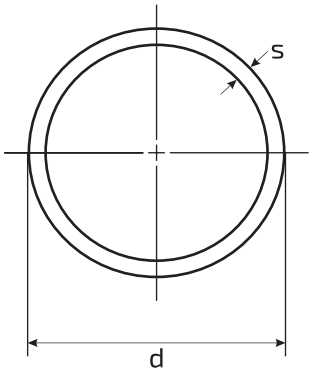


$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

PE 63 pressure pipes for water supply according to DIN 8074 8075

Nominal Outside Diameter (mm)	SDR 26 S 12.5 PN 4		SDR 17.6 S 8.3 PN 6		SDR 11 S 5 PN 10		SDR 7.4 S 3.2 PN 15.9	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	–	–	2.2	0.099
20	–	–	–	–	1.9	0.112	2.8	0.154
25	–	–	–	–	2.3	0.171	3.5	0.240
32	–	–	1.8	0.179	2.9	0.272	4.4	0.386
40	1.8	0.227	2.3	0.285	3.7	0.430	5.5	0.60
50	2.0	0.314	2.9	0.440	4.6	0.666	6.9	0.936
63	2.5	0.494	3.6	0.688	5.8	1.05	8.6	1.47
75	2.9	0.675	4.3	0.976	6.8	1.47	10.3	2.09
90	3.5	0.978	5.1	1.39	8.2	2.12	12.3	3.0
110	4.2	1.43	6.3	2.08	10.0	3.14	15.1	4.49
125	4.8	1.84	7.1	2.66	11.4	4.08	17.1	5.77
140	5.4	2.32	8.0	3.34	12.7	5.08	19.2	7.25
160	6.2	3.04	9.1	4.35	14.6	6.67	21.9	9.44
180	6.9	3.79	10.2	5.48	16.4	8.42	24.6	11.9
200	7.7	4.69	11.4	6.79	18.2	10.4	27.4	14.8
225	8.6	5.89	12.8	8.55	20.5	13.1	30.8	18.6
250	9.6	7.30	14.2	10.6	22.7	16.2	34.2	23.0
280	10.7	9.10	15.9	13.2	25.4	20.3	38.3	28.9
315	12.1	11.6	17.9	16.7	28.6	25.6	43.1	36.5
355	13.6	14.6	20.1	21.2	32.2	32.5	48.5	46.3
400	15.3	18.6	22.7	26.9	36.3	41.3	54.7	58.8
450	17.2	23.5	25.5	34.0	40.9	52.3	61.5	74.4
500	19.1	28.9	28.4	42.0	45.4	64.5	68.3	91.8
560	21.4	36.2	31.7	52.5	50.8	80.8	–	–
630	24.1	45.9	35.7	66.5	57.2	102	–	–
710	27.2	58.4	40.2	84.4	64.5	130	–	–
800	30.6	73.9	45.3	107	–	–	–	–
900	34.4	93.4	51	136	–	–	–	–
1000	38.2	115	56.7	167	–	–	–	–
1200	45.9	166	68	241	–	–	–	–
1400	53.5	226	–	–	–	–	–	–
1600	61.2	295	–	–	–	–	–	–

Material	:	PE 63
Minimum required strength	:	MRS = 6.3 Mpa
Design stress	:	$\sigma s = 5.04$ Mpa
Design safety factor	:	C = 1.25 for water
Color	:	Black
Length	:	sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. Larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.

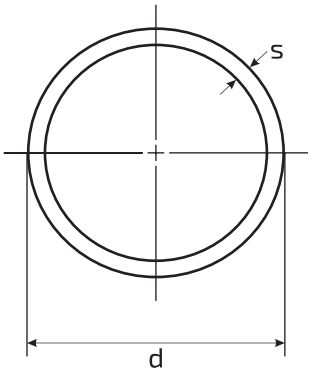


$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

PE 63 pressure pipes for water supply according to DIN 8074/8075

Nominal Outside Diameter (mm)	SDR 21 S 10 PN 3.9		SDR 13.6 S 6.3 PN 6.2		SDR 9 S 4 PN 9.8		SDR 6 S 2.5 PN 15.7	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	1.8	0.084	2.7	0.115
20	–	–	1.8	0.107	2.3	0.133	3.4	0.180
25	–	–	1.9	0.144	2.8	0.200	4.2	0.278
32	–	–	2.4	0.232	3.6	0.327	5.4	0.454
40	1.9	0.239	3.0	0.356	4.5	0.509	6.7	0.701
50	2.4	0.374	3.7	0.549	5.6	0.788	8.3	1.09
63	3.0	0.580	4.7	0.873	7.1	1.26	10.5	1.73
75	3.6	0.828	5.6	1.24	8.4	1.76	12.5	2.44
90	4.3	1.18	6.7	1.77	10.1	2.54	15.0	3.51
110	5.3	1.77	8.1	2.62	12.3	3.78	18.3	5.24
125	6.0	2.27	9.2	3.37	14.0	4.87	20.8	6.75
140	6.7	2.83	10.3	4.22	15.7	6.11	23.3	8.47
160	7.7	3.72	11.8	5.50	17.9	7.96	26.6	11.0
180	8.6	4.67	13.3	6.98	20.1	10.1	29.9	14.0
200	9.6	5.78	14.7	8.56	22.4	12.4	33.2	17.2
225	10.8	7.30	16.6	10.9	25.2	15.8	37.4	21.8
250	11.9	8.93	18.4	13.4	27.9	19.4	41.6	27.0
280	13.4	11.3	20.6	16.8	31.3	24.3	46.5	33.8
315	15.0	14.2	23.2	21.2	35.2	30.8	52.3	42.7
355	16.9	18.0	26.1	26.9	39.7	39.1	59.0	54.3
400	19.1	22.9	29.4	34.1	44.7	49.6	66.5	68.9
450	21.5	28.9	33.1	43.2	50.3	62.7	–	–
500	23.9	35.7	36.8	53.3	55.8	77.3	–	–
560	26.7	44.7	41.2	66.9	62.5	97.0	–	–
630	30.0	56.4	46.3	84.6	–	–	–	–
710	33.9	71.8	52.2	107	–	–	–	–
800	38.1	91.1	58.8	136	–	–	–	–
900	42.9	115	66.1	172	–	–	–	–
1000	47.7	142	–	–	–	–	–	–
1200	57.2	205	–	–	–	–	–	–
1400	66.7	278	–	–	–	–	–	–
1600	–	–	–	–	–	–	–	–

Material	:	PE 63
Minimum required strength	:	MRS = 6.3 Mpa
Design stress	:	$\sigma s = 3.94$ Mpa
Design safety factor	:	C = 1.6 for water
Color	:	Black
Length	:	sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.



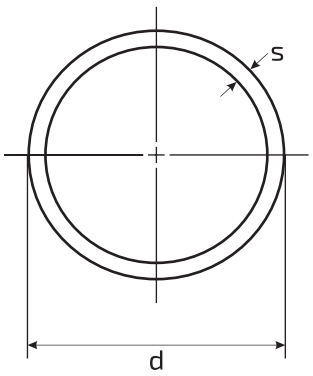
$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

HDPE PIPES FOR IRRIGATION

PE 80 pressure pipes irrigation systems according to DIN 8074/8075

Nominal Outside Diameter (mm)	SDR 41 S 20 PN 4		SDR 33 S 16 PN 4		SDR 22 S 10.5 PN 6		SDR 13.6 S 6.3 PN 10		SDR 11 S 5 PN 12.5		SDR 9 S 4 PN 16	
	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m	Wall Thickness (mm)	Weight kg/m
16	–	–	–	–	–	–	–	–	–	–	1.8	0.084
20	–	–	–	–	–	–	1.8	0.107	1.9	0.112	2.3	0.133
25	–	–	–	–	–	–	1.9	0.144	2.3	0.171	2.8	0.200
32	–	–	–	–	–	–	2.4	0.232	2.9	0.272	3.6	0.327
40	–	–	–	–	1.9	0.238	3.0	0.356	3.7	0.430	4.5	0.509
50	–	–	1.8	0.287	2.3	0.361	3.7	0.549	4.6	0.666	5.6	0.788
63	1.8	0.364	2.0	0.399	2.9	0.563	4.7	0.873	5.8	1.05	7.1	1.26
75	1.9	0.457	2.3	0.551	3.5	0.807	5.6	1.24	6.8	1.47	8.4	1.76
90	2.2	0.643	2.8	0.791	4.1	1.14	6.7	1.77	8.2	2.12	10.1	2.54
110	2.7	0.943	3.4	1.17	5.0	1.67	8.1	2.62	10.0	3.14	12.3	3.78
125	3.1	1.23	3.9	1.51	5.7	2.16	9.2	3.37	11.4	4.08	14.0	4.87
140	3.5	1.54	4.3	1.88	6.4	2.72	10.3	4.22	12.7	5.08	15.7	6.11
160	4.0	2.0	4.9	2.42	7.3	3.54	11.8	5.50	14.6	6.67	17.9	7.96
180	4.4	2.49	5.5	3.07	8.2	4.47	13.3	6.98	16.4	8.42	20.1	10.1
200	4.9	3.05	6.2	3.84	9.1	5.57	14.7	8.56	18.2	10.4	22.4	12.4
225	5.5	3.86	6.9	4.77	10.3	7.00	16.6	10.9	20.5	13.1	25.2	15.8
250	6.2	4.83	7.7	5.92	11.4	8.59	18.4	13.4	22.7	16.2	27.9	19.4
280	6.9	5.98	8.6	7.40	12.8	10.8	20.6	16.8	25.4	20.3	31.3	24.3
315	7.7	7.52	9.7	9.37	14.4	13.6	23.2	21.2	28.4	25.6	35.2	30.8
355	8.7	9.55	10.9	11.8	16.2	17.3	26.1	26.9	32.2	32.5	39.7	39.1
400	9.8	12.1	12.3	15.1	18.2	21.9	29.4	34.1	36.3	41.3	44.7	49.6
450	11.0	15.3	13.8	19.0	20.5	27.7	33.1	43.2	40.9	52.3	50.3	62.7
500	12.3	19.0	15.3	23.4	22.8	34.2	36.8	53.3	45.4	64.5	55.8	77.3
560	13.7	23.6	17.2	29.4	25.5	42.8	41.2	66.9	50.8	80.8	62.5	97.0
630	15.4	29.9	19.3	37.1	28.7	54.1	46.3	84.6	57.2	102	–	–
710	17.4	38.0	21.8	47.2	32.3	68.7	52.2	107	64.5	130	–	–
800	19.6	48.1	24.5	59.7	36.4	87.2	58.8	136	–	–	–	–
900	22	60.9	27.6	75.6	41	110	66.1	172	–	–	–	–
1000	24.5	75.2	30.6	93.1	45.5	136	–	–	–	–	–	–
1200	29.4	108	36.7	134	54.6	196	–	–	–	–	–	–
1400	34.4	147	42.9	183	63.7	267	–	–	–	–	–	–
1600	39.2	192	49	238	–	–	–	–	–	–	–	–

Material	:	PE 80
Minimum required strength	:	MRS = 8.0 Mpa
Design stress	:	σs = 6.4 Mpa
Design safety factor	:	C = 1.25 for water
Color	:	Black
Length	:	Sizes from 16mm to 32mm are available in coils of 100, 200 and 300 up to 1500 meters. Sizes from 40mm to 125mm are available in coils of 100 meters. Larger diameters are available in straight lengths of 12 meters. Different lengths can be supplied on request.



$$PN = \frac{20 \times MRS}{C \times (SDR - 1)}$$

HDPE for irrigation systems according to BS 1972

Nominal Size Inch	Outside diameter mm		Wall Thickness mm					
			Class B 6.1kgf/cm²		Class C 9.1kgf/cm²		Class D 12.2 kgf/cm²	
	Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.
1/2"	21.2	21.5	–	–	2.7	3.0	3.4	3.7
3/4"	26.6	26.9	2.3	2.6	3.4	3.7	4.3	4.7
1"	33.4	33.7	3.0	3.3	4.2	4.6	5.4	5.9
1 1/4"	42.1	42.5	3.7	4.1	5.3	5.8	6.8	7.5
1 1/2"	48.1	48.5	4.3	4.7	6.1	6.7	7.8	8.6
2"	60.1	60.6	5.3	5.8	7.6	8.4	–	–
3"	88.6	89.3	7.8	8.6	11.2	12.3	–	–
4"	113.9	114.7	10.0	11.0	–	–	–	–

Material : LDPE
Color : Black
Length : sizes from 1/2" to 1" are available in coils of 100, 200 and 300 meters. Sizes from 1 1/4" to 4" are available in coils of 100 meters. Different lengths can be supplied on request.

HDPE for irrigation systems according to BS 3284

Nominal Size Inch	Outside diameter mm		Wall Thickness mm			
			Class C 9.1kgf/cm²		Class D 12.2 kgf/cm²	
	Min.	Max.	Min.	Max.	Min.	Max.
1/2"	21.2	21.5	1.8	2.0	2.3	2.6
3/4"	26.6	26.9	2.3	2.6	2.9	3.2
1"	33.4	33.7	2.8	3.1	3.7	4.1
1 1/4"	42.1	42.5	3.6	4.0	4.6	5.1
1 1/2"	48.1	48.5	4.1	4.5	5.3	5.8
2"	60.1	60.6	5.1	5.6	6.6	7.3
3"	88.6	89.3	7.5	8.2	9.7	10.7
4"	113.9	114.7	9.6	10.6	–	–

Material: : HDPE
Color : Black
Length : sizes from 1/2" to 1" are available in coils of 100, 200 and 300 meters. Sizes from 1 1/4" to 4" are available in coils of 100 meters. Different lengths can be supplied on request.

MATERIAL HANDLING GUIDE

Lifting and Handling HDPE Pipes and Fittings

- Lifting and handling HDPE pipes and fittings must be done by trained people.
- Safety shoes or boots with impact protection are required any time an employee is engaged in lifting or carrying heavy objects.
- Employers of pipe fitters should routinely consider eye and face protection when working with pipe.
- When lifting equipments used; safety precautions must be followed.

Loading, Unloading and Transporting HDPE Pipes And Fittings

- Pipe is loaded into flatbed trailers fitted with metal stakes on the side.
- Loose loaded pipe shall be loaded in layers according to specified quantities and patterns.
- When pipe unloaded all safety precautions must be followed.
- Avoid any sharp tools may cause damages to the pipes.

Pipe And Fitting Storage

- The storage area should provide adequate protection against physical damage to components.
- It should be large enough to accommodate piping components as well as allow handling equipment tomove about freely.
- The storage area should have a relatively smooth, level surface free of stones, debris or other materials that could damage the pipe or fittings.

If the pipes stored off-site, follow the following steps

- Store small pipe in racks according to the length and size of the pipe.
- Block or strap the pipe to prevent it from rolling or falling off the rack.
- Pipe larger than 63mm in diameter should be stacked with spacing strips between each row.
- Arrange and block each row of stacked pipe to prevent it from rolling off the pile.

If the pipes stored in job-site, follow the following steps

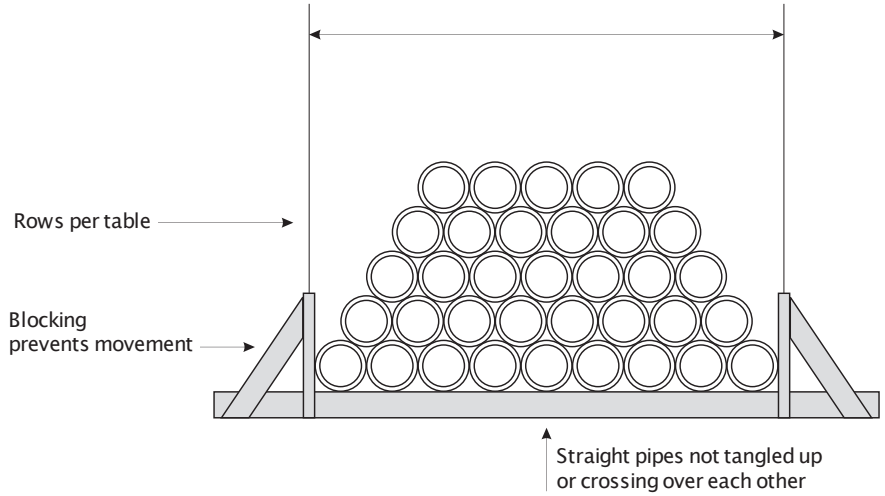
- When pipes of variable wall thickness are received, it is recommended that the pipe be segregated into piles, each pile containing a single size and pressure rating to minimize confusion at a later date.
- The thickest pipe should always be stored at the bottom of the pile.
- The pile should be constructed in a pyramidal, freestanding manner, with each successive layer having one less pipe than the layer below.
- The bottom layer should be braced to prevent movement.
- The maximum allowable stacking heights for polyethylene pipe should not exceed those in Table 1.
- Pipe coils should be stored upright on a level surface.

Indoor / Outdoor Storage

- Black HDPE pipe generally contains greater than 2% carbon black, it will resist damage from sunlight.
- Expansion and contraction caused by uneven heating in the sun may cause the pipe to bow if not restrained by racks.

Suggested Loose Storage Stacking Heights for HDPE pipe

Nominal Diameter (mm)	No. of Rows	
	Above SDR 17	SDR 17 & Below
110	15	12
160	10	8
200	9	7
225	8	6
250	6	5
315	5	4
400	4	3
500	3	3
630	3	2
710	2	2
800	2	2
900	2	1
1000	1	1



ASSEMBLY PROCEDURE

JOINTING AND FITTINGS

Heating Element Butt Welded Joints:

Two pipe end faces are heated together by using heating element until reaching melting temperature, then the pipe ends pressed together to form a uniform permanent bond.

Butt Fusion Fittings:

Spigot end fittings produced specially for butt fusion to pipe. These must be specified to match both the pressure rating and the SDR of the pipe. The pressure rating of the fittings must be equivalent or higher than that of the pipe.

Electro-fusion fittings:

Electro-fusion fittings are specified by their pressure rating, such that they are at least rated the same as the pipe pressure rating. The heating energy of this fittings are produced by heating wires.

Mechanical Fittings:

Electro-fusion fittings are specified by their pressure rating, such that they are at least rated the same as the pipe pressure rating. The heating energy of this fittings are produced by heating wires.

BUTT WELDING

Butt welding method used to join two lengths of HDPE pipes together or join HDPE pipe with HDPE fitting.

Butt welding machine

The following conditions should be achieved in a butt welding machine:

- Aligning the pipe ends
- Clamping the pipes
- Facing the pipe ends parallel and square to the centerline
- Heating the pipe ends
- Applying the proper fusion force

Butt welding steps

The following steps should be implemented to make perfect butt welding:

- Clean, clamp and align the pipe ends to be joined.
- Face the pipe ends to establish clean, parallel surfaces, perpendicular to the center line.
- Align the pipe ends.
- Melt the pipe interfaces.
- Join the two pipe ends together by applying the proper fusion force.
- Hold under pressure until the joint is cool.

Butt welding machine

SIZE (MM)
ø 40–200
ø 315–630
ø 800
ø 1,600

ELECTRO-FUSION

- Electro-fusion welding used to join two lengths of HDPE pipes together by using electro-fusion joint from the same material.
- The electro-fusion joint is heated internally by electric current passes through a coil inside the joint causing fusion.
- The following steps should be implemented when performing electro-fusion joining:

01- Prepare the pipes (Scrape, Clean)

- Be sure that the pipe ends are cut square when joining using electro-fusion couplings.
- The fusion area must be clean from dirt or contaminants; use 90% isopropyl alcohol.
- The pipe surface in the fusion must be scraped, about 0.2mm layer from the pipe outer surface, must be removed by using special tools (scraper).

02 - Mark the pipes

- Mark the pipe for stab depth of couplings or the proper fusion location of saddles. (Caution should be taken to assure that a non-petroleum marker is used).
- Align and restrain pipe and fitting.
- Place the pipe(s) and fitting in the clamping fixture to prevent movement of the pipe(s) or fitting.
- Give special attention to proper positioning of the fitting on the prepared pipe surfaces.

03 - Apply electric current

- Connect the electro-fusion control box to the fitting and to the power source.
- Apply electric current to the fitting as specified in the manufacturer's instructions.
- Read the barcode which is supplied with the electro-fusion fitting.
- If the control does not do so automatically, turn off the current when the proper time has elapsed to heat the

04 - Cool joints and remove clamps

- Allow the joint to cool for the recommended time.
- If using clamps, premature removal from the clamps and any strain on a joint that has not fully cooled can be detrimental to joint performance.

05 - Documenting Fusion

- The Electro-fusion control box that applies current to the fitting also controls and monitors the
- critical parameters of fusion, (time, temperature, & pressure).
- The control box is a micro- processor capable of storing the specific fusion data for each joint.
- This information can be downloaded to a computer for documentation and inspection of the day's work.

Electro-fusion welding machine

SIZE (MM)
ø 25-800