SPRINKLER IRRIGATION SYSTEMS WITH HDPE PIPES IS 14151 (PART 1 & 2)

Sprinkler irrigation system is a relatively new method of irrigation where the water is pumped through pipelines and sprayed under pressure across the field using rotating devices called sprinklers. This method of irrigation resembles artificial rain. The rotation is achieved by the pressure of water flowing through the sprinklers itself.

Ori-Plast manufactures HDPE pipe based sprinkler irrigation equipments of both medium duty and heavy duty type.

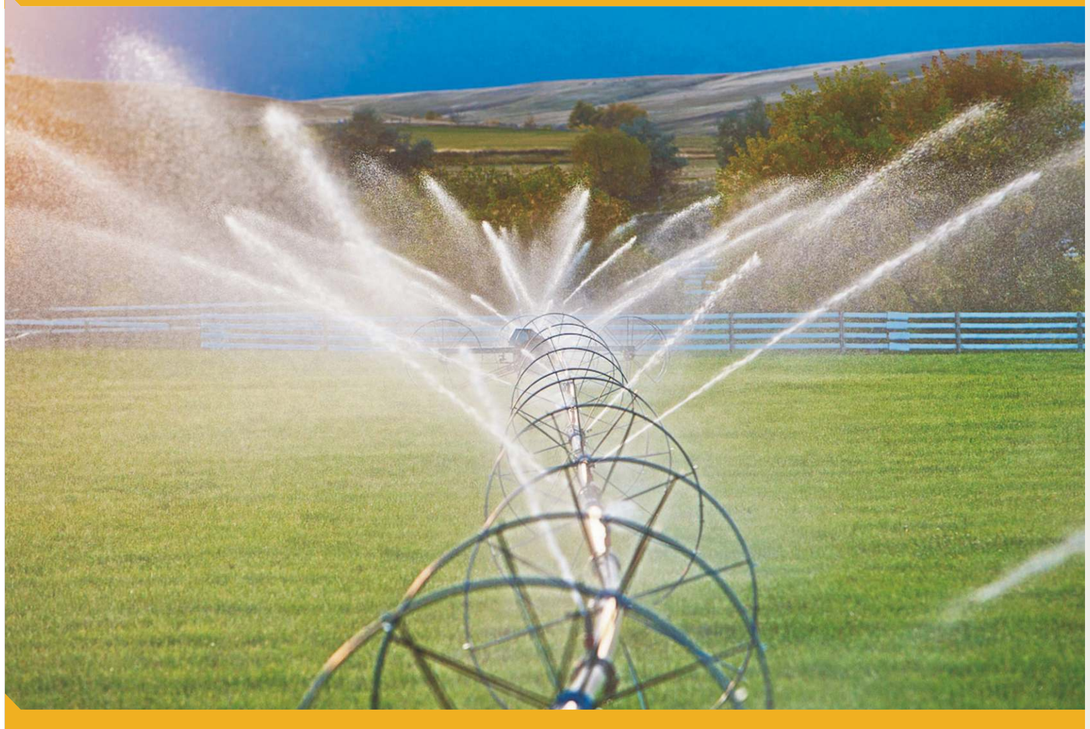
Medium duty type: Sizes 63mm to 110 mm OD and suitable for general agricultural crops e.g. Wheat, pulses, vegetables etc.

Heavy Duty type: Sizes 110mm to 160mm OD and suitable for plantation crops e.g. Tea, coffee, spices etc.

Ori-Plast sprinkler irrigation equipment have the following advantages

- Robust in construction and can withstand high operating pressure
- Water economy, maximum area coverage with minimum available water
- No run off of excess water and thus saves soil erosion
- Suitable for undulating topography which does not require to be leveled
- Easy installation & operation including lesser maintenance
- Savings in manpower and energy

We design, supply and install tailor made sprinkler irrigation system for all types of agricultural & plantation crops being cultivated across India.



SPECIAL USES OF ORI-PLAST HDPE PIPES

HDPE Pipes for Submarine Piping System for Seawater Intake

Any pipeline installed under the sea is subjected to various external forces including sea waves, under water currents and unstable sea bottom etc. All these unpredictable natural occurrences are to be duly factored in during the design as well installation stages of the pipeline and this result in expensive pipelines.

Conventional pipes e.g. MS, CI & Concrete pipes are rigid in nature and they can withstand only minimal deformation or strain before they burst or leak or come apart. Consequently all these pipes are to be heavily loaded or buried under the sea bottom sediments.

Flexibility is a necessary condition prescribed for a technically sound and economically viable submarine piping system. ORI-PLAST has brought about a revolution in submarine piping system by introducing HDPE pipes that offer the required flexibility, life and economic viability in the system.

Ori-Plast HDPE Pipes for on-Shore & off-Shore Dredging Application

HDPE pipes of PE 80 grade and pressure rating PN 2.5 is very light, being lightest of all and the material being lighter than water itself can be developed into a float by capping its ends. Two such pipes can be tied together by HDPE straps or strapping blocks to form into a float which can easily support another 6.0m long HDPE pipe of higher pressure rating and called the supply line. The combined floats can provide necessary buoyancy sufficient enough to keep the supply line floating even when it is carrying slurry consisting of water and 25-30% of sand.

A few of these 6.0m long pipes on floats are connected by means of flexible rubber hoses to form into a floating pipeline. These are then connected to an onshore HDPE pipeline of identical size & class which carries the dredged slurry from a dredger to an off shore discharge point.

ORI-PLAST had supplied and successfully commissioned a floating pipeline for Visakhapattanam Port Trust way back in 1990.

Ori-Plast®

ORI-PLAST HDPE PIPES FOR OTHER USES

PLB-HDPE Telecom Ducts for Underground Laying of Optical Fibre Cable

With the increasing demands on telecom industry, especially in developing countries for more connections, the use of new age Optical Fiber Cables (OFC) has become a necessity and to lay these cables under ground rapidly over long lengths, Silicon Coated Permanently Lubricated HDPE ducts, in short PLB pipes, are used as conduits.

Ori-Plast manufactures following pipes as per Department of Telecommunications' General Requirements no. : G/CDS-08/01, Dec. 99 Sizes (OD/ID):40mm/33mm and 32 mm / 26mm Lengths: 500 & 1000 mtrs. coil

The pipes are also available with inserted Nylon Rope for pulling the OFC inside instead of blowing.

The advantages of Ori-Plast PLB ducts can be stated as follows:

- Suitable for blowing of OFC cable for faster laying
- Being light in weight, these are easy to handle and to transport
- Saves a lot on manpower and costs through easy and rapid installation
- Highly resistant to corrosive water and aggressive soil conditions
- High impact strength protects it from heavy traffic loads
- Elastic with high flexural strength and Long lasting and trouble free maintenance

MILESTONES

Sea Water Intake Systems: For M/s. Thappar Water Base, Chennai, 450mm OD HDPE Pipes with specially designed suction blocks.

Sand Stowing System: For The Indian Iron & Steel Co. Ltd., 180mm OD of 10 Kg/cm^2 HDPE Pipes scored over steel pipes for their corrosion resistance, higher service life and 60% lower weight.

Effluents Disposal System: For M/s. Manali Petro Chemicals Ltd. Chennai, a SPIC Group Company, at their Manali factory, 250mm x 6.0km (of which 5.4 km was on shore and 0.6 km off shore) HDPE pipeline system with a specially designed multiport diffuser to spray the effluents into the sea.

Sand by Pass System: For Paradip Port Trust, HDPE pipes and fittings of different diameters against their off-shore and on-shore requirement.

Floating Dredged Slurry Disposal System: For Dredging Corporation of India Ltd., Visakhapatnam, 500mm OD of 6 kg/cm^2 HDPE pipes suitable for assembling and maintaining in floating condition.

Boiler Ash Disposal System: For Tuticorin Thermal Power Station, Tamil Nadu, 500mm OD of 10 kg/cm^2 HDPE pipes and fittings.

Sea Water Intake and Brine Discharge Pipeline: For Kundan Kulam Nuclear Power Project, Tamil Nadu of Nuclear Power Corporation of India Ltd., 450mm OD of 10kg/cm^2 and 355mm OD of 4 kg/cm^2 brine discharge pipeline for their desalination plant. The project was executed on behalf of M/s. Tata Projects Ltd., Hyderabad.

Ori-Plast®

STORAGE OF HDPE PIPES

- Black HDPE pipes should preferably be stored under cover. However it can still be stored in the open for limited periods as the blended carbon black protects it from aging due to sunlight.
- HDPE pipe coils may be stored either on edge or stacked flat one on top of the other.
- Straight length of HDPE pipes should be stored on horizontal racks with proper support.
- HDPE Pipes should not be stored alongside fertilizers, pesticides or chemicals.
- The ends of the pipes should preferably be plugged or covered while storing for longer duration.

Ori-Plast®

HANDLING OF HDPE PIPES

- HDPe pipes being tough and made up of a resilient material are elastic and practically unbreakable even under roughest handling conditions. However, being softer than metals it is more prone to damage by abrasion and by particles with sharp cutting edge. As such dragging of pipes or coils over rough ground or dropping them from height on sharp stones should be avoided.
- If due to unsatisfactory storage or handling, a pipe is damaged or 'Kinked', the damaged portion should be cut out completely.
- Low temperature does not affect HDPE as much as other plastic materials, and there is no need for taking additional precautions in handling during cold weather.

TRANSPORTATION OF HDPE PIPES

- HDPE pipes are light in weight (density being 950-955 kg/m3) and can be carried as head loads from the point of storage to anywhere including inaccessible places.
- HDPE pipes of larger diameters are generally supplied in straight lengths of 5-6m for easy transportation in standard trucks. These can also be supplied in 10-12m lengths and in trailers. Needless to mention the cost of transportation by trailers is much higher.
- Pipes of smaller diameters (say upto 50mm) are usually supplied in coils of varying lengths (say from 50- to 500m, depending upon the size). For supply of pipes above 50mm OD and upto 110mm OD of suitable pressure ratings, p0lease check with Marketing/Sales Department before placing the order.

ADVANTAGES OF PE 100 OVER PE 80 AND PE 63

The advantages of polyethylene pipes over other traditional pipes are well established. However with improvements in polyethylene product technology over the last few decades, newer grades of materials were invented by the PE raw material manufacturers. The most superior grade of PE available now is PE 100, also known as "3rd generation HDPE" with the following advantages over the other two grades:

The MRS value of PE 100 material is 10.0 MPa , which means that the pipes made out of this material can withstand a minimum circumferential stress (or hoop stress) of 10.0 MPa for 50 years at 20ºC. The comparative MRS values of all the three grade of materials are shown in the graph Fig. 1:

The above differences translate into higher operating pressure at the same wall thickness, or alternatively, thinner walled pipe at the same operating pressure. This means for identical flow rates and length of pipes, the head loss will be substantially less in the case of pipes made out of PE 100 grade of material, as has been shown in the graph Fig. 2

The benefit of lower Head Loss will directly reflect on energy cost and, needless to mention also on (a) Capital Cost (comparative weights for three grades of materials is shown in the graph Fig. 3) and (b) Maintenance Cost i.e. on complete life cycle cost.

Additionally PE 100 material sets new standards in three basic properties of polyethylene materials which are:

- **Creep rupture strength:** PE 100 resins have higher creep strength and hence PE 100 pipes are able to withstand a higher pressure for a given pipe diameter and wall thickness.
- **Stress crack resistance :** Tests carried out as per ISO standards confirm that for PE 100 pipes a higher circumferential stress is required to make a notch propagate into a complete pipe failure.
- **Resistance to rapid crack propagation:** A PE 100 pipe material arrests a rapidly growing crack comparatively better than other PE grades.

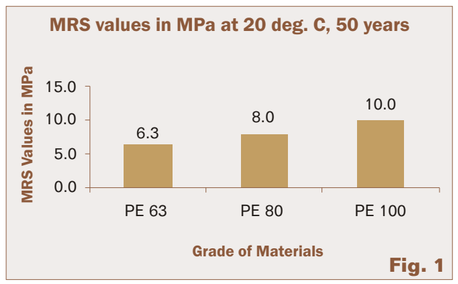


Fig. 1

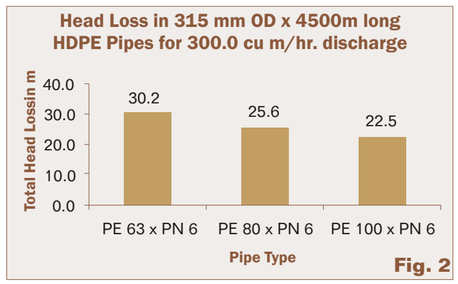


Fig. 2

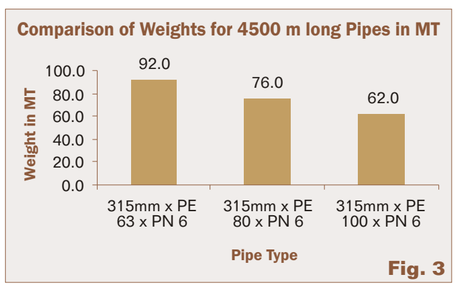
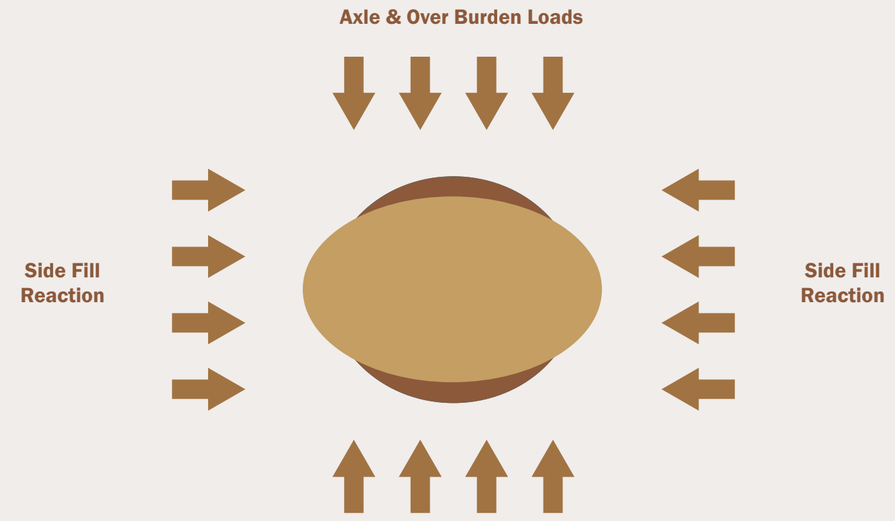


Fig. 3

UNDERGROUND INSTALLATION OF ORI-PLAST HDPE PIPES

In case of underground installation of flexible pipes including HDPE and MDPE pipes, the pipes are subjected to the following forces:



The lateral expansion, as shown above, mobilizes passive resistance in the soil which, in combination with the pipe's inherent stiffness, resists further lateral expansion and consequently further vertical deflection.

The extent of deflection and the stress depends not only on the pipe's properties but also on the soil properties. The extent of deflection and stress must be kept safely within HDPE/MDPE or flexible pipe's performance limits. Excessive deflection may cause loss of stability and flow restriction, while excessive compressive stress may cause crushing or ring buckling.

Thus factors affecting the performance of the pipeline are summarized as follows:

(a) Pipe Stiffness, (b) Soil Stiffness and (c) Load on the Pipe

Trench Width

With HDPE pipe, widening of the trench will not generally cause a loading greater than the load of the prism or the vertical column of soil. Trench width in firm and stable ground is determined solely on practical consideration. Recommended maximum trench widths in stable ground are given below :

OD of the pipe in mm	Maximum Trench Width in mm
From 110 to 400	Pipe OD + 300
From 450 to 630	Pipe OD + 450

TRENCH BOTTOM

The trench bottom should be constructed to provide a firm, stable and uniform support for the full length of the pipeline. A stable bedding minimizes bending of the pipe along its horizontal axis and suppoorts the embedded pipe. There should not be any sharp objects or large rocks or stones larger than 20mm below the pipeline. A minimum bedding thickness of 100-150mm under the pipeline should be provided.

SOIL

The type of soil and amount of compaction of the pipe embedded directly affect the performance of the pipe. With proper embedded soil and compaction, greater burial depths are possible and higher external pressure capability and lesser pipe deflection will occur.

MINIMUM COVER

(a) A minimum cover of 0.9 to 1.0m is recommended in case embedded under roads with general and truck traffic.

(b) A minimum cover of 1.8 to 2.0m is recommended in case where heavy dynamic loads are expected. We are aware that in case of pipe laid below 2.0m, it is not affected significantly by dynamic load.

(c) In case it is not possible for deep burial of the pipeline, suitable pipe protective cover is to be provided to prevent damage to the pipeline.

(d) For high static and/or surcharge loads, it is advisable to use pipe of an appropriate stiffness to ensure deformation within permissible limit.

BACK FILLING

(a) Filling and compaction of the sidefill or haunching layers

(b) Side sheeting is to be removed partially before sidefill in order to avoid gaps between the pipe and trench wall

(c) Pipe joints are to be left free of backfill for inspection

(d) Subsequent layers of backfill are to be placed over the pipe and compacted suitably at least 150mm above the crown of the pipe

(e) Lastly the final backfill materials are to be replaced in compacted layers of minimum 250 mm thickness and upto the top of the trench

JOINING

There are several joining methods for polyethylene pipes and a few of them are described in brief hereunder:

Butt Welding: This is the most time saving, highly economical, simple and widely accepted method of joining which is considered to be stronger than the pipe itself. In this process the preheated pipes and / or fittings are joined under controlled pressure and temperature conditions. Some of the fittings e.g. bend, tee of large diameters are also fabricated by this process. A trained and skilled pipe welder should be engaged for the job.

Flanged Joints : To join polyethylene pipes with metallic pipes, pumps, valves etc. a metallic flange is slipped on the PE pipes before welding a pipe end or stub end with the pipe. The flange which is held in position by the pipe end is then bolted with the valve / pump / metallic pipe which also have a flange end by incorporating either a natural or a synthetic rubber gasket. It is a suitable joining system even for pressure lines.

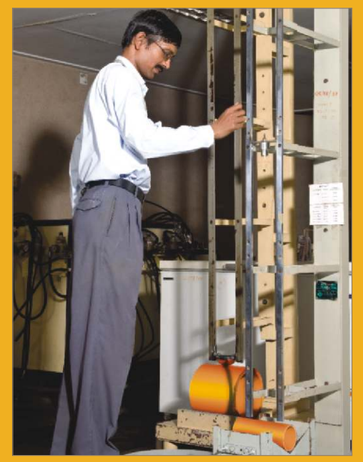
Victaulic Couplings: It is a semi permanent type of joint. The pipes are welded with pipe ends (almost similar to the ones used in the case of flanged joints but slightly different dimensionally). The ends are joined with the help of two bolts type CI 'semi circular' clamps with an integral and circular sealing ring in between. These joints allow faster assembly and the system is suitable for non-permanent water supply, dewatering application etc. The joint can be easily dismantled allowing for system change and reassembly at another location.

Compression Fittings: Mainly used for house connections from fixed mains and for temporary pipelines. The fittings are usually made out of another thermoplastic material i.e. polypropylene and consists of a middle ring, a rubber sealing ring, a serrated compression ring and a screwed nut. The pipe is inserted through all these upto the centre of the middle ring. The nut is then slowly screwed on to the middle ring. As a result the serrated ring compresses the pipe wall and grips it tightly. The water tightness is provided by the rubber sealing ring. The recommended pressure rating for 20mm to 63mm OD sizes is PN 16 and for 75 mm and 110 mm OD sizes is PN 10.

Electrofusion Joining: It is the preferable joining method for MDPE pipes for gaseous fuel conveyance. The fittings made out of identical MDPE material are incorporated with electrical resistance which, when connected to an appropriate power supply, melts and fuses the pipe and the fitting together. The effectiveness of the joint depends upon the correct preparation of the joining surfaces and ensuring the surfaces to be joined have satisfactory contact during the welding and cooling cycle.

Ori-Plast®

RESEARCH & DEVELOPMENT



Ori-Plast has a committed Research & Development team dedicated to achieve the highest level of efficiency and excellence. The R & D department is equipped with the latest facilities, know-how and technology.

The R&D wing boasts of a steady and progressive product development system and to back it up is an extensive range of the latest testing equipment that ensures the most optimal standardized quality in every batch.

Rigid quality control at every stage from raw material inspection to finished goods inspection and testing and an ongoing commitment to innovation and development ensures that Ori-Plast's products maintain a uniformly high standard of excellence. Export Promotion Award received ten times in succession from the Govt. of Orissa and five times from the Plastics and Linoleum Export Promotion Council along with numerous other awards and recognition from various other organizations speak of Ori-Plast's primary objective-Quality. Ori-Plast is an ISO 9001 : 2000 company.

Raw Material Testing

For Polyethylene (HDPE, MDPE & LDPE) materials, Test Certificates are received from the raw materials manufacturers. In case of various national and international standards e.g. ISO, DIN, ASTM etc. the compounded raw materials are formulated and tested as per the specified parameters.

All Ori-Plast products are tested in the company laboratory before release. Sometimes, the purchaser appoints an independent inspecting authority, generally called third party inspecting authority, to inspect the lot before the approval and issue of signed Test Certificates. Occasionally the inspecting authorities draw samples and send it to a Government Laboratory for testing.

Ori-Plast®

PRODUCT FAMILY

DESCRIPTION OF ITEMS	SPECIFICATIONS	SIZES	APPLICATIONS
POLYETHYLENE PRODUCTS			
HDPE Pipes & Fittings	IS 4984	20mm to 630mm	Water Supply
HDPE Pipes	IS 14333	63mm to 630mm	Sewerage & Slurry Disposal
HDPE Pipes & Fittings	IS 14151 (Part 1 & Part 2)	50mm to 160mm	Sprinkler & Flow Irrigation System
HDPE PLB Telecom Ducts	DOT: GR/CDS-08/02 Nov, 2008	32mm, 40mm & 50mm	Underground OFC Conduits
HDPE Pipes	ISO 4427	20mm to 630mm	Water Supply
HDPE Pipes	DIN 8074	20mm to 630mm	Water Supply, Sewerage & Slurry Disposal
MDPE Pipes	IS 14885 & ISO 4437	16mm to 315mm	Gaseous Fuel Conveyance
PVC PRODUCTS			
uPVC Pipes & Fittings	IS 4985	20mm to 630mm	Water Supply & Agro Irrigation Purpose
uPVC Pipes & Fittings	IS 13592	75mm, 110mm & 160mm	Soil, Waste & Rain Water Disposal
uPVC Casing & Screen Pipes	IS 12818 & DIN 4925	40mm to 400mm	Bore Well Construction
Direct Action Hand Pump	IS 14106	30mts & 40mtrs depth	Lifting Underground water
uPVC Pipes (types A, B & C)	TEC: G/CDS-03/02	50mm & 110mm	Underground cable conduits
uPVC Threaded Pipes & Fittings (Push Type)	ASTM D 1785 & ASTM D 2467	1/2" to 12"	Plumbing & Bore well construction
uPVC Pipes	ISO 4422	20mm to 630mm	Water Supply
uPVC Pipes	BS 3505	1/2" - 12"	Water Supply
CPVC PRODUCTS			
CPVC Pipes & Fittings	IS 15778, ASTM D2846	15mm(½") to 50mm(2")	Hot & Cold Water Supply
ROTO MOULDED PRODUCTS			
LLDPE Circular Tanks	IS 12701	200 liters to 1000 liters	Water Storage (for external installation)
OTHER PRODUCTS			
Solvent Cement	IS 14182		Joining uPVC Pipes & Fittings
Solvent Cement			Joining CPVC Pipes & Fittings
INJECTION MOULDED ITEMS			
Injection Moulded Items (MOC: PVC, HDPE, PP etc)		As per Cutomer's design & specification	