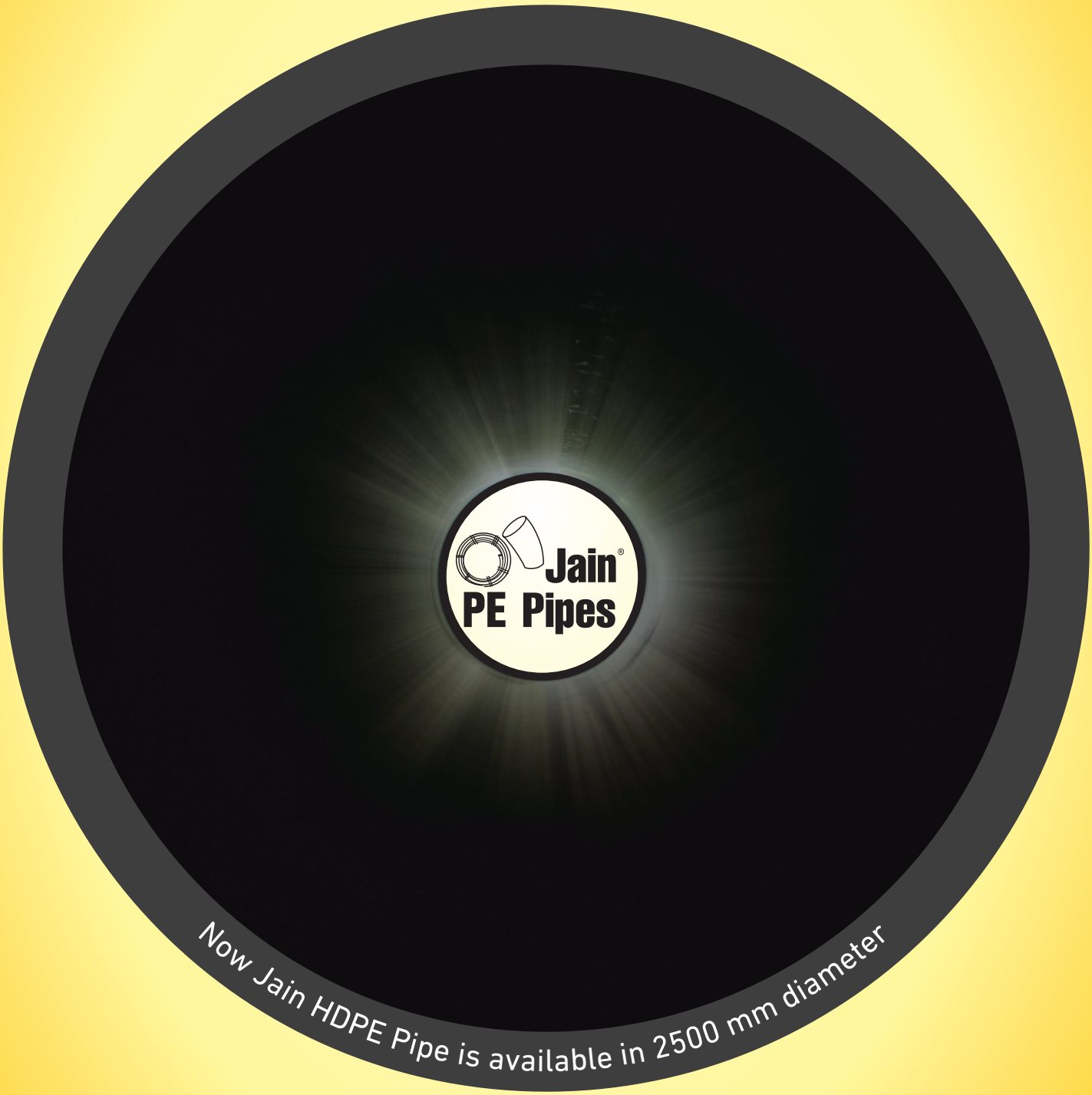
Another first from Jain Pipe
Well, not just the First
but the BIGGEST !



Life 100+ years

lowest Life Cycle Cost

Leak Proof Joint

Corrosion Resistant

Tough, Ductile, Flexible

Superior Seismic Resistance

Jain Irrigation Systems Ltd (JISL) the pioneer & leader of manufacturing quality PE piping systems in India, has been able to evolve its global presence with state-of-art 30 manufacturing bases spread over five continents that values total commitment for customer satisfaction.

The foundation laid by chairman, Dr. Bhavarlal Hiralal Jain and his mission was "Leave This World Better than You Found It". Towards this mission, he took up conservation of water, energy and environment and all the products he started manufacturing for the systems are aimed towards the conservation of the most important things for humanity today.

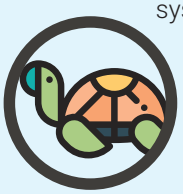
Presently, JISL is the largest producer of PVC and PE piping systems in Asia. These Pipes are available in all conceivable applications with pipes ranging from as small as 3mm to 2500mm in diameter and in pressure ratings ranging from no pressure pipes to 25 kgf/cm².

JISL has a production capacity of over 5,00,000 tonnes per annum or 8000 km/day of plastic pipes. The Piping Division includes a variety of PVC and PE Fittings catering to irrigation needs of the farmers apart from the drinking water supply networks, building construction, urban and rural infrastructure needs. The pipes are manufactured conforming to different national & International standards. On demand pipes can be supplied to custom specifications of end users. The quality of JISL products, services and systems is assured by DSIR approved in-house R&D laboratory and accredited by ISO 9001, ISO 14001, ISO 18001, WRc-NSF, DVGW certifications combined with over three decades of experience.

With three decades of engineering, design, manufacturing, installation, operation & maintenance experience and a unique culture of innovation, the JISL has forged ahead as the global leader for PE piping systems. JISL has many first and success stories to its credit. It has manufactured 1st time in India the OFC PE ducts lined with silicon, 2500 mm diameter HDPE pipes and fittings.

The large diameter HDPE pipes and fittings are typically used for sea water intake and brine water outfall submarine lines for desalination plants, thermal power plant in-plant piping systems, river water infiltration galleries for harvesting water even during dry times, replacement of open canal by underground piping systems, Drainage, Sewage, storm water, culverts, effluent and chemical conveyance systems

JISL also offers complete services for HDPE piping systems on a turn-key basis which includes site survey, design, selection of material, supply, installation, testing and training, operation and maintenance in the most economical way supported by a large pool of engineers. JISL has successfully executed many turn-key projects from concept to commissioning. JISL is a registered contractor with various Government departments & organizations.

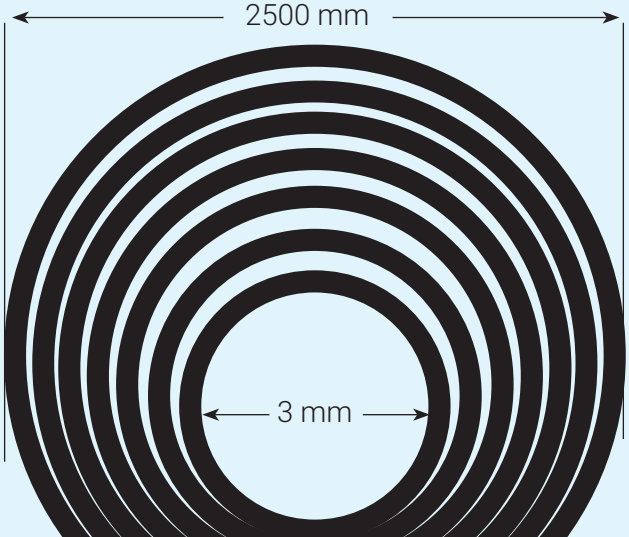


Life 100+ years

The demand for clean water is a big challenge to the municipalities worldwide. As rural, urban and smart cities continue to expand, the demand for cost-effective water supply and distribution becomes important. JISL has successfully implemented the new concept of 24x7 water supply schemes in a number of cities across Karnataka state using effective & efficient water supply & distribution systems. The concept of sustainable cities is achieved using effective & efficient water supply & distribution systems to end users through a leak proof pipe network (using HDPE pipes & fittings) so that users may draw the water 24 hours a day & 7 days a week. The 24x7 scheme can ensure quality of water for public health, uninterrupted safe water supply at desired pressure, reduction of water consumption by 30 to 50%. The success of 24x7 schemes lies in choosing the right pipe of MOC (Material of Construction). The water distribution network requiring leak-proof joints with maintenance free pipe systems with a life span of 100 + years can be achieved only by using pipes made of Polyethylene (PE) material.

It has pioneered a silent Productivity Revolution with modern irrigation systems and innovative technologies in order to save precious water and has helped to get significant increase in crop yields, especially for more than 8.5 million small farmers. JISL has also ushered in the new concept "Resource To Root" Integrated Irrigation Projects along with 24x7 water supply projects. "More Crop Per Drop" is the company's proposition for water and food security.

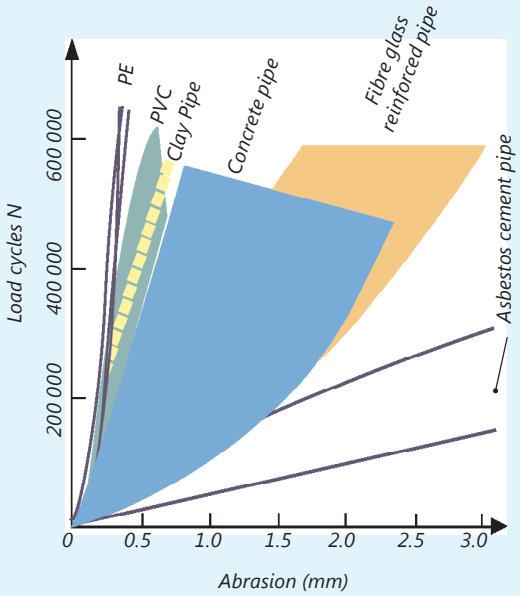
JISL is recognized by global institutions such as IFC, Harvard Business School, G–20 etc. as leading practitioner of sustainable development and thought leader in the new business model of "Creating Shared Value". All the products and services of JISL help create a sustainable future while fulfilling JISL Founder's Vision vision 'Leave this world better than you found it'.



Why to choose polyethylene (PE) pipes?

Polyethylene (PE) piping system offers significant advantages over conventional piping systems like Ductile Iron, Mild Steel, Cast Steel and Cement pipe systems. Its Major advantages are as listed below:

1. **Longevity:** PE pipes have the Long track record of excellent performance, approaching 100 years worldwide.
2. **Corrosion resistance:** PE is basically chemically inert. This pipe system does not rust and corrode. This system resists chemical attack from aggressive soils. There is no need for a protective layer or finishing process. PE pipe has very good abrasion resistance also.
3. **Leak tight:** Butt fused joints create a homogenous water-tight jointing for the pipe system. Unlike ring type joints or other mechanical jointing systems existing in conventional systems, there is no risk of leakages resulting from joint distortion due to soil settlement or corrosion effect of conveyed water or the soil in which it is buried.
4. **Optimum flow rate:** Smooth inside pipe surface allows for a high Friction Coefficient "C" factor and it remains constant throughout the lifetime of the PE Piping system due to innate resistance to scaling and biological build-up. Polyethylene is also biologically inert.
5. **Excellent water hammer characteristics to withstand surges:** The inherent properties of polyethylene allow the system to significantly lower the effect of surges due to water hammer when compared with any other Rigid Pipe material of construction.
6. **Flexibility:** Small diameter PE pipes can be coiled and supplied in length up to 2000m. This feature is one of the many contributions to cost & time saving during the installation process.
7. **Resistance to geological conditions:** PE piping systems have inherent resistance to ground temperature fluctuations and earth instability because of high impact and breakage resistance..
8. **Seismic Resistance:** The toughness, ductility and flexibility of PE pipe combined with its other special properties, such as its leak-free fully restrained heat fused joints, make it well suited for installation in dynamic soil environments and in areas prone to earthquakes.



9. **Abrasion Resistance:** PE pipe is a frequent choice for the transport of granular or slurry solutions, such as sand, fly ash and coal. The advantage of polyethylene in these applications is its wear resistance, which for example when conveying fine grain slurries has been shown in laboratory tests to be three to five times greater than for steel pipe. PE pipe has elastic properties that under proper flow conditions allow particles to bounce off its surface. This feature combined with PE's toughness results in a service life that exceeds that of many metal piping materials.

10. High strain-ability under stress virtually eliminates failure due to freezing of conveyed water during extremely cold weather conditions.

11. Reduced installation time and cost.

12. PE pipe can Achieve Maximum Cold Bending Radius

Pipe SDR	Allowable Cold Bending Radius (R)
≤ 13	R = 20D
> 13 <21	R = 25D
>21	R = 30D

'D' is the pipe diameter

Jain® PE Pipes
Solutions for Generations

Life and Life Cycle Cost

Normally the projects are designed based on minimum initial capital costs. In order to make the projects efficient and successful in long term and also keep recurring/ operational costs to minimum, the life cycle analysis of the major components of the project should be done and the components having minimum life cycle costs should be adopted/ selected. e.g. instead of conventional metal pipes, plastic pipes should be selected.

PE Piping Systems are one of the best thermoplastic Systems, having 100+ years of Life. This Piping material has coefficient of friction i.e. "C value" of 150, which results into minimum frictional losses per unit length as compare to conventional piping materials. The 'C value' of PE piping system is maintained throughout its life. This results into saving in energy cost.

Specific gravity of PE piping system is 0.94 to 0.96 gm/cc, hence they are light in weight as compared to conventional piping materials. The jointing of PE pipes is easier because of weight advantage. This has a direct impact on installation cost. They are cheaper than the conventional piping material. The maintenance cost in case of PE piping systems are less than the conventional Piping materials.

Thus, even if prima facie the PE Piping systems seem to be costly, considering the longer life of the PE pipes, reduced energy costs, reduced installation costs and reduced maintenance/recurring cost, they are far cheaper than the conventional piping materials.

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Attn. Mr. Sarode

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Jalgaon
INDIA

Sender:
Dipl.-Ing. Udo Pappler
Tel.: 0043 - 1 - 798 16 01 - 790
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2012-07-20

Confirmation

Dear Mr. Sarode!

The PE 80 and PE 100 pipes produced by JAIN Irrigation Systems Ltd. (Jalgaon, India) are tested in our institute according to DVGW GW 335-A2, which are according to the requirements similar to the standards EN 12201-2, DIN 8074 and DIN 8075.

Within the above mentioned standards, test on the raw material being used in the pipes and the product itself are executed, which are proving the service life-time of at least 100 years at a reference temperature of 20 °C. The most significant ones are the MRS-classification according to EN ISO 9080 and the internal pressure tests done on pipes.

Because of the executed test, I can herewith confirm, that the PE 80 and PE 100 pipes produced by JAIN Irrigation Systems Ltd. (Jalgaon, India) have – when installed properly and operated according to the conditions in table 8 up to table 13 of the DIN 8074:1999 – a minimum service-life-time of 100 years (at 20 °C).

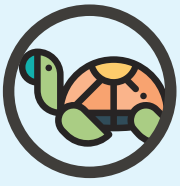
With kind regards

Dipl.-Ing. Udo Pappler
Piping department

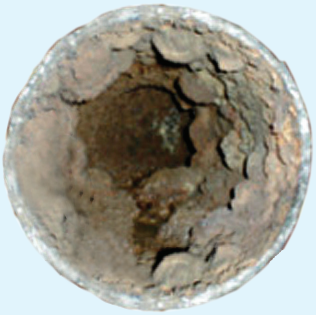
Bank Austria Creditanstalt, Wien 1, Schubertring 14, BLZ 12000, Konto-Nr. 52085 521 211, SWIFT/BIC: BKAUATWW, IBAN: AT 84 12000 52085 521 211, Handelsgericht: Wien, Firmenbuch-Nr.: FN 230299 a, UID: ATU 56534913, Gerichtsstand: Wien

GZ. 92714/630-IX/2/98

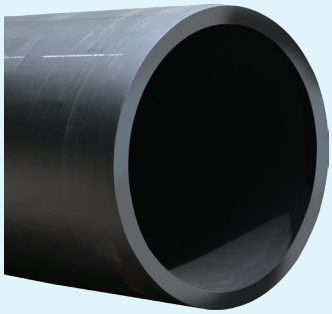
AUSTRIAN COOPERATIVE RESEARCH



Life 100+ years



Scale formation in
Conventional Metal Pipe



PE Pipe even
after 100 years

Standards for Large Diameter Pipe

WALL THICKNESS CHART FOR HDPE PIPE AS PER IS: 4984, YEAR 2016

(The Wall Thicknesses are calculated based on maximum allowable operating pressure at 27°C)

All Dimensions are in mm

SDR	SDR 41		SDR 33		SDR 26		SDR 21		SDR 17		SDR 13.6		SDR 11		SDR 9	
	Nominal Pressure, PN in bar															
PE 63	PN 2		PN 2.5		PN 3.2		PN 4		PN 5		PN 6		PN 8		-	
PE 80	PN 2.5		PN 3.2		PN 4		PN 5		PN 6		PN 8		PN 10		PN 12.5	
PE 100	PN 3		PN 4		PN 5		PN 6		PN 8		PN 10		PN 12.5		PN 16	
Nominal Dia (OD)	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1000	24.4	26.9	30.3	33.4	38.5	42.5	47.7	52.6	58.9	64.9	73.6	81.1	90.9	100.1	111.2	122.4
1200	29.3	32.3	36.4	40.1	46.2	50.9	57.2	63.0	70.6	77.8	88.3	97.2	109.1	120.1	-	-
1400	34.1	37.6	42.5	46.9	53.9	59.4	66.7	73.5	82.4	90.7	103.0	113.4	-	-	-	-
1600	39.0	43.0	48.5	53.5	61.6	67.9	76.2	83.9	94.2	103.7	117.7	129.6	-	-	-	-
1800	43.9	48.4	54.6	60.2	69.3	76.3	85.8	94.5	105.9	116.6	-	-	-	-	-	-
2000	48.8	53.8	60.6	66.8	77.0	84.8	95.3	104.9	117.7	129.6	-	-	-	-	-	-

WALL THICKNESS CHART FOR HDPE PIPE AS PER BS EN 12201-2, YEAR 2011

(The Wall Thicknesses are calculated based on maximum allowable operating pressure at 20°C)

All Dimensions are in mm

SDR		SDR 41		SDR 33		SDR 26		SDR 21		SDR 17		SDR 13.6		SDR 11		SDR 9	
		Nominal pressure, PN in bar															
PE 80		PN 3.2		PN 4		PN 5		PN 6		PN 8		PN 10		PN 12.5		PN 16	
PE 100		PN 4		PN 5		PN 6		PN 8		PN 10		PN 12.5		PN 16		PN 20	
Nominal Dia.		W.T		W.T		W.T		W.T		W.T		W.T		W.T		W.T	
Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
1000	1009.0	24.5	27.1	30.6	33.5	28.2	42.2	47.7	52.6	59.3	65.4	73.5	80.9	90.8	100.0	-	-
1200	1210.8	29.4	32.5	36.7	40.5	45.9	50.6	57.2	63.1	71.1	78.4	88.2	97.2	-	-	-	-
1400	1412.6	34.3	37.9	42.9	47.3	53.5	59.0	66.7	73.5	83.0	91.5	102.8	113.3	-	-	-	-
1600	1614.4	39.2	43.3	49.0	54.0	61.2	67.5	76.2	84.0	94.8	104.4	117.5	129.4	-	-	-	-
1800	1816.2	44.0	48.6	55.1	60.8	68.8	75.8	85.8	94.5	106.6	117.4	-	-	-	-	-	-
2000	2018.0	48.9	53.9	61.2	67.5	76.4	84.2	95.3	105.0	118.5	130.4	-	-	-	-	-	-
2250	2270.3	55.0	60.7	68.9	75.9	86.0	94.8	107.2	118.1	-	-	-	-	-	-	-	-
2500	2522.5	61.2	67.5	76.5	84.3	95.8	105.2	119.1	131.2	-	-	-	-	-	-	-	-

Notes: 1) Pipes conforming to ISO-4427, IS-14151, IS-14333 with latest amendments are available on demand.

2) We Offer PE Pipes and Fittings ranging from 3 mm to 2500 mm OD with pressure rating of 2.5 to 25 bar.

3) Special required sizes are also available on demand. Please contact us for more details.

Jain PE Fittings & Accessories

Complete range of PE Fittings and accessories i.e. Tee, Bend, Cross, Manifold etc. are available. We also manufacture and supply fittings as per customers requirement. Please contact us for details.

Jain® PE Pipes

Solutions for Generations

Applications: Large diameter HDPE Piping Systems

Jain PE Pipe and Fittings are widely used in following applications.

Industrial & Infrastructure

Irrigation & Agricultural

- Open Canal Replacement
- Rising Mains
- Distribution Network
- Drip Irrigation
- Sprinkler Irrigation

Water

- Drinking Water Pipelines
- Pumping Mains and Gravity Lines
- WasteWater Treatment Plants
- Infiltration Gallery

Sewerage & Waste Water

- Pumping Main for Sewerage
- Gravity Main for Sewer
- Rehabilitation of Sewer Lines
- Aeration and Odour Control
- Untreated and Treated Effluent

Manufacturing

- Pulp & Paper
- Chemical Process Lines
- Corrosive Liquids
- Effluent Disposal
- Building & Construction
- Fertilizers
- Food Processing Industry
- Fire Fighting Systems
- Pneumatic Conveyance of Particulates

Marine

- Marine Intake and Outfall
- Desalination Plant
- Dredging & Sand Stowing
- Salt Pan

Mining

- Leach Lines
- Coal Decant Systems
- Mine Drainage
- Coal Tailings
- Slurry and Sludge Transport
- De-watering
- Dust Suppression
- Sand Stowing

Ports & Highways

- Stay Cable Pipe for Cable Stayed Bridges
- Culverts and Storm Water Drains

Power Generations

- Thermal & Nuclear Power Station
- Hydel Power Plants
- Fly-Ash Slurry and others

Life 100+ years

Enables Sea Culture Sustainability!

Reject Water Outfall Diffuser: In Desalination & Power plants, the waste/brine water is disposed-off into deep sea using Diffuser which saves the aquatic life, thereby ultimately supporting the eco system Size: 1200mm x 900mm x 500mm

De Silting Chamber: When the water is conveyed through the closed conduit piping systems, it carries the silt along with. This silt, if not removed from the conduits time to time may result in reduced flow through it.

Replacement of Open Canals using below Ground Gravity Network of HDPE Pipes & Fittings

Sewerage Treatment Plant (45MGD / 200MLD)

Jain®
PE Pipes
Solutions for Generations

Solid Endurance: 1600mm diameter HDPE pipeline at 100 MLD Sea Water Desalination Plant Site during installation at Chennai. Flexibility and Stiffness of HDPE pipes & joints sustained impacts of high tide, low tide waves for more than 06 months

An inside View of Jain PE Pipe Manufacturing Plant

2000mm HDPE Pipes ready for despatches

Technical Properties

Polyethylene

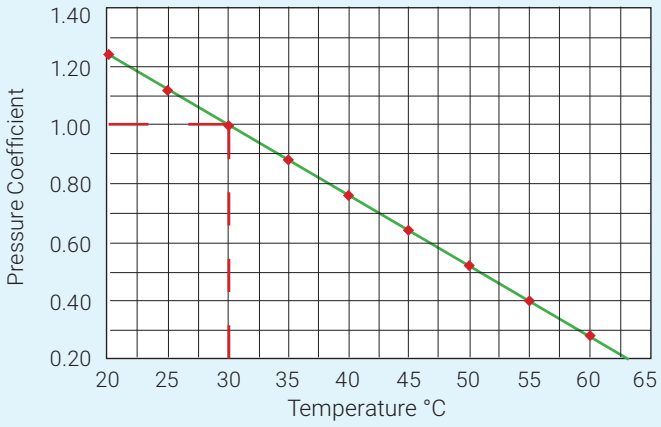
The standards give the PE pipe raw material grades as PE63, PE80 and PE100. The PE raw material is manufactured in the form of granules and the first generation grades of PE63 & PE80 raw materials were manufactured by UNIMODEL method. Subsequently PE100 grade was introduced with BIMODEL method of manufacturing, the PE80 grade also was included in the BIMODEL method. This BIMODEL method of manufacturing the PE granules both in PE 80 and PE 100 grades, improved not only the Minimum Required Strength but also the pipe performance by increasing the Notch Resistance as well as Resistance to Crack propagation. The increase in MRS also reduced the wall thickness for a given pressure class thereby increasing the internal diameter resulting in better fluid flow with reduced cost of pipe.

Material Grade

As per conveyed fluid temperature two material grades are available

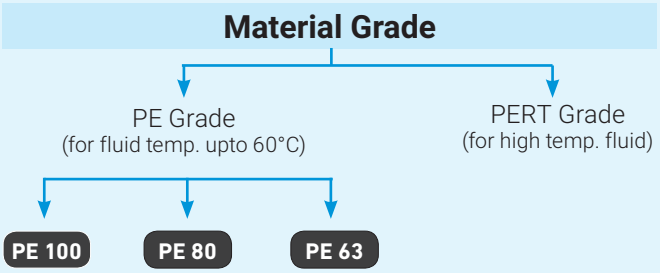
1) PE (PolyEthylene) Grade
2) PERT (PolyEthylene of Raised Temperature resistance) Grade

Basically PE Material is suitable for conveying fluids at ambient temperature and the Indian Standard is based on design temperature of 27°C (Indian ambient temperature). However, PE grades 63, 80 and 100 can be used up to 60°C with suitably degrading pressure class as per the graph given below;



For conveying fluids of elevated temperature (say 70°C), PERT materials grade is recommended for pipes and fittings.

Life 100+ years



Mechanical and Physical Properties of Raw Material

Property	Value	Unit
Density (Base Material)	940– 965	Kg/M³
Melt flow index (190°C /5.0 Kg)	0.2 – 1.1	g /10 Minutes
VST	120 - 130	°C
Crystalline melting Range	130 - 133	°C
Viscosity Number	390	Cm³/g
Hardness	56 - 65	Shore " D"
Tensile Strength at Yield	20 - 26	MPa
Ultimate tensile Strength	30	MPa
Elongation At Break	>600	%
Elastic Modulus	800 - 1200	MPa
Flexural Stress (3.5% Deflection)	13.8 – 20.3	MPa
Charpy Notched Impact at 0°C	16	KJ/M²
Thermal Stability at 210°C	≥15	Minutes
Carbon Black Content	2 - 3	%

Mechanical & Physical Properties of PE Pipe

Property	Value			Unit
Base density	930 to 960			Kg/m³
MFR @ 190 Deg.C and 5 kg load	0.2 to 1.1			g/10 min
Longitudinal Reversion Test	≤ 3			%
Carbon Black content	2.0 to 3.0			%
Carbon Black dispersion	Satisfactory dispersion			-
Anti-oxidant content in PE resin	Max 0.3			%
OIT of PE resin and Pipe @ 200 Deg.C	> 20			Minutes
Volatile content of PE resin	≤ 350			mg / kg
Water content of PE resin	≤ 300			mg / kg
Dimensional characteristics	As per IS 4984–2016			-
Hydraulic characteristics	PE63	PE80	PE100	-
27 Deg.C & 100 hrs Duration	6.9	8.6	10.7	MPa for Induced stress selected
80 Deg.C & 48 hrs Duration	3.8	4.9	5.7	
80 Deg.C & 165 hrs Duration	3.5	4.5	5.4	
80 Deg.C & 1000 hrs Duration	3.2	4.0	5.0	
Tensile strength of Butt fusion joint	Ductile failure			-
Elongation at break	≥ 350			%
Slow crack growth at 80+1 Deg.C, notched test specimen at below internal test pressure (Bar)	≥ 500			Hrs.
PE63 6.4 | PE80 8.0 | PE100 9.2				

Comparison of HDPE Pipe and Other Pipes

Description	HDPE Pipe	PVC Pipe	AC Pipe	Steel / DI Pipe
Pipe Weight	Light in weight	@1.5 times weight of HDPE for same parameters	@ 2-3 Times of HDPE pipe for same parameters	@ 7 Times of HDPE pipe for same parameters
Transportation	Easy for delivery and handling	Same as HDPE Pipe but cannot be delivered in coil length.	Requires special preparation and care in transportation	Heavy weight, need heavy equipment for loading and unloading
	- Pipe Outside Diameter Up to 160 mm. Can Be Coiled to get longer lengths	Not possible	Not possible	Not possible
Flexibility	Pipe can be bend in a radius equal to 25-40 Times Of Outside Diameter	Bending not recommended	Not possible	Not possible
Hazen William's "C" Factor	C = 150	C = 150	C = 100*	C = 100*
Speed of pressure wave in pipe	200 - 400 M/Sec	200 - 400 M/Sec	600 - 800 M/Sec	1,000 - 1,200 M/Sec
Maximum Working Pressure	25 Bar	16 Bar	25 Bar	50 Bar
Working Temperature*	- 40°C To 60 °C	0°C To 60 °C	30°C To 45 °C	-100°C To 300 °C
Service Life	More Than 50 Years	upto 50 Years	10 - 20 Years	10 - 30 Years, depends on lining material
Inner Surface	No Corrosion, No Calcium Carbonate deposits	No Corrosion, No Calcium Carbonate deposits	Water absorption @ 20%, can form Calcium Carbonate deposits	Susceptible to Corrosion, can Form calcium Carbonate deposits
Chemical Resistance	High resistant to Acid and base	Almost same as HDPE Pipe but cannot resist to some chemicals	Non resistant	Non resistant
Underground Installation	Welding on ground and laying into Trench, narrow trench is OK	Jointing in Trench	Need heavy equipment for jointing, Wider Trench is required (Jointing in Trench)	Need heavy equipment for jointing, Wider Trench is required (Jointing in Trench)
Cost of transportation and welding compare with pipe cost	10%	10%	30% (Not include cost of damage from pipe broken)	30%
Welding	Butt Welding / Thermal Jointing, Completely Leak Free joint	Solvent / RR Joint, completely leak free joint.	Integrity depends on the jointing material used	Flange Connection or welding, very Expensive
Use of Thrust blocks at pipe joints	Not required	Not required	Required	May or May not require
Surge pressure	Can accept significantly high surge pressure	Had in between property to resistance surge pressure	Can accept limited surge pressure	Can accept limited surge pressure

Jain® PE Pipes
Solutions for Generations

Big is Beautiful !

Invention & Innovation is a tradition at Jains!

Jain Irrigation Systems Ltd.
Small Ideas. Big Revolutions.

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E-mail jisl@jains.com, **Website www.jains.com**

Jain Pipes — Your Lifeline to Prosperity.®

Jain PE Pipes — Solutions for Generations

Jain Column Pipe — Your Lifeline to Prosperity.®

Jain Casing Pipe — Your Lifeline to Prosperity®

Jain Plumbing™ — Install Peace of Mind!

24 7 Drinking Water Solutions