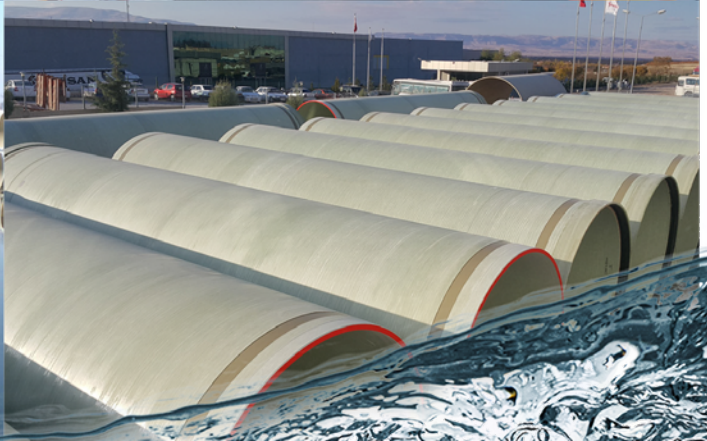
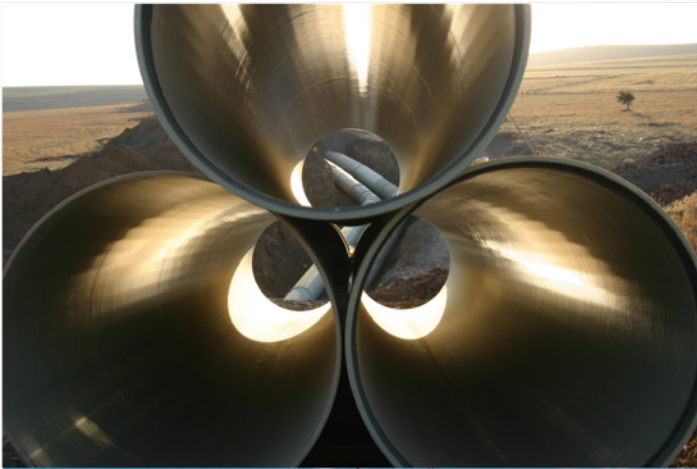




FRP PIPES & FITTINGS

PRODUCT CATALOGUE



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Company Profile

SUPERLIT, the first company of KARAMANCI HOLDING that has a prominent role in the Turkish industrial sector, was established in 1961.



SUPERLIT, which manufactures and sells pressure and non-pressure GRP (Glassfiber Reinforced Polyester) pipes in compliance with international standards, has become a favored brand on 5 continents worldwide, thanks to a wide range of products, its reliable quality and before-sales and after-sales technical / consultancy services it renders. With regards to installed capacity, SUPERLIT is one of the leading GRP pipe manufacturer in the GRP pipe sector worldwide.

The pipes, manufactured in factories located in Düzce and Malatya in Turkey, in compliance with international standards such as EN, ISO, ASTM and AWWA, with a diameter range of 2" to 156", with a stiffness of 18 – 36 – 72 psi (and over by special design), and a pressure resistance between 1 – 32 bars (up to 580 psi by special design), are used in the following applications:



Düzce Factory



Malatya Factory

- ✓ Clean water and potable water
- ✓ Irrigation
- ✓ Hydroelectric power plant
- ✓ Sewer system, stormwater
- ✓ Water treatment
- ✓ Seawater intake and discharge
- ✓ Jacking & trenchless technologies
- ✓ Water, petroleum and chemical storage tanks
- ✓ Industrial applications such as thermal&nuclear power plants, desalination plants, petrochemical plants etc.

SUPERLIT is the only GRP pipe manufacturer in Turkey that has 3 different pipe production technologies: Continuous Filament Winding, Centrifugal Casting technology, Helical Filament Winding.

Integrated Management Systems Certificates (ISO 9001, ISO 14001 & ISO 45001) have been granted by the internationally

recognized and reputable independent organizations.

Being one of the world's leading manufacturers in the pipe industry with an experience of more than half a century, SUPERLIT supplies pipes for projects in many regions of the world from Europe to Africa and from America to Asia and Australia.



GENERAL PROPERTIES OF GRP PIPES



Fields of Use

Application of SUPERLIT GRP pipes for underground and aboveground piping systems include;

- ✓ Potable water and clean water transportation lines
- ✓ Main conveyance and network lines for irrigation
- ✓ Rainwater and drainage lines
- ✓ Sewer lines
- ✓ Industrial wastewater lines
- ✓ Subsea piping, water intake, discharge lines and diffusers
- ✓ Piping of chemical plants
- ✓ Circulation lines of power plants
- ✓ Conveyance and penstock pipelines of hydroelectric power plants
- ✓ Jacking pipe and relining pipelines
- ✓ Water, petroleum and chemical storage tanks





Standards:

- ✓ ASTM D 3262 (wastewater)
- ✓ ASTM D 3754 (wastewater)
- ✓ ASTM D 3517 (water supply)
- ✓ ASTM D 3839 (installation)
- ✓ AWWA C 950 (water supply)
- ✓ AWWA M 45 (design and application)
- ✓ ISO 23856 (water supply&waste water)
- ✓ ISO 25780 (jacking)
- ✓ EN 1796 (water supply)
- ✓ EN 14364 (wastewater)
- ✓ ISO 10465 (installation)
- ✓ ISO 10639 (clean water)
- ✓ ISO 10467 (wastewater)
- ✓ AS 3571.1 (wastewater)
- ✓ AS 3571.2 (water supply)
- ✓ AS/NZS 2566.2 (installation)

Fittings:

- ✓ Elbows
- ✓ Flanges
- ✓ Reducers
- ✓ Tee pieces
- ✓ Manholes
- ✓ Special design pieces
- ✓ Grp saddles
- ✓ WYE pieces

Diameters:

Products are available in the range of 2" to 156".

Pipe Length:

Although standard lengths are 20' and 40', SUPERLIT GRP pipes can be manufactured with the lengths required, only limited by transportation capabilities.

Physical Properties:

GRP pipe is a flexible composite material consisting of reinforced glass fiber, thermosetting resin and silica sand. It is manufactured and installed in compliance with the following local and international standards.

Benefits of GRP Pipes

1 Long Service Life:

Pipes are designed in compliance with the international standards to serve a minimum of 50 years. Operating and maintenance costs are negligibly small.

2 Perfect and smooth inner surface:

The smooth inner surface of SUPERLIT GRP pipes reduces hydraulic losses. Thanks to its smooth inner surface, friction loss is at a minimum, and it keeps this characteristic throughout its entire service life.

3 Safe connections:

SUPERLIT GRP pipe joints are designed with the flexible connection method, and the sealing is provided by couplings having full-face integrated elastomeric seal.

4 Lightweight:

- It has approximately 1/4 the weight of steel pipes, approximately 1/5 of ductile pipes, and approximately 1/10 of concrete pipes.

- GRP pipes with varying diameters can be nested together and thus, more pipes can be transported using less vehicles. This means the cost of transportation can be lowered.
- Installation is fast and easy.
- Requires no special equipment for handling and mounting. Being lightweight means easy installation, even for longer pipe lengths.

5 Resistance against corrosion and chemicals:

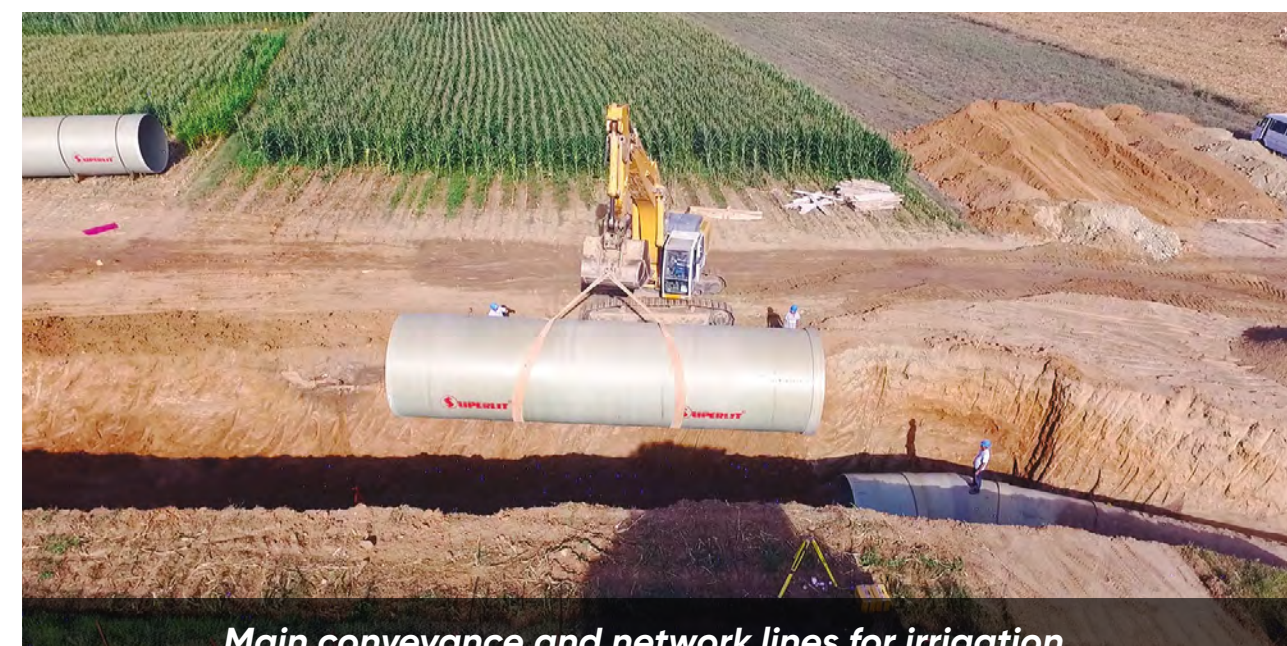
- It does not corrode since it is not manufactured with metallic materials.
- As a standard, it is designed to serve in a wide pH range.
- It has insulation properties and is not influenced by electric current.
- It does not require cathodic protection.
- It does not require inner and outer coating.

6 Surge pressure absorption

Additional pressure increases occurring due to surges are far less when compared with metal pipes. They are designed to absorb 40% of the surge pressure, without increasing the pressure class.



PROJECTS/ APPLICATIONS



Main conveyance and network lines for irrigation

Aydın Koçarlı-Irrigation of Bağarası
116 in - 132 in

TURKEY

1



Mestia HPP

Hydroelectric Power Plant
93 in / 100-150-250 psi

GEORGIA

2



Clean water and potable water transportation lines

Moerdijk - Nieuwe Keerleus Limmel
66 in

3

NETHERLANDS



Subsea piping, water intake, discharge lines and diffusers

CENAL - Thermal Power Plant of Çanakkale Karabiga
12 in - 156 in

5

TURKEY



Rainwater, drainage and sewer lines

İstanbul Water and Sewerage Administration 5th Section, Construction of
Wastewater Channel, Rain Water Channel and Stream Improvement
46 in - 108 in

4

TURKEY

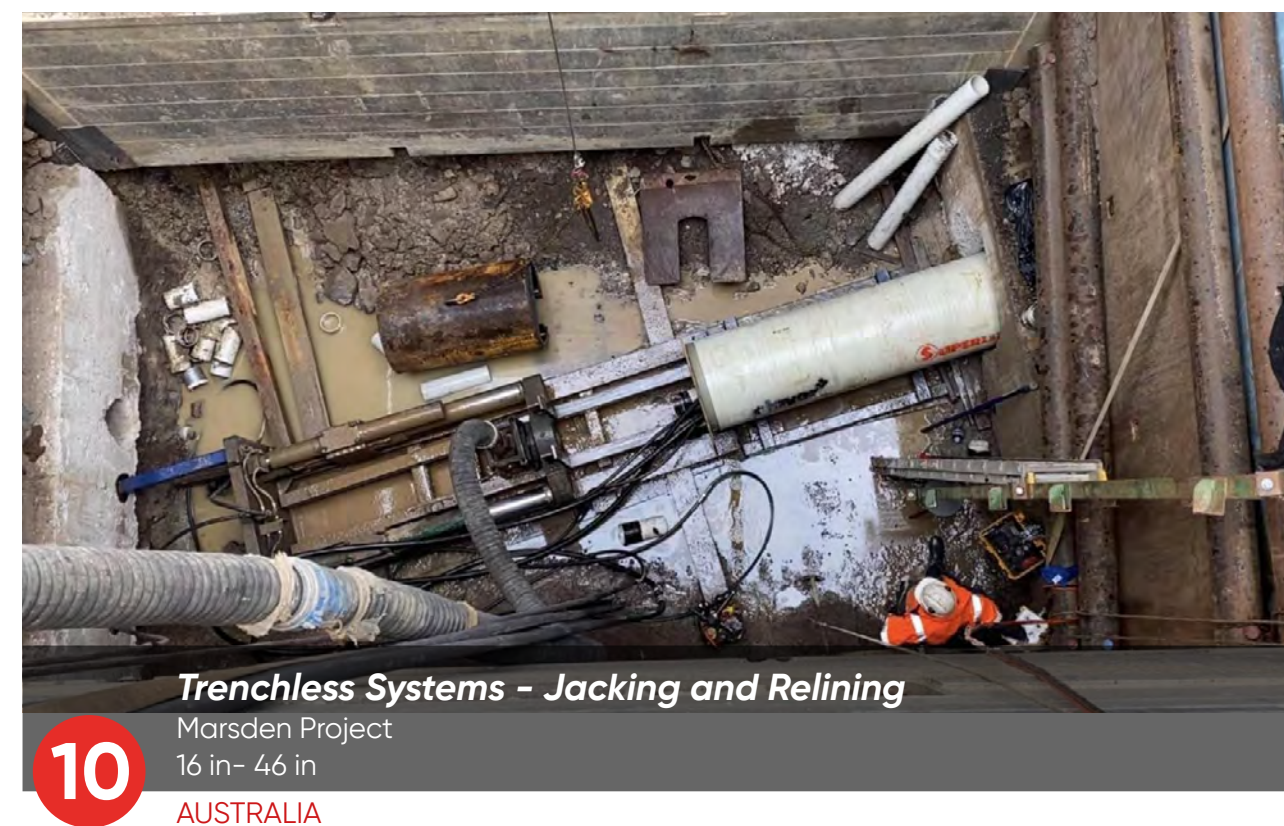
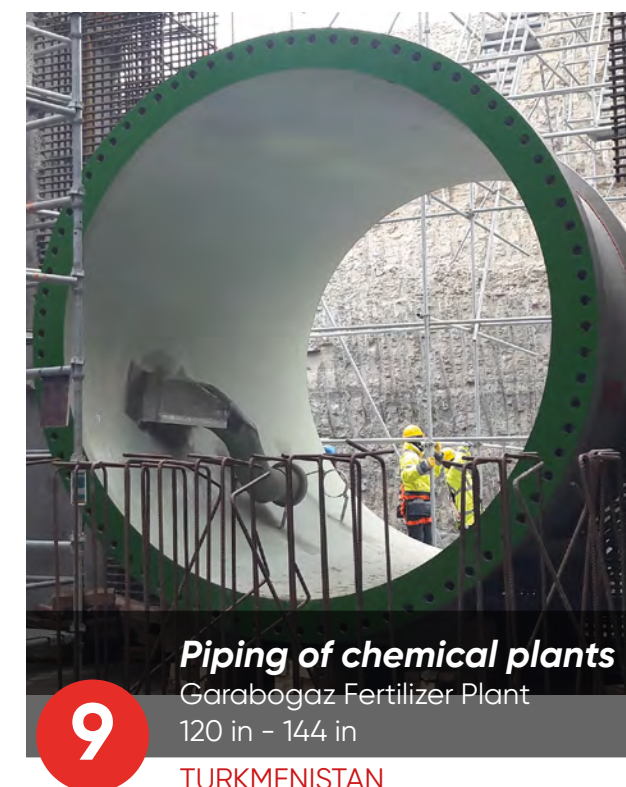
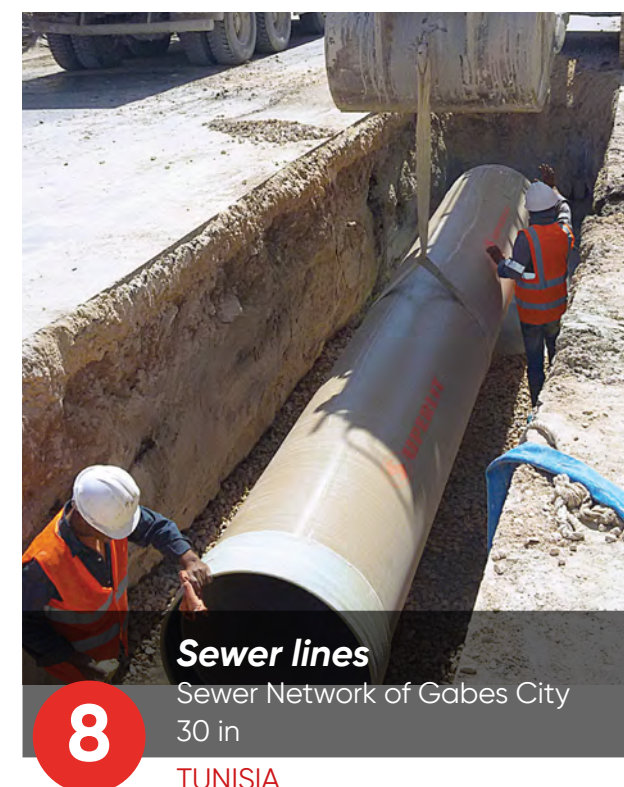


Main conveyance and network lines for irrigation

Siphon Application of Darende Gökpınar Irrigation
18 in - 50 in

6

TURKEY





DESIGN CONSIDERATIONS

Flow Rate

Recommended flow rate for the standard GRP pipe is 13,1 ft/sec maximum. Pipes allowing a higher flow rate can be manufactured by special design.

Flow Coefficient

Ratings to be used in hydraulic calculations for SUPERLIT GRP pipes:

- ✓ Hazen-William flow coefficient: C=150
- ✓ Manning coefficient: n=0,009
- ✓ Colebrook-White coefficient

$k=9,5 \times 10^{-5}$ ft for the pipes manufactured by the continuous filament winding method

$k=3,9 \times 10^{-5}$ ft for the pipes manufactured by the centrifugal casting method

UV Resistance

UV resistant topcoat can be applied to the outer surface of pipes in order to increase resistance to UV effects depending on the project requirements.

Poisson's Ratio

Poisson ratio that can be used in standard engineering calculations for GRP pipes is between 0.22 - 0.29. Higher temperature range can be redesigned specifically in accordance with the request.

Temperature

Service temperature of standard GRP pipes is between -40°F and $+95^{\circ}\text{F}$. For special solutions where the service temperature is above $+95^{\circ}\text{F}$, please consult Superlit.

Thermal Coefficient

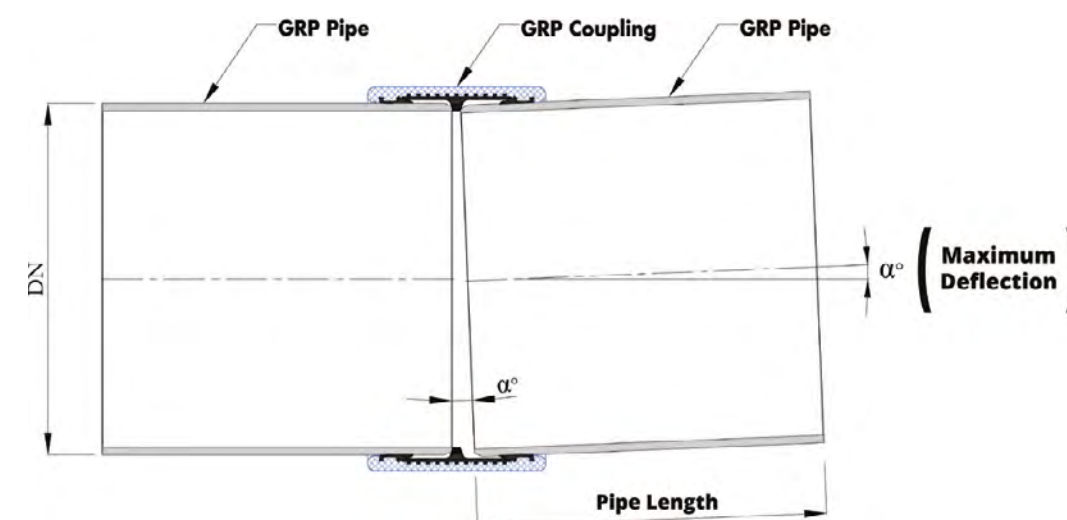
Thermal expansion and contraction coefficient of SUPERLIT GRP pipes in axial direction:

Between $(13-17) \times 10^{-6}$ in/in/ $^{\circ}\text{F}$

Angular Deflection on Couplings

Couplings are designed to meet the performance criteria (angular deflection, pressure, external load, and vacuum) of EN 1119, ISO 8639 AND ASTM 4161. Angular deflection ratings allowed by the standards are presented in the table below.

Pipe Diameter (in)	Maximum Angular Deflection Applicable on Coupling (Degrees)
12 - 20 in	3,0°
24 - 35 in	2,0°
39 - 70 in	1,0°
74 - 156 in	0,5°





GRP Pipe Diameters

SUPERLIT GRP pipes and joints are manufactured with the standard sizes below. Intermediate diameter manufacturing is possible on request.

Pipe Nominal Diameter (mm)	Pipe Nominal Diameter (in)	Pipe Nominal External Diameter (mm)	Pipe Nominal External (in)
300	12	324	12,8
350	14	376,4	14,8
400	16	427,3	16,8
450	18	475,8	18,7
500	20	530,3	20,9
600	24	633	24,9
700	27	718,5	28,3
800	30	820,5	32,3
900	35	924	36,4
1000	39	1025,5	40,4
1100	42	1125,5	44,3
1200	46	1228,5	48,4
1300	50	1331,5	52,4
1400	54	1433,5	56,4
1500	58	1536,5	60,5
1600	62	1638,5	64,5
1700	66	1739,5	68,5
1800	70	1841,5	72,5
1900	74	1944,5	76,6
2000	78	2046	80,6
2100	82	2148,5	84,6
2200	85	2250,5	88,6
2300	90	2354	92,7
2400	93	2454	96,6
2500	96	2553,5	100,5
2600	100	2657,5	104,6
2700	104	2758,5	108,6
2800	108	2858,5	112,5
2900	112	2962,5	116,6
3000	116	3065	120,7
3100	120	3166,5	124,7
3200	124	3269	128,7
3300	128	3370,5	132,7
3400	132	3473	136,7
3500	136	3574,5	140,7
3600	140	3676,5	144,7
3700	144	3778,5	148,8
3800	147	3880,5	152,8
3900	151	3982,5	156,8
4000	156	4085	160,8

*** Superlit produces FRP pipes according to (OD) series (OD fixed)
Pipe OD - US unit is obtained by dividing millimeters by 25.4
Pipe Nominal ID -US unit is the closest customery equivalent of metric units.
Actual ID of FRP pipe depends on SN and PN ratings for each pipe diameter



MANUFACTURING
PROCESS

CONTINUOUS
FILAMENT WINDING

Continuous Filament Winding (CFW)

Process:

The Continuous Filament Winding Process is the manufacturing of GRP pipes from continuously flowing glass fiber by winding it on an automatic machine.

The inner and outer walls of the pipe are constructed by pressing glass fiber and resin together, and filling material(sand) is then added.

As a result of reinforcing a high ratio of polyester by glass fiber, the inner and outer surfaces of the pipe become extremely robust against chemicals.

Since the mid-section of the pipe is highly durable, the required stiffness is obtained and the resistance against working pressures is obtained throughout the length of the pipe.

Material:

Standard SUPERLIT GRP pipes are manufactured using orthophthalic or terephthalic unsaturated polyester resin. In the case of special design requirements to meet specific conditions of the project, it is possible to manufacture using isophthalic and vinyl ester resin too.

Manufacturing:

The main machine in the Continuous Filament Winding manufacturing process comprises of a continuous steel band supported by beams that form a cylindrical mandrel.

By the motion of the mandrel under the control of the Programme Logic Controller (PLC) and the computers (PC), the glass fiber, the resin, the filling material and the surface materials are applied by precision measurements. The PLC-PC modules provide an integrated process control in line with the pre-programmed

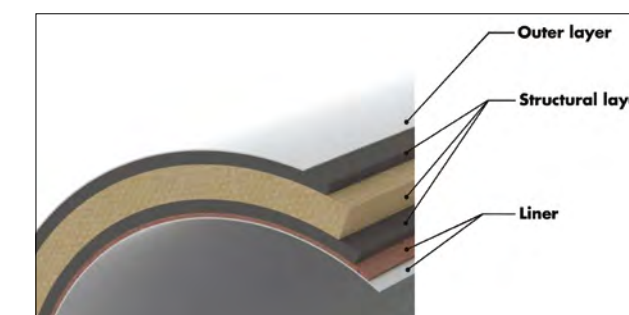
designs. Basic data, such as diameter, stiffness and pressure class are entered into the program. The PC calculates all the setting values of the machine. The process parameters and the thickness of the pipe are continuously monitored and traceability is provided by storing these data.

Curing of the laminate develops depending on the heat. Direct heating of the laminate ensured by heating elements. Laminate temperature is measured on the cure region from various points. Temperature distribution is monitored on the PC monitor graphically.

Extraction of resin is administrated from two different lines. Special resin for the inner layer of the pipe can be used for highly corrosive applications, while a normal resin for the body and outer layer can be utilized.

A cutting unit compatible with the pipe, which has an axial and radial stroke, enables the pipe to be cut smoothly and perpendicularly. Cutting operations take place automatically by entering the length of the pipe into the control system.

Pipes that have been cut are transferred to specifically designed lifting stands, then to the chamfering and calibration section, and from there to hydrostatic test section.



Centrifugal Casting(CC)

By using the latest computer technology involved in GRP pipe manufacturing with SUPERLIT Centrifugal Casting, raw material distribution and raw material consumption are kept under control. Following the entry of the class and diameter of the pipe to be manufactured into the computer, all manufacturing steps are controlled by the computer until the pipe comes out of the mold.

Manufacturing:

In SUPERLIT GRP pipes manufactured by the Centrifugal Casting method, glass fiber, polyester resin, and silica sand are used.

SUPERLIT GRP pipes, in this completely automatic and electronically controlled process, are manufactured by feeding the raw materials into the rotating mold, beginning from the outer surface of the pipe until reaching a predefined wall thickness.

A feeder leaves the amount of material, which is predefined in the system, within the mold. The resin that is formulated in a way that it is not polymerized during the whole process of loading, and fibers that are cut with a length in compliance with the design are molded from the head at the end of the feeder.

Distribution and organization of the fibers within layers are fabricated to counterbalance the resistance of the pipe in the designed circumferential and axial directions.

When the feeding of all the raw materials is completed, the cast rotation speed is increased in order to increase the compressive strength. By increasing the rotation speed of the mold, a full-compression and transition to a solid material(curing) are ensured.

By the reciprocating motion of the feeder within the mold, the wall thickness of the pipe is manufactured layer by layer. Glass fibers, which are reinforcing materials, are placed on both sides of the neutral axis on the pipe wall, and the gap remaining in between is filled by silica sand, resin, and glass fiber.

The mechanical properties of SUPERLIT GRP pipes are calibrated by changing the amounts, ratios, and direction of the material within the layers of the pipe. Thus, the flexibility of the design of the pipes enabled in a wide range of pressures, from non-pressure pipes to pressure pipes.

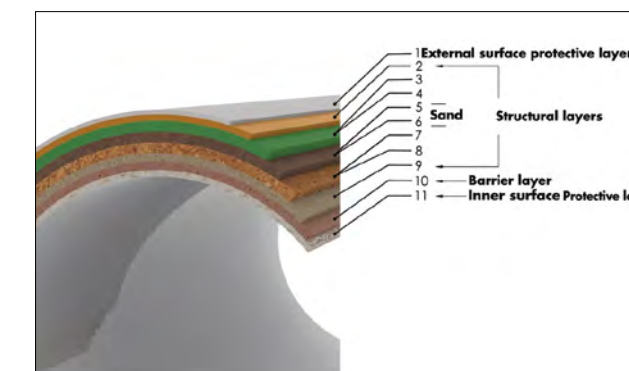
Design of Wall Thickness:

The layers of the pipes are polymerized in the form of 'solid blocks'. Glass fiber distribution in the manufacturing process is kept completely under control, in line with the requirements of the circumferential and axial strength, by the use of varying cutters and mold speeds.

Each layer, forming the wall of the pipe, has a specific function. When the interior of the pipe is examined, a flexible resin layer, having no glass fiber on the inner surface can be seen. The thickness of this layer, which is composed of a pure distinctive resin, is minimum 0,04", and gives the pipe its hydraulic properties and a high abrasion resistance.

A barrier layer exists behind the liner layer. The liner and barrier layers, together, function to prevent the penetration of foreign substances into the structural layers of the pipe.

Behind the barrier layer is the structural layer, which differs in design according to the pressure and stiffness class of the pipe. On the external surface of the pipe there is the outer layer, which protects the pipe from impacts and scratches during the loading processes. This layer, additionally, protects the pipe against UV radiation penetration.



MANUFACTURING
PROCESS

CENTRIFUGAL
CASTING





MANUFACTURING PROCESS

HELICAL FILAMENT WINDING

Helical Filament Winding(HFW)

SUPERLIT Helical Filament Wound glass-reinforced thermosetting resin pipe offers superior corrosion resistance and a combination of high mechanical and physical properties which have been proved in most severe operating conditions all over the world.

Production Method

Pipes are manufactured using the discontinuous filament winding process on computer-controlled machines by adjusting the relative speed of mandrel rotation with the controlled winding of the impregnated fibers on desire pattern, angle, and thicknesses over a rotating mold synchronous with glass distribution head movement.

The inside diameter of the finished pipe is defined by mandrel outside diameter and designed wall thickness is achieved by repeated winding passes and the outside diameter of the pipe is determined by the wall thickness. Following the completion of the curing, mold is separated from the cured pipe by using extraction equipment.

Field of Applications

Fields covered by SUPERLIT Helical Filament Winding GRP products are the following :

- ✓ Water distribution (civil and industrial) for pressure and gravity lines
- ✓ Sewer systems (urban and industrial)
- ✓ Irrigation networks
- ✓ Process lines for industrial plants
- ✓ Above ground fluid transmission lines
- ✓ Wastewater treatment plants
- ✓ Sub-sea pipelines
- ✓ Trenchless micro-tunneling jacking application



Raw Materials

- ✓ Resins : Ortophtalic , Teraphtalic , Isophtalic, Vinylester
- ✓ Glass Fiber Reinforcement: E-Glass or ECR

Nominal Stiffness Class

The standard SN class of the pipes are 72 psi. Higher stiffness classes are available up to 7200 psi for jacking applications or special project design conditions.

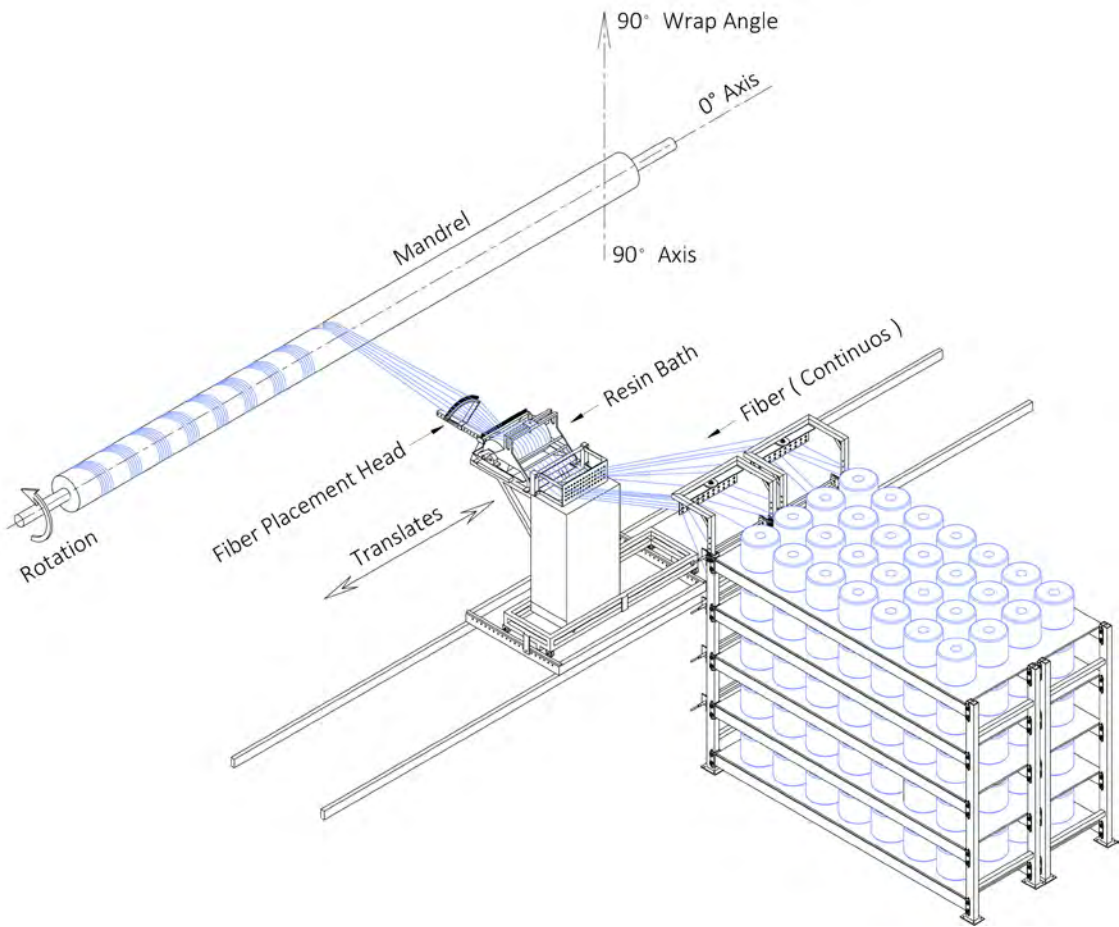
Jointing Type

There are two types of jointing is available for pipe jointing systems. Available type and jointing system details are given in the table:

- ✓ Restrained Rigid Type:
Butt-Wrap Lamination or Locked Type
- ✓ Un-restrained Flexible Type :
Full Face Coupling

Standard Certification

SUPERLIT Helical Filament Winding products are certified according to ASTM 3517 and ASTM 3754 standards.



Helical Winding Pipe Dimensional Parameters					
Pipe Specification					Joint Details
Nominal Diameter (inch)	Pressure Class (Psi)	Stiffness Class (Psi)	Internal Diameter (inch)	Outside Diameter (inch)	Jointing
2	87	72	2	2,3	Butt-wrap Lamination
	145		2	2,3	
	232		2	2,3	
	290		2	2,3	
	362,5		2	2,4	
	464	72	2	2,4	Butt-wrap Lamination
	87		3	3,5	
	145		3	3,5	
	232		3	3,5	
	290		3	3,5	
3	362,5		3	3,5	Butt-wrap Lamination
	464		3	3,6	
	87	72	4	4,2	Butt-wrap Lamination or REKA Couling
	145		4	4,2	
	232		4	4,2	
	290		4	4,3	
	362,5		4	4,3	
4	464		4	4,4	Butt-wrap Lamination or Full-Face Couling
	87	72	6	6,2	
	145		6	6,2	
	232		6	6,2	
	290		6	6,3	
6	362,5		6	6,3	Full-Face Coupling
	464		6	6,3	
	87	72	8	8,3	
	145		8	8,3	
	232		8	8,3	
8	290		8	8,3	Full-Face Coupling
	362,5		8	8,3	
	464		8	8,5	
	87	72	10	10,3	Full-Face Coupling
	145		10	10,3	
	232		10	10,3	
10	290		10	10,4	Full-Face Coupling
	362,5		10	10,4	
	464		10	10,4	
	87	72	12	12,4	Full-Face Coupling
	145		12	12,4	
	232		12	12,4	
12	290		12	12,4	Full-Face Coupling
	362,5		12	12,4	
	464		12	12,5	
	87	72	14	14,4	Full-Face Coupling
	145		14	14,4	
	232		14	14,4	
14	290		14	14,4	Full-Face Coupling
	362,5		14	14,4	
	464		14	14,4	
	87	72	16	16,4	Full-Face Coupling
	145		16	16,4	
	232		16	16,4	
16	290		16	16,4	Full-Face Coupling
	362,5		16	16,4	
	464		16	16,4	





CLASSIFICATION OF PRODUCTS



Pressure Classes

Pressure classifications(PN) are established in the ISO standards by considering the pressure unit to be applied as bar.

Classifications of Nominal Pressures

PN 1, 4, 6, 10, 12, 16, 25, and 32 are nominal pressure classifications. Pressure classification PN 1 is for non pressure (gravity) pipes.

GRP nominal pressures are classified in AWWA C950 as follows.

Psi: 50, 100, 150, 200, 250, 300, 350,400,450

SUPERLIT GRP pipes are manufactured according to following pressure classifications.

Pressure Classes (PN)	Pressure (BAR)	Pressure (Psi)	Pressure (MPa)	Pressure (atm)	Pressure (kPa)
1	1	14,5	0,1	1	100
6	6	87	0,6	6	600
10	10	145	1	10	1000
16	16	232	1,6	16	1600
25	25	362,5	2,5	25	2500
32	32	464	3,2	32	3200

Stiffness Classes

SUPERLIT GRP pipes are manufactured according to following stiffness classifications. It is possible to manufacture with intermediate values or stiffness value of greater than 72 psi.

ISO		ASTM	
Stifness (SN)	N/M ² (Pa)	AWWA C950 (Psi)	AWWA C950 (kPa)
2500	2500	18	124
5000	5000	36	248
6500	6500	46	322,4
10000	10000	72	496





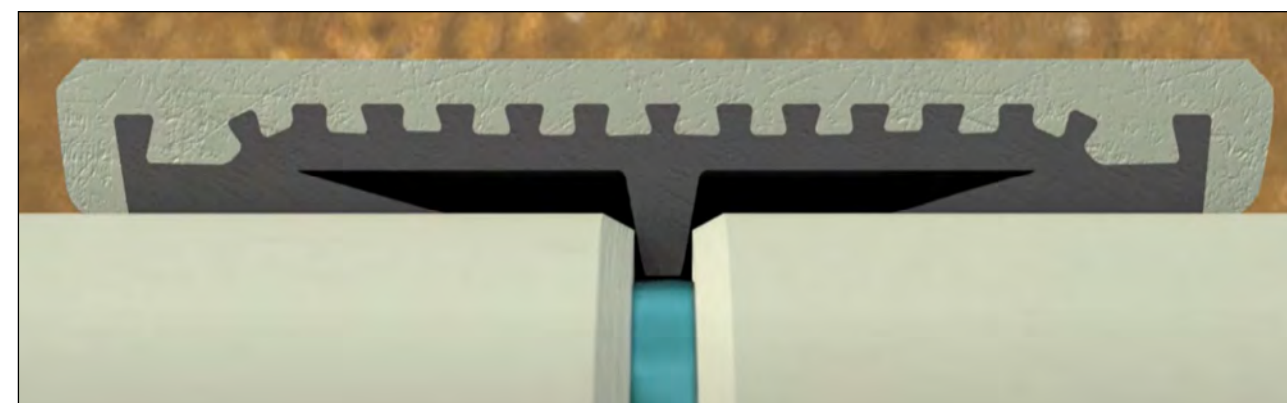
SUPERLIT INTEGRATED
GRP COUPLINGS

GRP Full-Face® Coupling



The inner surfaces of the SUPERLIT Full-Face® GRP Couplings are coated completely by EPDM sealing, which maintains a safer joining tightness when compared with similar systems and ensures water-tightness under high pressure.

Since the seal is integrated into the coupling, it does not dislocate and does not require to be installed on the worksite.



Whether they are produced by the continuous filament winding method or centrifugal casting, the pipes with identical nominal diameter have identical outer diameter. Therefore, regardless of the manufacturing method, the same SUPERLIT GRP couplings can be used on pipes with the same nominal diameters.

Nominal Diameter (in)	Coupling Width (in)	Coupling External Diameter de (inch)					
		14,5 -145 psi	174 psi	232 psi	290 psi	362,5 psi	464 psi
12	8,7	14,2	14,4	14,6	14,8	15,0	15,2
14	8,7	16,1	16,3	16,5	16,7	16,9	17,1
16	9,5	18,1	18,3	18,5	18,7	18,9	19,1
18	9,5	20,1	20,3	20,5	20,7	20,9	21,1
20	9,5	22,2	22,4	22,6	22,8	23,0	23,2
24	9,5	26,4	26,6	26,8	27,0	27,2	27,4
27	10,2	29,9	30,1	30,3	30,5	30,7	30,9
30	10,2	33,9	34,1	34,3	34,4	34,6	34,8
35	10,2	38,0	38,2	38,4	38,6	38,8	39,0
39	10,2	42,1	42,3	42,5	42,7	42,9	43,1
42	10,2	46,1	46,3	46,5	46,7	46,9	47,0
46	10,2	50,2	50,4	50,6	50,8	51,0	51,2
50	10,2	54,1	54,3	54,5	54,7	54,9	55,1
54	10,8	58,3	58,5	58,7	58,9	59,1	59,3
58	10,8	62,4	62,6	62,8	63,0	63,2	63,4
62	10,8	66,5	66,7	66,9	67,1	67,3	67,5
66	10,8	70,5	70,7	70,9	71,1	71,3	-
70	10,8	74,6	74,8	75,0	75,2	-	-
74	10,8	78,5	78,7	78,9	-	-	-
78	10,8	82,7	82,9	83,1	-	-	-
82	10,8	86,6	86,8	87,0	-	-	-
85	10,8	90,7	90,9	91,1	-	-	-
90	10,8	94,7	94,9	95,1	-	-	-
93	10,8	98,8	99,0	99,2	-	-	-
96	13,0	102,6	102,8	103,0	-	-	-
100	13,0	106,7	106,9	107,1	-	-	-
104	13,0	110,8	111,0	111,2	-	-	-
108	13,0	114,8	115,0	115,2	-	-	-
112	13,0	118,9	119,1	119,3	-	-	-
116	13,0	123,0	123,2	123,4	-	-	-
120	13,0	127,2	127,4	127,6	-	-	-
124	13,0	131,1	131,3	131,5	-	-	-
128	13,0	135,2	-	-	-	-	-
132	13,0	139,4	-	-	-	-	-
136	13,0	143,5	-	-	-	-	-
140	13,0	147,4	-	-	-	-	-
144	13,0	151,6	-	-	-	-	-
147	13,0	155,7	-	-	-	-	-
151	13,0	159,8	-	-	-	-	-
156	13,0	163,8	-	-	-	-	-

* Values above are for general information purposes. For the most current information, please visit the www.superlit.com

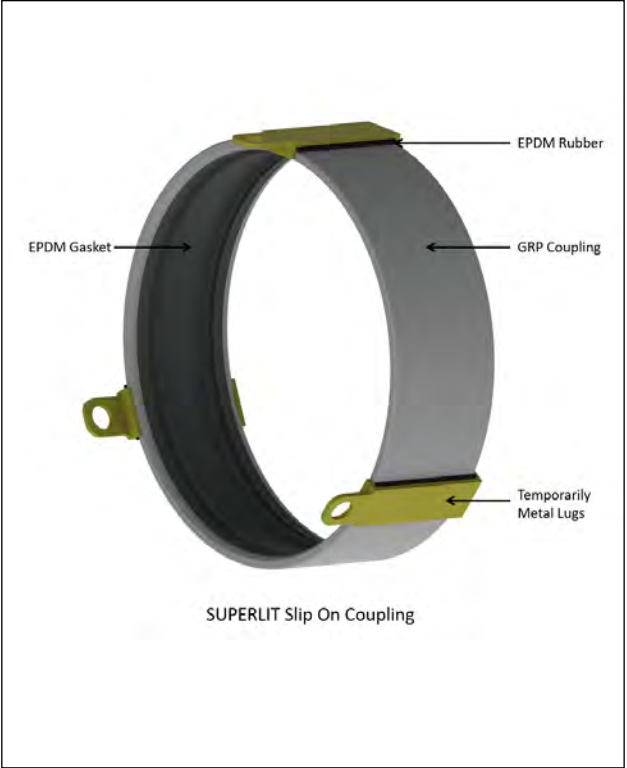
GRP Slip on Coupling



SUPERLIT Full-Face® GRP Slip-On Coupling developed product as a result of Superlit R&D studies.

New designed gasket profile allows sliding of the coupling on both direction over pipe surface, provides a technical solution to the repair of damaged pipe line section and tie-in problems of pipelines with corrosion free GRP composite structure. Full-Face® GRP Slip-On Couplings are completely covered from inside with EPDM integrated gasket profile bonded in factory condition.

Thanks to new designed rubber profile which allows new "Slip-On GRP Coupling" to slip over along with it's complete width on pipe spigot while complying all required performance criterias (angular deflection, pressure, external load and vacuum) as per related international standards.



GRP Jacking Coupling

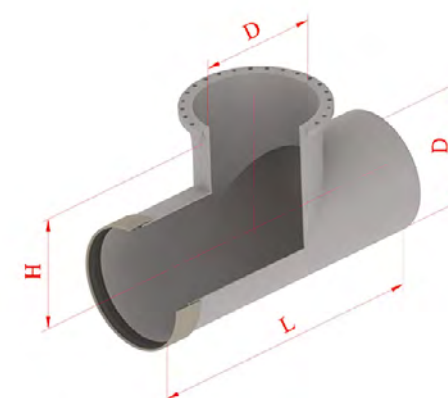
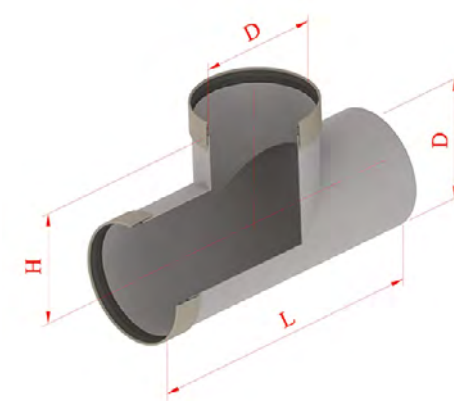
New developed GRP jacking coupling is taking place as an alternative to steel joints which are used in trenchless applications. It provides unique solutions to corrosion issue of aggressive soil environment where metal couplings have limit of service life under corrosion attack.

New composite jacking coupling has minimum 50 years of service life in similar and even higher conditions. Special designed full face rubber profile ensures leak tightness by help of its GRP structure of body and fully comply with the performance requirements of ISO 25780 standard.

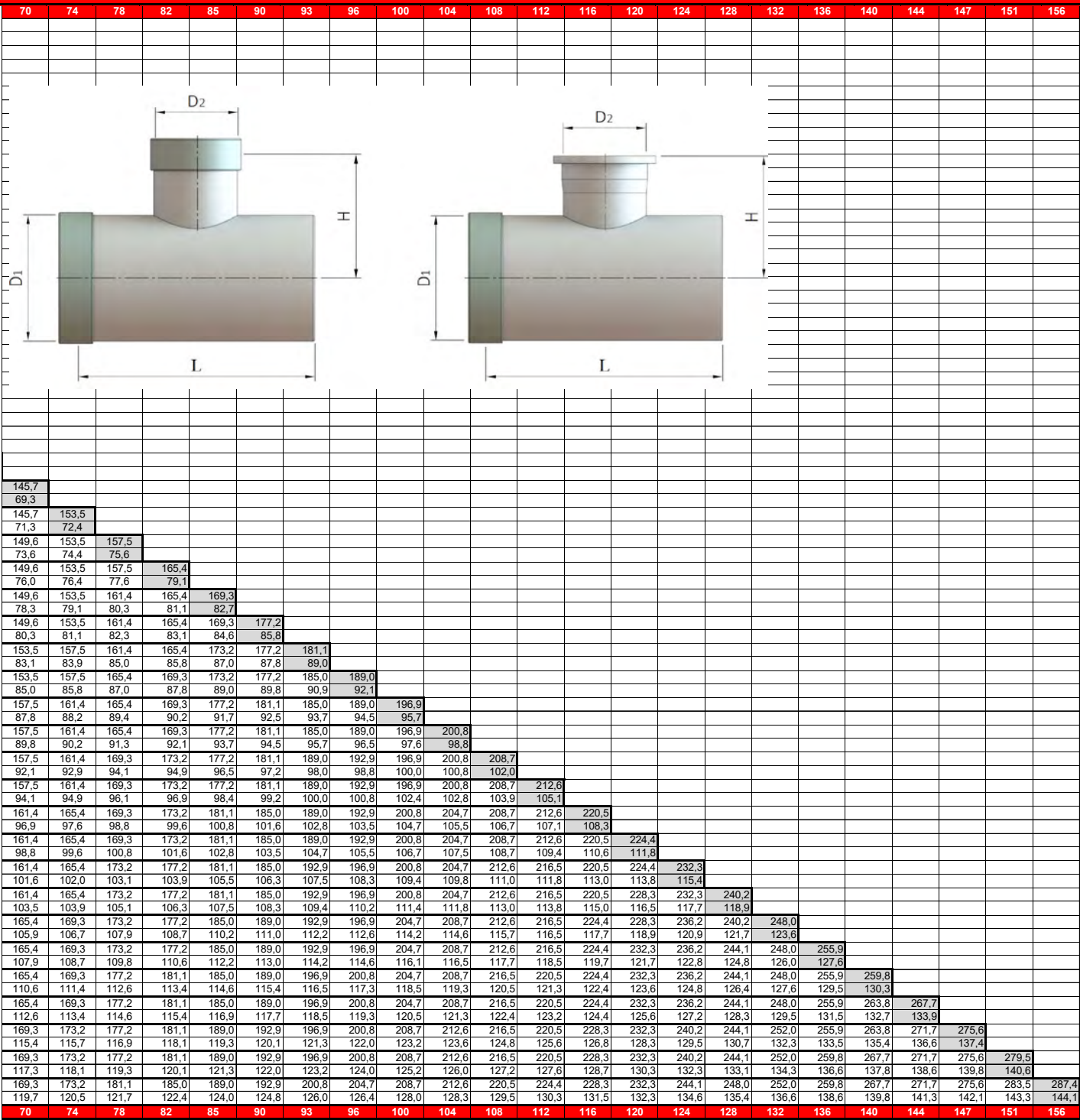




Tee Pieces

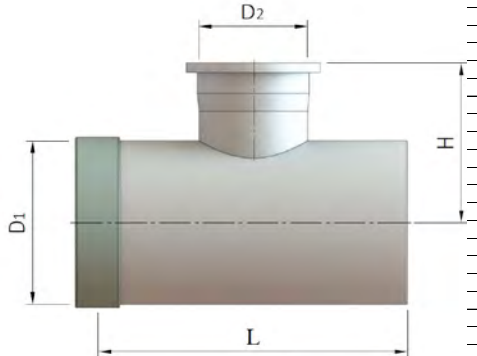


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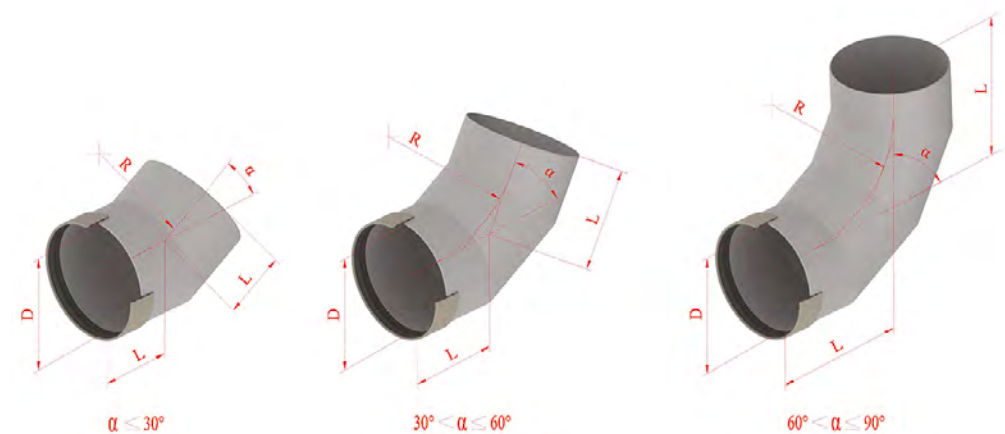


145 PSI																						
D1/D2		2	4	6	8	10	12	14	16	18	20	24	27	30	35	39	42	46	50	54	58	62
12	L (in)	23.6	27.6	31.5	35.4	35.4	39.4															
	H (in)	14.6	15.0	15.0	15.4	15.4	16.1															
14	L (in)	23.6	27.6	31.5	35.4	35.4	39.4	47.2														
	H (in)	15.7	15.7	15.7	16.5	16.5	16.9	18.1														
16	L (in)	23.6	27.6	31.5	35.4	35.4	39.4	47.2	51.2													
	H (in)	16.9	17.3	17.3	17.3	17.3	18.1	19.3	20.5													
18	L (in)	23.6	27.6	31.5	35.4	35.4	39.4	47.2	51.2	55.1												
	H (in)	18.1	18.1	18.1	18.5	18.5	18.9	20.1	21.7	22.8												
20	L (in)	23.6	27.6	31.5	35.4	39.4	39.4	47.2	51.2	55.1	59.1											
	H (in)	19.3	19.3	19.3	19.7	20.1	20.1	21.3	22.8	24.0	24.4											
24	L (in)	23.6	27.6	31.5	35.4	39.4	39.4	47.2	51.2	55.1	59.1	66.9										
	H (in)	21.3	21.3	21.3	21.7	22.0	22.0	23.2	24.8	26.0	26.4	27.6										
27	L (in)	23.6	27.6	31.5	35.4	39.4	43.3	51.2	55.1	59.1	63.0	70.9	74.8									
	H (in)	22.8	22.8	22.8	23.6	24.4	24.4	25.6	27.2	28.0	28.7	29.5	30.7									
30	L (in)	27.6	31.5	31.5	35.4	43.3	47.2	51.2	59.1	63.0	66.9	70.9	74.8	82.7								
	H (in)	25.2	25.2	25.2	25.6	26.4	27.6	28.3	29.5	30.7	31.5	32.3	33.5	34.6								
35	L (in)	27.6	31.5	35.4	39.4	43.3	51.2	55.1	59.1	63.0	66.9	74.8	78.7	82.7	86.6							
	H (in)	27.2	27.2	27.2	28.0	28.3	30.3	30.7	32.3	33.5	33.9	35.0	35.8	37.0	37.8							
39	L (in)	27.6	31.5	35.4	39.4	43.3	51.2	55.1	63.0	66.9	70.9	74.8	78.7	86.6	90.6	94.5						
	H (in)	29.1	29.1	29.5	30.3	30.7	32.7	33.5	34.6	35.8	36.6	37.4	38.6	39.8	40.2	41.3						
42	L (in)	27.6	31.5	35.4	39.4	43.3	55.1	59.1	63.0	66.9	70.9	78.7	82.7	86.6	90.6	98.4	102.4					
	H (in)	31.1	31.1	31.5	32.3	33.1	35.4	35.8	37.4	38.6	39.4	40.2	40.9	42.1	42.9	44.1	44.9					
46	L (in)	27.6	31.5	35.4	39.4	43.3	55.1	59.1	66.9	70.9	74.8	78.7	82.7	86.6	94.5	98.4	102.4	110.2				
	H (in)	33.1	33.1	33.9	34.6	35.0	37.8	38.6	40.2	40.9	41.7	42.5	43.7	44.9	45.7	46.5	47.6	48.8				
50	L (in)	27.6	31.5	35.4	39.4	43.3	59.1	63.0	66.9	70.9	74.8	82.7	86.6	90.6	94.5	102.4	106.3	110.2	114.2			
	H (in)	35.4	35.0	35.8	36.6	37.4	40.6	41.3	42.5	43.7	44.5	45.3	46.5	47.6	48.0	49.2	50.4	51.6	52.0			
54	L (in)	27.6	31.5	39.4	43.3	47.2	59.1	63.0	66.9	70.9	74.8	82.7	86.6	90.6	94.5	102.4	106.3	110.2	114.2	122.0		
	H (in)	37.8	37.8	38.6	39.4	40.2	42.9	43.7	44.5	45.7	46.5	47.2	48.4	49.6	50.0	51.2	52.4	53.5	53.9	55.5		
58	L (in)	27.6	35.4	39.4	43.3	47.2	59.1	63.0	70.9	74.8	78.7	82.7	86.6	94.5	98.4	102.4	106.3	114.2	118.1	122.0	129.9	
	H (in)	39.8	39.8	40.9	41.7	42.1	45.7	46.1	47.2	48.4	49.2	50.0	50.8	52.0	52.8	53.9	55.1	56.3	56.7	57.9	59.1	
62	L (in)	27.6	35.4	39.4	43.3	47.2	63.0	66.9	70.9	74.8	78.7	86.6	90.6	94.5	98.4	106.3	110.2	114.2	118.1	126.0	129.9	133.9
	H (in)	41.7	42.1	42.9	43.7	44.5	48.0	48.8	50.0	50.8	51.6	52.4	53.5	54.7	55.1	56.3	57.5	58.7	59.1	60.6	61.0	62.2
66	L (in)	27.6	35.4	39.4	43.3	47.2	63.0	66.9	70.9	74.8	78.7	86.6	90.6	94.5	98.4	106.3	110.2	114.2	118.1	126.0	129.9	133.9
	H (in)	43.7	44.1	45.3	46.1	46.5	50.0	50.8	52.0	52.8	53.5	54.3	55.5	56.7	57.5	58.7	59.4	60.6	61.0	62.6	63.0	64.2
70	L (in)	27.6	35.4	39.4	43.3	47.2	63.0	66.9	74.8	78.7	82.7	86.6	90.6	98.4	102.4	106.3	110.2	118.1	122.0	126.0	129.9	137.8
	H (in)	45.7	46.1	47.6	48.4	48.8	52.8	53.5	54.3	55.5	56.3	57.1	58.3	59.4	59.8	61.0	62.2	63.4	63.8	65.4	65.4	66.9
74	L (in)	27.6	35.4	43.3	47.2	51.2	63.0	66.9	74.8	78.7	82.7	86.6	90.6	98.4	102.4	106.3	110.2	118.1	122.0	126.0	129.9	137.8
	H (in)	47.6	48.4	49.6	50.4	51.2	54.7	55.5	56.3	57.5	58.3	59.1	60.2	61.4	61.8	63.0	64.2	65.4	65.7	67.3	67.7	68.9
78	L (in)	27.6	35.4	43.3	47.2	51.2	66.9	70.9	74.8	78.7	82.7	86.6	90.6	94.5	98.4	102.4	110.2	114.2	118.1	122.0	129.9	137.8
	H (in)	49.6	50.4	52.0	52.8	53.1	57.5	57.9	59.1	60.2	61.0	61.8	62.6	63.8	64.6	65.7	66.9	68.1	68.5	69.7	70.1	71.7
82	L (in)	31.5	35.4	43.3	47.2	51.2	66.9	70.9	74.8	78.7	82.7	86.6	90.6	94.5	98.4	102.4	110.2	114.2	118.1	122.0	129.9	137.8
	H (in)	51.6	52.8	54.3	55.1	55.5	59.4	59.8	61.0	62.2	63.0	63.8	64.6	65.7	66.5	67.7	68.9	70.1	70.5	71.7	72.0	73.6
85	L (in)	31.5	35.4	43.3	47.2	51.2	66.9	70.9	78.7	82.7	86.6	90.6	94.5	102.4	106.3	110.2	114.2	122.0	126.0	129.9	133.9	141.7
	H (in)	53.9	54.7	56.3	57.1	57.9	62.2	62.6	63.8	65.0	65.4	66.1	67.3	68.5	69.3	70.5	71.3	72.8	72.8	74.4	74.8	76.0
90	L (in)	31.5	35.4	43.3	47.2	51.2	66.9	70.9	78.7	82.7	86.6	90.6	94.5	102.4	106.3	110.2	114.2	122.0	126.0	129.9	133.9	141.7
	H (in)	55.9	57.1	58.7	59.4	59.8	64.2	64.6	65.7	66.9	67.3	68.5	69.3	70.5	71.3	72.4	73.2	74.8	75.2	76.4	76.8	78.3
93	L (in)	31.5	39.4	43.3	47.2	51.2	70.9	74.8	78.7	82.7	86.6	94.5	98.4	102.4	106.3	114.2	118.1	122.0	126.0	133.9	137.8	141.7
	H (in)	57.9	59.1	60.6	61.4	62.2	66.5	67.3	69.1	69.3	70.1	70.9	72.0	73.2	73.6	74.8	76.0	77.2	77.6	79.1	79.5	80.7
96	L (in)	31.5	39.4	47.2	51.2	55.1	70.9	74.8	82.7	86.6	90.6	94.5	98.4	106.3	110.2	114.2	118.1	126.0	129.9	133.9	137.8	145.7
	H (in)	60.6	62.6	64.2	64.6	65.0	69.3	70.1	71.3	72.0	72.4	73.2	74.0	75.2	75.6	76.8	78.0	79.1	79.5	81.1	81.5	82.7
100	L (in)	31.5	39.4	47.2	51.2	55.1	74.8	78.7	82.7	86.6	90.6	98.4	102.4	106.3	110.2	118.1	122.0	126.0	129.9	137.8	141.7	145.7
	H (in)	62.6	64.6	66.5	66.9	67.3	72.0	72.4	74.0	74.8	75.2	76.0	76.4	77.6	78.3	79.5	80.7	81.9	82.3	83.5	83.9	85.4
104	L (in)	31.5	39.4	47.2	51.2	55.1	74.8	78.7	82.7	86.6	90.6	98.4	102.4	106.3	110.2	118.1	122.0	126.0	129.9	137.8	141.7	145.7
	H (in)	64.6	66.9	68.5	68.9	69.7	74.0	74.4	76.0	76.8	77.2	78.0	78.3	79.5	80.3	81.5	82.7	83.9	84.3	85.4	85.8	87.4
108	L (in)	31.5	43.3	51.2	55.1	59.1	74.8	78.7	86.6	90.6	94.5	98.4	102.4	110.2	114.2	118.1	122.0	129.9	133.9	137.8	141.7	149.6
	H (in)	66.5	68.9	70.9	71.3	71.7	76.4	77.2	78.7	79.1	79.5	80.3	81.1	82.3	82.7	83.9	85.0	86.2	86.6	88.2	88.6	89.8
112	L (in)	31.5	43.3	51.2	55.1	59.1	74.8	78.7	86.6	90.6	94.5	98.4	102.4	110.2	114.2	118.1	122.0	129.9	133.9	137.8	141.7	149.6
	H (in)	68.9	70.9	72.8	73.2	74.0	78.7	79.1	80.7	81.5	81.5	82.7	83.1	84.3	85.							

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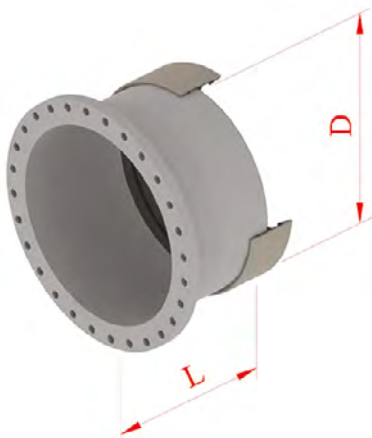
Elbows



DN(in)	R(in)	11.25° L	22.5° L	30° L	45° L	60° L	90° L
12	17,7	10,8	11,8	12,8	15,7	17,7	25,6
14	20,7	10,8	11,8	12,8	16,7	19,7	27,6
16	23,6	12,8	13,8	14,8	18,7	21,7	31,5
18	26,6	12,8	14,8	15,7	20,7	24,6	37,4
20	29,5	12,8	14,8	15,7	20,7	24,6	37,4
24	35,4	12,8	15,7	17,7	23,6	27,6	42,3
27	41,3	15,7	16,7	18,7	25,6	30,5	47,2
30	46,1	15,7	17,7	20,7	27,6	33,5	53,1
35	47,2	15,7	18,7	21,7	28,5	34,4	55,1
39	50,0	16,7	19,7	22,6	29,5	36,4	57,1
42	52,0	18,7	20,7	23,6	31,5	39,4	61,0
46	53,9	18,7	20,7	23,6	32,5	40,4	63,0
50	55,9	19,7	21,7	25,6	34,4	42,3	65,0
54	57,9	19,7	22,6	26,6	35,4	43,3	66,9
58	61,8	21,7	25,6	28,5	40,4	49,2	74,8
62	65,7	23,6	26,6	31,5	43,3	51,2	78,7
66	69,7	26,6	30,5	33,5	47,2	55,1	86,6
70	73,6	26,6	30,5	33,5	47,2	55,1	86,6
74	77,6	27,6	31,5	35,4	51,2	59,1	94,5
78	81,5	27,6	31,5	35,4	51,2	59,1	94,5
82	85,4	30,5	34,4	37,4	55,1	63,0	102,4
85	89,4	30,5	34,4	37,4	55,1	63,0	102,4
90	93,3	31,5	35,4	39,4	59,1	66,9	110,2
93	97,2	31,5	35,4	39,4	59,1	66,9	110,2
96	102,4	39,4	43,3	47,2	66,9	74,8	118,1
100	106,3	39,4	43,3	47,2	66,9	74,8	118,1
104	110,2	43,3	47,2	51,2	70,9	78,7	126,0
108	114,2	43,3	47,2	51,2	70,9	78,7	126,0
112	118,1	47,2	51,2	55,1	74,8	82,7	133,9
116	122,0	47,2	51,2	55,1	74,8	82,7	133,9
120	126,0	51,2	55,1	59,1	78,7	86,6	141,7
124	129,9	51,2	55,1	63,0	78,7	86,6	141,7
128	133,9	55,1	59,1	66,9	82,7	90,6	149,6
132	137,8	55,1	59,1	66,9	82,7	90,6	149,6
136	141,7	59,1	63,0	70,9	86,6	94,5	157,5
140	145,7	59,1	63,0	70,9	86,6	94,5	157,5
144	149,6	63,0	66,9	74,8	90,6	98,4	165,4
147	153,5	63,0	66,9	74,8	90,6	98,4	165,4
151	157,5	66,9	70,9	78,7	94,5	102,4	173,2
156	161,4	66,9	70,9	78,7	94,5	102,4	173,2

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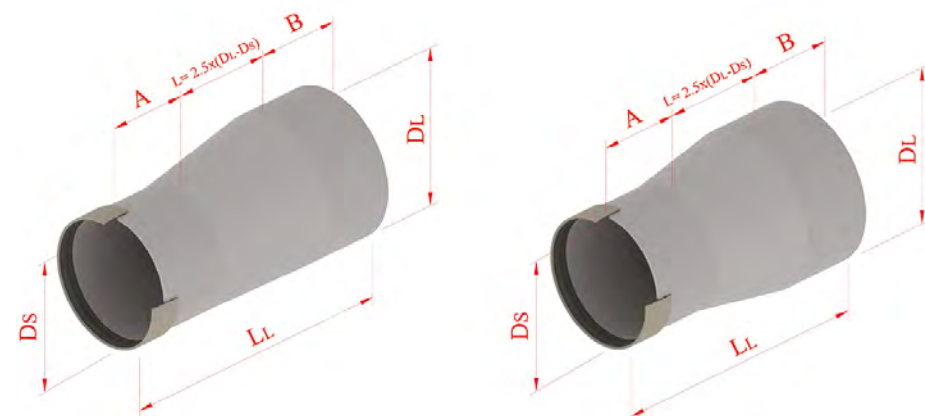
Flanges



DN(in)	L(in)
12	24
14	24
16	24
18	24
20	24
24	24
27	24
30	24
35	24
39	24
42	28
46	28
50	31
54	31
58	31
62	35
66	35
70	39
74	39
78	39
82	43
85	43
90	47
93	47
96	51
100	51
104	55
108	55
112	59
116	59
120	59
124	59
128	59
132	59
136	59
140	59
144	59
147	59
151	59
156	59

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Reducers



DL (in)	DS (in)	A=B (mm)	L (mm)	LL (mm)
12	8	15,7	9,8	41,3
12	10	15,7	4,9	36,4
14	10	15,7	9,8	41,3
14	12	15,7	4,9	36,4
16	12	15,7	9,8	41,3
16	14	15,7	4,9	36,4
18	14	15,7	9,8	41,3
18	18	15,7	4,9	36,4
20	14	15,7	14,8	46,3
20	16	15,7	9,8	41,3
24	16	15,7	19,7	51,2
24	20	15,7	9,8	41,3
27	20	15,7	19,7	51,2
27	24	15,7	9,8	41,3
30	24	15,7	19,7	51,2
30	27	15,7	9,8	41,3
35	27	15,7	19,7	51,2
35	30	15,7	9,8	41,3
39	30	15,7	19,7	51,2
39	35	15,7	9,8	41,3
42	35	15,7	19,7	51,2
42	39	15,7	9,8	41,3
46	39	19,7	19,7	59,1
46	42	19,7	9,8	49,2
50	42	19,7	19,7	59,1
50	46	19,7	9,8	49,2
54	46	19,7	19,7	59,1
54	50	19,7	9,8	49,2
58	50	19,7	19,7	59,1
58	54	19,7	9,8	49,2
62	58	23,6	9,8	57,1
62	54	23,6	19,7	66,9
66	58	23,6	19,7	66,9
66	62	23,6	9,8	57,1
70	54	23,6	39,4	86,6
70	62	23,6	19,7	66,9
74	66	23,6	19,7	66,9
74	70	23,6	9,8	57,1
78	62	23,6	39,4	86,6
78	70	23,6	19,7	66,9

DL (in)	DS (in)	A=B (mm)	L (mm)	LL (mm)
82	74	23,6	19,7	66,9
82	78	23,6	9,8	57,1
85	78	23,6	19,7	66,9
85	82	23,6	9,8	57,1
90	82	23,6	19,7	66,9
90	85	23,6	9,8	57,1
93	85	23,6	19,7	66,9
93	90	23,6	9,8	57,1
96	90	29,5	19,7	78,7
96	93	29,5	9,8	68,9
100	93	29,5	19,7	78,7
100	96	29,5	9,8	68,9
104	96	29,5	19,7	78,7
104	100	29,5	9,8	68,9
108	100	29,5	19,7	78,7
108	104	29,5	9,8	68,9
112	104	29,5	19,7	78,7
112	108	29,5	9,8	68,9
116	108	29,5	19,7	78,7
116	112	29,5	9,8	68,9
120	112	35,4	19,7	90,6
120	116	35,4	9,8	80,7
124	116	35,4	19,7	90,6
124	120	35,4	9,8	80,7
128	120	35,4	19,7	90,6
128	124	35,4	9,8	80,7
132	124	35,4	19,7	90,6
132	128	35,4	9,8	80,7
136	128	41,3	19,7	102,4
136	132	41,3	9,8	92,5
140	132	41,3	19,7	102,4
140	136	41,3	9,8	92,5
144	136	41,3	19,7	102,4
144	140	41,3	9,8	92,5
147	140	41,3	19,7	102,4
147	144	41,3	9,8	92,5
151	144	43,3	19,7	106,3
151	147	43,3	9,8	96,5
156	147	43,3	19,7	106,3
156	151	43,3	9,8	96,5



* Values above are for general information purposes. For the most current information, please visit the www.superlit.com

GRP Manholes



GRP Tank and Water Retention Systems



Deblin Airport

Deblin Airport
93 in

POLAND



Petroleum Tanks

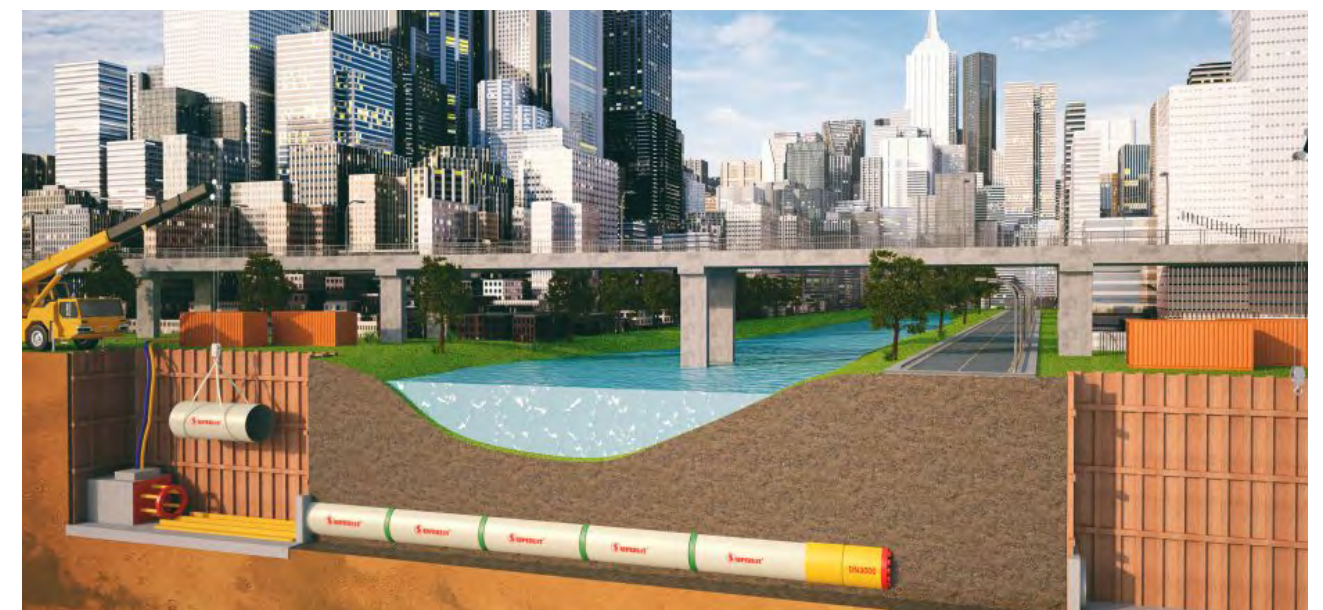
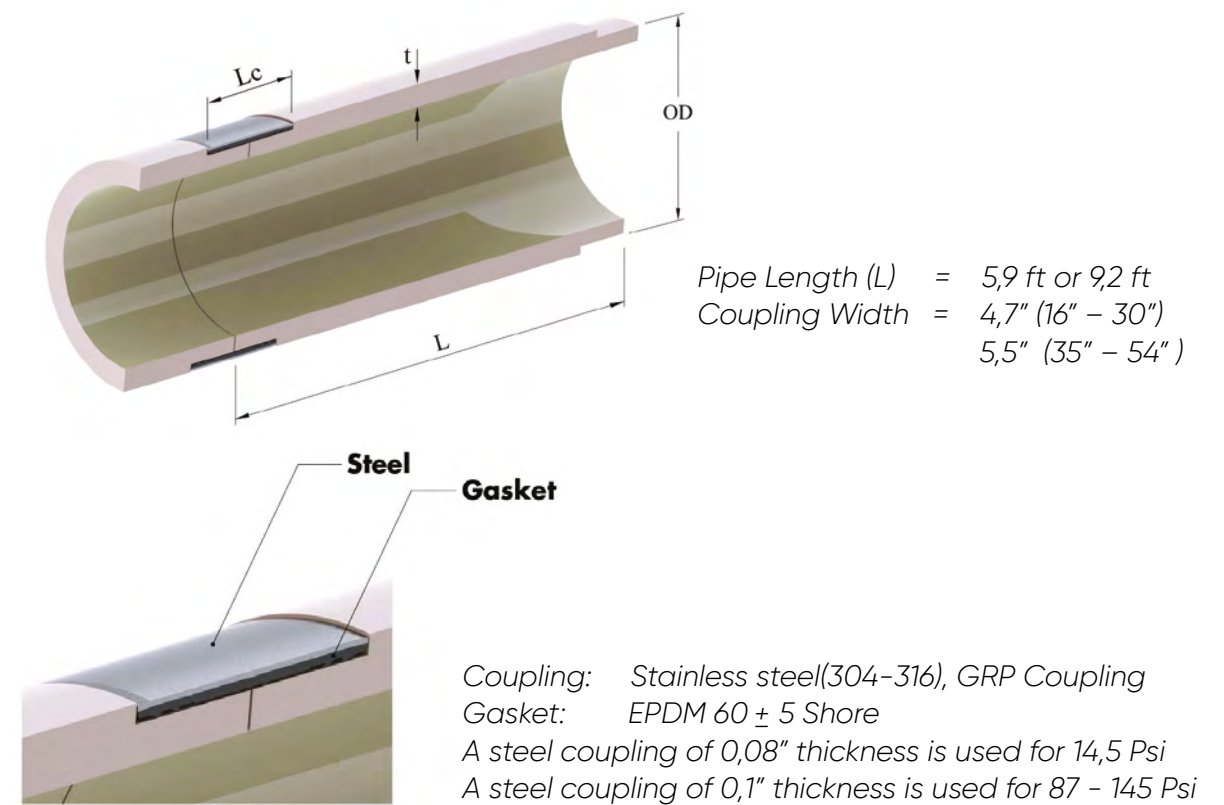
39 in – 93 in

GEORGIA

TRENCHLESS SYSTEMS

Jacking Pipes

There are no excavations in the jacking pipe installation model.
Pipes are installed inside a tunnel underground by using special purpose machines (tunnel boring machine-TBM), by jacking method.



GRP Coupling & FW Jacking Pipe Data Sheet

(Load Base)

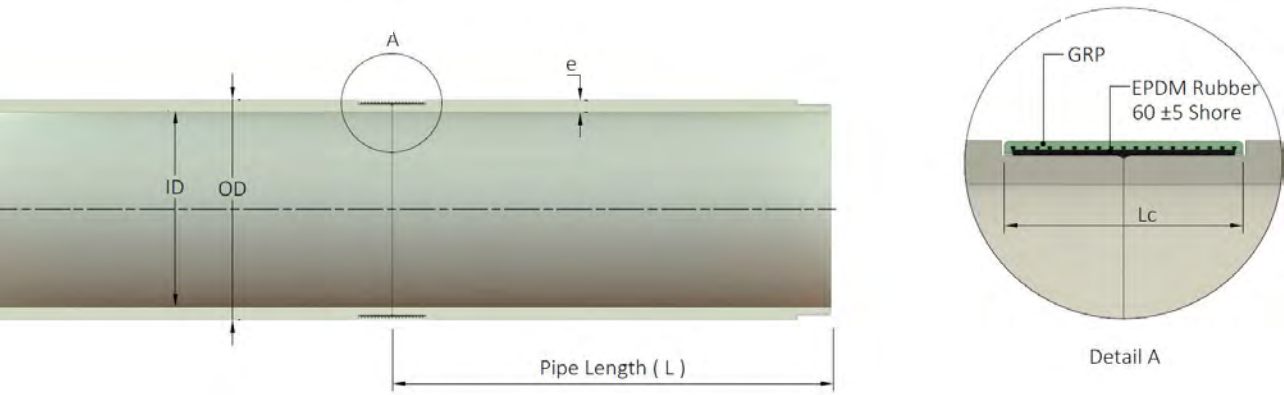
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
50	14,8	12,4	1,2	45	4.956
	16,8	14,6	1,1	47	2.361
	18,8	16,8	1,0	50	1.300
	20,3	18,3	1,0	52	907
	20,9	18,9	1,0	53	829
	21,7	19,7	1,0	55	738
	24,3	22,4	1,0	62	512
	25,6	23,6	1,0	66	437
	28,3	26,3	1,0	73	321
	29,9	28,0	1,0	77	269
	32,3	30,3	1,0	84	212
	33,9	31,8	1,0	91	207
	36,4	34,3	1,0	99	166
	37,8	35,7	1,0	103	147
	40,4	38,3	1,0	110	120
	43,3	41,4	0,9	109	76
	44,4	42,5	0,9	112	70
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
100	16,8	13,1	1,9	75	12.403
	18,8	15,4	1,7	79	6.332
	20,3	17,1	1,6	80	3.914
	20,9	17,9	1,5	79	3.020
	21,7	18,7	1,5	80	2.459
	24,3	21,7	1,3	81	1.177
	25,6	23,0	1,3	86	1.003
	28,3	25,8	1,2	90	602
	29,9	27,6	1,1	89	409
	32,3	30,0	1,1	97	323
	33,9	31,6	1,1	101	279
	36,4	34,2	1,1	106	200
	37,8	35,6	1,1	110	178
	40,4	38,2	1,1	118	145
	43,3	41,1	1,1	122	105
	44,4	42,2	1,1	126	97
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
150	20,3	16,1	2,1	103	9.865
	20,9	16,7	2,1	107	8.963
	21,7	17,6	2,0	108	6.976
	24,3	20,8	1,8	109	3.165
	25,6	22,1	1,7	112	2.501
	28,3	25,0	1,6	117	1.451
	29,9	24,7	1,5	119	1.034
	32,3	29,3	1,5	126	750
	33,9	30,9	1,5	128	594
	36,4	33,5	1,4	135	435
	37,8	35,0	1,4	136	354
	40,4	37,8	1,3	138	240
	43,3	40,7	1,3	144	176
	44,4	41,9	1,2	143	148
	48,4	46,0	1,2	152	102
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
200	24,3	19,8	2,2	135	6.542
	25,6	21,2	2,2	140	5.226
	28,3	24,3	2,0	144	2.788
	29,9	26,1	1,9	144	1.911
	32,3	28,7	1,8	151	1.309
	33,9	30,3	1,8	157	1.087
	36,4	33,0	1,7	160	725
	37,8	34,5	1,6	161	575
	40,4	37,2	1,6	167	416
	43,3	40,3	1,5	170	287
	44,4	41,5	1,5	170	244
	48,4	45,6	1,4	176	157
	50,8	48,1	1,3	180	124
	53,1	50,5	1,3	183	99
	55,1	52,6	1,3	185	80
	56,5	53,9	1,3	189	74

JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
300	29,9	24,6	2,7	199	5.918
	32,3	27,2	2,5	204	3.784
	33,9	28,9	2,5	210	3.002
	36,4	31,8	2,3	214	1.926
	37,8	33,3	2,2	217	1.569
	40,4	36,1	2,1	222	1.069
	43,3	39,3	2,0	226	719
	44,4	40,5	1,9	225	605
	48,4	44,7	1,8	232	379
	50,8	47,2	1,8	237	295
	53,1	49,7	1,7	237	223
	55,1	51,8	1,7	241	185
	56,5	53,2	1,6	244	165
	59,0	55,9	1,6	247	129
	60,5	57,0	1,7	277	160
	64,5	61,1	1,7	293	127
	67,7	64,3	1,7	304	105
	72,5	69,1	1,7	327	85
	76,5	73,1	1,7	345	72
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
400	36,4	30,5	3,0	269	4.300
	37,8	32,1	2,8	270	3.325
	40,4	35,0	2,7	275	2.231
	43,3	38,2	2,5	280	1.475
	44,4	39,5	2,4	279	1.231
	48,4	43,8	2,3	287	758
	50,8	46,4	2,2	292	583
	53,1	48,8	2,1	295	453
	55,1	51,0	2,0	296	359
	56,5	52,4	2,0	298	313
	59,0	55,2	1,9	300	241
	60,5	56,3	2,1	332	285
	64,5	60,4	2,0	348	220
	67,7	63,9	1,9	345	157
	72,5	68,8	1,9	356	112
	76,5	72,9	1,8	368	89
	80,6	76,9	1,8	388	76
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
500	43,3	37,2	3,0	332	332
	44,4	38,5	3,0	333	333
	48,4	42,9	2,7	340	340
	50,8	45,6	2,6	343	343
	53,1	48,0	2,5	347	347
	55,1	50,2	2,4	350	350
	56,5	51,7	2,4	353	353
	59,0	54,4	2,3	355	355
	60,5	55,6	2,4	386	386
	64,5	59,8	2,4	400	400
	67,7	63,2	2,2	400	400
	72,5	68,3	2,1	407	407
	76,5	72,4	2,0	415	415
	80,6	76,6	2,0	425	425
	85,0	81,2	1,9	437	437
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
600	48,4	42,0	3,2	392	392
	50,8	44,6	3,1	399	399
	53,1	47,2	3,0	403	403
	55,1	49,4	2,8	403	403
	56,5	50,9	2,8	409	409
	59,0	53,7	2,7	411	411
	60,5	54,9	2,8	439	439
	64,5	59,1	2,7	457	457
	67,7	62,6	2,6	454	454
	72,5	67,6	2,4	466	466
	76,5	71,9	2,3	469	469
	80,6	76,1	2,2	478	478
	85,0	80,7	2,2	489	489
	88,6	84,4	2,1	491	491
	96,6	92,2	2,2	566	566
JACKING LOAD Gj	OD	ID	e	Mass	SN
(tons)	(inch)	(inch)	(inch)	(lb/ ft)	PSI
700	55,1	48,6	3,2	458	1.389
	56,5	50,1	3,2	460	1.187
	59,0	53,0	3,0	462	896
	60,5	54,1	3,2	495	955
	64,5	58,4	3,0	507	677
	67,7	62,0	2,9	507	491
	72,5	67,1	2,7	516	333
	76,5	71,3	2,6	523	245
	80,6	75,5	2,5	536	190
	85,0	80,2	2,4	540	139
	88,6	83,9	2,3	546	110
	96,6	91,8	2,4	616	99
	100,5	95,7	2,4	642	87
	104,6	99,8	2,4	669	77

GRP Coupling & FW Jacking Pipe Data Sheet

(Stiffness Base)

JACKING LOAD Gj (tons)	OD (inch)	ID (inch)	e (inch)	Mass (lb/ ft)	SN PSI
800	59	52,2	3,4	518	1.320
	60	53,4	3,5	546	1.337
	64	57,7	3,4	563	960
	68	61,3	3,2	560	681
	73	66,5	3,0	573	469
	77	70,7	2,9	580	342
	81	75,0	2,8	592	262
	85	79,7	2,7	600	194
	89	83,4	2,6	608	156
	97	91,3	2,6	675	132
	101	95,3	2,6	693	111
	105	99,4	2,6	722	98
1000	109	103,5	2,6	738	84
	113	107,4	2,6	766	75
1200	73	65,3	3,6	679	777
	77	69,6	3,5	689	570
	81	73,9	3,3	695	420
	85	78,7	3,2	711	316
	89	82,4	3,1	724	258
	97	90,3	3,1	801	216
	101	94,5	3,0	794	163
	105	98,8	2,9	807	133
	109	102,9	2,8	816	109
	113	107,0	2,8	824	89
	117	111,1	2,8	854	80
	121	115,2	2,8	885	72
1400	89	81,5	3,5	820	387
	97	89,6	3,5	888	301
	101	93,7	3,4	905	248
	105	97,9	3,3	923	204
	109	102,0	3,3	937	169
	113	106,2	3,1	938	135
	117	110,5	3,1	949	112
	121	114,7	3,0	959	93
1400	109	101,3	3,6	1.035	232
	113	105,5	3,5	1.040	187
	117	109,8	3,4	1.056	156
	121	114,1	3,3	1.057	126



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 14,5, PN 87 and PN 145.
- * Jacking force safety coefficient = 3.5
- * Pipe wall thicknesses and stiffness values are calculated theoraticlly. All the values are obtained by calculations, and may differ from the actual product owing to the production tolerances.
- * SUPERLIT, as the manufacturer, may change the technical data without prior notice.

You can contact us at sales@superlit.com for dimensions, jacking forces and other technical data.

OD Inch	PIPE STIFFNESS SN (PSI)																							
	144				230,4				288				360				460,8				576			
	ID Inch	e Inch	Mass lb / ft	F max kN	ID Inch	e Inch	Mass lb / ft	F max kN	ID Inch	e Inch	Mass lb / ft	F max kN	ID Inch	e Inch	Mass lb / ft	F max kN	ID Inch	e Inch	Mass lb / ft	F max kN	ID Inch	e Inch	Mass lb / ft	F max kN
13,6	12,7	0,4	15	11	12,7	0,4	15	11	12,7	0,5	16	24	12,6	0,5	18	50	12,5	0,5	19	74	12,4	0,6	21	96
14,8	13,9	0,5	18	17	13,9	0,5	18	17	13,8	0,5	19	41	13,7	0,6	22	72	13,6	0,6	23	98	13,5	0,6	25	124
16,8	15,9	0,5	20	12	15,8	0,5	24	62	15,7	0,6	26	95	15,6	0,6	28	130	15,5	0,7	30	166	15,4	0,7	32	201
18,8	17,8	0,5	26	59	17,6	0,6	30	124	17,5	0,6	32	161	17,4	0,7	34	207	17,4	0,7	36	234	17,2	0,8	40	294
20,3	19,2	0,5	30	98	19,0	0,6	34	171	18,9	0,7	37	217	18,8	0,8	40	270	18,7	0,8	42	305	18,5	0,9	46	374
20,9	19,7	0,6	31	111	19,6	0,6	36	190	19,4	0,7	39	241	19,3	0,8	42	295	19,2	0,8	46	352	19,1	0,9	49	402
21,7	20,5	0,6	34	137	20,3	0,7	38	220	20,2	0,7	42	268	20,0	0,8	46	335	19,9	0,9	49	394	19,8	0,9	52	449
24,3	23,0	0,7	42	276	22,8	0,8	48	382	22,7	0,8	53	451	22,5	0,9	58	526	22,4	1,0	62	601	22,2	1,0	66	667
25,6	24,2	0,7	47	277	24,0	0,8	54	403	23,9	0,9	58	466	23,7	0,9	64	553	23,5	1,0	69	635	23,4	1,1	73	713
28,3	26,8	0,8	56	387	26,5	0,9	66	540	26,4	1,0	71	619	26,2	1,0	77	728	26,0	1,1	84	829	25,8	1,2	90	928
29,9	28,3	0,8	65	454	28,1	0,9	74	587	27,9	1,0	79	679	27,7	1,1	87	805	27,5	1,2	94	916	27,3	1,3	101	1.026
32,3	30,6	0,9	74	485	30,3	1,0	85	670	30,1	1,1	93	786	29,9	1,2	101	927	29,7	1,3	110	1.062	29,5	1,4	117	1.181
33,9	32,0	0,9	81	566	31,7	1,1	95	788	31,6	1,1	101	898	31,4	1,3	111	1.052	31,1	1,4	120	1.204	30,9	1,5	129	1.340
36,4	34,4	1,0	95	730	34,1	1,1	110	969	33,9	1,2	117	1.087	33,7	1,3	128	1.276	33,5	1,5	138	1.440	33,2	1,6	149	1.614
37,8	35,7	1,0	103	822	35,4	1,2	118	1.070	35,2	1,3	127	1.224	35,0	1,4	138	1.408	34,8	1,5	150	1.590	34,5	1,6	161	1.771
40,4	38,2	1,1	116	981	37,9	1,3	134	1.279	37,7	1,4	144	1.444	37,4	1,5	159	1.673	37,1	1,6	171	1.881	36,9	1,7	182	2.062
43,3	40,9	1,2	133	1.196	40,6	1,4	155	1.552	40,4	1,5	166	1.728	40,1	1,6	181	1.987	39,8	1,7	196	2.217	39,5	1,9	211	2.459
44,4	42,0	1,2	140	1.279	41,6	1,4	163	1.658	41,4	1,5	175	1.846	41,1	1,7	192	2.134	40,8	1,8	206	2.362	40,5	1,9	221	2.603
48,4	45,8	1,3	167	1.624	45,4	1,5	191	2.021	45,1	1,6	208	2.297	44,8	1,8	227	2.611	44,5	1,9	246	2.914	44,2	2,1	263	3.193
50,8	48,0	1,4	185	1.875	47,6	1,6	214	2.334	47,3	1,7	230	2.607	47,0	1,9	251	2.936	46,7	2,0	270	3.254	46,4	2,2	290	3.587
53,1	50,2	1,4	202	2.094	49,8	1,7	231	2.573	49,5	1,8	250	2.876	49,1	2,0	274	3.263	48,8	2,1	295	3.605	48,5	2,3	316	3.961
55,1	52,1	1,5	217	2.295	51,6	1,7	251	2.837	51,3	1,9	270	3.160	51,0	2,0	296	3.571	50,7	2,2	319	3.943	50,3	2,4	341	4.312
56,5	53,4	1,5	226	2.420	52,9	1,8	264	3.022	52,6	1,9	284	3.344	52,3	2,1	310	3.774	51,9	2,3	335	4.173	51,6	2,4	359	4.570
59,0	55,9	1,6	247	2.699	55,3	1,9	288	3.358	55,0	2,0	308	3.695	54,6	2,2	338	4.173	54,3	2,4	364	4.600	53,9	2,6	393	5.071
60,5	57,2	1,6	261	2.413	56,7	1,9	302	3.098	56,4	2,0	326	3.472	56,0	2,2	355	3.962	55,6	2,4	386	4.448	55,2	2,6	415	4.931
64,5	61,0	1,7	296	2.757	60,5	2,0	341	3.499	60,1	2,2	371	3.972	59,7	2,4	406	4.546	59,3	2,6	437	5.044	58,9	2,8	470	5.579
67,7	64,1	1,8	325	3.240	63,5	2,1	380	4.130	63,1	2,3	409	4.615	62,7	2,5	448	5.229	62,3	2,7	480	5.774	61,9	2,9	514	6.315
72,5	68,6	1,9	374	3.898	68,0	2,3	437	4.910	67,6	2,5	469	5.442	67,1	2,7	513	6.146	66,7	2,9	552	6.788	66,3	3,1	591	7.425
76,5	72,4	2,1	417	4.476	71,7	2,4	484	5.569	71,3	2,6	523	6.193	70,9	2,8	568	6.937	70,4	3,1	618	7.737	69,8	3,3	667	8.531
80,6	76,2	2,2	462	5.079	75,5	2,5	536	6.269	75,1	2,7	580	6.991	74,6	3,0	632	7.839	74,1	3,2	679	8.617	73,6	3,5	727	9.389
85,0	80,5	2,3	515	5.794	79,8	2,6	592	7.051	79,3	2,9	643	7.883	78,7	3,1	702	8.847	78,2	3,4	757	9.736				
88,6	83,8	2,4	559	6.410	83,1	2,8	644	7.792	82,6	3,0	702	8.730	82,0	3,3	763	9.734	81,5	3,6	822	10.689				
96,6	91,4	2,6	665	6.977	90,6	3,0	767	8.642	90,0	3,3	835	9.743	89,5	3,5	898	10.760								
100,5	95,1	2,7	718	7.687	94,2	3,1	835	9.584	93,7	3,4	905	10.731	93,3	3,6	956	11.545								
104,6	99,0	2,8	780	8.531	98,1	3,2	896	10.421	97,6	3,5	975	11.700												
108,6	102,8	2,9	838	9.314	101,8	3,4	966	11.400																
112,5	106,5	3,0	904	10.221	105,5	3,5	1038	12.402																
116,6	110,4	3,1	967	11.088																				
120,7	114,2	3,2	1032	11.986																				

Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 14,5, PN 87 and PN 145.
- * Jacking force safety coefficient = 3.5
- * Pipe wall thicknesses and stiffness values are calculated theoraticlly. All the values are obtained by calculations, and may differ from the actual product owing to the production tolerances.
- * SUPERLIT, as the manufacturer, may change the technical data without prior notice.

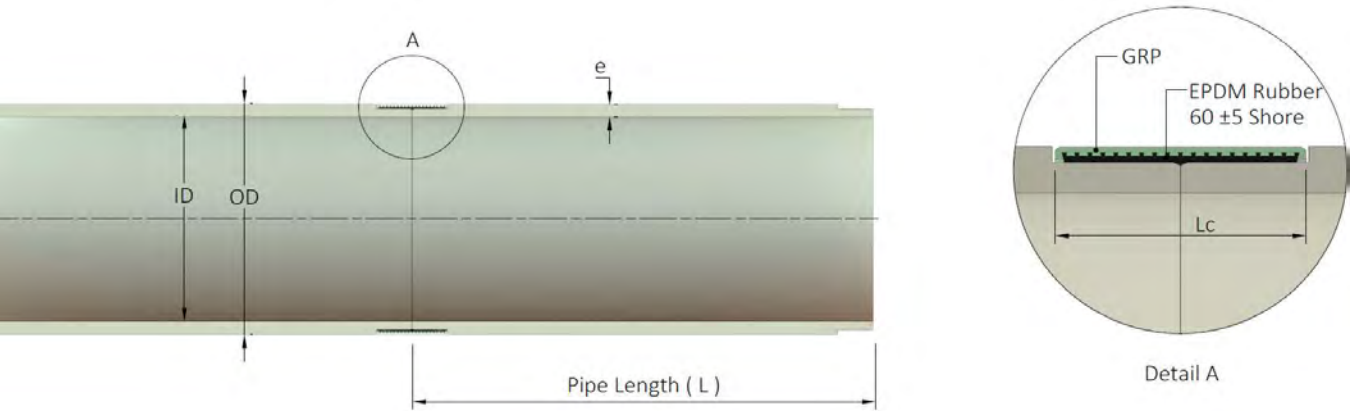
You can contact us at sales@superlit.com for dimensions, jacking forces and other technical data.

Relining Pipes

The relining model also does not require excavation.
In order to renew the old pipelines, new GRP pipes are installed by inserting them inside the existing pipes.



OD Inch	PIPE STIFFNESS SN (PSI)																							
	720				921,6				1152				1440				2304				4608			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	Inch	Inch	lb / ft	kN	Inch	Inch	lb / ft	kN	Inch	Inch	lb / ft	kN	Inch	Inch	lb / ft	kN	Inch	Inch	lb / ft	kN	Inch	Inch	lb / ft	kN
13.6	12.3	0.6	22	124	12.2	0.7	24	152	12.1	0.8	26	186	12.0	0.8	28	215	11.7	0.9	33	289				
14.8	13.4	0.7	27	157	13.3	0.7	29	190	13.2	0.8	31	232	13.0	0.9	34	270	12.7	1.0	39	356	12.2	1.3	47	491
16.8	15.2	0.8	34	243	15.1	0.8	37	283	15.0	0.9	40	338	14.8	1.0	43	387	14.5	1.2	50	497	13.9	1.5	60	672
18.8	17.1	0.9	43	348	16.9	1.0	46	401	16.7	1.0	50	469	16.6	1.1	54	527	16.2	1.3	62	667	15.6	1.6	76	885
20.3	18.4	1.0	50	435	18.2	1.0	54	495	18.0	1.1	59	581	17.9	1.2	62	640	17.4	1.4	73	803	16.8	1.8	88	1,056
20.9	18.9	1.0	53	468	18.8	1.1	57	534	18.6	1.2	62	618	18.4	1.2	67	686	18.0	1.5	77	860	17.3	1.8	93	1,130
21.7	19.6	1.0	57	521	19.5	1.1	61	593	19.3	1.2	67	681	19.1	1.3	71	751	18.6	1.5	83	945	17.9	1.9	101	1,231
24.3	22.0	1.1	72	763	21.9	1.2	78	855	21.6	1.3	84	961	21.4	1.4	90	1,055	20.9	1.7	105	1,295	20.1	2.1	128	1,664
25.6	23.2	1.2	80	814	23.0	1.3	86	915	22.8	1.4	93	1,035	22.6	1.5	99	1,137	22.0	1.8	116	1,401	21.2	2.2	141	1,808
28.3	25.6	1.3	97	1,040	25.4	1.4	105	1,169	25.1	1.6	114	1,328	24.9	1.7	122	1,441	24.3	2.0	142	1,767	23.4	2.4	171	2,258
29.9	27.1	1.4	109	1,159	26.9	1.5	118	1,300	26.6	1.7	129	1,482	26.4	1.8	136	1,606	25.7	2.1	159	1,965	24.8	2.6	192	2,515
32.3	29.3	1.5	127	1,345	29.0	1.6	136	1,502	28.7	1.8	149	1,694	28.4	1.9	159	1,863	27.8	2.3	184	2,279	26.7	2.8	224	2,930
33.9	30.7	1.6	139	1,506	30.4	1.7	150	1,682	30.1	1.9	164	1,909	29.8	2.0	174	2,076	29.1	2.4	202	2,539	28.0	2.9	247	3,261
36.4	33.0	1.7	161	1,810	32.7	1.8	173	2,010	32.3	2.0	189	2,254	32.0	2.2	202	2,467	31.3	2.5	234	2,992	30.1	3.1	285	3,821
37.8	34.2	1.8	174	1,987	34.0	1.9	187	2,195	33.6	2.1	204	2,466	33.3	2.3	218	2,699	32.5	2.6	253	3,261	31.3	3.3	307	4,151
40.4	36.6	1.9	198	2,318	36.3	2.0	214	2,572	35.9	2.2	233	2,887	35.6	2.4	249	3,136	34.7	2.8	289	3,798				
43.3	39.2	2.0	228	2,740	38.9	2.2	244	2,999	38.5	2.4	267	3,377	38.1	2.6	284	3,657	37.2	3.0	331	4,419				
44.4	40.2	2.1	240	2,906	39.9	2.2	257	3,192	39.4	2.5	281	3,572	39.1	2.6	300	3,894	38.2	3.1	349	4,675				
48.4	43.9	2.3	284	3,538	43.5	2.4	306	3,896	43.0	2.7	333	4,333	42.6	2.9	357	4,722								
50.8	46.0	2.4	314	3,966	45.7	2.6	336	4,325	45.2	2.8	368	4,840	44.7	3.0	394	5,271								
53.1	48.1	2.5	343	4,382	47.7	2.7	370	4,824	47.2	3.0	403	5,361	46.7	3.2	431	5,812								
55.1	49.9	2.6	369	4,767	49.5	2.8	398	5,235	48.9	3.1	435	5,835	48.5	3.3	464	6,302								
56.5	51.1	2.7	388	5,054	50.7	2.9	417	5,507	50.2	3.1	455	6,131	49.8	3.3	484	6,602								
59.0	53.5	2.8	422	5,539	53.1	3.0	454	6,050	52.5	3.3	496	6,740	52.0	3.5	530	7,287								
60.5	54.8	2.8	445	5,411	54.3	3.1	480	5,981	53.8	3.3	521	6,641												
64.5	58.5	3.0	504	6,142	58.0	3.3	545	6,802	57.5	3.5	582	7,405												
67.7	61.4	3.2	557	7,013	60.9	3.4	599	7,706																
72.5	65.7	3.4	637	8,173																				



Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 14,5, PN 87 and PN 145.
* Jacking force safety coefficient = 3.5
* Pipe wall thicknesses and stiffness values are calculated theoretically. All the values are obtained by calculations, and may differ from the actual product owing to the production tolerances.
* SUPERLIT, as the manufacturer, may change the technical data without prior notice.

You can contact us at sales@superlit.com for dimensions, jacking forces and other technical data.



MARINE-LUG® SYSTEM



Patented special Marine-Lug®, which has been designed by SUPERLIT engineers, is an underwater pipe mounting system for installing large diameter pipes.

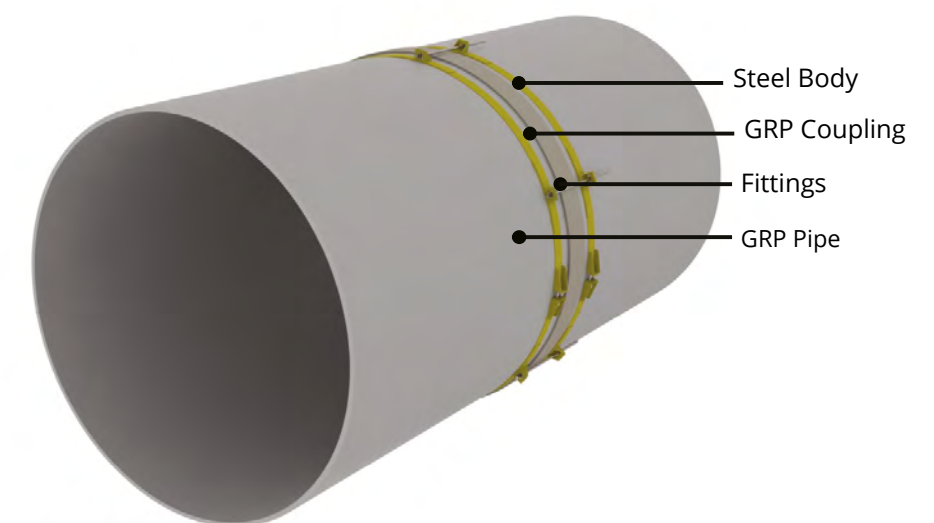
It facilitates the assembly of pipes underwater; it keeps the pipes stable until backfilling completed.

The rapid and easy installation of the newly designed Marine-Lug® can stay underwater for a limited period of time.

With the Marine-Lug® complete the installation of the pipes without taking life threatening risks, high productivity is ensured with low costs.



- Lugs located on the steel body
- Rotatable (easy to align lug holes)
- Can be removed after pipe installation
- Mounting capability as well as rapid and easy manufacturing





Standards developed by EN, ISO, AWWA, and ASTM cover a series of glassfiber reinforced pipe applications including conveyance of water, domestic wastewater and chemical substances. The common ground of all these standards is that all are performance-based. In other words, the performance tests required for the GRP pipe are defined in these standards. These standards include many quality control and performance tests.

1 EN:

This product standard is applicable for GRP pipes that have the diameter of 2" - 156", and that are used for water and wastewater conveyance applications. SUPERLIT GRP pipes meet the requirements of this standard.

- ISO 23856 water supply, drainage and sewerage with or without pressure
- EN 1796 for water supply with or without pressure
- EN 14364 for drainage and sewerage with or without pressure

2 ISO:

This product standard is applicable for GRP pipes that have the diameter range of 2" - 156", and used for water and wastewater conveyance applications. It includes efficiency testing and complete product testing for pipes and couplings. It includes pipes of various stiffness classifications up to an operating pressure of 464 psi. SUPERLIT GRP pipes meet the requirements of this standard.

- ISO 25780 water supply, drainage and sewerage with or without pressure
- ISO 10467 for pressure and non-pressure drainage and sewerage
- ISO 10639 for pressure and non-pressure water supply
- ISO 10465 for installation procedures

3 AWWA:

AWWA is one of the comprehensive standards applicable for glassfiber pipes.

Within this standards, there are comprehensive specifications focusing on quality control and performance tests for the pipes and their joints that are used in pressure water pipeline applications. SUPERLIT GRP pipes are designed to meet the performance requirements of this standard.

Design principles of GRP pipes installed underground and aboveground are defined in the AWWA M45 standard.

- AWWA C950 for fiberglass pressure pipes. Refers to clean water conveyance.
- AWWA M45 guide for fiberglass pipe design.

4 ASTM:

There are various ASTM product standards used for various glassfiber reinforced pipe applications.

- ASTM D3262 for fiberglass sewer pipe. Refers to non-pressure wastewater conveyance.
- ASTM D3517 for fiberglass pressure pipe. Refers to clean water conveyance.
- ASTM D3754 for fiberglass sewer and industrial pressure pipe.



QUALITY CONTROL AND PERFORMANCE TESTS



Quality Control

Circumferential and axial load bearing capacities of the manufactured pipes are proven by routine tests. In addition, the structure and composition of the pipe is checked and verified by tests.

Controls during manufacturing phase

- ✓ Raw material control tests
- ✓ Barcol hardness
- ✓ Wall thickness measurement
- ✓ Pipe length measurement
- ✓ Outer diameter measurement
- ✓ Hydrostatic pressure test

Controls performed on samples

- ✓ Pipe stiffness

Being a physical property of the pipe, the specific stiffness is a measure of strength against ring deformation under external loads. Initial ring stiffness is the value obtained in lb/in/in that is calculated by the formula below, when the pipe is tested in accordance with ISO 7685 and EN 1228, by applying a deflection of approximately 3%.

ASTM D 2412

$$PS = \frac{F}{\Delta y}$$

Ps= Pipe stiffness lbf/in/in or (kPa)

Δy: measured change of the inside diameter in inches or (mm)

F: the load applied to the pipe to produce or piece percentage of deflection N/m or pounds-force per linear inch.

Non-destructive deflection test with no structural damage

When the pipe sample is tested in accordance with ISO 10466, by implementing the following nominal deflections, it should meet the conditions in the table below.

Nominal Stiffness psA	18	36	72
Specific ring deflection in which defects on the surface have not occurred, %	14,3	11,3	9
Specific ring deflection in which structural defect has not occurred, %	23,9	18,9	15

Hoop tensile strength

When the samples that are cut out from the pipe are tested as per ISO 8521 and EN 1394, the results should comply with the minimum rating tables ranking in the international standards.

Axial tensile strength

When the samples that are cut out from the pipe in an axial direction are tested as per ISO 8513 and EN 1396, the results should comply with the minimum rating tables ranking in the international standards. SUPERLIT GRP pipe manufacturing technology comprises a detailed quality control program. Compliance of the pipes and fittings production and their tests to international and local standards is ensured by this program.



Quality Control Tests

Before manufacturing, the raw material is tested. Tests aim to check the compliance to the standards of the raw materials and products (pipe, coupling and fittings) manufactured. A hydrostatic pressure test simulating the operating conditions is applied to pipes with flexible connections and having diameters between 2" - 156".

Measured Properties	Acceptance Criteria
Pipe Wall Thickness	Wall thickness should not be less than the declared value.
Pipe Length	+/- 2"
Pipe Diameter	EN1796, EN14364, ISO10639, ISO10467 AWWA C950(complying with the related tables of outer diameter series (Serie-B))
Pipe Hardness	Minimum 33 Barcol
Pipe Stiffness	As per EN 1228, ISO 7685, ASTM D2412
Axial Tensile Strength	As per EN 1393, ISO 8513 standards
Pipe Hoop Tensile Strength	As per EN 1394, ISO 8521 standards
Loss on Ignition Test	As per ASTM D2584 standard



FRP

Fiber Reinforced Polymer
Pipes and Fittings



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