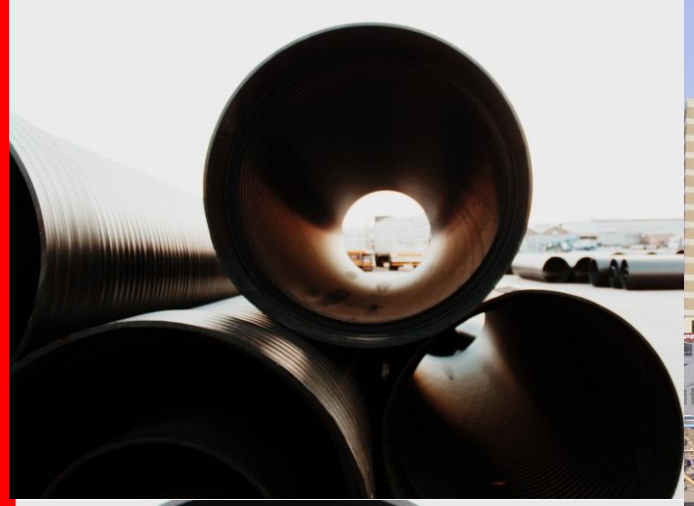

PEXMART SPIRAL

SPIRAL HDPE PIPE produces a spirally wound structured wall pipe manufactured from PE-HD known as SPIRAL Structured Wall HDPE Pipe. It is available in diameters ranging from 300mm to 1800mm.

The SPIRAL Structured Wall HDPE Pipe systems economical and competitive, as the structured wall concept creates a pipe with superior ring stiffness, utilizing considerably less raw material than conventional solid walled thermoplastic pipes of equal stiffness.

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Spiral Structured Wall HDPE Pipe

Over the years, traditional material used for sewerage and waste disposal pipelines have been found to be deficient. Some become brittle and others are subject to attack from theeffluent carried and gasses created in the pipe or from aggressive soil conditions.

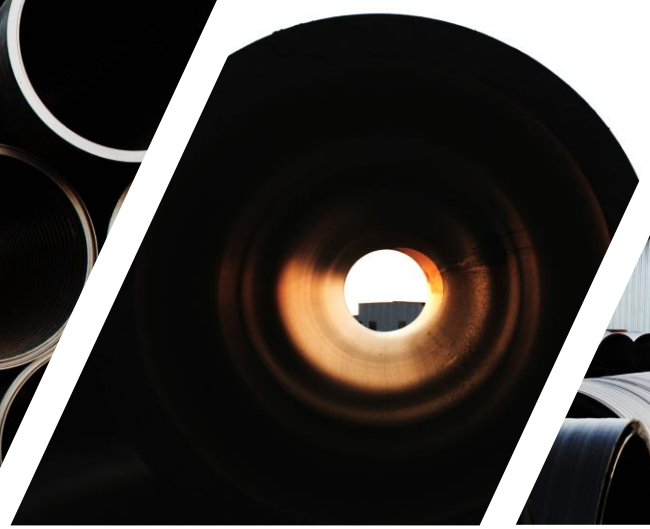
This led to the use of flexible pipes such as High Density Polyethylene (HDPE), which can withstand present day traffic loads, deep laying conditions and chemical attack.

SPIRAL Structured Wall HDPE Pipefeatures include:

- Resistance to chemical attack, abrasion, scale, sediment build-up andUV degradation.
- No electrolytic or galvanic corrosion
- Lightweight
- Long lengths
- High impact strength
- Superior flow characteristics
- Flexibility
- Variety of jointing methods
- Comprehensive range of fittings
- Cost savings in transportation,handling and installation.

Principal applications for SPIRAL StructuredWall HDPE Pipe include:

- Gravity trunk sewer mains
- Sewer rising mains
- Storm water drainage
- Sub soil drainage
- Corrosion resistant tanks

Manufacture Spiral Pipes

In the manufacture of SPIRAL Structured Wall HDPE Pipe a specially designed inner liner is wound upon a heated rotating mandrel. A hollow extruded rectangular profile, is then wound over the inner liner and intimately bonded to it. This innovative wall construction uses geometric efficiency to maximizes ring stiffness.

A wide range of profile sizes and winding Pitches are available for almost all requirements in any type of soil condition. Because SPIRAL Structured Wall HDPE Pipe is manufactured on a mandrel, the internal diameter remains constant for each nominal size, irrespective of wall profile or thickness. The versatile nature of HDPE permits the custom fabrication of bends, tees and man-hole units to compliment the pipes, as well as corrosion resistant tanks to meet a wide range of applications.

MATERIAL PROPERTIES

SPIRAL Structured Wall HDPE Pipe offers an optimum combination of strength and durability.

Chemical and corrosion resistance

High density polyethylene (HDPE) is an ideal pipe material due to its outstanding resistance to corrosive and aggressive chemical environments. The material is used extensivelyfor sewer applications as it is inert to hydrogen sulphide gas. SPIRAL Structured Wall HDPE Pipe is not affected by scale and sediment build-up experienced in pipes made of traditional materials and is not subject to electrolytic or galvanic corrosion.

Abrasion resistance

High density polyethylene (HDPE) is an ideal pipe material due to its outstanding resistance to corrosive and aggressive chemical environments. The material is used extensivelyfor sewer applications as it is inert to hydrogen sulphide gas. SPIRAL Structured Wall HDPE Pipe is not affected by scale and sediment build-up experienced in pipes made of traditional materials and is not subject to electrolytic or galvanic corrosion.

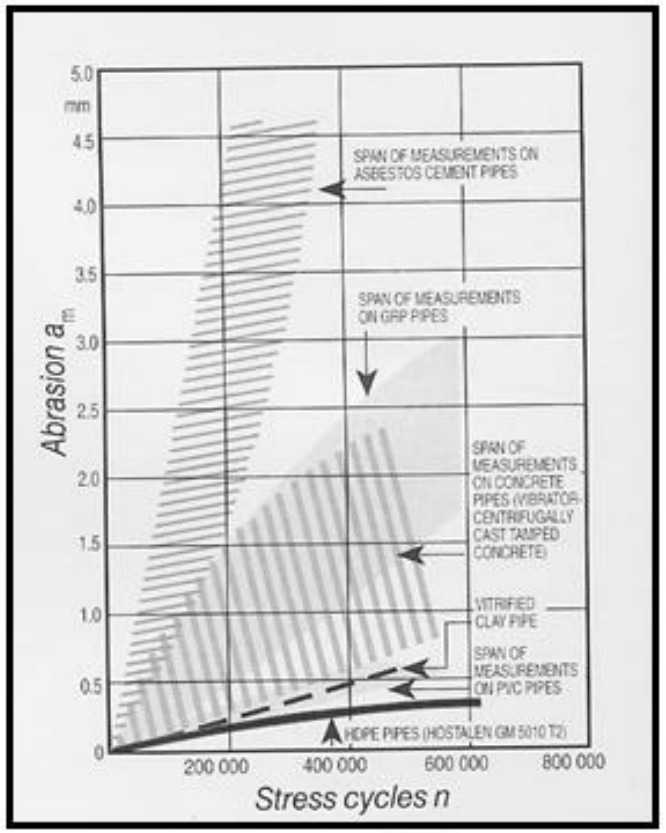


Fig 1: Average abrasion values for pipes made from various materials.

Temperature effects

High density polyethylene (HDPE) is an ideal pipe material due to its outstanding resistance to corrosive and aggressive chemical environments. The material is used extensivelyfor sewer applications as it is inert to hydrogen sulphide gas. SPIRAL Structured Wall HDPE Pipe is not affected by scale and sediment build-up experienced in pipes made of traditional materials and is not subject to electrolytic or galvanic corrosion.

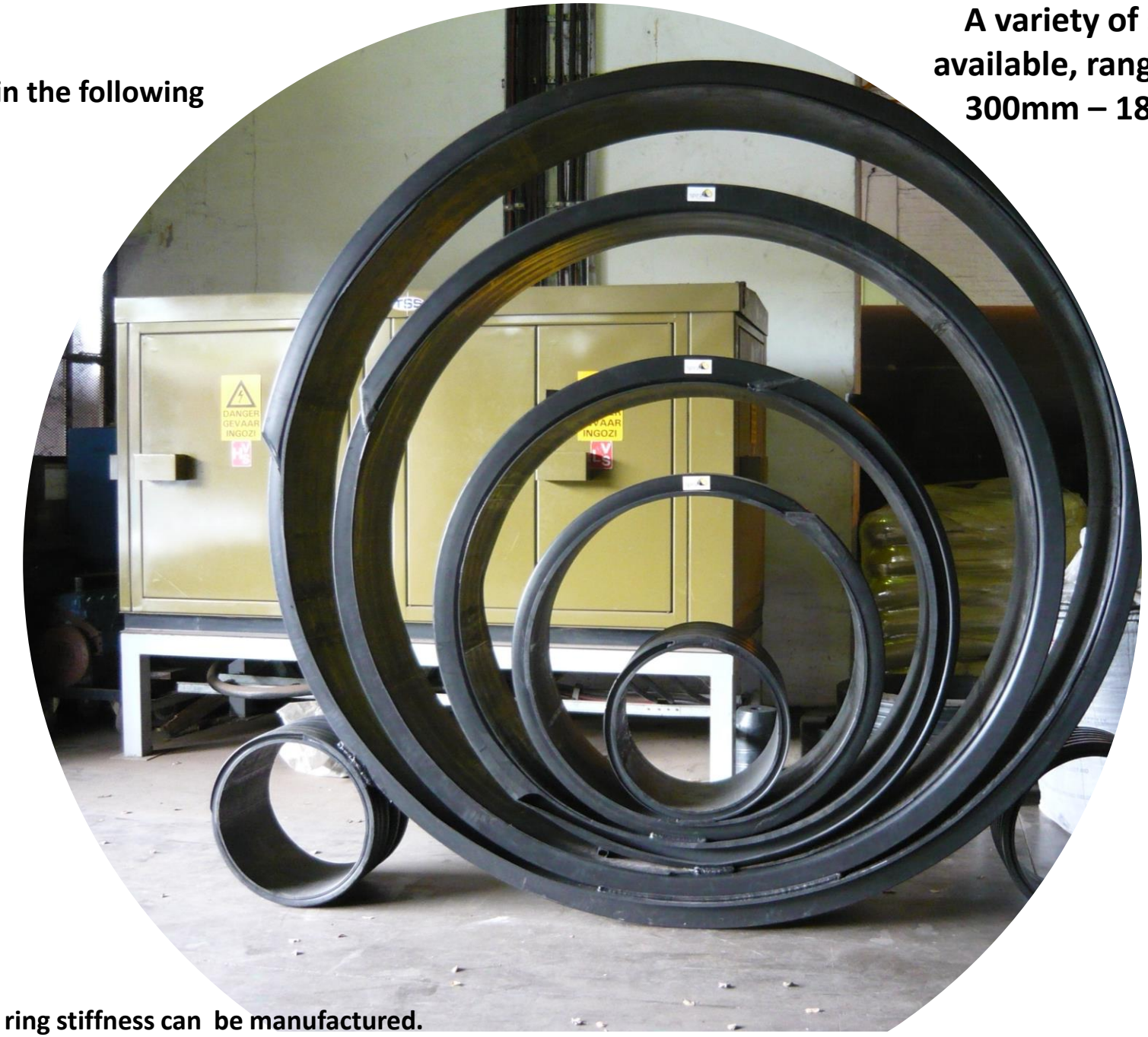
Weather resistance

High density polyethylene (HDPE) is an ideal pipe material due to its outstanding resistance to corrosive and aggressive chemical environments. The material is used extensivelyfor sewer applications as it is inert to hydrogen sulphide gas. SPIRAL Structured Wall HDPE Pipe is not affected by scale and sediment build-up experienced in pipes made of traditional materials and is not subject to electrolytic or galvanic corrosion.

DIMENSIONS

SPIRAL Structured Wall HDPE Pipe is available in the following sizes and ring stiffness classes:

	Ring Stiffness	
Dia	kN/m2	
mm	ISO 9969 / SANS 21138	
300	4	8
350	4	8
400	4	8
450	4	8
500	4	8
560	4	8
600	4	8
700	4	8
750	4	8
800	4	8
900	4	8
1000	4	8
1100	4	8
1200	4	8
1250	4	8
1500	4	8
1800	4	8



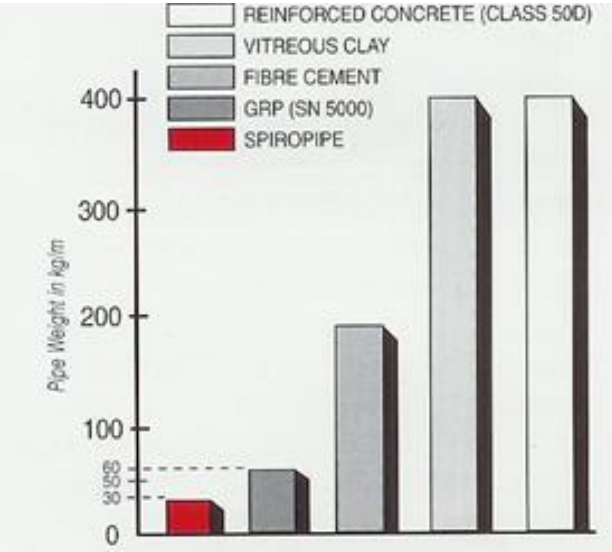
A variety of sizes is available, ranging from 300mm – 1800mm

Depending on the quantity required, special sizes and ring stiffness can be manufactured.

FEATURES

Lightweight

SPIRAL Structured Wall HDPE Pipe is considerably lighter than other pipe materials as shown in *Fig. 2*



The savings which result from the use of lightweight pipe can be significant. Transport costs are reduced, installation equipment may be smaller and less expensive to operate and job site handling efficiency improved, usually resulting in earlier completion.

Durability

The impact resistance of HDPE is quite outstanding. The tough ductile nature of the pipe enables it to withstand stresses from transportation and site handling that would normally cause breakages with brittle pipe materials. The pipe can inherent flexibility andaccommodate considerable soil movement.

Length

Standard pipe length is 6m, and multiples of 6m. Non-standard lengths are available on request. The advantages of longer length standard pipes are well recognized. Installations are normally faster than for conventional pipe materials. Fewer joints and longer lengths result in an increase in the amount of pipe laid per day.

SPIRAL Structured Wall HDPE effluent pipes are nominally designed for an internal pressureof 1 bar, for a 50-year working lifetime at 20ºC. However, pipes can be produced for working pressures of up to 20 bar. Solid wall SPIRAL Pipe, produced by the spiral winding technique, is designed to comply with the performance requirements of SABS ISO 4427:1996.

Jointing

SPIRAL Structured Wall HDPE Pipe offers a number of jointing methods:

The socket and spigot extrusion weld joint is recommended forsewerage, low pressure water supply or drainage situations where joints may be subject to longitudinal tensile forces.

This is a field joint which is accomplished by using portable HDPE extrusion welding equipment in conjunction with ultra-high frequency spark testing to ensure leak tight joints. For pipe sizes up to 500mm in diameter, the jointsare welded on the outside only.

For pipe sizes 600mm and above, joint welding is usually on the inside of the pipe but can be on the outside or both. In some applications, particularly storm water drainage, welding ofthese joints is often not necessary, and arubber Ogee type sheath, obtainable from Spiral HDPE Pipe is used.

Butt-welded joint is used for high pressure applications. Hot plate butt welding equipment is required and can be used either in the field or factory.

Buried Pipe Performance

The major consideration for the performanceof all buried pipe is the pipe material characteristics. These can greatly affect installation practice. Rigid pipe materials such as reinforced concrete (RC) and fiber cement (FC) can withstand very little deformation before structural failure occurs from external loading.In addition, materials such as RC are subject to chemical attack and traditionally their wall thickness has been increased using a sacrificial layer, thus decreasing the internal diameter.

Generally flexible pipes have a much highertolerance to wall strain than rigid materials and consequently can withstand relatively large deformation without failure. This characteristic of flexible pipe allows it todeflect under external load without damage and transfer a significant amount of the overburden load to the surrounding soil.

Consequently, the design principles for flexible pipes are based on the interaction between thepipe and the surrounding soil. Within the category of plastics used for flexiblepipe manufacture, some materials have a much higher tolerance to strain than others. Thermoplastics such as HDPE have the highest tolerance and are extremely ductile innature. Consequently, flexible pipes manufactured from material other than HDPErequire a higher stiffness in order to maintaindeflection and wall strain within allowable design limits for the same ground and loadingconditions.

Ring Stiffness

SPIRAL Structured Wall HDPE Pipe can be manufactured with variable ring stiffness depending on inner liner thickness, profile size,and profile winding pitch. Popular classes of ring stiffness are:

- 4kN/m²
- 8kN/m²
- 12kN/m² (on request)

Pipes with higher ring stiffness can bemanufactured on request.

Ring stiffness is determined in accordance withISO 9969 / SANS 21138 Thermoplastics pipes – determination of ring stiffness.

Pipe deformation calculation

The crown deformation under earth load is determined by the Rsvalue on the X – axis of the Watkins graph. (See Fig 1)

Rs = EB / ER x I/Dm3where :
EB = soil modulus
Dm = mean pipe diameter
ER = Elastic modulus of material

On the Y – axis of the Watkins graph the relative pipe deformation σv/ξB for a given Rsvalue can be read off.
Soil compression value EB can be derived from the calculated value qvand soil modulus EB:

ξB = qv / EBwhere:
qv = ρ . H
ρ = backfill densityH = Cover depth

Finally, pipe deformation σv is obtained as follows:

σv = (σv / ξB) . ξB

and should be designed not to exceed 6% in50 years.

Soil Modulus EB is sensitively dependent on embedment material and degree of compaction PPr (%) as indicated in *Table 1*.

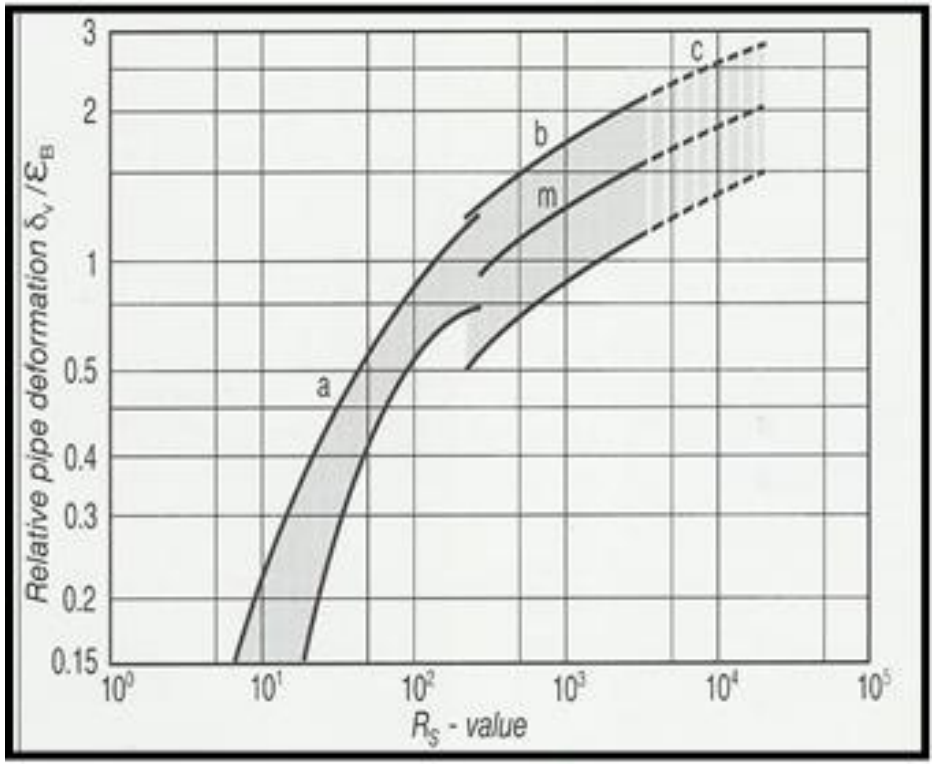


Table 1 : Deformation moduli of various soils

Type of soil (Group[1])	Degree of compaction $D_{Pr(\%)}$ (for particular case[2]) 1	2	3	4	Deformation modulus E_s (N/mm²) for particular case 1	2	3	4
1	95	90	85	97	16	6	2,5	23
2	95	90	85	97	8	3	1,2	11
3	92	90	85	95	3	2	0,8	5
4	92	90	85	95	2	1,5	0,6	4

[1]) Soil group 1 : non-cohesive soils, gravel
Soil group 2 : non-cohesive soils, sand
Soil group 3 : cohesive mixed soils (sand and gravel)
Soil group 4 : cohesive soils (silt, clay, loam)
[2]) Case 1 : trench backfill compacted in layers against the undisturbed soil or embankment fill (without compaction test).
Case 2 : vertical bracing of pipe trench with planks or lightweight sheet piling or non-compacted backfill or hydraulic fill.
Case 3 : vertical bracing of pipe trench with sheet piling or wooden piles.
Case 4 : backfill compacted in layers or embankment fill (with compaction test).

Installation

Recommended InstallationPractice

SPIRAL Structured Wall HDPE Pipe is a flexible conduit and is designed to deflect under external loading to transfer the load from the pipe wall to the surrounding soil.
Requirements for achieving satisfactory installation of SPIRAL Structured Wall HDPE Pipe do not differ greatly from those of rigid pipe materials. Performance of flexible pipe – soil systems has been demonstrated by laboratory tests and confirmed in Europe, North America, South America, Australia and South Africa.

Installation

The most critical aspect for the successful installation of flexible pipe–soil system is achieving stable and permanent side support around the pipe. The bedding and initial backfill materials should be of a readily compactable nature.

Trench excavation

The trench is excavated to the line and gradeas specified. The trench width must be sufficient to allow placing and compaction of the pipe bedding material with suitable equipment.

BEDDING

Bedding performs the important function of leveling the trench bottom, assuring uniformsupport and load distribution along the barrelas well as supporting the hunching material.

Pipe jointing

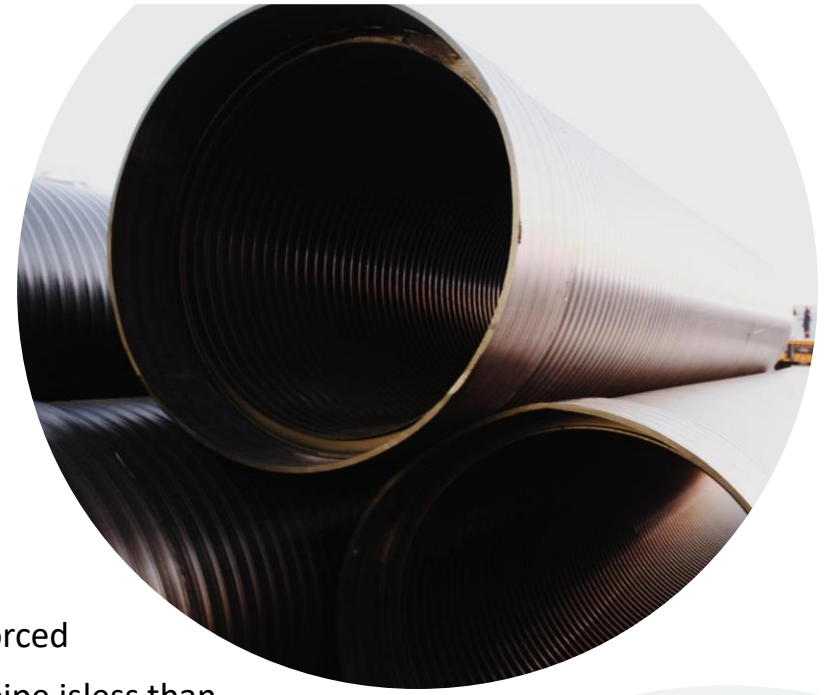
Following preparation of trench and bedding, pipes are lowered into the trench with suit- able lifting equipment. Generally, the excavatoror back actor bucket is utilized with a single sling at the pipe's midpoint. Pipes of all diameters can be joined using two chain blocks
– The ribbed wall aids with grip for chains. Pipes can also be push–jointed using the back actor or excavator, the bucket bearing ona piece of timber laid across the pipe face to avoid damage to the jointing surface. The usual practice is to lay pipes with sockets facing upstream.

Traffic loading situations

In cases where the installed pipeline will be subjected to repetitive wheel loading with less than 1,0m of soil cover, the following practices are recommended:

Pipe should be encased in reinforced concrete where cover over the pipe isless than 300mm

Care should be taken to avoid flotation of the pipe duringpouring of concrete. In situations where cover of pipe is between 300mm and 1000mm, crusher run material should be placed and compacted to the normal degree of 95% Standard Proctor. This material can be used either to bed andtotally encase the pipe or it can be placed from the initial backfill – which should be soil type 1 or 2 and also compacted to 95% to the traffic surface level.



Tanks

We also manufacture specialized tanks of up to3500mm in ID, according to the customer’s requirements

Choose the right tank from the start.

Durability

The impact resistance of HDPE is quite outstanding. The tough ductile nature of the tank enables it to withstand stresses caused by transportation and site handling that would normally cause breakages with brittle tank materials. The pipe’s inherent flexibility can accommodate considerable movement.

Get in Touch

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