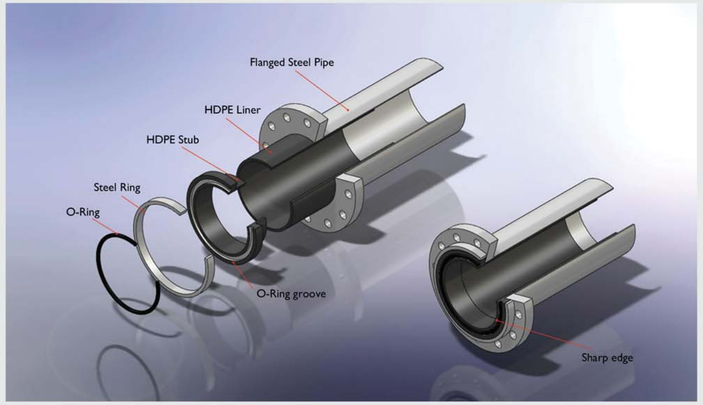
Cross-Section Steel Polypipe



Steel Polypipe's defining feature is the unique combination of the HDPE liner with the host steel pipe. The inherent strength of steel ensures that the pipe delivers high pressure capability, structural integrity, and resistance to mechanical damage, while the elastic and visco-elastic properties of the HDPE give the pipe corrosion and abrasive resistant properties. Manufacturing methods that compensate for HDPE thermal expansion. Robors patented system assists with the reduction of unnecessary stress on joints, as well as early liner deterioration visibility.

Robor has custom designed equipment and patented technology which enables it to offer valuable expertise to clients considering new pipeline installations or evaluating the feasibility of refurbishing existing systems.

It should be noted that any realistic comparison of different piping materials should be based on the full life cycle cost of an installation. This would include the following costs: total material, fabrication, installation and commissioning, together with the present value of the following based costs: system operating cost, maintenance, replacement and production losses from unscheduled downtime.

The table below provides details of the standard product specification

Nominal Bore		100	ISO	200	250	300	350	400	450	500	600
Steel OD	(mm)	114.3	165.1	219.1	273	323.9	355.6	406.4	457.2	508	609.6
HDPE thickness	(mm)	8	8	8	10	10	12	13	13	17	20
Steel thickness	(mm)	4	4.5	4.5	4.5	4.5	6	6	6	6	6
Bore of lined pipe	(mm)	90.3	140.1	194.1	244	294.9	319.6	368.4	419.2	462	557.6
Composite mass	(kg/m)	13.5	21.77	29.2	38.2	45.53	64.93	75.66	101.07	101.07	127.21

All steel wall thicknesses are based on medium pipe specifications
Composite mass calculated on 9.144m and average flanged weights of 25bar and 40bar
The above is based on standard sizes and different sizes are available on request
Special sizes are also available on request, as per customer ID request. These steel pipes are based on spiral welded pipe

robor
steel, tube and pipe
Steel Polypipe

Flow

HDPE has excellent flow characteristics as compared to traditional materials:

- Smooth interior surface offers low resistance to flow
- Excellent flow properties maintained throughout life cycle Inherent chemical and abrasion resistance of the liner material
- Smooth walls and non-wetting characteristic of polyethylene provide high flow capacity and reduced friction loss
- Lower operating costs

Major benefits experienced by users:

- The inherent strength of steel provides high pressure capability, structural integrity and resistance to mechanical damage
- Reduced pipe friction means less pumping effort, same volume
- Lower wear level means less down-time and reduced replacement costs
- Cost-effective method to refurbish existing pipelines

Another practical method of relating pipe roughness and flow in a pipe is by way of the empirical design formula developed by Hazen and Williams:

Hazen Williams co-efficient for different pipe materials

One method of expressing the roughness and flow in a pipeline is the Hazen Williams equation, i.e.

V 0,849 C x ROSS x S031

Where

C = Hazen Williams co-efficient
V = velocity of flow (m/s)
R = hydraulic radius
S = slope of hydraulic gradient

S = H/L
HL = head loss due to friction (m)
L = total length of pipeline (m)

$R = \frac{A}{P}$ = hydraulic radius (m)

A = X-sect area of flow (m2)
P = wetted perimeter (m)

It should be noted that the Hazen Williams formula is applicable on the flow of water in pipes larger than 50mm and at velocities less than 3 mis. Typical values for the Hazen Williams co-efficient for various materials are provided below:

PIPE MARETIAL	NEW	25 YEARS OLD	50 YEARS OLD	BADLY CORRODED
HDPE	150	140	140	130
Smooth Concrete & FRC	150	130	120	100
Steel	150	130	100	60
Cast Iron	130	110	90	50
Vitrified Clay	120	100	80	45

For diameters smaller than 1000mm reduce by:

$$0{,}1\left[1-\frac{\text{diam.(mm)}}{1000}\right]C$$

STEEL POLYPIPE
POLYLINED STEEL PIPE

robor

For more information:
Tel: +27 (0)11 971 1600 • Fax: +27 (0)11 971 1620 • steelpolypipe@robor.co.za • www.robor.co.za

robor

For more information:
Tel: +27 (0)11 971 1600 • Fax: +27 (0)11 971 1620 • steelpolypipe@robor.co.za • www.robor.co.za

Robor's Steel Polypipe, high density polyethylene lined steel piping, bonds the strength of steel with the chemical and abrasion-resistance of high density polyethylene.

Steel Polypipe is ideal for conveying corrosive fluids and abrasive slurries reliably and efficiently. It is best suited to applications where the service conditions cannot be adequately satisfied by traditional piping materials (steel, plastic, copper or concrete, etc.) on their own. Steel Polypipe is utilised, not only to ensure an extended life for new piping systems, but also to extend the life of old piping infrastructure.

Robor's latest developments include the butt welded stub flange which lends itself to be pre-stressed to overcome differential thermal expansion. HDPE butt welding is done in accordance with the ISO 21307-2011 procedure resulting in achieving 100 % of the strength of the parent material.

Applications

High density polyethylene (HDPE) - lined steel pipe - offers high performance and has proven itself in new and unusual applications in Europe, Britain, America and southern Africa.

Installed Applications include:

- Acid Lines
- Air Supply Lines
- Brine
- Buried Fire Mains
- CO2 Applications
- Caustic Lines
- Cooling Lines
- Crude Oil
- Effluent Lines
- Gas Gathering
- Process Water
- Refined Oil
- Sludge Lines
- Pipeline Rejuvenation
- Water Distribution
- Line Pipe
- Salt Water Injection/Disposal
- Suspended/Supported Lines

robor
steel, tube and pipe
Steel Polypipe

Steel Polypipe benefits include

- Holiday free
- Tough, ductile and durable
- Increase in energy efficiencies
- Low temperature impact toughness
- Reduced maintenance
- Structural integrity of steel pipe
- Liner lock to pipe bore
- Normal support spacing with standard hangers
- Liner material environmentally friendly (recyclable)
- Liner stiffness deters collapse away from the pipe wall
- Non toxic
- Long service life
- Liner thickness to customer spec.
- Constant wall thickness / concentric bore
- Eliminates corrosion inhibitor systems
- Abrasion resistant
- No internal general or pitting corrosion
- Higher pressure rating than freestanding plastic pipe
- Excellent solvent resistance
- Low permeation rates in gas systems
- Good shock resistance
- Suitable for conveyance of various aggressive media.

Properties of HDPE

Typical Value			
Properties	**Testing Method**	**Unit**	**HDPE**
Density	DIN 53479	g/cm^3	0,955
Melt index MFI 190/5	ISO R292	g/10 min	0,4-0,7
Tensile strength at yield point	ISO R527 Method E	MPa	22
Elongation at yield point		%	15
Ultimate tensile strength strain rate		MPa	32,0
Elongation at break		%	>800
Flexural stress at conventional Deflection (6mm)	ISO R178 DIN 53452	MPa	28
Ball indentation hardness	DIN 53456	MPa	40
Shore hardness D	DIN 53505	Mpa	60
Modules of tension (20°C)	DIN 53447/ ISO R458	MPa	240
Impact strength (notched)	DIN 53453/ ISO R179	mi/mm^2	18
Crystalline melting range	Polarization/Microscope	°C	127-131
Thermal conductivity at 20°C	Two sheet method	W/m°C	0,43
Coefficient of linear thermal expansion up to 80°C		$\frac{1}{°C}$	$2x10^{-4}$
Dielectric strength	DIN 53481 0,2mm moulded sheet	kV/cm	800
Dielectric loss factor tan 8(106 cycles)	DIN 53483		$3x10^{-4}$
Dielectric constant (2x106 cycles)	DIN 53483		2,5
Surface resistance	DIN 53482	ohms	$>10^{12}$

robor
steel, tube and pipe
Steel Polypipe

Fittings Solutions

Standard Bend Dimensions

A - 90° Bend

B - 45° Bend

C - 22° Bend

Nominal Diameter mm	Outside Diameter mm	Centre to Face			Radius
		A90°	B45°	C22°	
150	165	1151	736	570	750
200	219	1368	815	598	1000
250	273	1585	894	622	1250
300	323.9	1802	973	647	1500
350	355.6	2019	1052	671	1750
400	406.4	2236	1131	696	2000
450	457.2	2453	1210	720	2250
500	508	2670	1289	745	2500
600	609.6	3105	1447	794	3000