TECHNO GROUP®

- **TECHNO PLAST ® : Pipe Extrusion manufacturer**
- **TECHNO FIT ® : Injection moulding manufacturer**
- **TECHNO ALIMCO ® : Blow Moulding manufacturer**
- **TECHNO COR ® : Corrugated Pipe manufacturer**
- **TECHNO THERM ® : Marketing & Engineering Services**

TECHNO PLAST ®

Grounds 35000 Sq.M , Covered Area 5000 Sq,M
Situated in Sednaya , 30 km north of Damascus

Founded in 1976 . It has eight extrusion lines supplied by Krauss Maffei & Cincinnati Milacron

It holds the *ISO 9002* certificate since 1998 & has the *ISO 9001* for total quality control from Loyds , England . It also holds the *S.K.Z . German certificate* for its products of heating pipes

It produces annually a total of 6000 tons producing the following products:

- PE 100 pipes for drinking water networks
- PPR pipes for domestic cold & hot water networks
- PPR-AL-PPR pipes for domestic cold & hot water networks
- PEX pipes for domestic cold & hot water networks
- PEX –AL-PEX pipes for domestic cold & hot water networks
- PP pipes for house drainage
- PE corrugated pipes for sewer networks sizes 200mm,250mm,300mm&400mm

TECHNO FIT ®

Grounds 20000Sq.M , Covered Area 4000 Sq.M
Situated in Shinshar , 15km south of Homs

Founded in 1994 , equipped with six Injection machines & a complete CNC workshop for manufacturing moulds . It has a line for producing the Drip Tape

It produces the following products :

- **PP Compression Fittings**
- **PPR Fittings for cold & hot domestic network**
- **PP Fittings for house drainage network**
- **PE fittings for dinking water system**
- **PE Drip Tape**

TECHNO PLAST®

TECHNO ALIMCO ®

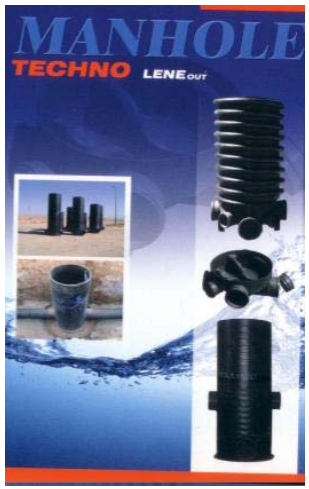
Grounds 15000 Sq.M , Covered Area 2000 Sq.M
Situated in Shinshar , 15km south of Homs .

Founded in 1997 . Equipped with six Blow Machines producing bottles for Oil & milk customers

TECHNO COR ®

Grounds 30000 Sq.M , Covered area 2400Sq.M
Situated in Sednaya , 30km north of Damascus

Founded in 2006 . The factory produces corrugated pipes for the Sewage Network with Internal Diameter sizes: 500mm , 600mm , 700mm , 800mm , 900mm , 1000mm , 1100mm, 1200mm , 1400mm, 1600mm & 2000mm. Also produces manholes according to DIN 19537



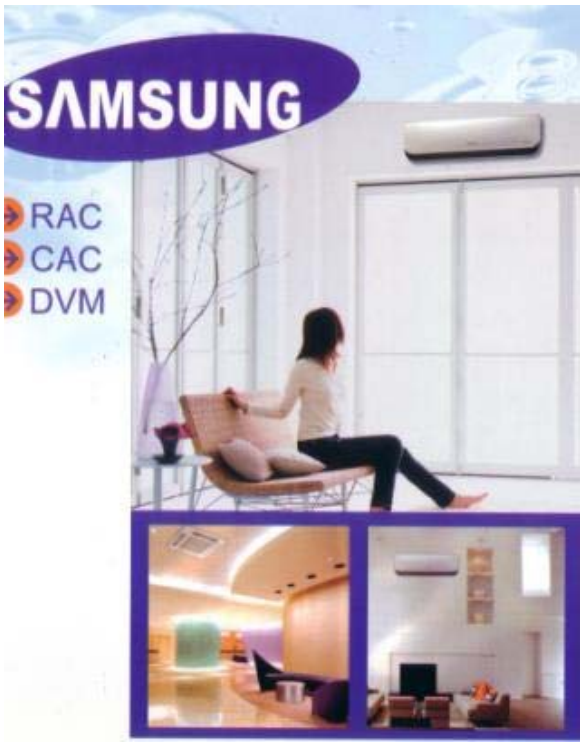
Manholes according to DIN 19537

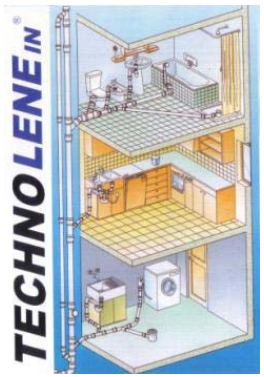
TECHNO PLAST®

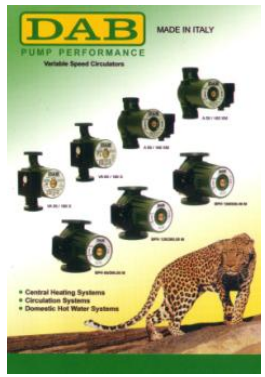
TECHNO THERM ®

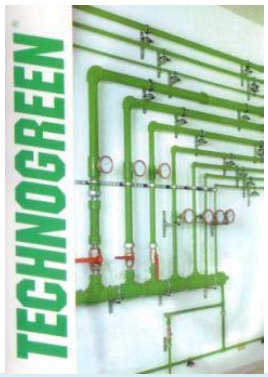
Office Area 250 Sq.M Warehouse area 5500 Sq.M

Founded in 1994 . It is a marketing and engineering service provider for indoor drinking water, domestic water networks, floor heating, air conditioning, solar water heating.









TECHNO PLAST®

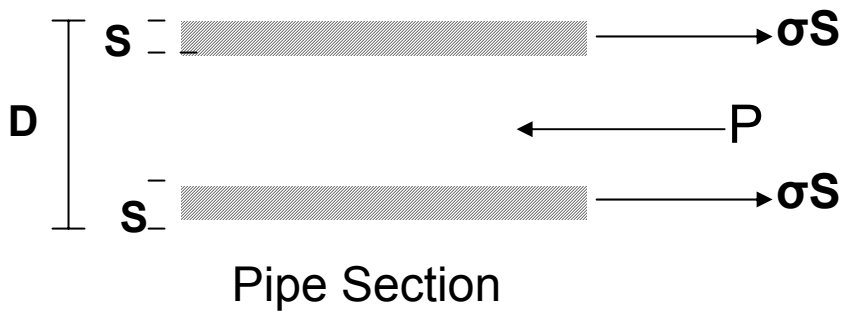
TECHNO PLAST®

A peripheral stress is generated once the pipe is pressurized.

The relationship is:

$$2\sigma S = P(D - S)$$

P = The Pressure is in MPA
D = The Outside Diameter mm
S = The Wall Thickness mm
σ = The Hoop Stress in MPA



Pipe Section

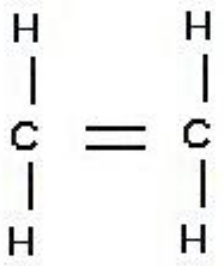
$$\sigma = P(D - S) / 2S \rightarrow S = PD / (2\sigma + P)$$

PE100 Chemistry

Polyethylene is obtained by the polymerization of ethylene molecules

Monomer

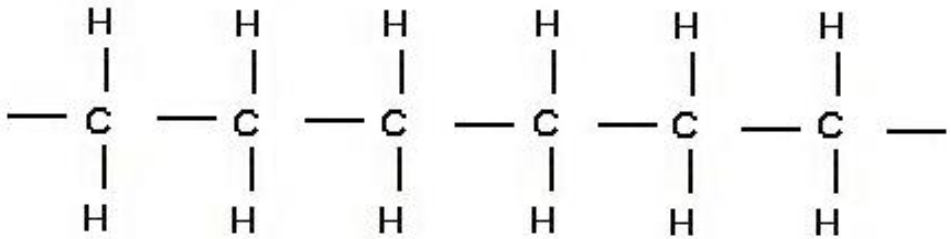
C_2H_4



The final product is a heterogeneous product. Number of monomer units (n) varies between 10&100,000 → Length of polymer chain varies considerably

Polymer

$$\left[CH_2 - CH_2 \right]_n$$



10 ≤ n ≤ 100,000

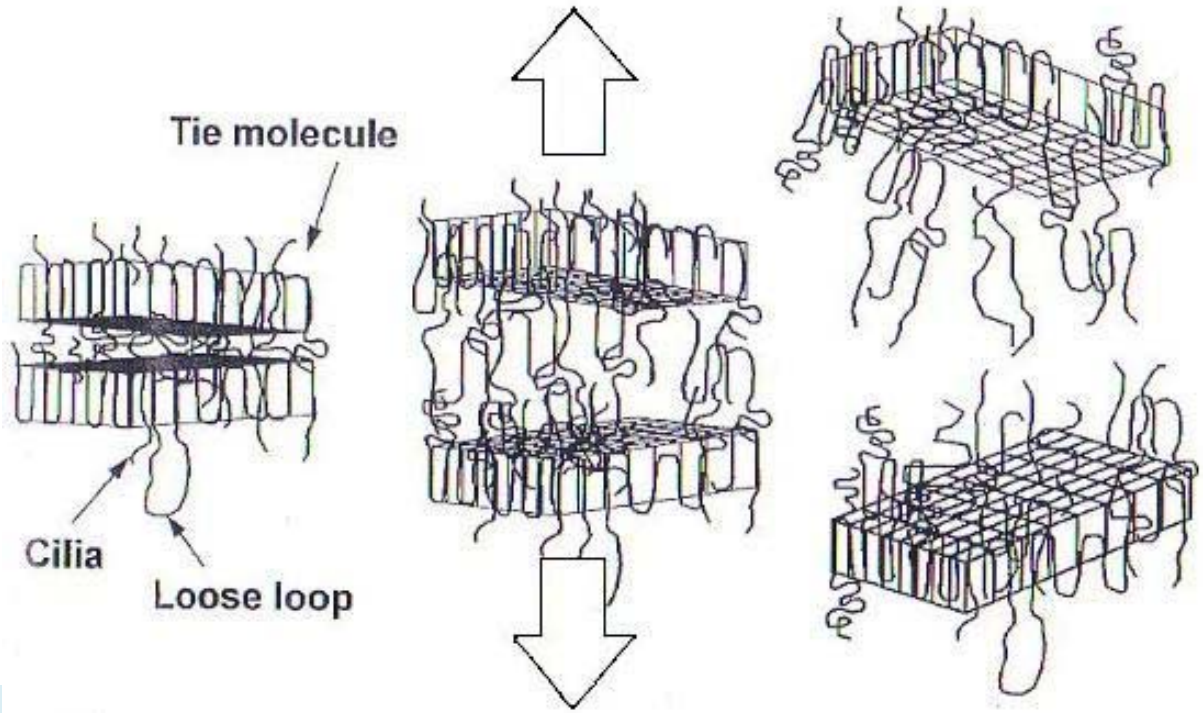
PE100 Chemistry

Due to this heterogeneity PE is a semi-crystalline material that consists of two phases:

Crystalline phase: Composed of short chains. Confers rigidity to the material

Amorphous phase: Long chains have more difficulty is crystallizing

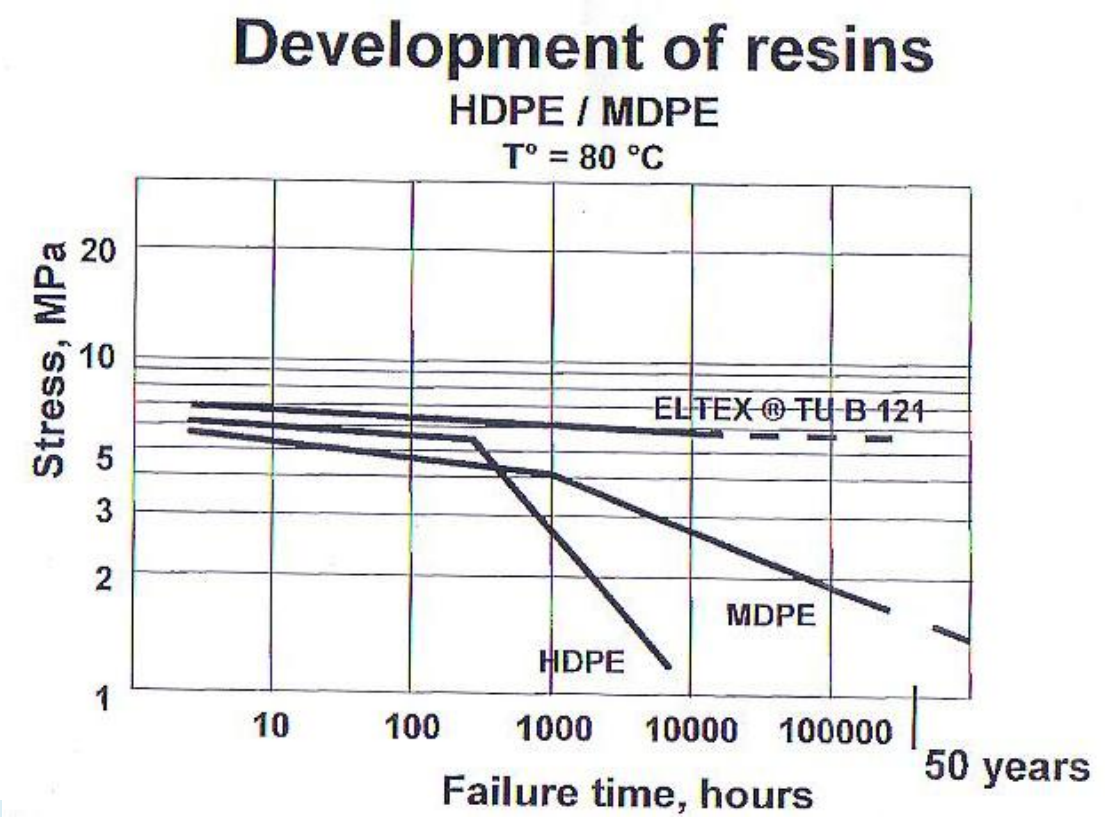
A balance has to be found between the number of short and long chains



PE100 Chemistry

First generation PE had a high rigidity but stress cracking appeared shortly after 100 hours at 80 Deg C

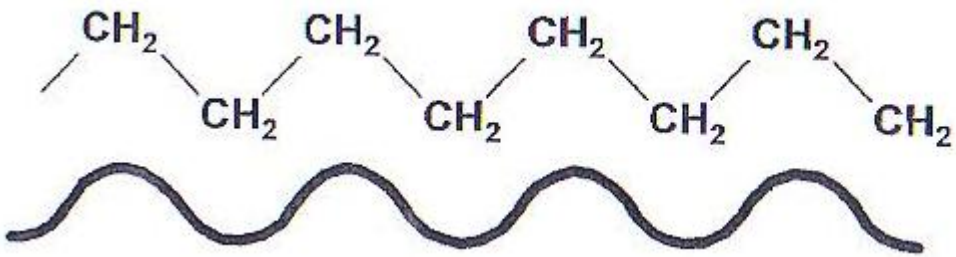
Second generation PE had a lower density which reduced its rigidity and stress cracking shifted to 1000 hours at 80 Deg C



TECHNO PLAST®

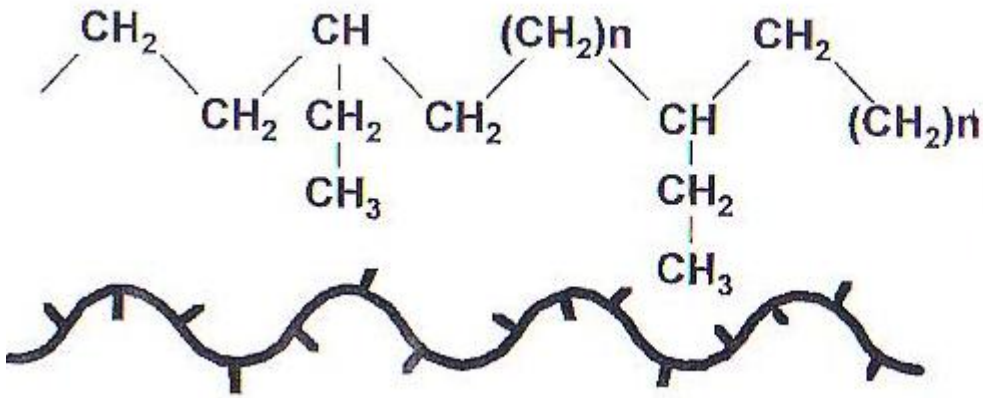
PE100 Chemistry

1st Generation PE



(linear chain homopolymer)

2nd Generation PE



(branched chain ethylene-butene copolymer)

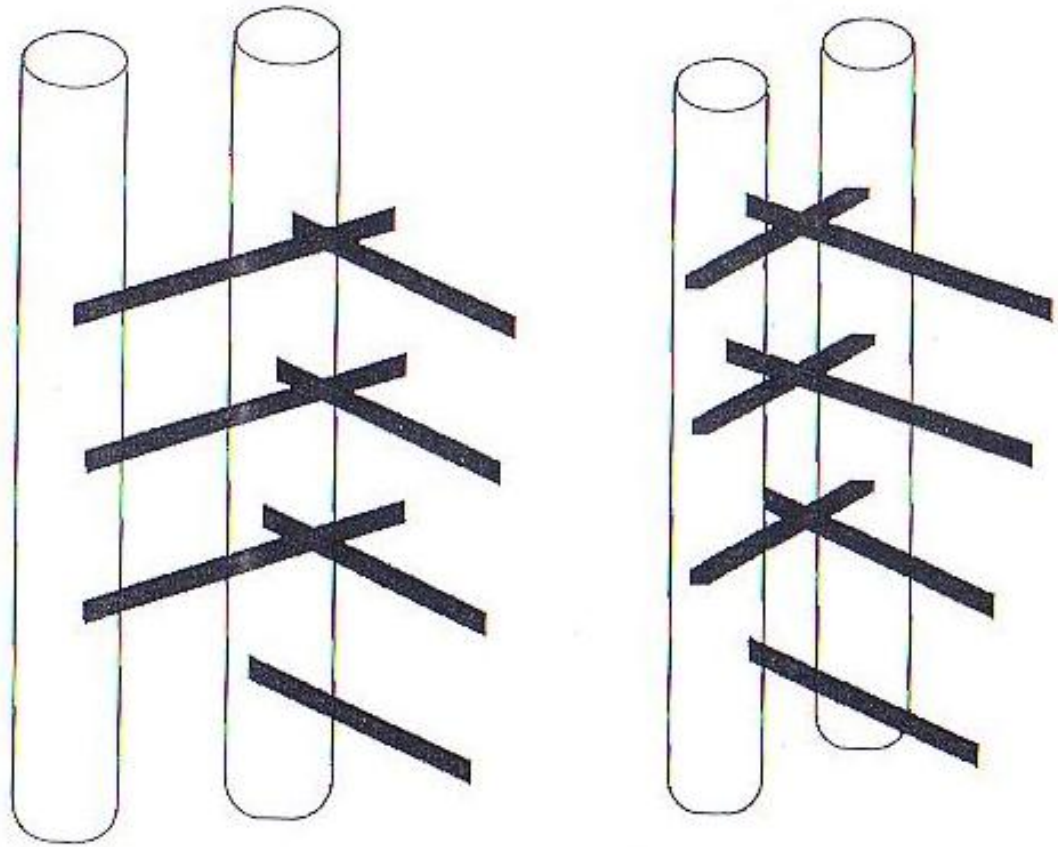
To lower the density the of 2nd Generation PE, the material's tendency to crystallize had been reduced by the incorporation of a comonomer

PE100 Chemistry

Increased entanglement achieved by incorporating the comonomer in the amorphous zone

SOLVAY was able to add the comonomer during the polymerization of the high molecular fraction

This created the 3rd Generation PE that shows a more favorable balance between rigidity and ESCR



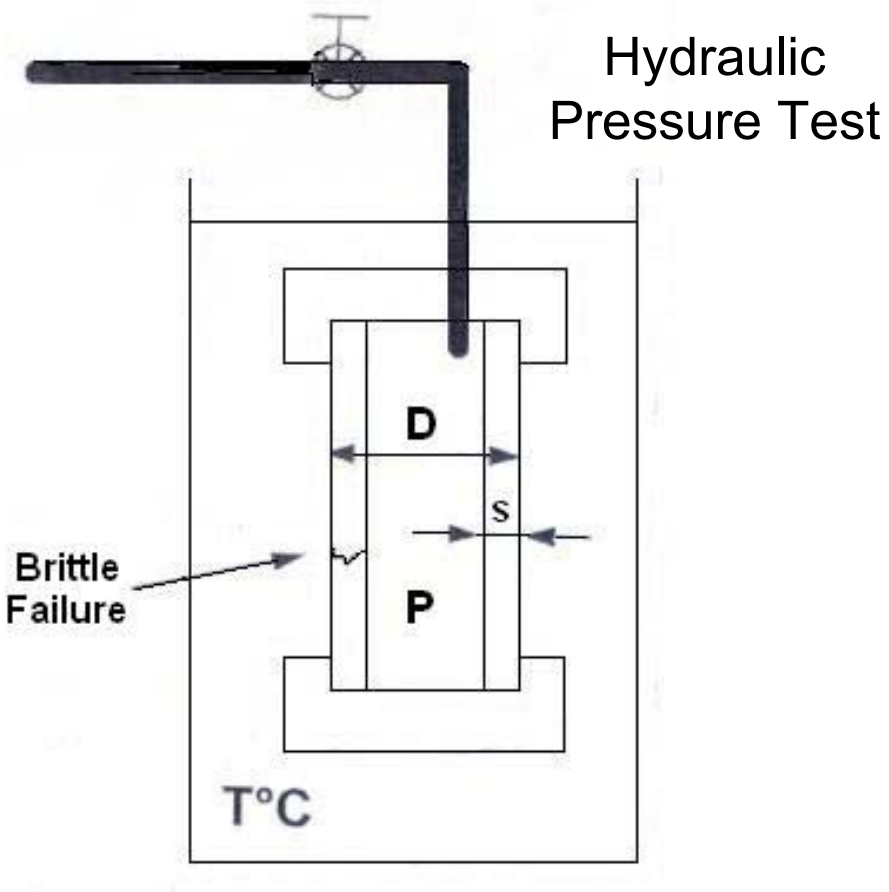
Regression Curves

In order to determine the hydrostatic strength of the material regression curves must be established.

These are obtained by performing hydraulic pressure tests on pipes in the laboratory

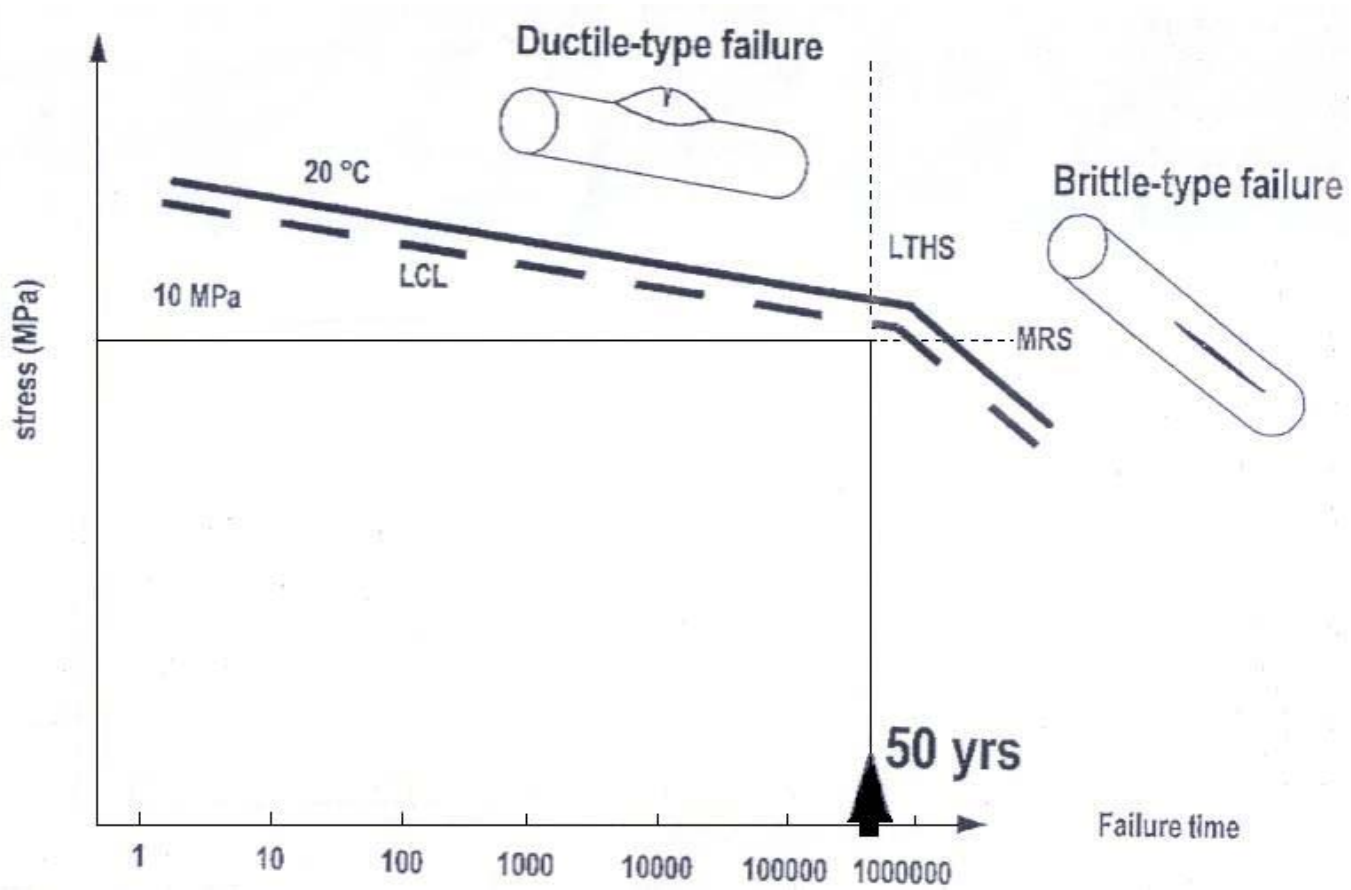
Putting large number of pipes under different pressures in order to determine the relationship between applied pressure and failure-time.

More specific it is the relationship between hoop-stress and failure-time



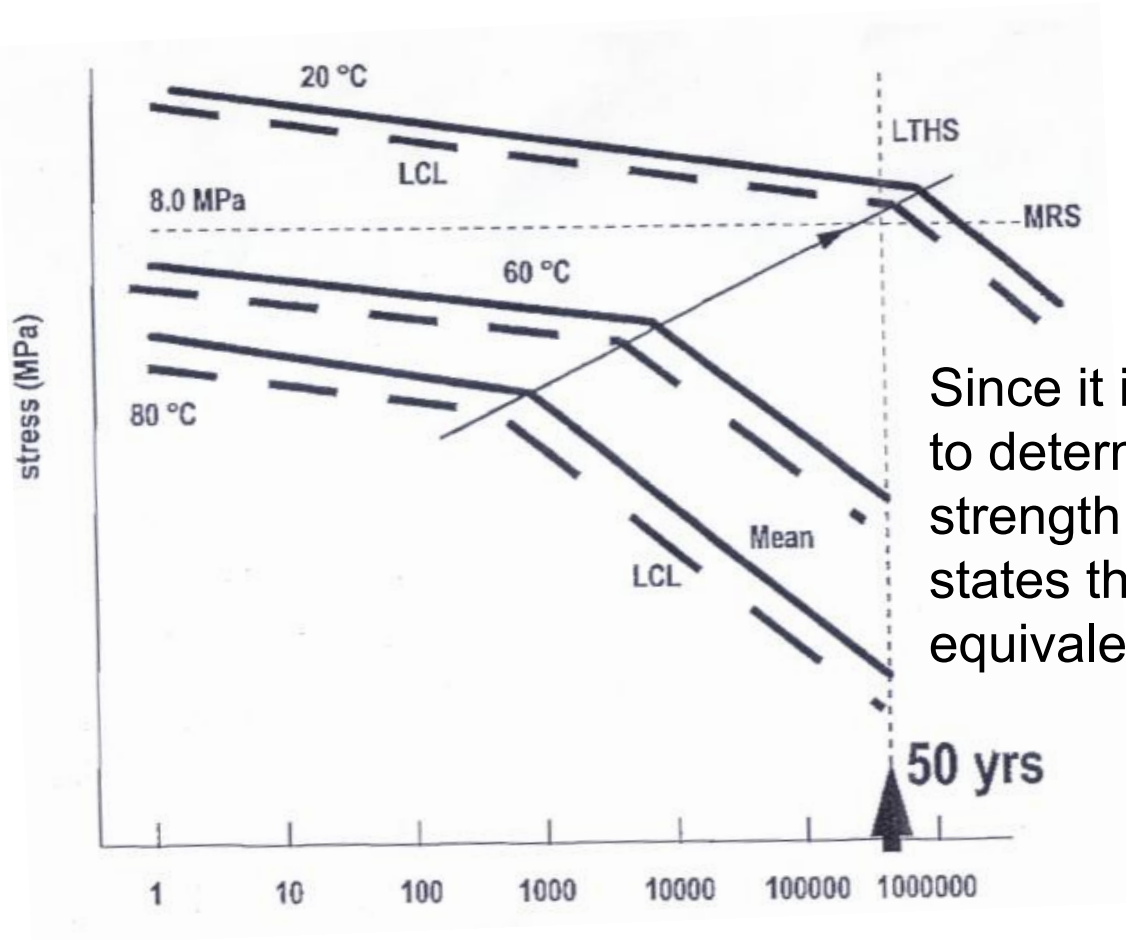
$$\sigma = P(D - S) / 2S$$

Regression Curves



Experimental data is plotted on a log/log graph of hoop-stress versus failure-time and the relationship between failure-time and hoop-stress is established by linear regression analysis

Regression Curves



Since it is unrealistic to wait 50 years to determine the final hydrostatic strength of the material, ISO9080 states that 1000 hours @ 80 Deg. C is equivalent to 50 years @ 20 Deg. C

MRS CLASSIFICATION

The regression analysis yields a mean hydrostatic strength called the Long Term Hydrostatic Strength (LTHS)

A Lower Confidence Limit (LCL) may also be calculated

In order to describe the hydrostatic performance of PE material it is given a classification called an MRS-Classification (Minimum Required Strength)

The MRS class of a material is determined by the LCL

If the LCL of the 20 Deg C line falls between 8.0 & 9.9 MPA at 50 years the material is classified as an MRS8.0 or PE80 material

If the LCL of the 20 Deg C line falls between 10 & 11.2 MPA at 50 years the material is classified as an MRS10 or PE100 material

Operating Pressure

In order to translate the MRS-classification into a Maximum Allowable Operating Pressure (M.A.O.P) this formula is used:

M.A.O.P in bar = (20 * M.R.S in MPa) / [(SDR – 1) * C]

SDR = D / S

D = Nominal Outside Diameter
S = Nominal Wall thickness

C = Design Coefficient (Safety Factor)
C ≥ 1.25 for water
C ≥ 2.00 for gas

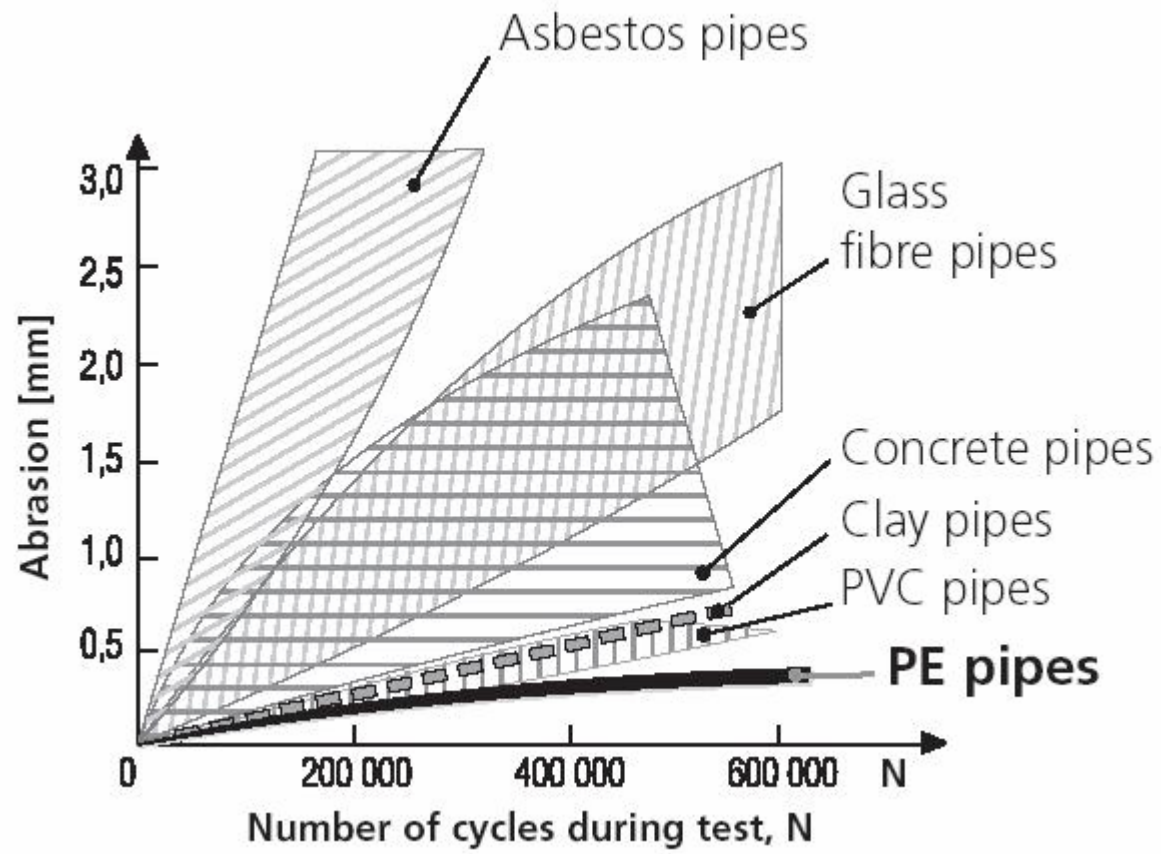
D/S	SERIES	MATERIAL CLASS		
SDR	S	PE 63 --> σ 50	PE 80 --> σ 63	PE 100 --> σ 80
		PN (bar)		
41	20	2.5	3.2	4
33	16	3.2	4	5
27.6	13.3	-	-	6
26	12.5	4	5	-
22	10.5	-	6	-
21	10	5	-	8
17.6	8.3	6	-	-
17	8	-	8	10
13.6	6.3	8	10	12.5
11	5	10	12.5	16
9	4	12.5	16	20
7.4	3.2	16	20	25
6	2.5	20	25	32

Wall thickness for pipe series																							
Nom. size DN/OD	SDR 6 S-2.5		SDR 7.4 S-3.2		SDR 9 S-4		SDR 11 S-5		SDR 13.6 S-8.3		SDR 17 S-8		Nom size	SDR 17.6 S-8.3		SDR 21 S-10		SDR 26 S-12.5		SDR 33 S-16		SDR 41 S-20	
	sy.min	sy.max	sy.min	sy.max	sy.min	sy.max	sy.min	sy.max	sy.min	sy.max	sy.min	sy.max		sy.min	sy.max	sy.min	sy.max	sy.min	sy.max	sy.min	sy.max	sy.min	sy.max
	Grade "V"																						
16	3.0	3.4	2.3	2.7	2.0	2.3	-	-	-	-	-	-	16	-	-	-	-	-	-	-	-	-	-
20	3.4	3.9	3.0	3.4	2.3	2.7	2.0	2.3	-	-	-	-	20	-	-	-	-	-	-	-	-	-	-
25	4.2	4.8	3.5	4.0	3.0	3.4	2.3	2.7	2.0	2.3	-	-	25	-	-	-	-	-	-	-	-	-	-
32	5.4	6.1	4.4	5.0	3.6	4.1	3.0	3.4	2.4	2.6	2.0	2.3	32	2.0	2.3	-	-	-	-	-	-	-	-
40	6.7	7.5	5.5	6.2	4.5	5.1	3.7	4.2	3.0	3.5	2.4	2.8	40	2.3	2.7	2.0	2.3	-	-	-	-	-	-
50	8.3	9.3	6.9	7.7	5.6	6.3	4.6	5.2	3.7	4.2	3.0	3.4	50	2.9	3.3	2.4	2.8	2.0	2.3	-	-	-	-
63	10.5	11.7	8.6	9.6	7.1	8.0	5.8	6.5	4.7	5.3	3.8	4.3	63	3.6	4.1	3.0	3.4	2.5	2.9	-	-	-	-
75	12.5	13.9	10.3	11.5	8.4	9.4	6.6	7.6	5.6	6.3	4.5	5.1	75	4.3	4.9	3.6	4.1	2.9	3.3	-	-	-	-
90	15.0	16.7	12.3	13.7	10.1	11.3	8.2	9.2	6.7	7.5	5.4	6.1	90	5.1	5.8	4.3	4.9	3.5	4.0	-	-	-	-
110	18.3	20.3	15.1	16.8	12.3	13.7	10.0	11.1	8.1	9.1	6.6	7.4	110	6.3	7.1	5.3	6.0	4.2	4.8	-	-	-	-
125	20.8	23.0	17.1	19.0	14.0	15.6	11.4	12.7	9.2	10.3	7.4	8.3	125	7.1	8.0	6.0	6.7	4.8	5.4	-	-	-	-
140	23.3	25.8	19.2	21.3	15.7	17.4	12.7	14.1	10.3	11.5	8.3	9.3	140	8.0	9.0	6.7	7.5	5.4	6.1	-	-	-	-
160	26.6	29.4	21.9	24.2	17.9	19.8	14.6	16.2	11.8	13.1	9.5	10.6	160	9.1	10.2	7.7	8.6	6.2	7.0	-	-	-	-
180	29.9	33.0	24.6	27.2	20.1	22.3	16.4	18.2	13.3	14.8	10.7	11.9	180	10.2	11.4	8.6	9.6	6.9	7.7	-	-	-	-
200	33.2	36.7	27.4	30.3	22.4	24.8	18.2	20.2	14.7	16.3	11.9	13.2	200	11.4	12.7	9.6	10.7	7.7	8.6	-	-	-	-
225	37.4	41.3	30.8	34.0	25.2	27.9	20.5	22.7	16.6	18.4	13.4	14.9	225	12.8	14.2	10.8	12.0	8.6	9.6	-	-	-	-
250	41.5	45.8	34.2	37.8	27.9	30.8	22.7	25.1	18.4	20.4	14.8	16.4	250	14.2	15.8	11.9	13.2	9.6	10.7	-	-	-	-
280	46.5	51.3	38.3	42.3	31.3	34.6	25.4	28.1	20.6	22.8	16.6	18.4	280	15.9	17.6	13.4	14.9	10.7	11.9	-	-	-	-
315	52.3	57.7	43.1	47.6	35.2	38.9	28.6	31.6	23.2	25.7	18.7	20.7	315	17.9	19.8	15.0	16.6	12.1	13.5	9.7	10.8	7.7	8.6
355	59.0	65.0	48.5	53.5	39.7	43.8	32.2	35.6	26.1	28.9	21.1	23.4	355	20.1	22.3	16.9	18.7	13.6	15.1	10.9	12.1	8.7	9.7
400	-	-	54.7	60.3	44.7	49.3	36.3	40.1	29.4	32.5	23.7	26.2	400	22.7	25.1	19.1	21.2	15.3	17.0	12.3	13.7	9.8	10.9
450	-	-	61.5	67.8	50.3	55.5	40.9	45.1	33.1	36.6	26.7	29.5	450	25.5	28.2	21.5	23.8	17.2	19.1	13.8	15.3	11.0	12.2
500	-	-	-	-	55.8	61.5	45.4	50.1	36.8	40.6	29.7	32.8	500	28.3	31.3	23.9	26.4	19.1	21.2	15.3	17.0	12.3	13.7

Properties of PE pipelines

- Coefficient of friction is constant and does not change with time
- High abrasion resistance
- Corrosion resistance (chemical compounds)
- Very good fluid-flow properties
- Non toxic material
- 100% tight joints
- Flexibility
- Reliability

High Abrasion Resistance



SOURCE: University of Darmstadt (DIN 19534)

Corrosion Resistance (chemical compounds)

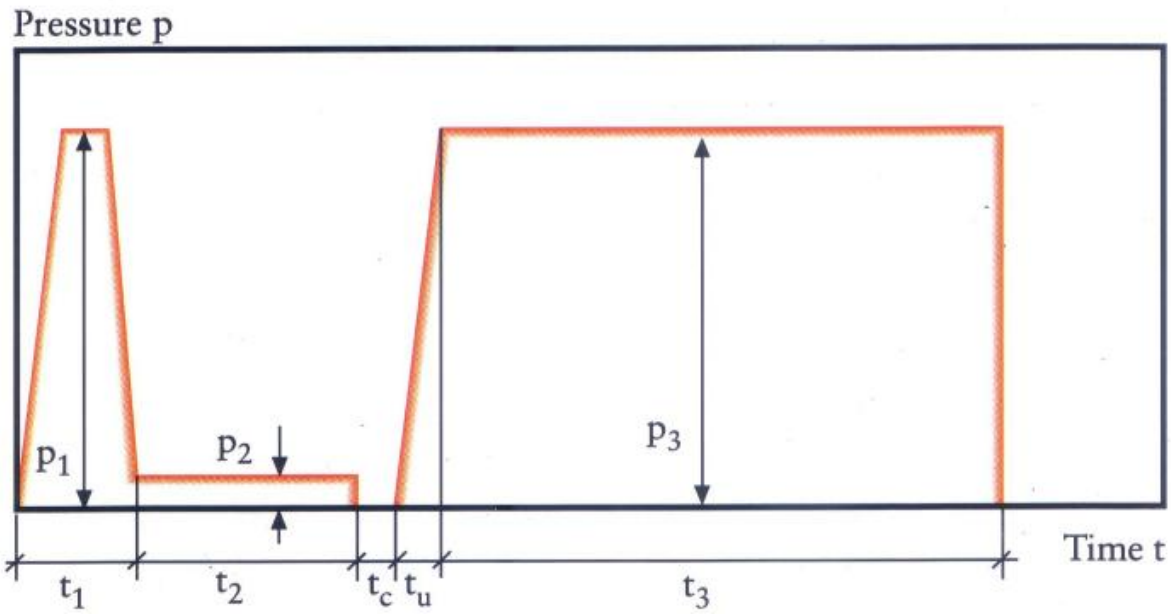
Polyethylene pipes are low-resistant to oxidants and aromatic solvents.

Very Good fluid-flow Properties

PE pipes retain low and constant roughness grade k = 0.01 mm.

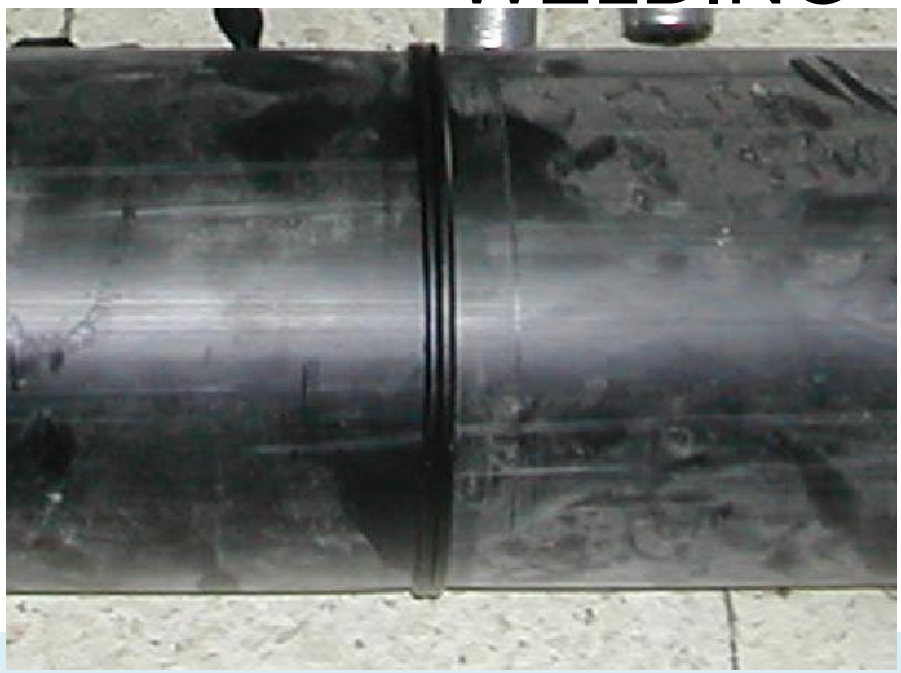
Non Toxic Material

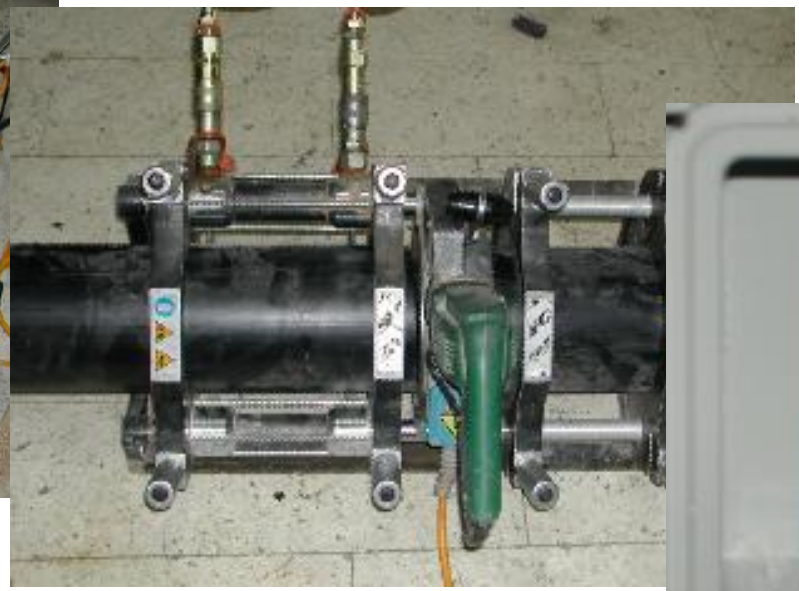
Construction of drinking water tanks. Such tanks are made
of PE material approved by the PZH (National Institute of Hygiene) in Warsaw.

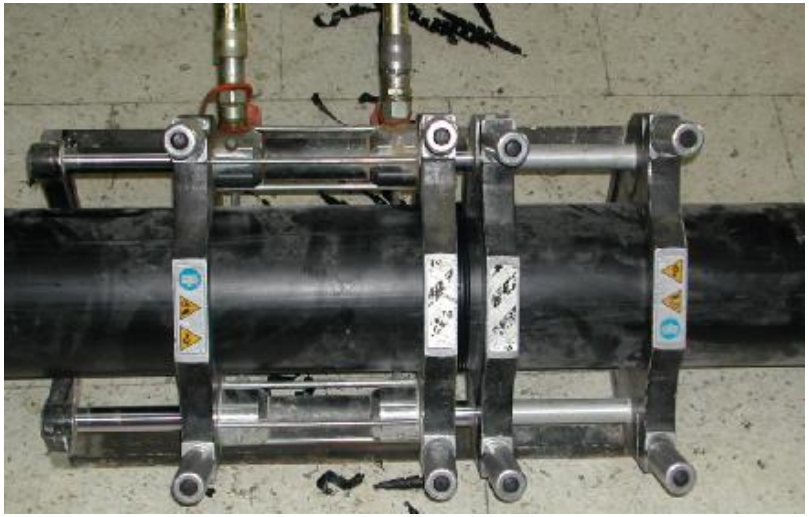


100% Tight Joints

BUTT WELDING







TECHNO PLAST®

ELECTRO FUSION SOCKETS

TECHNO PLAST®

MECHNICAL : USING STUBS & METALIC FLANGES

MECHNICAL: USING COMPRESSION FITTINGS

MECHNICAL: USING VICTAULIC

TECHNO PLAST®

Flexibility

With natural bend radius of R = 50 outside diameters, PE pipes may be laid according to variations of the pipeline route and in many cases use of expensive fittings can be avoided.

Reliability

Failure frequency of PE pipes is much lower than that of rigid pipes (Concrete, Clay, GRP).

PE pipes are resistant to changing atmospheric conditions.

DRINKING WATER NETWORK

The pipes used are made out of Black PE100 with an MRS (Minimum Resistance Strength) of 10 MPA & a design Hoop Stress of 8 MPA & are manufactured According to ISO 4427 & EN 12201

The working pressure is the hydrostatic pressure inside the pipe that can be applied continuously at a temperature of 20C for a period of 50 years

The color of the pipe is Black with a continuous stripe of Blue to indicate that this is a drinking Water Pipe as specified by ISO 4427 paragraph 3.1.3

We avoided using a blue colored pipe because its resistance to UV rays is limited to 3.8GJ/sqm as detailed in paragraph 6.3 of ISO 4427 .

The available sizes & working pressures are listed below :

OD mm	PN bar
20	20 bar
25	16 bar
32	16 bar
40	10 & 16 bar
50	10 & 16 bar
63	10 & 16 bar
75	10 & 16 bar
90	10 & 16 bar
110	10 , 16 & 20 bar
125	10 , 16 & 20 bar
140	10 , 16 & 20 bar

OD mm	PN bar
160	10 , 16 & 20 bar
180	10 , 16 & 20 bar
200	10 , 16 & 20 bar
225	10 , 16 & 20 bar
250	10 , 16 & 20 bar
280	10 , 16 & 20 bar
315	10 , 16 & 20 bar
355	10 & 16 bar
400	10 & 16 bar
450	10 & 16 bar
500	10 & 16 bar

For OD 20, 25, & 32 mm: Minimum wall thickness 2.3mm according to ISO 4427 , para 4.1.4

Printed on the pipe at one meter interval are the following information:

- **TECHNO PLAST**
- **ISO 4427**
- **OUTSIDE DIAMETER**
- **WALL THICKNESS**
- **ALLOWABLE WORKING PRESURE**
- **DATE OF PRODUCTION**
- **BATCH No.**

The Batch No. for a specific pipe will make it traceable & a record at the factory will supply the following information:

- **Date pipe produced**
- **Name of head of production crew**
- **Source & type of material used**
- **Machine used for production with all the set parameters**
- **Result of Laboratory tests that were done on this batch No.**

The tests that are regularly performed in our laboratory for each batch are the following:

- **Long term behavior test according to ISO 1167**
- **Melt index according to ISO 1133**
- **Thermal stability , OIT according to ISO 10830**
- **Heat reversal test according to Din 8075**
- **Elongation test according to ISO 6259 3**
- **Tensile stress according to ISO 6259**

Melt index according to ISO 1133

Heat reversal test according to Din 8075

Thermal stability , OIT according to ISO 10830

Elongation & Tensile tests according to ISO6259

Long term behavior test according to ISO 1167

TECHNO PLAST®

Pipes with an OD of 63mm & below :

The pipes are supplied in coils of 100 meters .
PP Mechanical Compression Fittings are used

Following are the Compression Fittings that are readily available at our inventory & manufactured by TECHNO .

MALE ADAPTOR : 63X2” , 50X1.1/2” , 40X1.1/4” , 32X1” , 25X3/4” & 20X1/2”
FEMALE ADAPTOR : 63X2” , 50X1.1/2” , 40X1.1/4” , 32X1” , 25X3/4 & 20X1/2”
COUPLING : 63 , 50 , 40 , 32 , 25 & 20
EQUAL TEE : 63 , 50 , 40 , 32 , 25 & 20
90 ELBOW : 63 , 50 , 40 , 32 , 25 & 20
END PLUG : 63 , 50 , 40 , 32 , 25 & 20

PP Mechanical Clamp Saddles are readily available at our inventory & are manufactured by TECHNO . The following sizes are available

63mm	**Off take ½” , ¾” , 1” , 1.1/4” , 1.1/2”**
50mm	**Off take ½” , ¾” , 1” , 1.1/4”**
40mm	**Off take ½” , ¾” , 1”**
32mm	**Off take ½” , ¾”**

Pipes that are larger than 63mm:

Sizes 75 & 90mm can be supplied as either a 100 meter Coil or a 12 meters straight pipe . Pipe sizes above 110mm are supplied in 12 meters straight pipes

We use Injected moulded fittings manufactured out of PE100 material .
For TEES & Elbows above 250mm we use assembled fabricated fittings

Following are the fitting & sizes that are readily available in our inventory :

Reducer	**sizes 63mm – 500mm in all combinations**
Equal Tee	**63 , 75 , 90 , 110 , 125 , 140 , 160 , 180 , 200 , 225 , 250**
90 Elbow	**63 , 75 , 90 , 110 , 125 , 140 , 160 , 180 , 200 , 225 , 250**
Stub	**63 , 75 , 90 , 110 , 125 , 140 , 160 , 180 , 200 , 225 , 250**
	280 , 315 , 355 , 400 , 450 & 500

For TEES & Elbows above 250mm we use assembled fabricated fittings by TECHNO

Injected moulded fittings manufactured out of PE100 material by TECHNO