



GRP JACKING PIPES



60+ years

COMPANY PROFILE



SUPERLIT Group Manufacturing Facilities belongs to the KARAMANCI HOLDING established in 1961. Since the beginning of the sixties SUPERLIT has been present in Türkiye market and an international market as a leader of pipe manufacturer supplying their products to 5 continents worldwide.

Superlit GRP products made using the Filament Continues Winding and Helical Discontinues Winding technologies covering diameter range of DN50- DN4000 mm, with a stiffness of 1250, 2500, 5000, 10000 Nominal Pressure Class is 1 – 32 bars and for special design is much higher for both SN & PN.

The Products are corrosion resistant, chemical resistant, and high-resistant in water and sewage applications and light in weight used in the following applications:

- 1. Clean Water and Potable Water Application
- 2. Irrigation Application
- 3. Hydroelectric Power Plant Application
- 4. Sewer Application
- 5. Storm Water Application
- 6. Water Treatment Application
- 7. Seawater Application
- 8. Trenchless & Jacking Application
- 9. Water Tank Storage Application
- 10. Petroleum Tank Application
- 11. Chemical Industrial Tank Application

The entire products produce by SUPERLIT are also simple to handle and are manufactured to a high quality in accordance to an international standards such as EN, ISO, ASTM and AWWA. SUPERLIT is the only GRP pipe manufacturer in Türkiye that has 3 different pipe production technologies: Continuous Filament Winding, Centrifugal Casting technology and 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 century, SUPERLIT supplies pipes for projects in many different regions around the world from Europe to Africa and from America to Asia and Australia.

 PRESENCE IN 5 CONTINENTS

 61 YEARS OF EXPERIENCE

 3 DIFFERENT PIPE PRODUCTION TECHNOLOGIES

 ENGINEERING AND R&D

 PROVIDING SITE SUPERVISION

 QUALITY MANAGEMENT

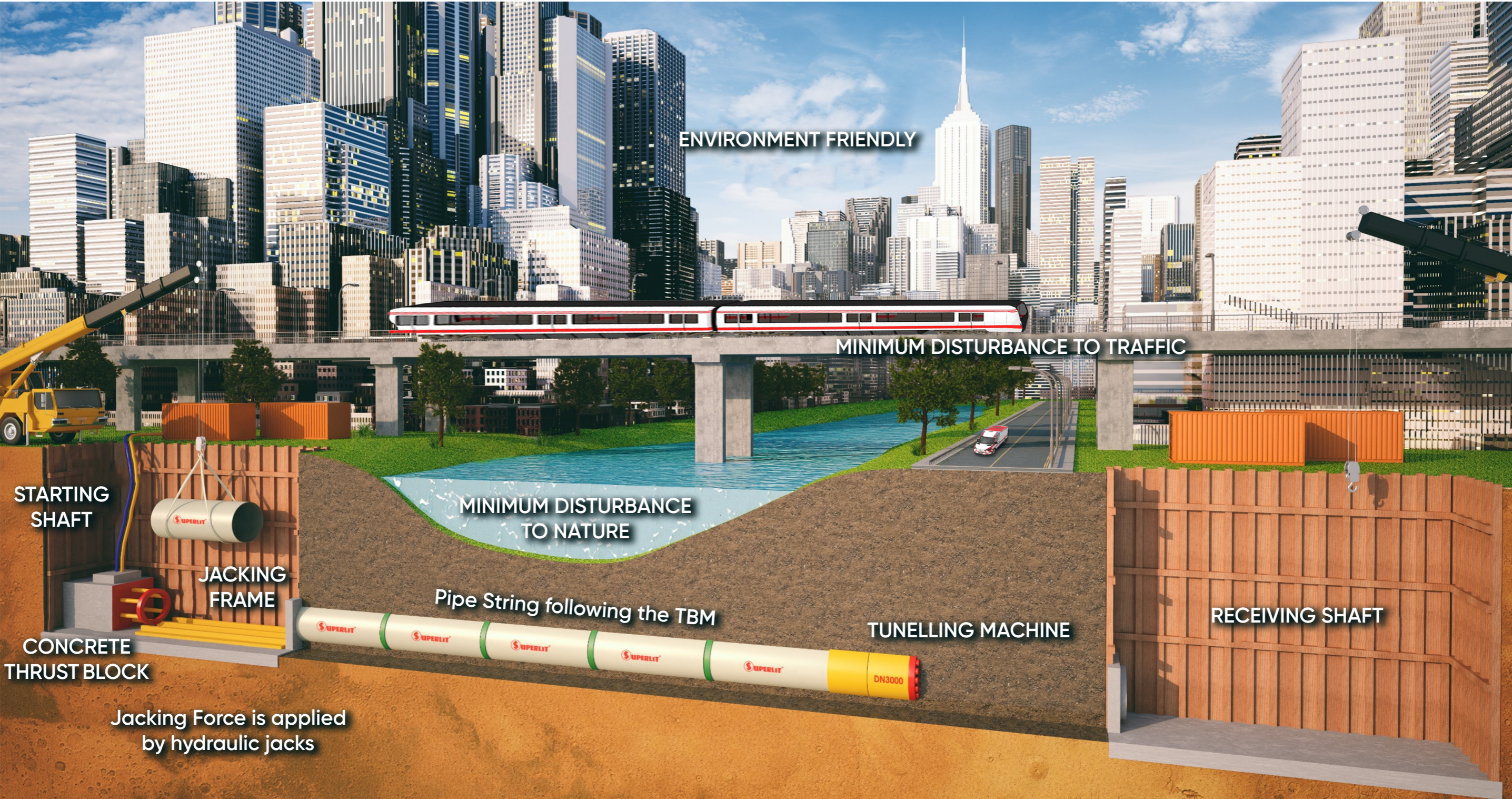
 ENVIRONMENT FRIENDLY AND SUSTAINABILITY

 WIDE FIELD SERVICE

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1. JACKING PIPES & BENEFITS



1.1 Introduction

Trenchless technologies are an engineering solution where it is not a good option to make open cut excavation for installation of underground pipelines. Within several technologies in this area; micro tunnelling method which is an underground tunnel construction technique has a wide acceptance due to its advantages. The machinery in this system is also called as TBM when worked diameters are in larger sizes, compared to micro tunnelling machines. When pipes are pushed behind the cutting machine by hydraulic jacking from a drive shaft, this method of construction

is called “pipe jacking”. Superlit Jacking pipes are designed to be used according to above shortly described technique.

When pipes are pushed or pulled inside an old or existing line, this system is another trenchless technology and generally called as “slip-lining” or “re-lining” and Superlit GRP products can be designed and used for this system also. Consult to Superlit for details of needs in this application area.

1.2 Purpose and Scope

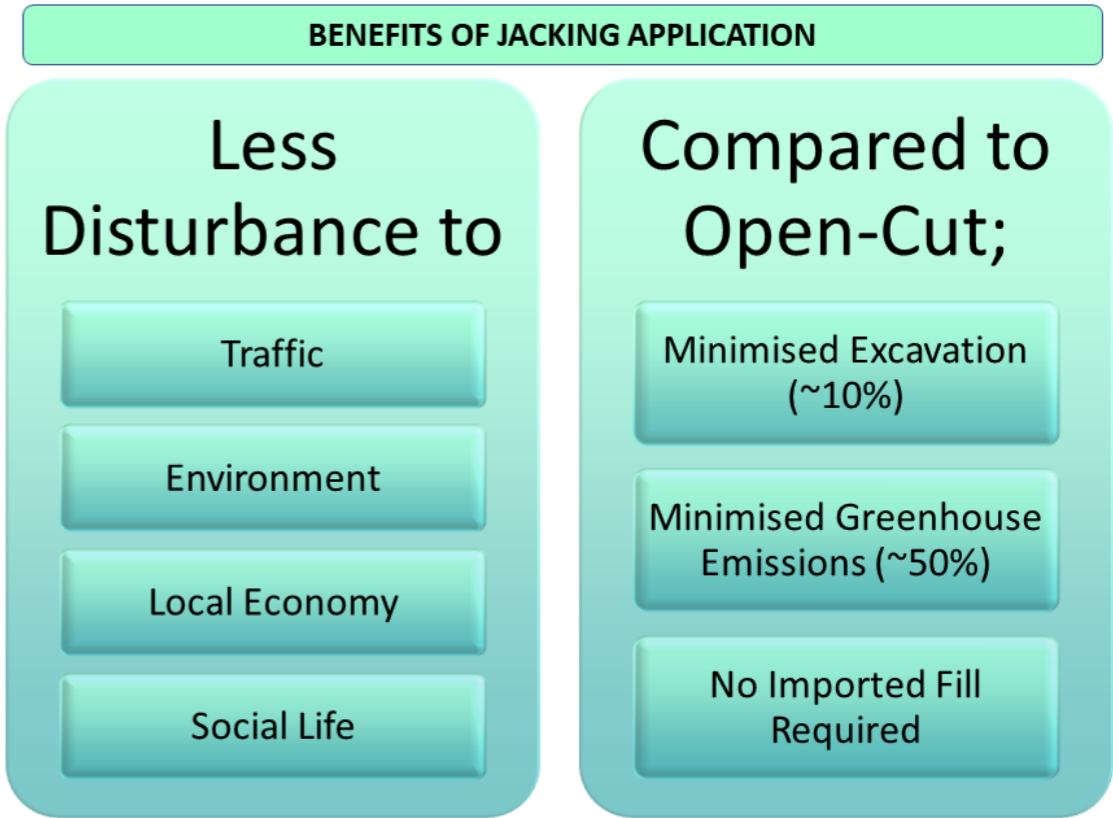
The purpose of this document is to guide on glass fiber reinforced thermosetting plastics – GRP piping systems (pipes and joints) intended to be installed with pipe jacking construction methodology.

1.3 Jacking Application and Benefits

There are various soil removal techniques in trenchless application such as steerable – non-steerable; manned – unmanned techniques. Each technique has its own different versions and machinery design. The selection of the trenchless technique depends on the borehole diameter, geological properties of the soil and ground water condition, jacking length and cover depth.

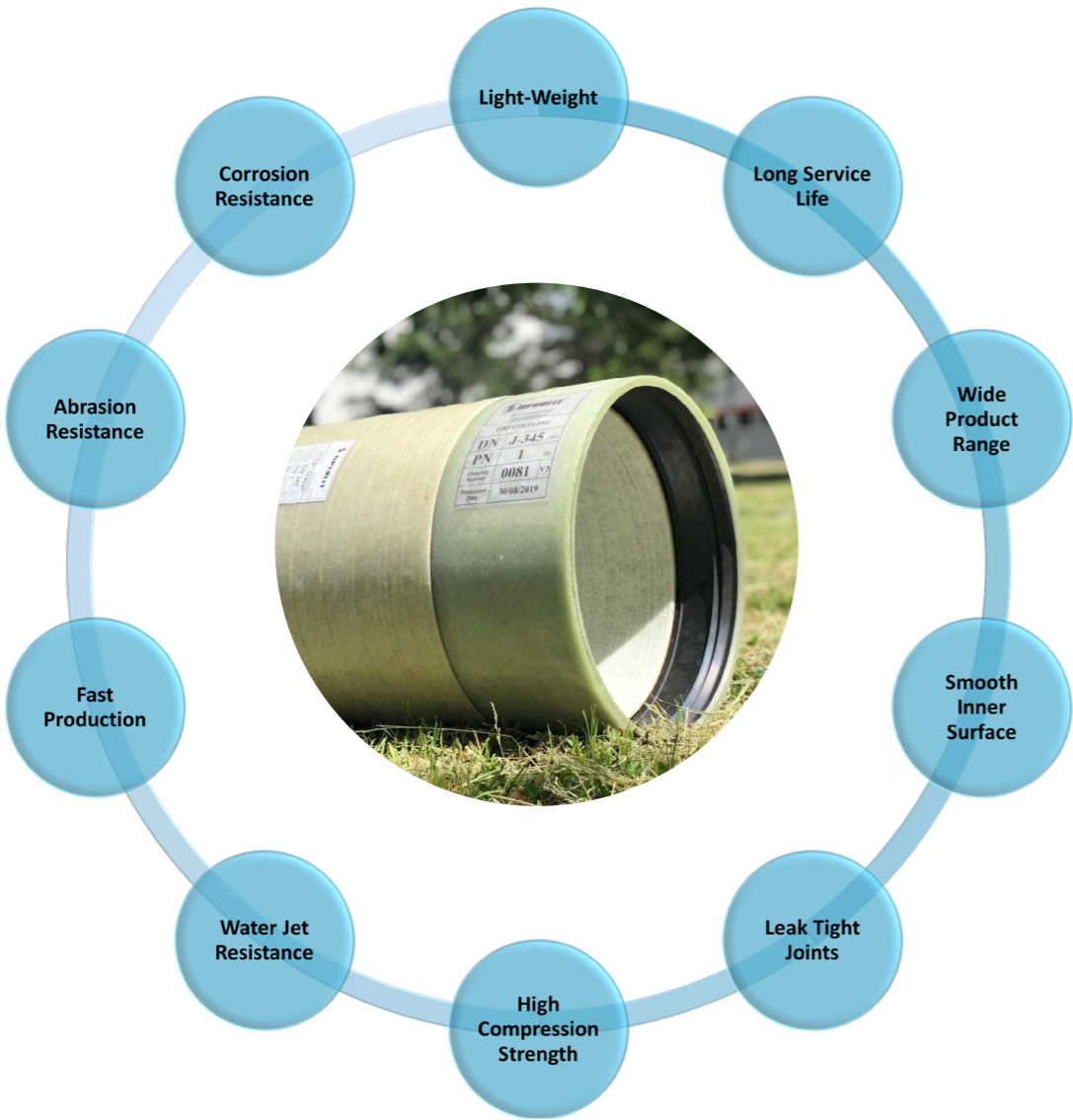
In non-steerable techniques there can be a misalignment on the route depending on the geological conditions and jacking distance. Steerable techniques are the choice where an accurate alignment is necessary for the project. Pipe jacking and micro-tunnelling technologies are mostly preferred where a precise alignment is required in order to avoid any damages to the other structures, service lines, adjacent building and civil engineering works. Laser beams, or navigation systems are located through the machine; measures, records and informs the machine operator related to any misalignment on the jacking route.

Pipe jacking systems also have, continuous lubricating system that reduces friction forces around pipe and soil and allows longer jacking lengths with less jacking forces.



1.4 GRP Jacking Pipes and Advantages

GRP jacking pipes have several advantages compared to the other rigid type of heavy weight jacking piping materials. Some of the benefits outcomes from the material properties of being a glass fiber reinforced composite and some of the benefits comes from the advantages from manufacturing processes as listed in below scheme.



Due to the above listed advantages, Superlit GRP Jacking pipes are the best choice for designers as an alternative to concrete and vitrified clay jacking pipes. Superlit GRP jacking pipes and joints are capable of resisting up to 16 bars internal pressure.

1.4.1 Raw Materials

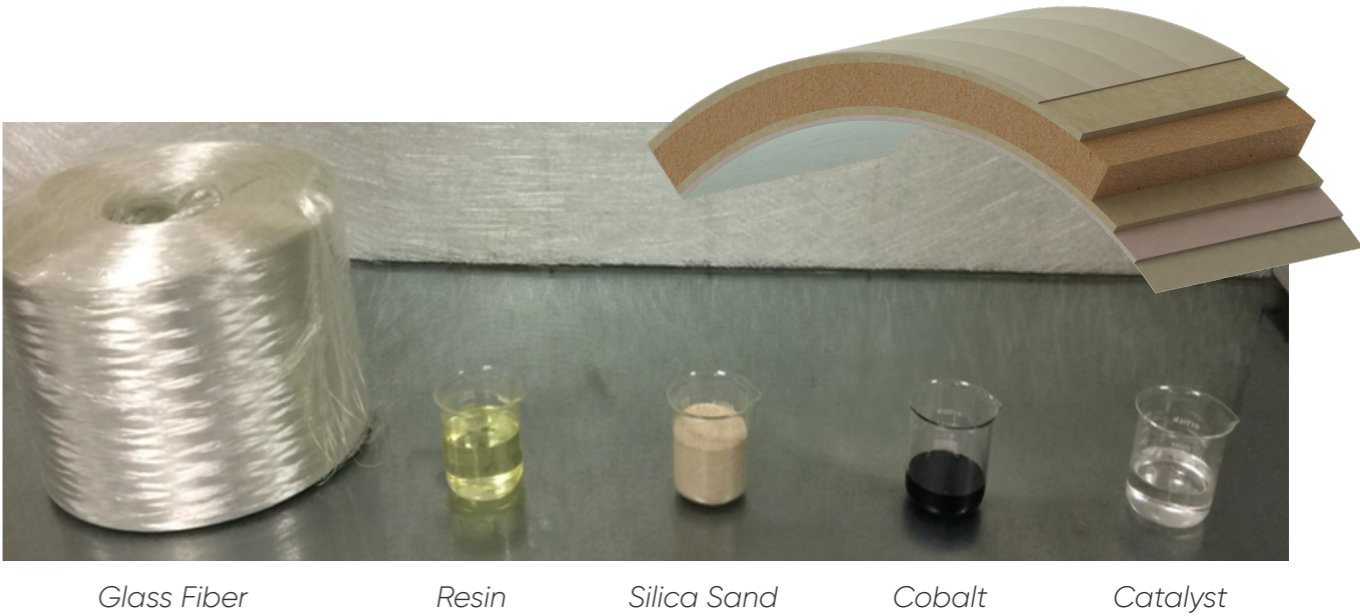
The main raw materials in the GRP composite structure are the polyester resin, glass fiber, silica sand filler and some chemicals such as cobalt and catalyst for proper curing of the structure. Type of the raw materials vary depending on the manufacturing technology in Superlit GRP Jacking Pipes. In accordance with the Quality Manual, only approved raw materials listed in vendor list can be used in production.

Quality plan is being followed for the testing of raw materials. At each delivery all raw materials are being tested in Superlit Raw Material Laboratory and can only be used in production after approval.

Glass Fiber: Glass fibers are the elements that gives the mechanical strength to GRP pipe. The most common type is E glass in production of GRP pipes. For a requirement of an improved properties against acid and chemicals ECR glass type is recommended. Fiberglass is generally used in the production as continuous roving cylindrical packages and can be directly used as a continuous hoop form and/ or chopped filament form depending on the selected manufacturing technology.

Resin: The second main component of the composite structure is the resin and it effects the chemical, thermal and mechanical properties of the structure. In the production of GRP pipes unsaturated polyester type thermosetting resins are used. Resin is the matrix of the composite structure, that keeps glass fibers and silica sand filler together in the designed orientation.

Filler: The other component that has a positive performance effect on the GRP structure is the silica sand filler. Silica sand filler which has a minimum 98% SiO₂ content provides stiffness and compressive strength to the GRP pipe.



1.4.2 Certificates, Standards and Performance Tests

SUPERLIT is the only GRP pipe manufacturer in Türkiye 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.



International product standard for GRP jacking pipes is ISO 25780. The main product standard for GRP pipes is ISO 23856 which is published recently. The full name of the standards is:

***ISO 25780:** Plastics piping systems for pressure and non-pressure water supply, irrigation, drainage or sewerage – Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin – Pipes with flexible joints intended to be installed using jacking techniques

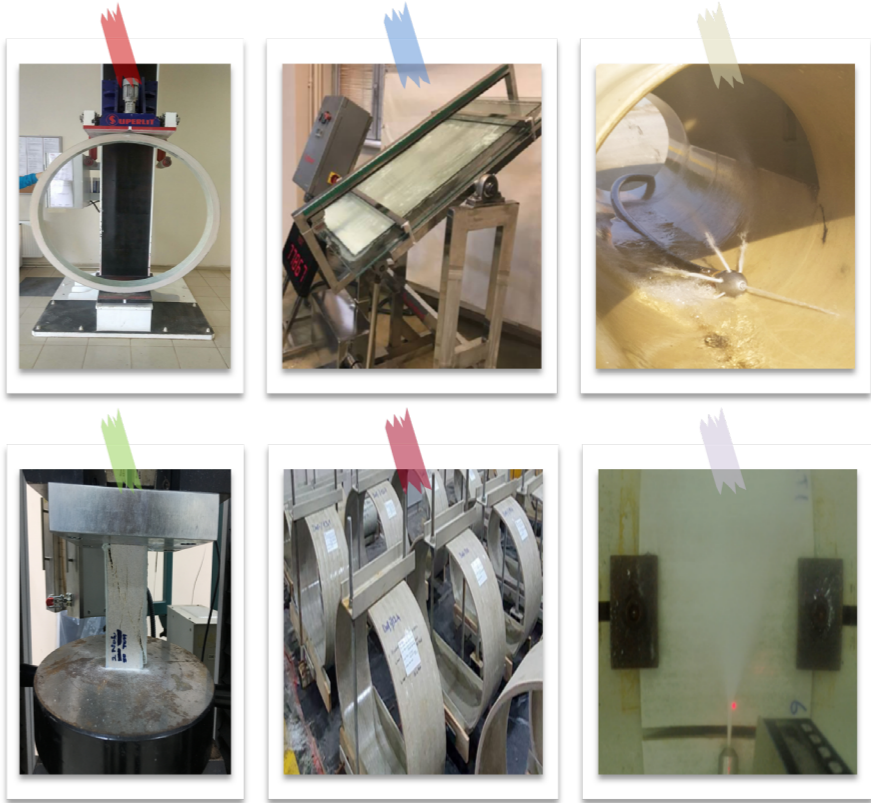
***ISO 23856:** Plastics piping systems for pressure and non-pressure water supply, drainage or sewerage – Glass-reinforced thermosetting plastics (GRP) systems based on unsaturated polyester (UP) resin

***ISO 10467 and ISO 10639** were the main reference standards for GRP pipes and test methods specified within ISO 25780. The main product standard of GRP Pipes is ISO 23856 which supersedes well known GRP standards: EN 1796, EN 14364, ISO 10467 and ISO 10639.

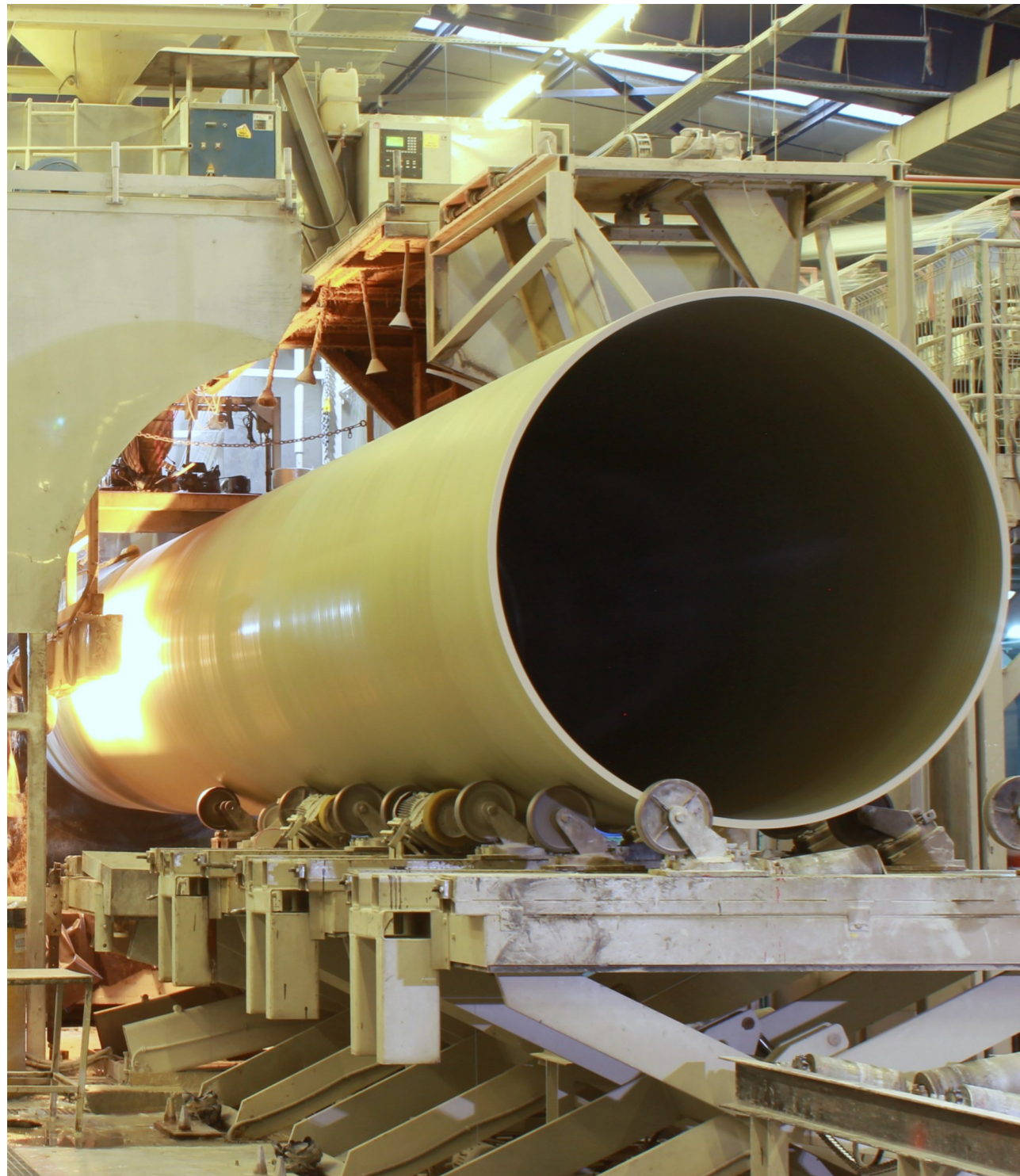
ISO 23856 merges and supersedes previous mentioned standards therefore it suits for all types of water supply and sewerage with or without pressure.



Standards developed by EN, ISO, AWWA, and ASTM cover a series of glass fiber 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. In addition to regular GRP pipe tests offered by the product standards, GRP jacking pipes are also subjected to longitudinal compressive strength test in order to prove jacking load limits.



2. DESIGN & MANUFACTURING



2.1 Design of GRP Jacking Pipes

Jacking load is calculated based on compressive strength test results which is defined in ISO25780 standard; by applying compression force to a prismatic test sample taken from jacking pipe in longitudinal direction. Ultimate compressive strength results vary between 85 to 110 MPa depending on the manufacturing technology and composition of pipe structure. In the design of jacking load, minimum values are used as 85 MPa for CFW and HW pipes and 90 MPa value is used for pipes manufactured with CC technology.



Allowable Jacking force is calculated by multiplying the minimum ultimate compression strength with minimum cross-sectional area (generally calibrated section at the joint zone). After that, $F_{sm}=1.75$ applied as material safety factor and $F_{se}=2$ applied as eccentric loading factor. In total $F_s=3.5$ applied and allowable jacking load is declared on product datasheets.

Depending on the geological conditions and soil loads, road-rail-aircraft traffic loads, influences related to jacking methodology i.e., route, annular gap grouting; stresses, deformations and buckling verifications should be checked in order to prove that pipe SN class is suitable for project conditions. DWA-A 161E standard has a detailed static calculation methodology for jacking pipeline designers in order to verify these mentioned controls. Due to this design approach pipe SN class is another classification of GRP jacking pipes presented for Jacking applications. Superlit propose SN class up to 1.000.000 N/m² for jacking pipes depending on the pipe diameter.



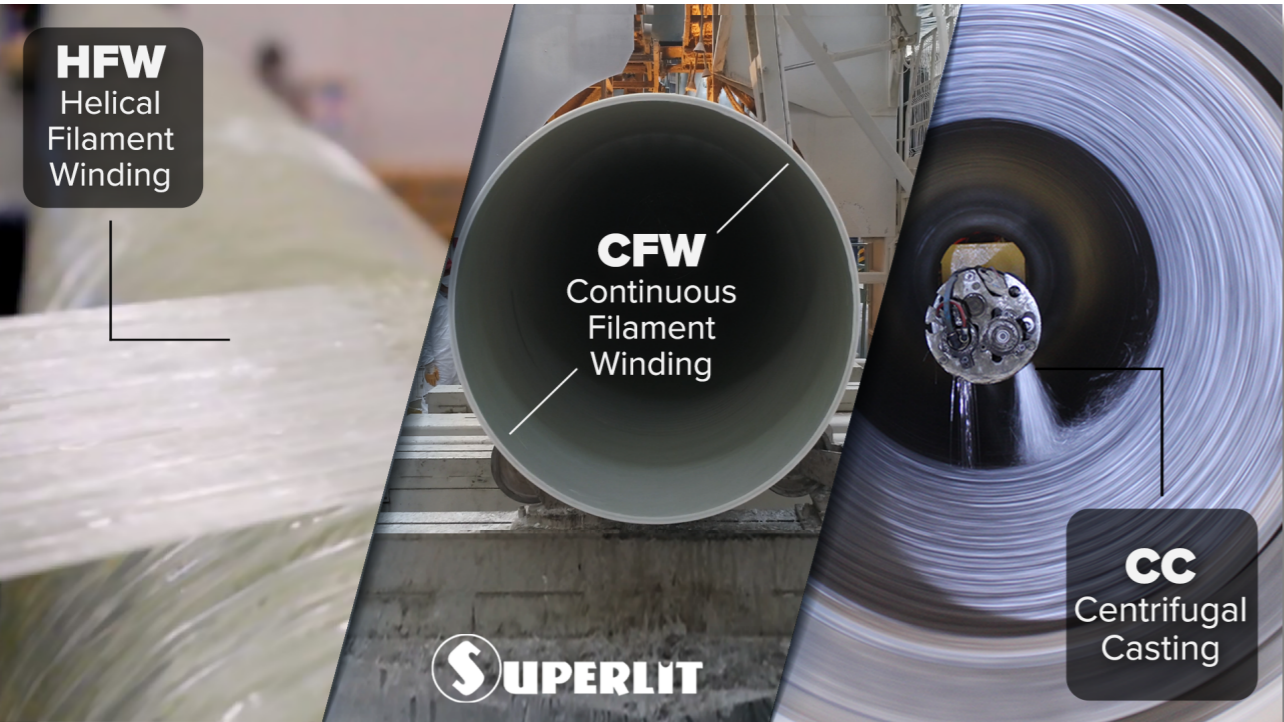


Below material characteristics given in technical parameters table and pipe geometry related characteristics documented in Superlit GRP Jacking Pipe Datasheets will help designers to choose correct pipe for their projects.

TECHNICAL PARAMETERS	
Product Standard	ISO 25780 – ISO 23856
Ultimate Axial Compression Strength	FW : min 85 MPa CC : min 90 MPa
Hoop Flexural Modulus	9000 – 11000 MPa
Safety Factor	Min 3,5 (Applied safety factor on declared Jacking load)
Specific Unit Weight	18 – 21 kN/m ³
Flow Coefficient	Hazen-Williams C=150 Manning n= 0,009
Service Temperature	-40°C +35°C (Higher temp. available up on request)
Thermal Expansion Coefficient	(24-30) x 10 ⁻⁶ mm/mm/°C
Poisson's Ratio	0,22 – 0,29

2.2 Manufacturing of Jacking Pipes

Superlit GRP jacking pipes can be produced with both manufacturing technologies of Continuous Filament Winding, Centrifugal Casting and Helical Winding. Selection of the production technology depends on project specification and product dimensional properties.



2.2.1 Continuous Filament Winding Method (CFW)

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.

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 Program 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 PLCPC modules provide an integrated process control in line with the pre-programmed designs. Basic

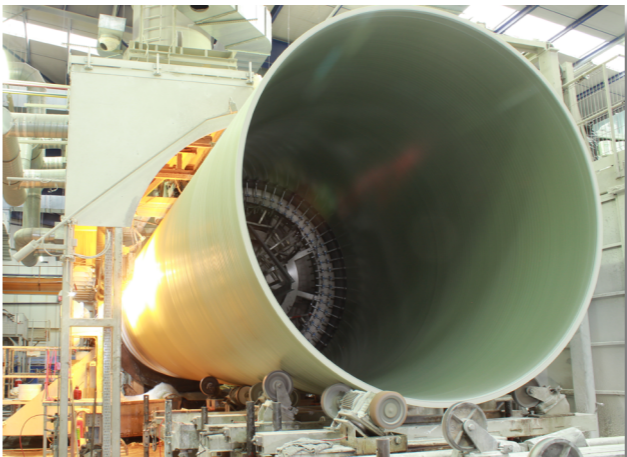
data, such as diameter, stiffness and pressure class are entered into the program. The PC calculates all the setting values of the machine. The process parameters and the thickness of the pipe are continuously monitored and traceability is provided by storing these data.

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.



2.2.2 Centrifugal Casting Method (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.

Distributions 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 1 mm, 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.

2.2.3 Helical Winding Method (HW)

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.

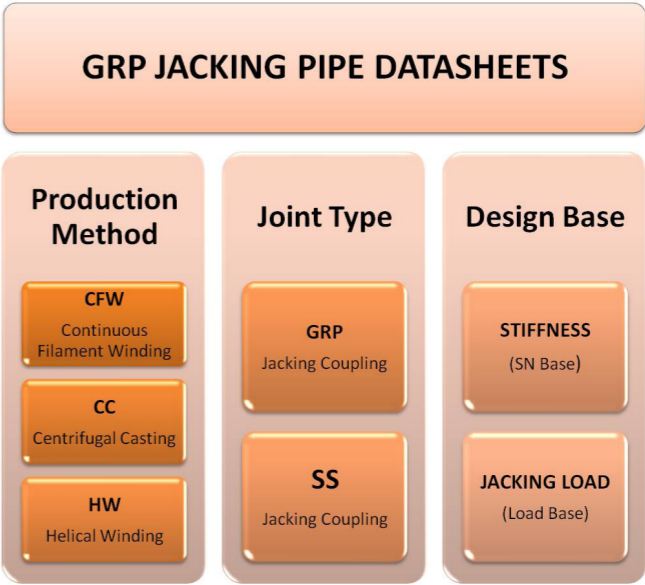
The inside diameter of the finished pipe is defined by mandrel outside diameter and designed wall thickness is achieved by repeated winding passes and the outside diameter of the pipe is determined by the wall thickness. Following the completion of the curing, mold is separated from the cured pipe by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



2.3 Superlit Jacking Pipes Product Range

Thanks to Superlit Production Technologies that, it is possible to manufacture GRP jacking pipes both on Continuous Filament Winding, Centrifugal Casting and Helical Winding Machines. Pipe joints can be designed with GRP coupling and or either SS coupling. Pipe properties can be read from several pages of datasheets given on the tables at Appendix. A depending on the SN based or load based classification.

Within datasheets Pipe OD, t, ID, Mass, Fmax, Pipe Stiffness, Production Method and Joint Type, information can be read in order to make an accurate design for the project. For special diameters or pipe classes it is advised to contact Superlit for availability.



GRP JACKING DATASHEET

CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : SN 100 000 – 1 000 000

OD (mm)	PIPE STIFFNESS SN (N/m ²)																							
	100 000				128 000				160 000				200 000				320 000				640 000			
	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax
	mm	mm	kg/m	kN	mm	mm	kg/m	kN	mm	mm	kg/m	kN	mm	mm	kg/m	kN	mm	mm	kg/m	kN	mm	mm	kg/m	kN
345	312,6	16,2	33	124	310,0	17,5	36	152	306,8	19,1	39	186	304,0	20,5	42	215	296,8	24,1	49	289				
376	340,8	17,6	40	157	338,0	19,0	43	190	334,4	20,8	46	232	331,0	22,5	50	270	323,4	26,3	58	356	311,0	32,5	70	491
427	387,0	20,0	51	243	384,0	21,5	55	283	379,8	23,6	60	338	376,0	25,5	64	387	367,4	29,8	74	497	353,2	36,9	90	672
478	433,2	22,4	64	348	429,6	24,2	69	401	425,0	26,5	75	469	421,0	28,5	80	527	411,2	33,4	93	667	395,4	41,3	113	885
515	466,6	24,2	75	435	462,8	26,1	80	495	457,4	28,8	88	581	453,6	30,7	93	640	443,0	36,0	108	803	426,0	44,5	131	1.056
530	480,4	24,8	79	468	476,4	26,8	85	534	471,2	29,4	92	618	467,0	31,5	99	686	456,0	37,0	115	860	438,4	45,8	139	1.130
550	498,4	25,8	85	521	494,2	27,9	91	593	489,0	30,5	100	681	484,8	32,6	106	751	473,0	38,5	124	945	455,0	47,5	150	1.231
618	560,0	29,0	107	763	555,2	31,4	116	855	549,6	34,2	125	961	544,6	36,7	134	1.055	531,6	43,2	156	1.295	511,0	53,5	190	1.664
650	589,0	30,5	119	814	584,0	33,0	128	915	578,0	36,0	139	1.035	572,8	38,6	148	1.137	559,2	45,4	172	1.401	537,6	56,2	210	1.808
718	651,0	33,5	144	1.040	645,2	36,4	156	1.169	638,0	40,0	170	1.328	632,8	42,6	181	1.441	617,6	50,2	211	1.767	594,0	62,0	255	2.258
760	688,8	35,6	162	1.159	682,8	38,6	175	1.300	675,0	42,5	192	1.482	669,6	45,2	203	1.606	653,8	53,1	236	1.965	628,8	65,6	286	2.515
820	743,0	38,5	189	1.345	736,8	41,6	203	1.502	729,2	45,4	221	1.694	722,4	48,8	236	1.863	705,4	57,3	274	2.279	678,0	71,0	334	2.930
860	775,6	40,2	207	1.506	773,0	43,5	223	1.682	764,4	47,8	244	1.909	758,0	51,0	259	2.076	740,0	60,0	301	2.539	711,0	74,5	368	3.261
924	837,2	43,4	240	1.810	830,2	46,9	258	2.010	821,6	51,2	281	2.254	814,0	55,0	300	2.467	795,0	64,5	348	2.992	764,0	80,0	424	3.821
960	869,8	45,1	259	1.987	862,8	48,6	278	2.195	853,6	53,2	303	2.466	845,6	57,2	324	2.699	826,0	67,0	376	3.261	794,0	83,0	457	4.151
1.026	930,0	48,0	295	2.318	922,0	52,0	318	2.572	912,0	57,0	347	2.887	904,0	61,0	370	3.136	882,4	71,8	430	3.798				
1.099	995,8	51,6	339	2.740	988,2	55,4	363	2.999	977,0	61,0	398	3.377	968,6	65,2	423	3.657	945,4	76,8	493	4.419				
1.127	1.021,2	52,9	357	2.906	1.013,0	57,0	383	3.192	1.002,0	62,5	419	3.572	992,6	67,2	447	3.894	969,4	78,8	519	4.675				
1.229	1.114,0	57,5	423	3.538	1.104,6	62,2	456	3.896	1.093,0	68,0	496	4.333	1.082,8	73,2	531	4.722								
1.290	1.169,0	60,5	467	3.966	1.160,0	65,0	500	4.325	1.147,0	71,5	547	4.840	1.136,0	77,0	587	5.271								
1.348	1.221,6	63,2	510	4.382	1.211,0	68,5	550	4.824	1.198,0	75,0	600	5.361	1.187,0	80,5	641	5.812								
1.399	1.267,8	65,6	549	4.767	1.257,0	71,0	592	5.235	1.243,0	78,0	647	5.835	1.232,0	83,5	690	6.302								
1.434	1.299,2	67,4	578	5.054	1.289,0	72,5	620	5.507	1.274,8	79,6	677	6.131	1.264,0	85,0	720	6.602								
1.499	1.359,0	70,0	628	5.539	1.348,0	75,5	675	6.050	1.333,0	83,0	738	6.740	1.321,0	89,0	788	7.287								
1.536	1.392,0	72,0	662	5.811	1.380,0	78,0	714	6.381	1.366,0	85,0	775	6.941												
1.638	1.485,0	76,5	750	6.142	1.472,0	83,0	811	6.802	1.460,0	89,0	866	7.405												
1.720	1.559,0	80,5	829	7.013	1.546,0	87,0	892	7.706																
1.842	1.670,0	86,0	948	8.173																				

Detailed information with product tolerances of an individual pipe is being shared for specific project is given in Jacking Pipe TDS. Consult to Superlit for project-based assistance.

3. JOINTS



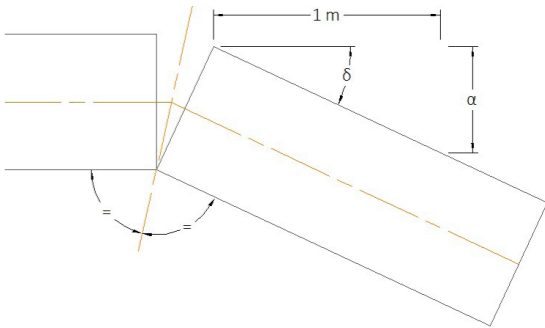
3.1 Jacking Pipe Joints

Superlit Jacking pipes has flexible coupling joints, provides leak tightness during construction and operation periods. This leak tightness refers to both internal and external water pressures, and also for pressures caused by lubricants.

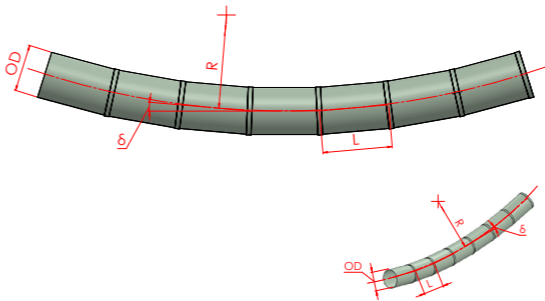
The outside diameter of Jacking pipe joint/ coupling does not exceed the external diameter of pipe body. This joints system is also called as “flush joint”.

Flexible joint design allows to angular deviation in accordance with the requirement of ISO25780 standard as given in below table. With this joint capability, pipe string can follow a radius in pipe jacking projects with curved line.

External diameter	Max. allowable installed deflection	
OD (mm)	α (mm/m)	δ (degrees)
OD ≤ 200	20	1,1458
200 < OD ≤ 500	15	0,8594
500 < OD ≤ 1000	10	0,5729
1000 < OD	α = 10x (1000/OD)	atan (α/1000)



Minimum radius (R) of the curved line can be calculated by using above table depending on the OD, max allowable angular deflection at joint and jacking pipe length. Minimum R values can be found as a reference in below table calculated for selected pipe diameters.



OD (mm)	α (mm/m)	δ (°)	*Rmin (m)
478	15	0,8594	200
860	10	0,5729	300
1099	9,1	0,5213	330
1434	7	0,3995	430
1842	5,4	0,3110	560
2453	4,1	0,2336	740
2858	3,5	0,2005	860
* Rmin = Permissible minimum radius for selected diameters Considering a jacking pipe length of 3.0 m			

Material of the coupling can be selected as GRP, Coated Steel, Stainless Steel with SS304, SS316, or SS 316Ti depending on the pressure and chemical requirement.

During installation, applied jacking load transferred from one pipe to the next generates axial compression forces acting on the cross section of the pipe. In practice, a perfect contact of the jacking faces is not common and, in most cases, jacking loads are transferred with an eccentricity. This eccentric loading is an expected result when pipeline is intentionally designed with curves. This reduced contact area has already been considered in design of Superlit Jacking pipes and declared jacking loads are calculated by including an additional factor of safety of 2 as a stress eccentricity ratio.

Sealing material is generally chosen from EPDM which has very good chemical resistance and meets the requirement of EN 681-1 standard. Sealing element with different material can be manufactured in accordance with project specific requirements.

3.1.1 GRP Jacking Coupling

GRP jacking coupling is a flush joint 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 aggressive conditions. Special designed full face rubber profile integrated with the coupling during production, ensures leak tightness by help of its GRP structure of body and fully comply with the performance requirements of ISO 25780 standard.



3.1.2 Stainless Steel Jacking Coupling

Most of the Jacking pipe suppliers use Steel or Stainless Steel at the connections of pipe spigots. Stainless Steel Jacking Couplings were very popular due to corrosion resistance property before GRP composite Jacking couplings introduced in the market.



EPDM Sealing Rubber is bonded to SS Sleeve firmly and can provide leak tightness up to 16 bars internal pressures. The grade of SS material is SS304 preferably and other grades such as SS316, SS316Ti are available upon request for special project conditions.

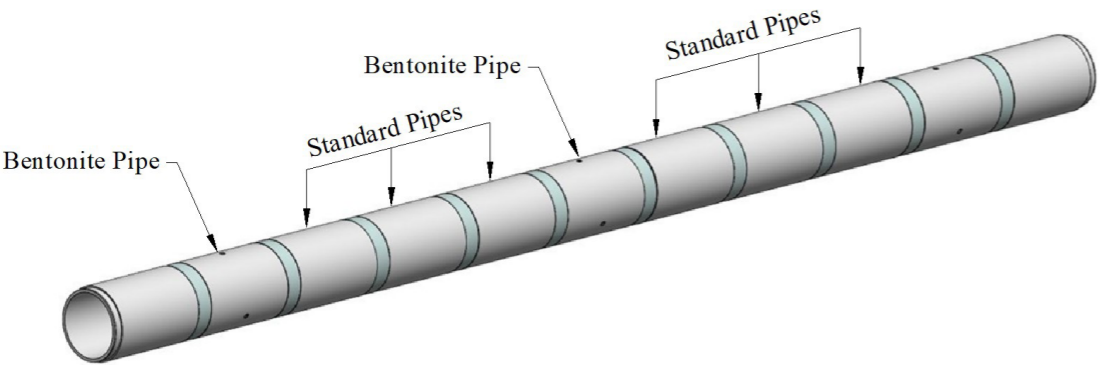
In concrete jacking pipes and vitrified clay jacking pipes, jacking forces are usually distributed from one pipe to the other with pressure transfer rings in order to distribute jacking load evenly between the pipe faces. Solid wood or OSB boards are being used for this purpose.

For GRP pipes, due to the elastic properties of material itself, jacking loads are transferred to the next pipe through the pipe face without using pressure transfer ring.

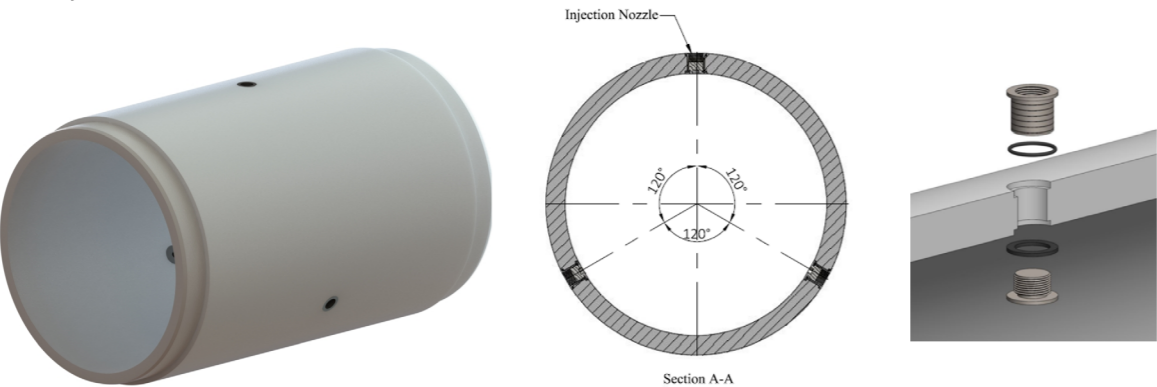
3.2 Bentonite Pipe & Injection Nozzles

For long run jacking applications, in order to reduce friction forces between pipe external surface and soil, annular gap is lubricated with bentonite suspension. The basic functions of bentonite injection are to support excavated area, lubricate the pipe surface for easy sliding, and to provide a buoyant region at the annular gap.

Lubrication medium is distributed to the gap between pipe and soil through the injection nozzles that has been located over pipe. In general injection ports are placed within an interval of 9-15 m depending on the properties of the ground. In such a case, depending on the pipe segment length every 3rd – 5th pipe is prepared with lubrication system consisting of injection nozzles. These pipes specifically instrumented with injection nozzles are generally called **"bentonite pipe"**.



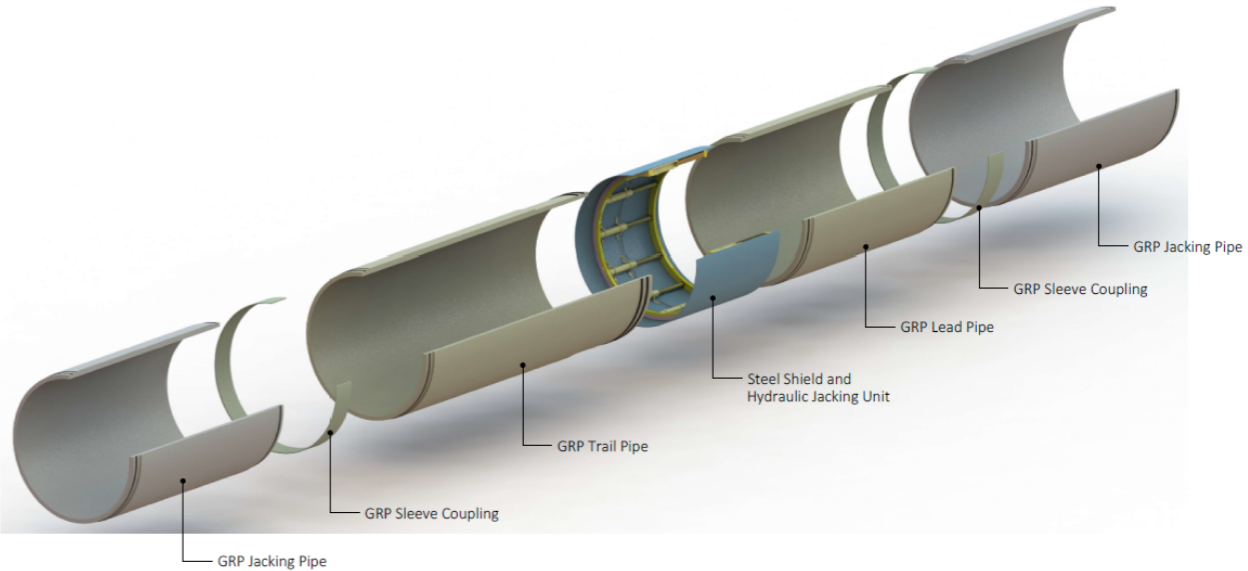
Injection nozzles are generally 1" diameter brass or stainless steel, with a length designed to fit pipe wall thickness. In general, 3 injection port distributed on the circumference of the pipe is the common design. Port quantity and frequency along the pipe string can be reduced depending on the project requirements.



Contact injection will cause an external pressure outside of the pipe. Injection pressure and volume should be measured in order to prevent an accidental return of the injection fluid or damage to the jacking pipe. Where there is water table on the jacking route, injection pressure should be adjusted slightly above the groundwater pressure.

3.3 Intermediate Jacking Station

Intermediate jacking stations (IJS) are jacking units located in the pipe string in order to provide additional thrust; divide and separate pipeline to prevent exceeding the capacity of main jacking station or jacking pipes. IJS consists of steel shield and hydraulic jacking cylinders distributed evenly on the whole circumference. These components are removed after the final stage and jacking string is being completed. Special designed jacking pipes are installed in front and behind the steel shield. These specifically designed grp pipes have different sealing elements, additional lubrication ports and special calibration lengths in order to adapt frequent longitudinal movements during application.

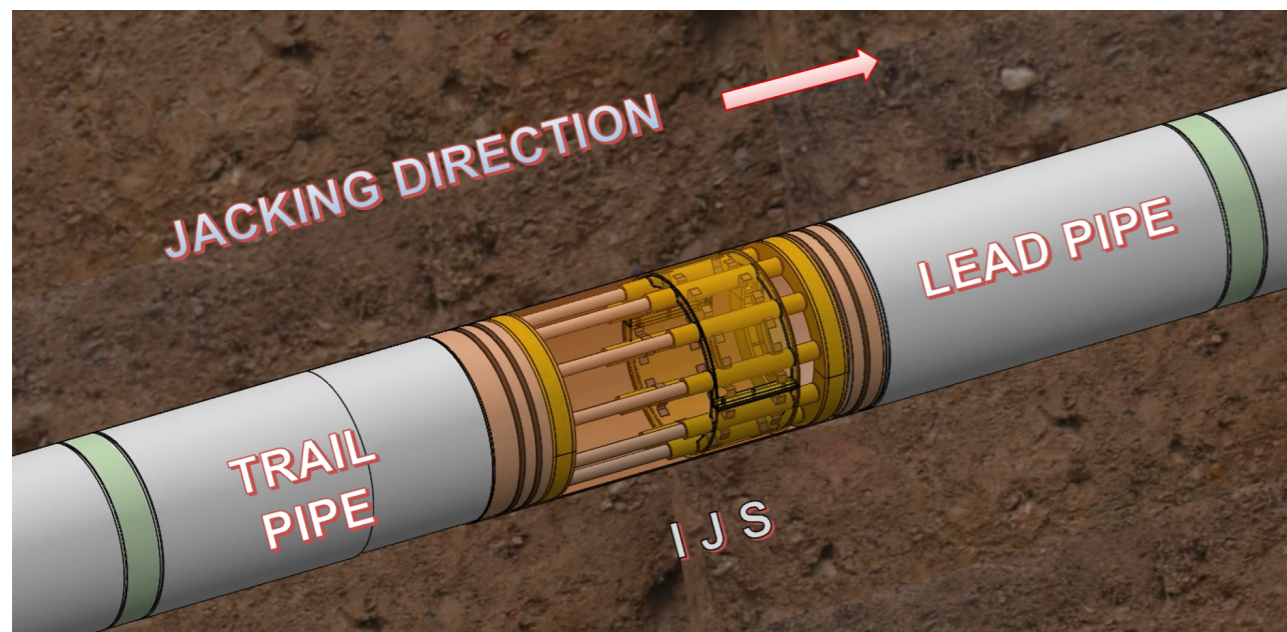
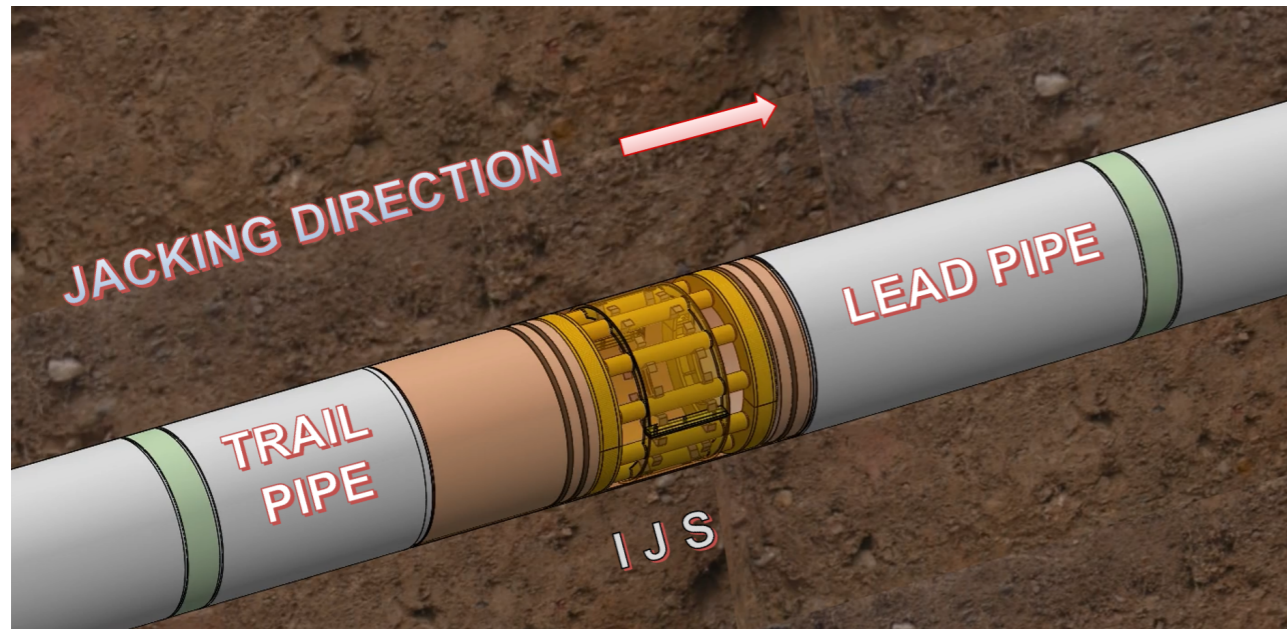


Inside of the steel shield has to be smooth, free from any grooves and bulges that can damage sealing gasket during longitudinal bi-directional movements.

Special pipe located between steel shield and receiving shaft is called "Lead pipe" that is in front of the steel shield; while the pipe located between starting pit and steel shield is called "Trail pipe" that is behind the steel shield. Trail pipe has two sealing element, lubrication ports to lubricate gaskets and a long pipe body calibration to allow steel shield slide over along the length of jacking cylinders stroke. The other side of the trail pipe is machined for integration with regular grp jacking pipes. Lead pipe sealing element is different than trail pipe seals, since there will be not be a continuous and both directional movement at this joint side.

It is recommended to use wooden rings between steel and grp pipe faces to allow even distribution of jacking forces. Wooden rings are not necessary between grp-to-grp joints.

Depending on the theoretical jacking force calculations based on geological conditions and drive length; quantity and the distance between IJS can be estimated. During installation phase, with the aid of automatic data recording system maximum jacking force at the shaft should be checked. As a general practice IJS is added to the pipe string where the applied jacking force exceeds 80% of the maximum allowable jacking force of the pipes or any other components in the system.



4. INSTALLATION GUIDE



This chapter gives brief information as a reference to contractors and field engineers, regarding the installation steps of jacking pipes. There may be other national or local construction codes; project specifications documented for the project, or jacking method related special conditions may arise on site. Therefore, client has to consult manufacturer when there is a conflict between parties or where there are unclear conditions.

4.1 Handling & Storage

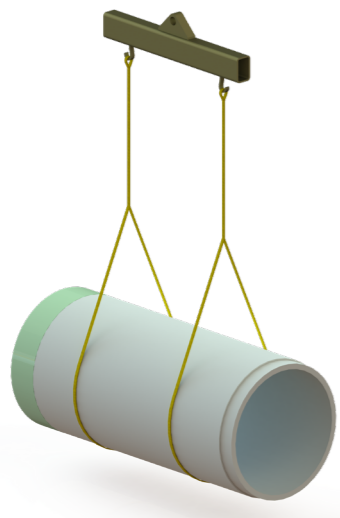
4.1.1 Handling of Jacking Pipes

When pipes received to site, goods have to be visually checked if there are any transportation related damages. This section can be followed through GRP pipe installation manual for detailed sketches and explanations



During the offloading of jacking pipes, or lowering pipes to the launch shaft, textile straps must be used. All lifting slings, and connection elements must be free from damages and has to be adequate in handling the jacking pipe weight. It is not allowed to use steel cables or chains directly in contact with grp material which can cause a damage in grp material surface or jacking coupling. Other important points to be followed as below during handling operations.

- ④ Identify proper lifting points and methods.
- ④ Visually control each product for damages or cracks and report any damage. Damaged goods should not be used unless inspected and repaired by Superlit personnel.
- ④ While loading, unloading or placing jacking pipes on the ground, prevent any impact with rigid objects to avoid structural damage.
- ④ Based on jacking pipe diameters, lengths and weights, as well as jobsite conditions, crane-lifting strap method or forklift can be used for these operations.
- ④ Use at least two lifting straps when lifting the pipe in horizontal position. Take care about the accessories which can change the centre of gravity. Guide ropes can help to control pipe manually.
- ④ Jacking pipe should not be dropped or rolled, which can cause serious damages.



4.1.2 Storage of Jacking Pipes

If the jacking pipes will be unloaded to stock area before installation it is recommended to store goods with original packages. General requirements for storage area and related considerations are listed below.



- ④ The storage area should be flat, levelled and clear of objects such as rocks, stones, sharp edges, etc.
- ④ Pipes can be stored in piles to minimize the storage area within the allowed limits. Maximum stack height is recommended as 2.5 m and it is not recommended to stack pipes greater than DN 1200.
- ④ Precautions have to be considered to prevent goods, from rolling or falling due to wind effects.
- ④ If jacking couplings are delivered separately as bundles, couplings should be stored at horizontal position to prevent radial deflection.
- ④ Vegetable based lubricants used for pipe and coupling installation should always be stored in their original packaging.

4.2 Installation of Jacking Pipes

4.2.1 Dimensional Controls

Jacking pipe diameter, pipe lengths, injection nozzles, lead pipe, trail pipe and all necessary elements in the whole string has been designed and confirmed by the client prior to installation. During the installation, before lowering the pipes inside the launch shaft; field technicians should control if there is any critical deviation on the goods, and report if any.

GRP Jacking pipe nominal outside diameter is declared in product datasheets and pipe spigot diameter is calibrated according to joint design and suitability between machinery and jacking frame connectors of the pipe spigots

agreed before production. Due to the nature of the Filament Winding and Helical Winding production processes; actual outside of the pipe barrel at all cross sections can be variable from the declared nominal diameter.

Jacking machine boring head diameter is generally 15-40 mm larger than the nominal outside diameter of pipe, therefore max OD of pipe is always less than the bored gap in practice. ISO25780 standard recommends that; the maximum OD of pipe shall be agreed between purchaser and manufacturer; for specific project conditions.

4.2.2 Pipe Assembly

Below steps and controls should be followed during the installation of jacking pipes;

- ❶ Pipes should be lowered into the launching pit by means of textile straps, as described in handling section. Extra care should be taken not to damage grp/ss jacking coupling and spigot end.
- ❷ Depending on the jacking frame and TBM machine shield design, jacking coupling can be on the front end or back end. It has to be controlled that pipe is placed in correct position.
- ❸ It has to be checked that pipe spigot, coupling and injection nozzles are free from dirt, and to be cleaned if any.
- ❹ EPDM gasket of the joint should be lubricated with vegetable-based lube before assembly.
- ❺ Pipe should be kept in straight horizontal alignment during pushing pipe end inside the joint.
- ❻ During the stock condition, pipe may be pre-deflected due to self-weight/stocked pipes weight. Therefore, it is recommended to turn pipe that will be installed 900 at least 4-6 hours prior to installation. In general, the clearance between pipe and coupling is enough for alignment and jointing, this method can be followed if found necessary by site practices.
- ❼ It has to be checked through the machine records that applied jacking loads are not exceeding the allowable jacking load of the pipe.
- ❽ Allowable angular deflection values given in Section 3.1 of this manual should not be exceeded.
- ❾ When jacking string is designed with intermediate jacking stations, trailer pipe sealings has to be lubricated frequently from the nozzles over the pipe in order to ensure functionality of the gasket performance.
- ❿ If the jacking line is a section of a standard open cut project, use necessary adaptors for the connection between jacking pipe and regular pipes. If the jacking pipe is a continuous system consisting from several jacking drives, manholes or special connectors can be used to finalize and close gaps inside shaft.



5. APPENDIX

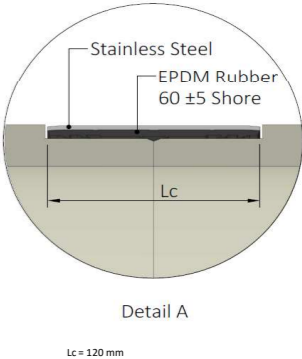
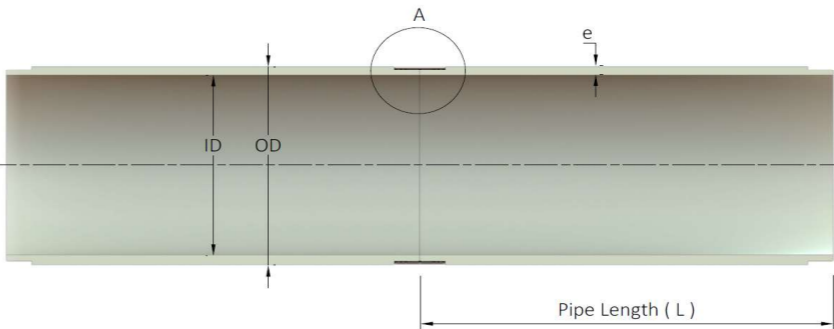
Jacking Pipe Datasheets

HELICAL FILAMENT WINDING (HW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : SN 120 000 – 1 000 000

OD (mm)	120 000				200 000				320 000				640 000				1 000 000			
	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
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
272	242,0	15,0	22	111	236,0	18,0	26	160	232,0	20,0	29	192	212,0	30,0	41	345	192,0	40,0	52	483
324	288,0	18,0	31	194	280,0	22,0	38	272	272,0	26,0	44	348	252,0	36,0	59	528	242,0	41,0	66	620



Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressive strength = 85 N/mm²
* 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.

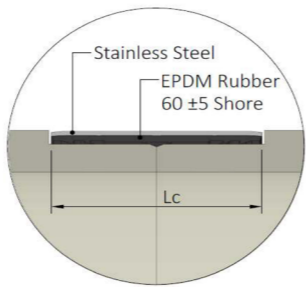
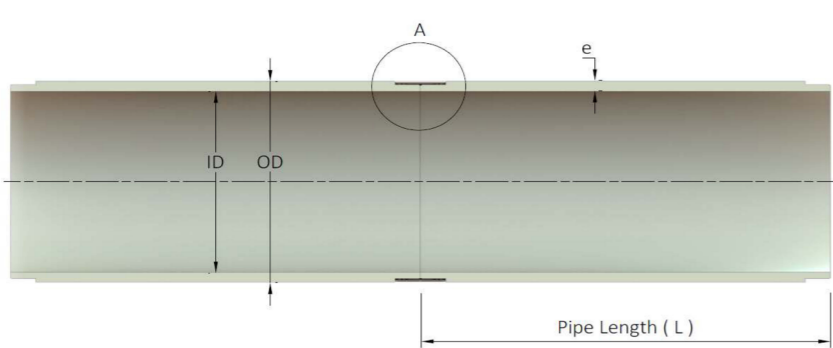


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : SN 20 000 – 80 000

OD (mm)	PIPE STIFFNESS (N/m ²)																							
	20 000						32 000						40 000						50 000					
	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
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
345	326,4	9,3	20	18	323,5	10,8	23	50	321,8	11,6	24	69	319,4	12,8	27	96	317,2	13,9	29	120	315,2	14,9	31	141
376	355,8	10,1	23	39	352,6	11,7	27	78	350,6	12,7	29	102	348,0	14,0	32	133	345,8	15,1	34	160	343,6	16,2	37	186
427	404,0	11,5	30	84	400,4	13,3	35	133	398,0	14,5	38	166	395,4	15,8	41	202	392,8	17,1	44	237	390,2	18,4	47	272
478	452,2	12,9	38	138	448,0	15,0	44	203	445,6	16,2	47	240	442,6	17,7	51	285	440,8	18,6	54	313	436,8	20,6	59	373
515	487,2	13,9	44	183	482,8	16,1	50	256	480,0	17,5	55	302	476,8	19,1	59	355	474,6	20,2	63	390	470,4	22,3	69	459
530	501,6	14,2	46	198	497,0	16,5	53	277	494,0	18,0	58	328	490,8	19,6	63	382	487,4	21,3	68	439	484,4	22,8	73	489
550	520,4	14,8	50	228	515,7	17,2	57	311	513,0	18,5	62	359	509,2	20,4	68	426	505,8	22,1	73	485	502,6	23,7	78	540
618	584,8	16,6	63	330	579,5	19,3	72	435	576,0	21,0	79	505	572,2	22,9	86	580	568,4	24,8	92	654	565,0	26,5	98	720
650	615,0	17,5	70	385	609,0	20,5	81	511	606,0	22,0	87	574	601,8	24,1	95	661	597,8	26,1	102	743	594,0	28,0	109	821
718	679,6	19,2	84	459	673,0	22,5	98	612	669,6	24,2	105	690	664,8	26,5	115	800	660,4	28,8	125	900	656,0	31,0	134	1.000
760	718,0	21,0	97	576	712,6	23,7	110	708	708,8	25,6	118	801	703,6	28,2	130	927	699,0	30,5	140	1.038	694,4	32,8	150	1.148
820	776,0	22,0	110	676	769,0	25,5	127	862	764,6	27,7	138	978	759,2	30,4	151	1.119	754,0	33,0	163	1.254	749,4	35,3	174	1.373
860	814,0	23,0	121	767	806,0	27,0	141	989	802,0	29,0	151	1.099	796,4	31,8	165	1.253	790,8	34,6	179	1.406	785,8	37,1	192	1.541
924	874,0	25,0	141	853	865,0	29,0	163	1.092	862,0	31,0	174	1.211	855,6	34,2	191	1.399	850,0	37,0	206	1.563	844,0	40,0	222	1.738
960	908,0	26,0	153	950	900,0	30,0	175	1.198	895,0	32,5	189	1.352	889,0	35,5	206	1.536	883,0	38,5	223	1.718	877,0	41,5	239	1.900
1.026	971,0	27,5	172	1.118	962,0	32,0	200	1.417	957,0	34,5	215	1.581	950,0	38,0	236	1.810	943,6	41,2	255	2.018	938,0	44,0	271	2.199
1.099	1.040,0	29,5	198	1.344	1.030,0	34,5	231	1.699	1.025,0	37,0	247	1.875	1.017,6	40,7	270	2.135	1.011,0	44,0	292	2.364	1.004,0	47,5	314	2.607
1.127	1.066,6	30,2	208	1.431	1.056,2	35,4	243	1.810	1.051,0	38,0	260	1.998	1.043,0	42,0	286	2.285	1.036,6	45,2	307	2.513	1.029,8	48,6	329	2.754
1.229	1.163,0	33,0	248	1.789	1.153,0	38,0	284	2.187	1.146,0	41,5	309	2.463	1.138,0	45,5	338	2.776	1.130,2	49,4	366	3.080	1.123,0	53,0	391	3.358
1.290	1.220,0	35,0	276	2.049	1.209,0	40,5	318	2.508	1.202,4	43,8	343	2.781	1.194,4	47,8	373	3.110	1.186,6	51,7	402	3.428	1.178,4	55,8	432	3.761
1.348	1.275,0	36,5	301	2.276	1.264,0	42,0	344	2.755	1.257,0	45,5	372	3.058	1.248,0	50,0	408	3.445	1.240,0	54,0	439	3.786	1.231,6	58,2	471	4.143
1.399	1.323,4	37,8	323	2.483	1.311,4	43,8	373	3.026	1.304,2	47,4	402	3.349	1.295,0	52,0	440	3.759	1.286,6	56,2	474	4.131	1.278,2	60,4	508	4.501
1.434	1.357,0	38,5	337	2.613	1.344,0	45,0	393	3.216	1.337,0	48,5	422	3.538	1.327,6	53,2	461	3.967	1.318,8	57,6	498	4.367	1.310,0	62,0	534	4.764
1.499	1.418,6	40,2	368	2.901	1.405,0	47,0	429	3.560	1.398,0	50,5	459	3.897	1.388,0	55,5	503	4.375	1.379,0	60,0	542	4.802	1.369,0	65,0	585	5.274
1.536	1.453,4	41,3	388	2.982	1.439,6	48,2	450	3.667	1.432,0	52,0	485	4.041	1.422,0	57,0	529	4.531	1.412,0	62,0	574	5.017	1.402,0	67,0	618	5.500
1.638	1.550,0	44,0	440	3.474	1.536,0	51,0	508	4.216	1.527,0	55,5	552	4.689	1.516,0	61,0	604	5.263	1.506,4	65,8	650	5.761	1.496,0	71,0	699	6.297
1.720	1.628,0	46,0	484	3.878	1.612,0	54,0	565	4.768	1.603,2	58,4	609	5.253	1.592,0	64,0	666	5.867	1.582,0	69,0	715	6.412	1.572,0	74,0	765	6.953
1.842	1.743,0	49,5	557	4.582	1.726,0	58,0	650	5.594	1.717,0	62,5	698	6.126	1.705,0	68,5	763	6.831	1.694,0	74,0	822	7.472	1.683,0	79,5	880	8.109
1.944	1.839,4	52,3	621	5.199	1.822,0	61,0	721	6.292	1.812,0	66,0	778	6.916	1.800,0	72,0	846	7.659	1.787,0	78,5	920	8.459	1.774,0	85,0	992	9.254
2.046	1.936,0	55,0	688	5.840	1.918,0	64,0	797	7.031	1.907,0	69,5	863	7.753	1.894,0	76,0	940	8.600	1.882,0	82,0	1.011	9.378	1.870,0	88,0	1.082	10.150
2.160	2.044,0	58,0	766	6.305	2.026,0	67,0	881	7.562	2.014,0	73,0	957	8.394	2.000,0	80,0	1.045	9.358	1.987,0	86,5	1.126	10.248				
2.250	2.129,0	60,5	832	6.943	2.110,0	70,0	958	8.325	2.097,0	76,5	1.044	9.263	2.083,0	83,5	1.136	10.267	2.069,6	90,2	1.223	11.222				
2.453	2.321,0	66,0	989	8.469	2.300,0	76,5	1.142	10.134	2.286,0	83,5	1.243	11.235	2.273,0	90,0	1.336	12.252								
2.553	2.416,0	68,5	1.069	9.241	2.393,0	80,0	1.242	11.138	2.379,0	87,0	1.347	12.285	2.369,0	92,0	1.422	13.099								
2.658	2.514,5	71,5	1.161	10.150	2.492,5	82,5	1.334	12.040	2.477,5	90,0	1.451	13.319												
2.758	2.610,0	74,0	1.247	10.995	2.586,6	85,7	1.438	13.081																
2.858	2.704,0	77,0	1.345	11.964	2.680,4	88,8	1.544	14.144																
2.962	2.803,0	79,5	1.439	12.895																				
3.065	2.901,0	82,0	1.536	13.856																				



Lc = 120 mm (OD: 345 – 860 mm)
Lc = 140 mm (OD: 924 – 1434 mm)
Lc = 170 mm (OD: 1499 – 3065 mm)

Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * Pipe wall thicknesses and stiffness values are calculated theoreticly. 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.



CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : SN 100 000 – 1 000 000

OD (mm)	PIPE STIFFNESS (N/m ²)																																									
	100 000						128 000						160 000						200 000						320 000						640 000						1 000 000					
	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax										
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN										
345	312,6	16,2	33	169	310,0	17,5	36	197	306,8	19,1	39	231	304,0	20,5	42	260	296,8	24,1	49	334																						
376	340,8	17,6	40	219	338,0	19,0	43	251	334,4	20,8	46	293	331,0	22,5	50	331	323,4	26,3	58	417	311,0	32,5	70	552	301,6	37,2	79	651														
427	387,0	20,0	51	315	384,0	21,5	55	354	379,8	23,6	60	409	376,0	25,5	64	459	367,4	29,8	74	568	353,2	36,9	90	744	342,4	42,3	102	873														
478	433,2	22,4	64	427	429,6	24,2	69	480	425,0	26,5	75	547	421,0	28,5	80	605	411,2	33,4	93	745	395,4	41,3	113	964	383,4	47,3	128	1.124														
515	466,6	24,2	75	520	462,8	26,1	80	580	457,4	28,8	88	666	453,6	30,7	93	725	443,0	36,0	108	888	426,0	44,5	131	1.141	413,0	51,0	149	1.329														
550	480,4	25,8	79	556	476,4	26,8	85	621	471,2	29,4	92	706	467,0	31,5	99	773	456,0	37,0	115	948	438,4	45,8	139	1.218	425,0	52,5	157	1.416														
580	498,4	28,8	85	612	494,2	27,9	93	684	489,0	30,5	100	772	484,8	32,6	106	842	473,0	38,5	124	1038	455,0	47,5	150	1.312	441,0	54,5	170	1.553														
618	560,0	29,0	107	817	555,2	31,4	116	909	549,6	34,2	125	1.015	544,6	36,7	134	1.109	531,6	43,2	156	1349	511,0	53,5	190	1.717	496,0	61,0	213	1.976														
660	589,0	30,5	119	932	584,0	33,0	128	1.023	578,0	36,0	139	1.143	572,8	38,6	148	1.245	559,2	45,4	172	1.510	537,6	56,2	210	1.916	521,4	64,3	237	2.210														
718	651,0	33,5	144	1.112	645,2	36,4	156	1.241	638,0	40,0	170	1.399	632,8	42,6	181	1.513	617,6	50,2	211	1.839	594,0	62,0	255	2.329	576,0	71,0	288	2.691														
760	688,5	35,6	162	1.281	682,8	38,6	175	1.422	679,0	42,5	192	1.604	669,4	45,2	203	1.728	653,8	53,1	236	2.087	628,8	65,5	286	2.637	609,4	75,3	324	3.049														
820	743,0	38,5	189	1.537	736,8	41,6	203	1.694	729,5	45,4	221	1.885	722,4	48,8	236	2.058	705,4	57,3	274	2.481	680,8	71,0	334	3.121	658,0	81,0	376	3.589														
860	779,6	40,4	207	1.707	773,0	43,5	223	1.883	764,4	47,8	244	2.110	758,0	51,0	259	2.277	740,0	60,0	301	2.740	711,0	64,5	368	3.462																		
924	837,2	43,2	240	1.934	830,2	46,9	258	2.134	821,6	51,2	281	2.378	814,0	55,0	300	2.591	795,0	64,5	348	3.116	764,0	80,0	424	3.945																		
960	869,8	45,1	259	2.115	862,8	48,6	278	2.324	853,6	53,2	303	2.594	845,6	57,2	324	2.828	826,0	67,0	376	3.390	794,0	83,0	457	4.279																		
1.026	930,0	48,0	295	2.456	920,0	52,0	318	2.710	912,0	57,0	347	3.024	904,0	61,0	370	3.274	882,4	71,8	430	3.936																						
1.099	995,8	51,9	339	2.888	988,2	55,4	363	3.147	977,0	61,0	398	3.524	968,6	65,2	423	3.805	945,4	76,8	493	4.567																						
1.127	1.021,2	52,9	357	3.057	1.013,0	57,0	383	3.343	1.002,0	62,5	418	3.724	992,6	67,2	447	4.045	969,4	78,8	519	4.826																						
1.229	1.114,0	57,5	423	3.704	1.104,6	62,2	456	4.061	1.093,0	68,0	496	4.499	1.082,6	73,2	531	4.887																										
1.290	1.169,0	60,5	467	4.104	1.160,0	65,0	500	4.499	1.147,0	71,5	547	5.014	1.136,0	77,0	587	5.445																										
1.348	1.221,6	63,2	510	4.563	1.211,0	68,5	550	5.006	1.198,0	75,0	600	5.543	1.187,0	80,5	641	5.993																										
1.399	1.276,6	65,6	549	4.955	1.251,0	71,0	592	5.423	1.243,0	78,0	647	6.024	1.232,0	83,5	690	6.491																										
1.434	1.298,2	67,0	587	5.247	1.289,0	72,5	630	5.800	1.274,8	79,6	677	6.325	1.264,0	85,0	720	6.795																										
1.499	1.359,0	70,0	628	5.742	1.348,0	75,5	675	6.253	1.333,0	83,0	738	6.943	1.321,0	89,0	788	7.489																										
1.536	1.392,0	72,0	662	5.979	1.380,0	78,0	714	6.550	1.366,0	85,0	775	7.210																														
1.638	1.485,0	76,5	750	6.859	1.472,0	83,0	811	7.519	1.460,0	89,0	866	8.122																														
1.720	1.559,0	80,5	829	7.651	1.546,0	87,0	892	8.348																																		
1.842	1.670,0	86,0	948	8.857																																						

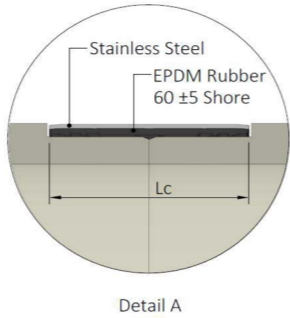
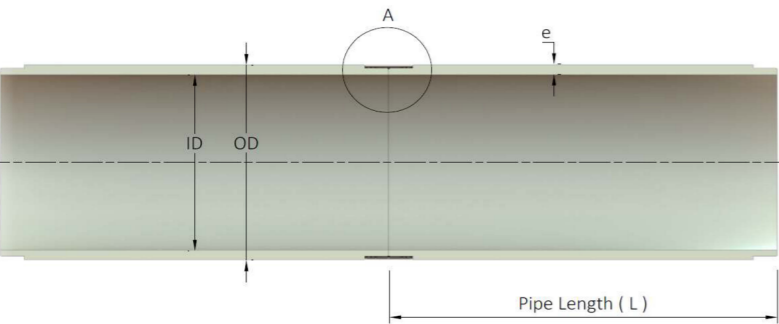


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 50 – 150 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
50	376	320.0	28.0	61	494.183
	427	377.0	25.0	63	228.188
	478	432.0	23.0	66	122.547
	515	471.0	22.0	68	84.310
	530	486.0	22.0	70	77.060
	550	508.0	21.0	70	59.353
	618	579.0	19.5	73	32.814
	650	612.0	19.0	75	25.901
	718	678.0	20.0	88	22.319
	760	720.0	20.0	93	18.730
	820	778.0	21.0	105	17.225
	860	816.0	22.0	116	17.167
	924	878.0	23.0	130	15.782
	960	914.0	23.0	135	14.032
	1.026	978.0	24.0	151	13.037
	1.099	1.051.0	24.0	162	10.557
	1.127	1.079.0	24.0	166	10.199
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
100	427	339.0	44.0	106	1.380.390
	478	390.0	44.0	120	948.700
	515	427.0	44.0	130	742.225
	530	460.0	35.0	109	321.832
	550	482.0	34.0	110	260.452
	618	556.0	31.0	114	134.095
	650	590.0	30.0	117	103.140
	718	661.0	28.5	123	64.294
	760	705.0	27.5	127	48.174
	820	768.0	26.0	130	31.967
	860	809.4	25.3	133	25.352
	924	873.0	25.5	144	20.812
	960	910.0	25.0	147	17.403
	1.026	974.0	26.0	163	16.001
	1.099	1.047.0	26.0	175	12.953
	1.127	1.075.0	26.0	180	11.989
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
150	515	413.0	51.0	149	1.205.045
	530	430.0	50.0	151	1.025.790
	550	454.0	48.0	151	793.340
	618	532.0	43.0	155	379.532
	650	568.0	41.0	157	276.915
	718	641.0	38.5	164	165.067
	760	686.0	37.0	168	121.629
	820	751.0	34.5	170	76.889
	860	793.0	33.5	174	60.430
	924	857.6	33.2	186	46.981
	960	896.0	32.0	186	37.209
	1.026	964.0	31.0	194	27.445
	1.099	1.040.0	29.5	198	19.045
	1.127	1.068.0	29.5	203	17.624
	1.229	1.171.0	29.0	219	12.808
	1.290	1.232.0	29.0	230	11.038



Lc = 120 mm (ID: 345 – 860 mm)
Lc = 140 mm (ID: 924 – 1434 mm)
Lc = 170 mm (ID: 1499 – 3065 mm)

Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.

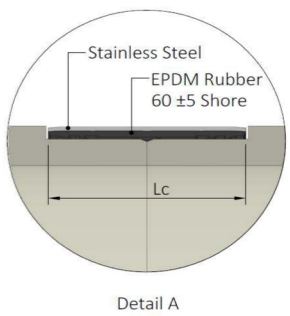
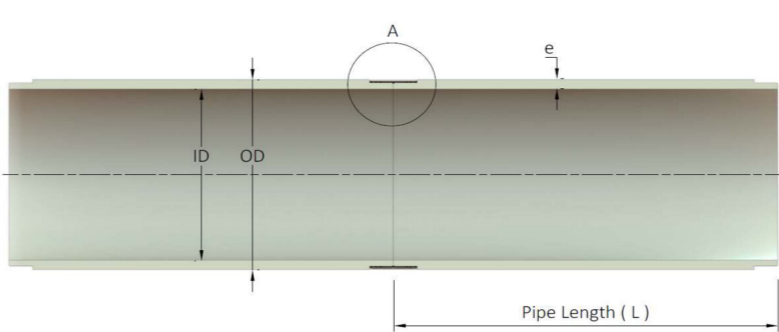
You can contact us at sales@superlit.com for dimensions, jacking forces and other technical data.

CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 200 – 400 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
200	618	508.0	55.0	194	807.618
	650	545.0	52.5	197	587.635
	718	621.0	48.5	204	329.319
	760	668.0	46.0	206	231.645
	820	734.0	43.0	210	146.820
	860	777.0	41.5	213	112.910
	924	842.0	41.0	227	86.719
	960	881.0	39.5	228	68.448
	1.026	951.0	37.5	233	47.294
	1.099	1.028.0	35.5	237	32.219
	1.127	1.057.0	35.0	240	28.522
	1.229	1.163.0	33.0	248	18.197
	1.290	1.224.0	33.0	261	15.674
	1.348	1.284.0	32.0	264	12.454
	1.399	1.335.0	32.0	275	11.112
	1.434	1.370.0	32.0	282	10.300
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
300	760	626.0	67.0	292	782.831
	820	688.0	61.0	291	448.684
	860	743.2	58.4	294	334.972
	924	812.0	56.0	305	232.621
	960	851.6	54.2	308	185.586
	1.026	924.0	51.0	312	123.977
	1.099	1.002.2	48.4	319	84.697
	1.127	1.032.0	47.5	322	73.800
	1.229	1.141.0	44.0	327	44.345
	1.290	1.205.0	42.5	333	34.252
	1.348	1.266.0	41.0	337	26.740
	1.399	1.319.0	40.0	341	22.088
	1.434	1.356.0	39.0	342	18.928
	1.499	1.423.0	38.0	349	15.242
	1.536	1.462.0	37.0	348	13.027
	1.638	1.565.0	36.5	367	10.255
	1.720	1.642.0	39.0	412	10.818
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
400	924	778.0	73.0	390	546.793
	960	820.0	70.0	391	421.471
	1.026	895.0	65.5	395	274.710
	1.099	976.0	61.5	401	180.428
	1.127	1.007.0	60.0	402	154.029
	1.229	1.118.0	55.5	409	91.637
	1.290	1.184.0	53.0	412	68.134
	1.348	1.246.0	51.0	415	52.666
	1.399	1.299.0	50.0	424	44.108
	1.434	1.337.0	48.5	422	37.158
	1.499	1.405.4	46.8	427	28.994
	1.536	1.444.0	46.0	430	25.489
	1.638	1.549.0	44.5	445	18.865
	1.720	1.634.0	43.0	453	14.603
	1.842	1.756.0	43.0	486	11.829
	1.944	1.858.0	43.0	513	10.025



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.



CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING

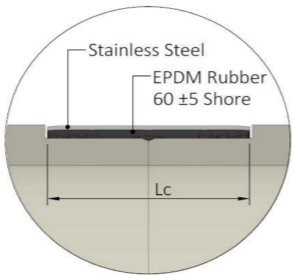
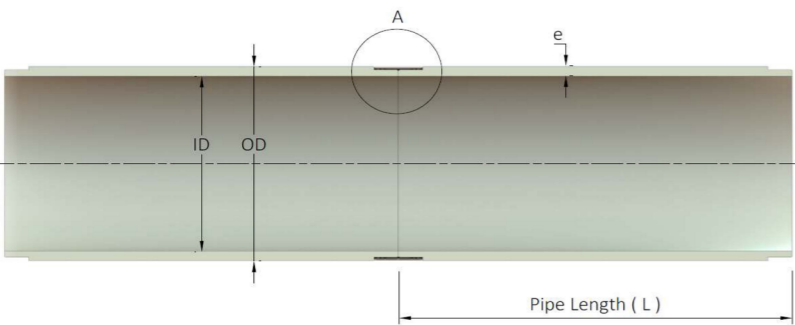


GRP JACKING PIPE TABLE : LOAD 500 – 700 TONS

GRP JACKING PIPE TABLE : LOAD 800 – 1200 TONS

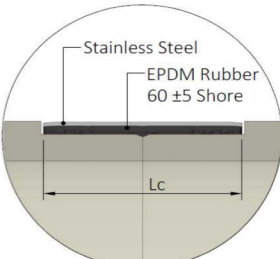
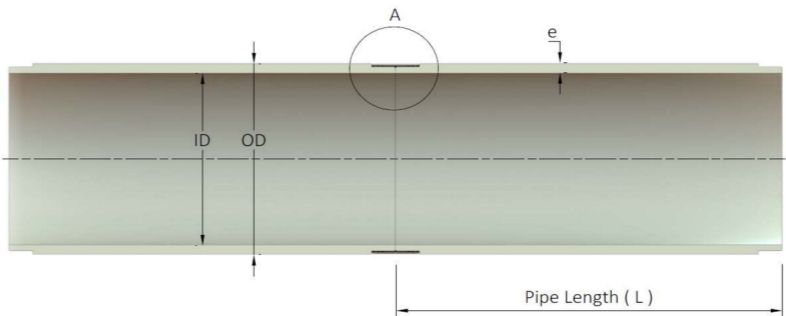
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
500	1.026	866,0	80,0	475	498.943
	1.099	950,0	74,5	479	317.239
	1.127	981,0	73,0	483	274.095
	1.229	1.095,0	67,0	489	158.147
	1.290	1.162,0	64,0	493	117.361
	1.348	1.225,0	61,5	497	90.126
	1.399	1.279,0	60,0	505	74.228
	1.434	1.317,6	58,2	503	62.454
	1.499	1.387,0	56,0	507	48.219
	1.536	1.426,0	55,0	512	42.255
	1.638	1.532,0	53,0	528	30.846
	1.720	1.618,0	51,0	535	23.539
	1.842	1.745,0	48,5	546	16.315
	1.944	1.852,0	46,0	548	11.745
	2.046	1.954,0	46,0	578	10.038
	2.160	2.064,0	48,0	637	10.169
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
600	1.099	922,0	88,5	562	554.211
	1.127	955,0	86,0	562	465.154
	1.229	1.071,0	79,0	571	267.449
	1.290	1.139,0	75,5	576	198.199
	1.348	1.204,0	72,0	577	148.217
	1.399	1.259,0	70,0	584	120.552
	1.434	1.298,0	68,0	583	101.772
	1.499	1.368,0	65,5	590	78.702
	1.536	1.408,0	64,0	592	67.806
	1.638	1.515,0	61,5	609	48.978
	1.720	1.602,0	59,0	615	36.974
	1.842	1.731,0	55,5	623	24.736
	1.944	1.838,0	53,0	629	18.164
	2.046	1.943,0	51,5	645	14.203
	2.160	2.058,0	51,0	675	11.666
	2.250	2.150,0	50,0	691	10.169
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
700	1.399	1.239,0	80,0	663	174.869
	1.434	1.278,0	78,0	664	149.170
	1.499	1.349,0	75,0	671	114.507
	1.536	1.390,0	73,0	671	97.367
	1.638	1.498,0	70,0	689	69.732
	1.720	1.586,0	67,0	696	52.190
	1.842	1.716,0	63,0	704	34.807
	1.944	1.824,0	60,0	710	25.316
	2.046	1.930,0	58,0	724	19.463
	2.160	2.045,0	57,5	759	16.031
	2.250	2.139,0	55,5	765	12.678
	2.453	2.349,0	52,0	784	10.057
	2.553	2.452,0	50,5	794	10.169
	2.658	2.559,5	49,0	803	10.390

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
800	1.499	1.329,0	85,0	755	170.250
	1.536	1.370,0	83,0	757	146.088
	1.638	1.480,0	79,0	773	101.981
	1.720	1.570,0	75,0	775	74.279
	1.842	1.700,0	71,0	790	50.501
	1.944	1.810,0	67,0	790	35.646
	2.046	1.916,0	65,0	809	27.686
	2.160	2.032,0	64,0	842	22.312
	2.250	2.126,0	62,0	852	17.832
	2.453	2.337,0	58,0	872	11.131
	2.553	2.441,0	56,0	878	10.237
	2.658	2.549,5	54,0	883	10.306
	2.758	2.652,0	53,0	900	10.239
	2.858	2.756,0	51,0	899	10.144
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
1000	1.842	1.670,0	86,0	948	87.220
	1.944	1.780,0	82,0	959	63.416
	2.046	1.890,0	78,0	964	46.228
	2.160	2.007,0	76,5	1.001	36.754
	2.250	2.102,0	74,0	1.011	29.202
	2.453	2.315,0	69,0	1.033	18.002
	2.553	2.419,0	67,0	1.046	14.535
	2.658	2.527,5	65,0	1.058	11.703
	2.758	2.632,0	63,0	1.066	10.012
	2.858	2.736,0	61,0	1.071	10.269
	2.962	2.844,0	59,0	1.076	10.389
	3.065	2.951,0	57,0	1.077	10.105
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
1200	2.250	2.076,0	87,0	1.182	43.315
	2.453	2.293,0	80,0	1.192	28.449
	2.553	2.399,0	77,0	1.197	22.331
	2.658	2.508,5	74,5	1.208	17.815
	2.758	2.614,0	72,0	1.215	14.301
	2.858	2.718,0	70,0	1.226	11.752
	2.962	2.826,0	68,0	1.236	10.167
	3.065	2.933,0	66,0	1.243	10.552



Detail A

Lc = 120 mm (OD: 345 – 860 mm)
Lc = 140 mm (OD: 924 – 1434 mm)
Lc = 170 mm (OD: 1499 – 3065 mm)



Detail A

Lc = 120 mm (OD: 345 – 860 mm)
Lc = 140 mm (OD: 924 – 1434 mm)
Lc = 170 mm (OD: 1499 – 3065 mm)

Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.

Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
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- * 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.

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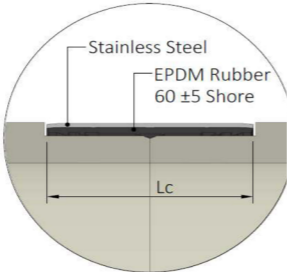
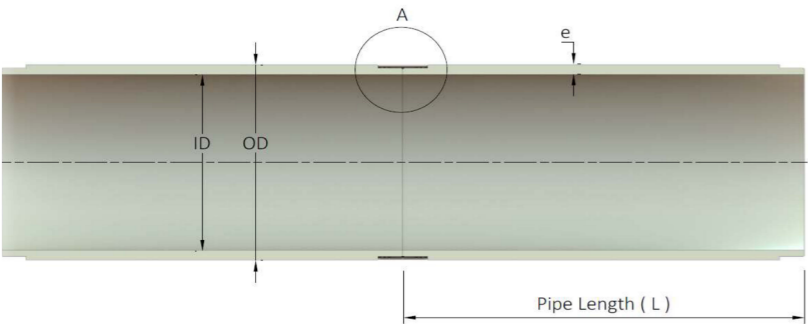


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 1400 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
1400	2.453	2.271,0	91,0	1.350	42.460
	2.553	2.377,0	88,0	1.362	33.783
	2.658	2.487,5	85,0	1.373	26.785
	2.758	2.592,0	83,0	1.394	22.180
	2.858	2.698,0	80,0	1.396	17.732
	2.962	2.808,0	77,0	1.395	14.117
	3.065	2.915,0	75,0	1.408	11.718



Detail A

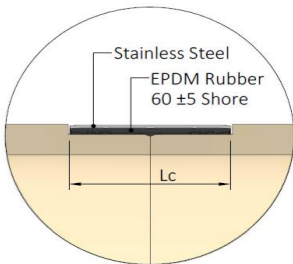
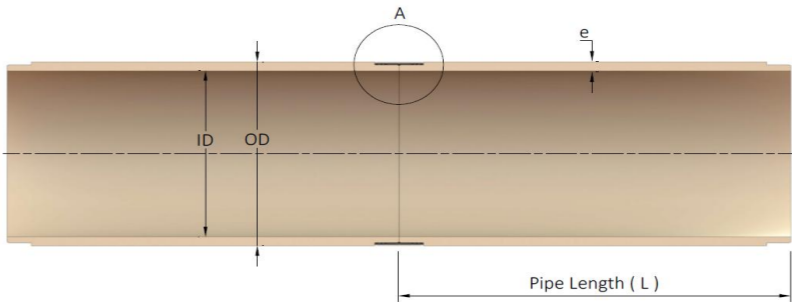
Lc = 120 mm (OD: 345 – 860 mm)
Lc = 140 mm (OD: 924 – 1434 mm)
Lc = 170 mm (OD: 1499 – 3065 mm)

CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING

GRP JACKING PIPE TABLE : SN 32 000 – 640 000

OD (mm)	PIPE STIFFNESS SN (N/m ²)															
	32 000				40 000				50 000				64 000			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
427	X	X	X	X	X	X	X	X	393,6	16,7	40	263	391,4	17,8	42	295
530	X	X	X	X	491,6	19,2	57	421	489,2	20,4	61	463	486,0	22,0	66	520
616	574,8	20,6	71	552	571,6	22,2	77	618	568,6	23,7	83	618	565,0	25,5	89	754
718	670,4	23,8	97	753	666,6	25,7	105	845	663,0	27,5	113	932	658,8	29,6	122	1.033
820	765,8	27,1	128	1.049	761,6	29,2	139	1.166	757,4	31,3	149	1.282	752,4	33,8	162	1.419
924	863,2	30,4	160	1.330	858,4	32,8	173	1.480	853,6	35,2	186	1.630	848,0	38,0	202	1.803
1.026	959,0	33,5	196	1.701	953,8	36,1	212	1.881	948,4	38,8	229	2.068	942,0	42,0	248	2.288
1.229	1.149,2	39,9	280	2.590	1.143,2	42,9	302	2.840	1.136,8	46,1	326	3.105	1.129,4	49,8	353	3.410
1.434	1.341,8	46,1	379	3.647	1.334,6	49,7	409	3.998	1.327,2	53,4	442	4.356	X	X	X	X

OD (mm)	PIPE STIFFNESS SN (N/m ²)															
	128 000				160 000				200 000				320 000			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
427	382,8	22,1	53	416	379,6	23,7	57	460	376,0	25,5	62	510	367,4	29,8	73	626
530	475,2	27,4	83	709	471,0	29,5	89	781	466,6	31,7	96	856	455,8	37,1	114	1.037
616	552,4	31,8	112	1.010	547,6	34,2	121	1.106	542,4	36,8	131	1.209	529,6	43,2	155	1.459
718	643,8	37,1	154	1.388	638,2	39,9	166	1.518	631,8	43,1	179	1.666	616,4	50,8	213	2.016
820	735,2	42,4	204	1.884	728,4	45,8	221	2.065	721,2	49,4	239	2.255	X	X	X	X
924	828,6	47,7	255	2.394	821,4	51,3	276	2.610	X	X	X	X	X	X	X	X
1.026	920,8	52,6	313	3.006	X	X	X	X	X	X	X	X	X	X	X	X
1.229	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1.434	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



Lc = 120 mm (OD: 427 – 820 mm)
Lc = 140 mm (OD: 924 – 1434 mm)

Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.
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Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.
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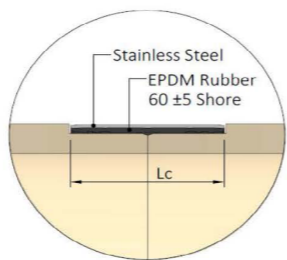
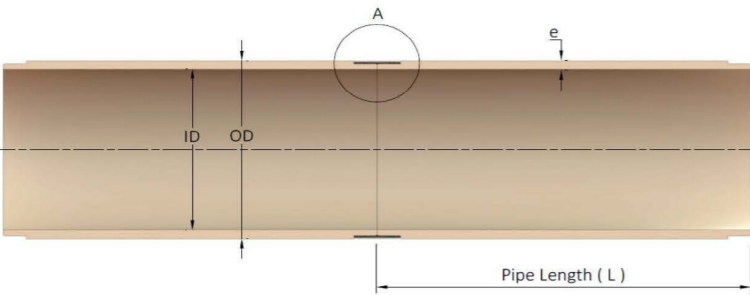


CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 50 – 200 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
50	427	381,0	23,0	132.958
	530	490,4	19,8	41.449
	616	580,0	18,0	19.551
	718	683,0	17,5	11.045
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
100	530	465,0	32,5	195.884
	616	558,8	28,6	85.094
	718	665,0	26,5	41.201
	820	771,8	24,1	21.060
150	924	877,4	23,3	13.400
	530	438,2	45,9	568.799
	616	536,6	39,7	228.070
	718	646,6	35,7	104.346
200	820	755,8	32,1	49.975
	924	863,4	30,3	29.765
	1.026	969,8	28,1	17.947
	1.229	1.179,2	24,9	7.794
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
200	616	513,4	51,3	493.408
	718	627,6	45,2	212.037
	820	739,6	40,2	99.380
	924	849,2	37,4	56.705
	1.026	957,2	34,4	32.908
	1.229	1.168,8	30,1	13.890
200	1.434	1.379,8	27,1	6.353



Lc = 120 mm (OD: 427 – 820 mm)
Lc = 140 mm (OD: 924 – 1434 mm)

Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressice strength = 85 N/mm²
* 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.
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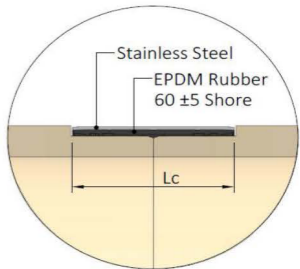
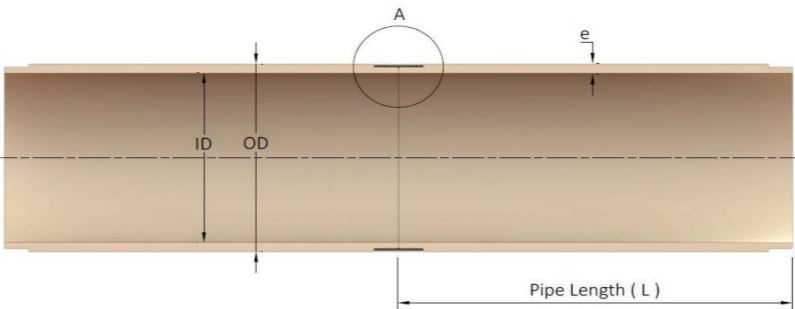


CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE STAINLESS STEEL JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 250 – 500 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
250	718	607,8	55,1	378.021
	820	723,0	48,5	174.646
	924	834,8	44,6	96.657
	1.026	944,4	40,8	54.821
	1.229	1.158,4	35,3	22.140
300	1.434	1.371,0	31,5	10.087
	820	706,2	56,9	286.770
	924	820,2	51,9	151.754
	1.026	931,4	47,3	85.260
	1.229	1.147,8	40,6	33.132
400	1.434	1.362,2	35,9	14.873
	1.229	1.126,6	51,2	74.745
	1.434	1.344,2	44,9	28.323
	500	1.326,0	54,0	47.981
	1.434	1.326,0	54,0	47.981



Lc = 120 mm (OD: 427 – 820 mm)
Lc = 140 mm (OD: 924 – 1434 mm)

Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressice strength = 85 N/mm²
* 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.
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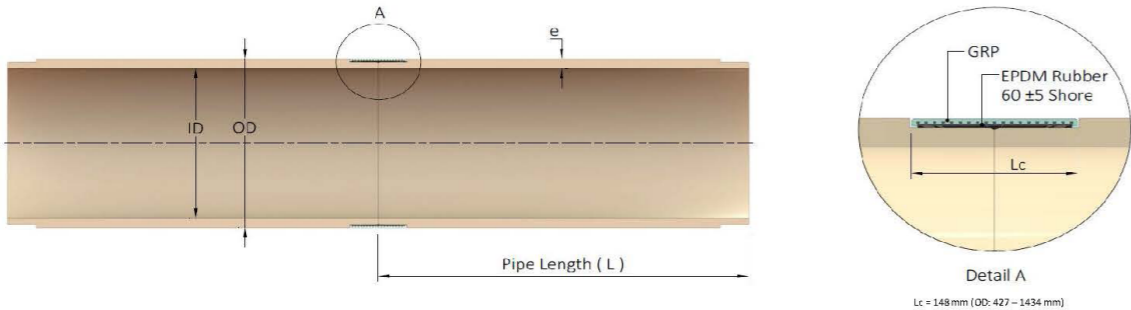


CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 50 – 200 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
50	427	370,1	28,5	262.416
	530	480,7	24,6	82.270
	616	570,8	22,6	39.514
	718	676,3	20,8	17.189
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
100	530	451,8	39,1	355.537
	616	546,7	34,7	156.204
	718	656,1	31,0	66.979
	820	761,6	29,2	38.284
150	924	867,4	28,3	24.376
	718	635,2	41,4	166.980
	820	743,6	38,2	83.656
	924	851,7	36,1	51.483
200	1.026	958,7	33,7	31.387
	1.229	1.168,9	30,1	13.899
	820	725,3	47,4	167.212
	924	835,7	44,1	95.309
200	1.026	944,5	40,8	55.793
	1.229	1.157,3	35,9	23.843
	1.434	1.369,1	32,4	11.016



Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressive strength = 85 N/mm²
* 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.
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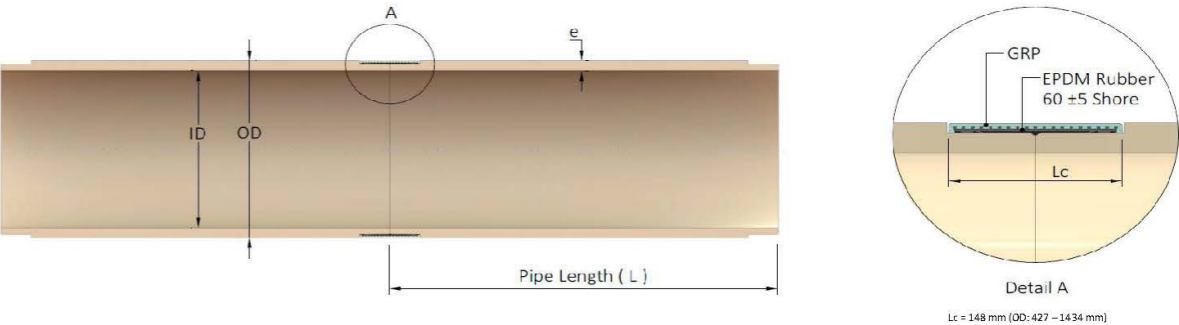


CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 250 – 400 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
250	924	819,4	52,3	159.850
	1.026	930,1	48,0	90.977
	1.229	1.145,5	41,7	37.162
	1.434	1.359,2	37,4	17.069
JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	SN (N/m ²)
300	1.026	915,5	55,3	139.364
	1.229	1.133,7	47,6	54.511
	1.434	1.349,3	42,4	24.777
400	1.434	1.329,1	52,4	45.855



Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressive strength = 85 N/mm²
* 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.
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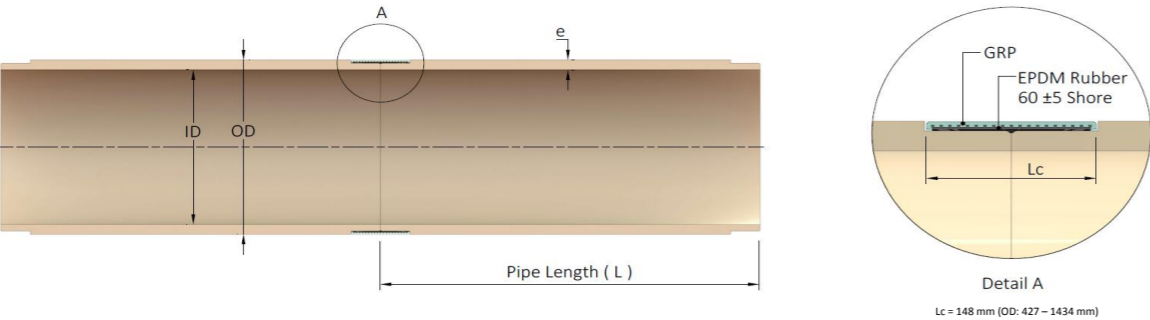
CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : SN 32 000 – 640 000

OD (mm)	PIPE STIFFNESS SN (N/m ²)															
	32 000				40 000				50 000				64 000			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
427	X	X	X	X	X	X	X	X	393,6	16,7	40	164	391,4	17,8	42	195
530	X	X	X	X	X	X	X	X	489,2	20,4	61	341	486,0	22,0	66	397
616	574,8	20,6	71	408	571,6	22,2	77	475	568,6	23,7	83	537	565,0	25,5	89	611
718	670,4	23,8	97	636	666,6	25,7	105	728	663,0	27,5	113	815	658,8	29,6	122	916
820	765,8	27,1	128	863	761,6	29,2	139	980	757,4	31,3	149	1.096	752,4	33,8	162	1.233
924	863,2	30,4	160	1.114	859,4	32,8	173	1.264	851,6	35,2	186	1.414	848,0	38,0	202	1.587
1.026	959,0	33,5	196	1.460	953,8	36,1	212	1.641	948,4	38,8	229	1.827	942,0	42,0	248	2.047
1.229	1.149,2	39,9	280	2.300	1.143,2	42,9	302	2.550	1.136,8	46,1	326	2.815	1.129,4	49,8	353	3.120
1.434	1.341,8	46,1	379	3.309	1.334,6	49,7	409	3.659	1.327,2	53,4	442	4.017	X	X	X	X

OD (mm)	PIPE STIFFNESS SN (N/m ²)															
	128 000				160 000				200 000				320 000			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
427	382,8	22,1	53	316	379,6	23,7	57	361	376,0	25,5	62	410	367,4	29,8	73	526
530	475,2	27,4	83	586	471,0	29,5	89	658	466,6	31,7	96	733	455,8	37,1	114	914
616	552,4	31,8	112	867	547,6	34,2	121	963	542,4	36,8	131	1.066	529,6	43,2	155	1.315
718	643,8	37,1	154	1.271	638,2	39,9	166	1.402	631,8	43,1	179	1.549	616,4	50,8	213	1.899
820	735,2	42,4	204	1.698	728,4	45,8	221	1.879	721,2	49,4	239	2.069	X	X	X	X
924	828,6	47,7	255	2.178	821,4	51,3	276	2.394	X	X	X	X	X	X	X	X
1.026	920,8	52,6	313	2.765	X	X	X	X	X	X	X	X	X	X	X	X
1.229	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1.434	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.

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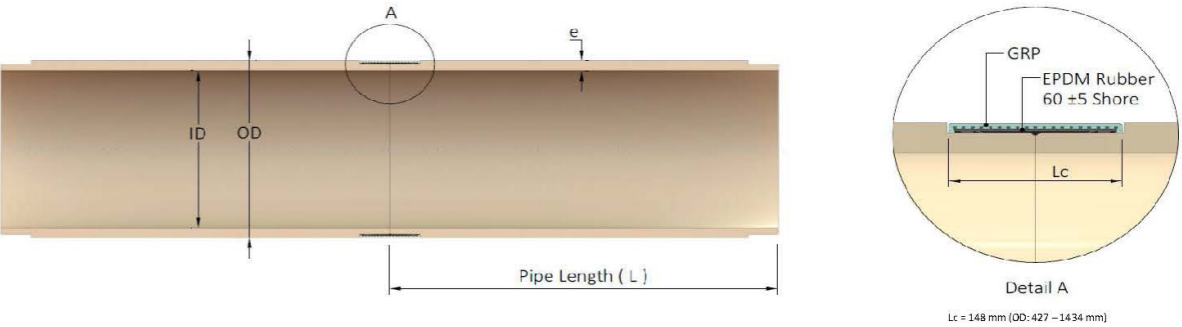
CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING

GRP JACKING PIPE TABLE : LOAD 250 – 400 TONS

JACKING LOAD Gj	OD	ID	e	SN
(tons)	(mm)	(mm)	(mm)	(N/m ²)
250	924	819,4	52,3	159.850
	1.026	930,1	48,0	90.977
	1.229	1.145,5	41,7	37.162
	1.434	1.359,2	37,4	17.069

JACKING LOAD Gj	OD	ID	e	SN
(tons)	(mm)	(mm)	(mm)	(N/m ²)
300	1.026	915,5	55,3	139.364
	1.229	1.133,7	47,6	54.511
	1.434	1.349,3	42,4	24.777

JACKING LOAD Gj	OD	ID	e	SN
(tons)	(mm)	(mm)	(mm)	(N/m ²)
400	1.434	1.329,1	52,4	45.855



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.
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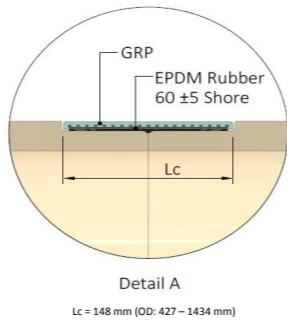
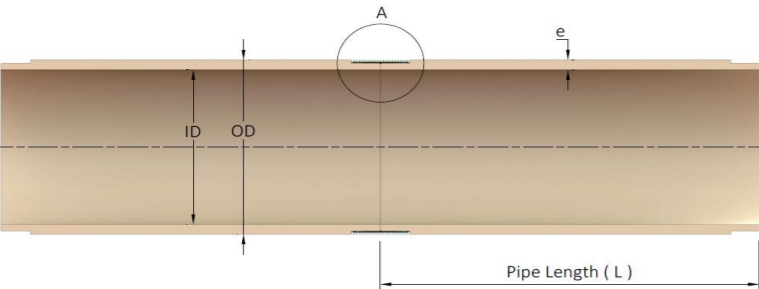
CENTRIFUGAL CASTING (CC)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : SN 32 000 – 640 000

OD (mm)	PIPE STIFFNESS SN (N/m ²)															
	32 000				40 000				50 000				64 000			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
427	X	X	X	X	X	X	X	X	393,6	16,7	40	164	391,4	17,8	42	195
530	X	X	X	X	X	X	X	X	486,0	22,0	66	341	482,8	23,6	71	454
616	574,8	20,6	71	408	571,6	22,2	77	475	568,6	23,7	83	537	565,0	25,5	89	611
718	670,4	23,8	97	636	666,6	25,7	105	728	663,0	27,5	113	815	654,4	31,8	131	1.021
820	765,8	27,1	128	863	761,6	29,2	139	980	757,4	31,3	149	1.096	747,2	36,4	174	1.375
924	863,2	30,4	160	1.114	859,4	32,8	173	1.264	853,6	35,2	186	1.414	848,0	40,8	218	1.759
1.026	959,0	33,5	196	1.460	953,8	36,1	212	1.641	948,4	38,8	229	1.827	942,0	42,0	248	2.047
1.229	1.149,2	39,9	280	2.300	1.143,2	42,9	302	2.550	1.136,8	46,1	326	2.815	1.129,4	49,8	353	3.120
1.434	1.341,8	46,1	379	3.309	1.334,6	49,7	409	3.659	1.327,2	53,4	442	4.017	X	X	X	X

OD (mm)	PIPE STIFFNESS SN (N/m ²)															
	128 000				160 000				200 000				320 000			
	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max	ID	e	Mass	F max
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
427	382,8	22,1	53	316	379,6	23,7	57	361	376,0	25,5	62	410	367,4	29,8	73	526
530	475,2	27,4	83	586	471,0	29,5	89	658	466,6	31,7	96	733	455,8	37,1	114	914
616	552,4	31,8	112	867	547,6	34,2	121	963	542,4	36,8	131	1.066	529,6	43,2	155	1.315
718	643,8	37,1	154	1.271	638,2	39,9	166	1.402	631,8	43,1	179	1.549	616,4	50,8	213	1.899
820	735,2	42,4	204	1.698	728,4	45,8	221	1.879	721,2	49,4	239	2.069	X	X	X	X
924	828,6	47,7	255	2.178	821,4	51,3	276	2.394	X	X	X	X	X	X	X	X
1.026	920,8	52,6	313	2.765	X	X	X	X	X	X	X	X	X	X	X	X
1.229	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1.434	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressice strength = 85 N/mm²
- * 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.

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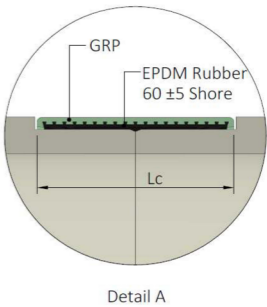
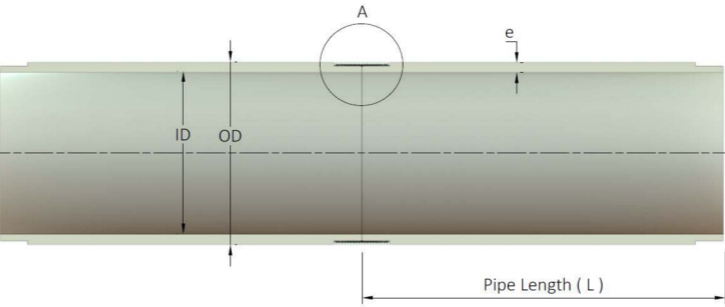
CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING

GRP JACKING PIPE TABLE : LOAD 50 – 150 TONS

JACKING LOAD GJ (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
50	376	314,0	31,0	67	688.303
	427	371,0	28,0	70	327.874
	478	426,0	26,0	74	180.575
	515	465,0	25,0	77	126.004
	530	480,0	25,0	79	115.106
	550	500,0	25,0	82	102.446
	618	568,0	25,0	93	71.090
	650	600,0	25,0	98	60.720
	718	668,0	25,0	109	44.542
	760	710,0	25,0	115	37.334
	820	770,0	25,0	125	29.503
	860	808,0	26,0	136	28.746
	924	872,0	26,0	147	23.027
	960	908,0	26,0	153	20.466
	1.026	974,0	26,0	163	16.675

JACKING LOAD GJ (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
100	427	333,0	47,0	112	1.722.594
	478	392,0	43,0	117	879.382
	515	435,0	40,0	119	543.675
	530	454,0	38,0	117	419.465
	550	476,0	37,0	119	341.581
	618	552,0	33,0	121	163.423
	650	584,0	33,0	128	139.292
	718	656,0	31,0	134	83.648
	760	702,0	29,0	133	56.844
	820	762,0	29,0	144	44.865
	860	802,0	29,0	151	38.693
	924	868,0	28,0	158	27.784
	960	904,0	28,0	164	24.687
	1.026	970,0	28,0	175	20.106
	1.099	1.045,0	27,0	182	14.546

JACKING LOAD GJ (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
150	515	409,0	53,0	154	1.370.088
	530	424,0	53,0	159	1.244.856
	550	448,0	51,0	160	968.848
	618	528,0	45,0	162	439.562
	650	562,0	44,0	167	347.366
	718	636,0	41,0	174	201.573
	760	682,0	39,0	177	143.627
	820	744,0	38,0	187	104.130
	860	786,0	37,0	191	82.462
	924	852,0	36,0	201	60.467
	960	890,0	35,0	203	49.162
	1.026	960,0	33,0	206	33.307
	1.099	1.035,0	32,0	214	24.480
	1.127	1.065,0	31,0	213	20.535
	1.229	1.169,0	30,0	226	14.215



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressice strength = 85 N/mm²
- * 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.
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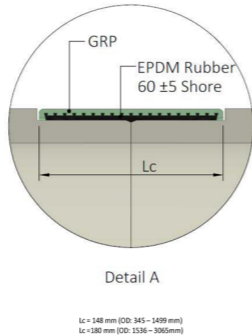
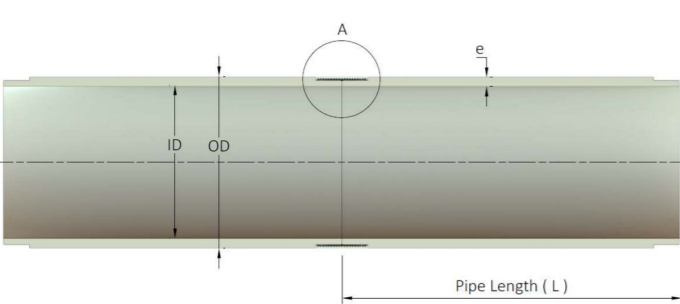


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 200 – 400 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
200	618	504,0	57,0	201	908.614
	650	538,0	56,0	209	725.852
	718	616,0	51,0	214	387.236
	760	664,0	48,0	215	265.416
	820	728,0	46,0	224	181.842
	860	769,0	45,5	233	151.009
	924	838,0	43,0	238	100.721
	960	877,0	41,5	239	79.901
	1.026	946,0	40,0	248	57.835
	1.099	1.023,0	38,0	253	39.797
	1.127	1.053,0	37,0	253	33.882
	1.229	1.159,0	35,0	262	21.819
	1.290	1.222,0	34,0	268	17.183
	1.348	1.282,0	33,0	273	13.690
300	1.399	1.335,0	32,0	275	11.112
	1.434	1.370,0	32,0	282	10.300
	760	624,0	68,0	296	821.962
	820	692,0	64,0	304	525.555
	860	735,0	62,5	313	416.957
	924	807,0	58,5	318	267.491
	960	846,0	57,0	323	217.874
	1.026	918,0	54,0	330	148.534
	1.099	997,0	51,0	336	99.832
	1.127	1.028,0	49,5	335	83.986
	1.229	1.136,0	46,5	345	52.674
	1.290	1.200,0	45,0	352	40.905
	1.348	1.262,0	43,0	352	30.990
	1.399	1.315,0	42,0	358	25.683
400	1.434	1.351,0	41,5	363	22.930
	1.499	1.419,0	40,0	367	17.851
	1.536	1.448,0	44,0	412	22.217
	1.638	1.551,0	43,5	436	17.589
	1.720	1.634,0	43,0	453	14.603
	1.842	1.756,0	43,0	486	11.829
	1.944	1.858,0	43,0	513	10.025
	924	774,0	75,0	400	597.178
	960	816,0	72,0	402	461.745
	1.026	890,0	68,0	409	309.794
	1.099	971,0	64,0	416	204.815
	1.127	1.003,0	62,0	415	170.911
	1.229	1.113,0	58,0	427	105.258
	1.290	1.178,0	56,0	434	80.958
	1.348	1.240,0	54,0	439	62.954
500	1.399	1.295,0	52,0	440	49.837
	1.434	1.332,0	51,0	443	43.440
	1.499	1.401,0	49,0	446	33.429
	1.536	1.430,0	53,0	494	39.541
	1.638	1.534,0	52,0	518	30.531
	1.720	1.622,0	49,0	514	21.842
	1.842	1.748,0	47,0	530	15.550
	1.944	1.852,0	46,0	548	12.332
	2.046	1.954,0	46,0	578	10.540
	924	774,0	75,0	400	597.178
	960	816,0	72,0	402	461.745
	1.026	890,0	68,0	409	309.794
	1.099	971,0	64,0	416	204.815
	1.127	1.003,0	62,0	415	170.911
	1.229	1.113,0	58,0	427	105.258
	1.290	1.178,0	56,0	434	80.958
	1.348	1.240,0	54,0	439	62.954
	1.399	1.295,0	52,0	440	49.837
	1.434	1.332,0	51,0	443	43.440
	1.499	1.401,0	49,0	446	33.429
	1.536	1.430,0	53,0	494	39.541
	1.638	1.534,0	52,0	518	30.531
	1.720	1.622,0	49,0	514	21.842
	1.842	1.748,0	47,0	530	15.550
	1.944	1.852,0	46,0	548	12.332
	2.046	1.954,0	46,0	578	10.540



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.
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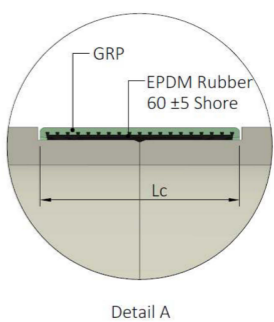
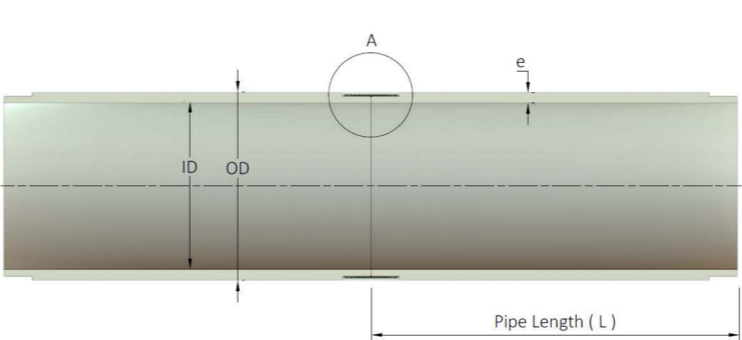


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 500 – 700 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
500	1.099	945,0	77,0	494	352.836
	1.127	977,0	75,0	495	298.944
	1.229	1.090,0	69,5	506	177.663
	1.290	1.157,0	66,5	511	132.467
	1.348	1.220,0	64,0	516	102.164
	1.399	1.275,0	62,0	521	82.269
	1.434	1.312,0	61,0	526	72.349
	1.499	1.382,0	58,5	529	55.256
	1.536	1.412,0	62,0	574	61.396
	1.638	1.518,0	60,0	595	45.351
	1.720	1.606,0	57,0	595	33.220
	1.842	1.734,0	54,0	606	22.727
	1.944	1.840,0	52,0	618	17.128
	2.046	1.945,0	50,5	633	13.371
600	2.160	2.062,0	49,0	650	10.318
	1.229	1.067,0	81,0	584	289.790
	1.290	1.134,0	78,0	594	219.902
	1.348	1.198,0	75,0	600	168.715
	1.399	1.255,0	72,0	600	131.777
	1.434	1.292,0	71,0	608	116.612
	1.499	1.363,0	68,0	611	88.524
	1.536	1.394,0	71,0	653	93.911
	1.638	1.500,0	69,0	680	70.167
	1.720	1.590,0	65,0	676	49.980
	1.842	1.718,0	62,0	693	34.863
	1.944	1.826,0	59,0	698	25.297
	2.046	1.932,0	57,0	712	19.417
	2.160	2.050,0	55,0	727	14.716
700	2.250	2.144,0	53,0	731	11.582
	2.453	2.341,0	56,0	843	11.046
	1.399	1.234,0	82,5	682	192.875
	1.434	1.273,0	80,5	684	164.889
	1.499	1.345,0	77,0	688	124.437
	1.536	1.375,0	80,5	736	132.595
	1.638	1.484,0	77,0	755	94.068
	1.720	1.574,0	73,0	755	68.244
	1.842	1.704,0	69,0	768	46.195
	1.944	1.812,0	66,0	778	34.019
	2.046	1.918,0	64,0	797	26.388
	2.160	2.038,0	61,0	804	19.237
	2.250	2.132,0	59,0	812	15.304
	2.453	2.331,0	61,0	916	13.682
	2.553	2.431,0	61,0	955	12.100
	2.658	2.535,5	61,0	995	10.697



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * 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.
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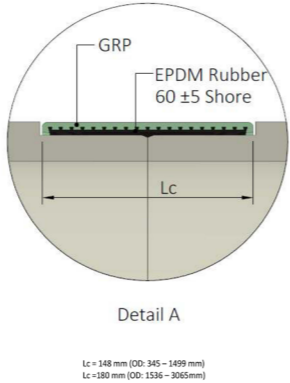
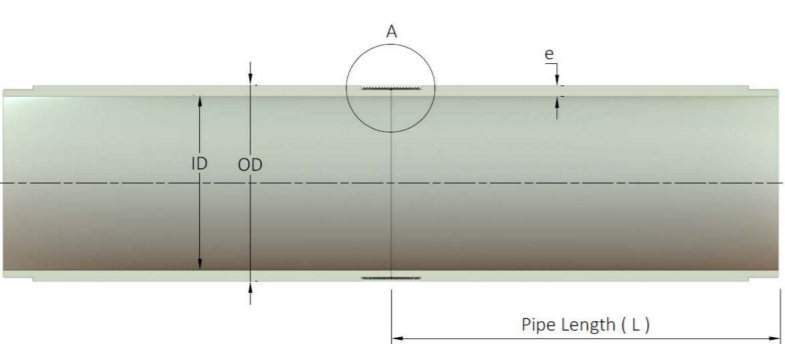


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 800 – 1200 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
800	1.499	1.325,0	87,0	771	183.329
	1.536	1.357,0	89,5	813	185.648
	1.638	1.466,0	86,0	838	133.351
	1.720	1.558,0	81,0	834	94.601
	1.842	1.688,0	77,0	853	65.075
	1.944	1.797,0	73,5	863	47.552
	2.046	1.904,0	71,0	881	36.413
	2.160	2.024,0	68,0	893	26.917
	2.250	2.118,0	66,0	905	21.630
	2.453	2.319,0	67,0	1.004	18.267
	2.553	2.421,0	66,0	1.031	15.419
	2.658	2.525,5	66,0	1.074	13.628
1000	2.758	2.628,0	65,0	1.099	11.601
	2.858	2.728,0	65,0	1.140	10.399
	1.842	1.658,0	92,0	1.011	107.881
	1.944	1.768,0	88,0	1.026	79.143
	2.046	1.878,0	84,0	1.035	58.269
	2.160	1.998,0	81,0	1.058	43.912
	2.250	2.092,0	79,0	1.077	35.777
	2.453	2.293,0	80,0	1.192	30.030
	2.553	2.401,0	76,0	1.182	22.638
	2.658	2.509,5	74,0	1.201	18.418
	2.758	2.614,0	72,0	1.215	15.096
	2.858	2.718,0	70,0	1.226	12.405
1200	2.962	2.822,0	70,0	1.271	11.114
	3.065	2.925,0	70,0	1.317	10.006
	2.250	2.070,0	90,0	1.221	53.711
	2.453	2.275,0	89,0	1.321	41.822
	2.553	2.379,0	87,0	1.347	34.416
	2.658	2.487,5	85,0	1.373	28.273
	2.758	2.592,0	83,0	1.394	23.412
	2.858	2.698,0	80,0	1.396	18.718
	2.962	2.806,0	78,0	1.413	15.505
	3.065	2.913,0	76,0	1.427	12.884



Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressice strength = 85 N/mm²
* 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.
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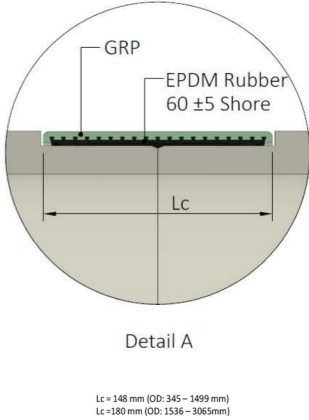
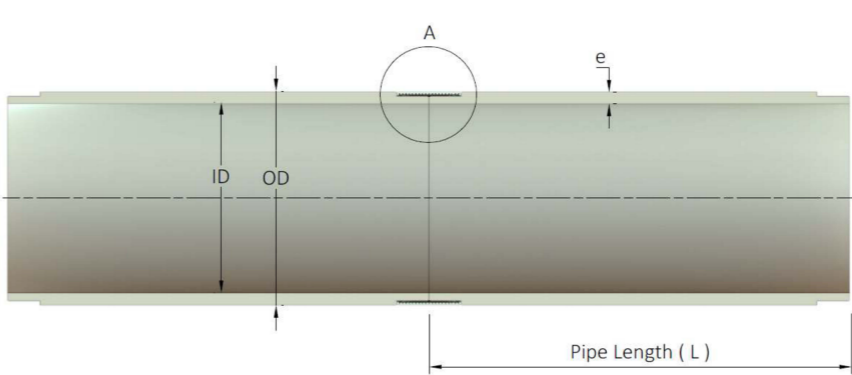


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : LOAD 1400 TONS

JACKING LOAD Gj (tons)	OD (mm)	ID (mm)	e (mm)	Mass (kg/m)	SN (N/m ²)
1400	2.758	2.574,0	92,0	1.540	32.208
	2.858	2.680,0	89,0	1.548	26.024
	2.962	2.788,0	87,0	1.571	21.718
	3.065	2.897,0	84,0	1.573	17.536



Design Acceptance Criteria:
* Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
* Jacking force safety coefficient = 3.5
* Ultimate compressice strength = 85 N/mm²
* 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.
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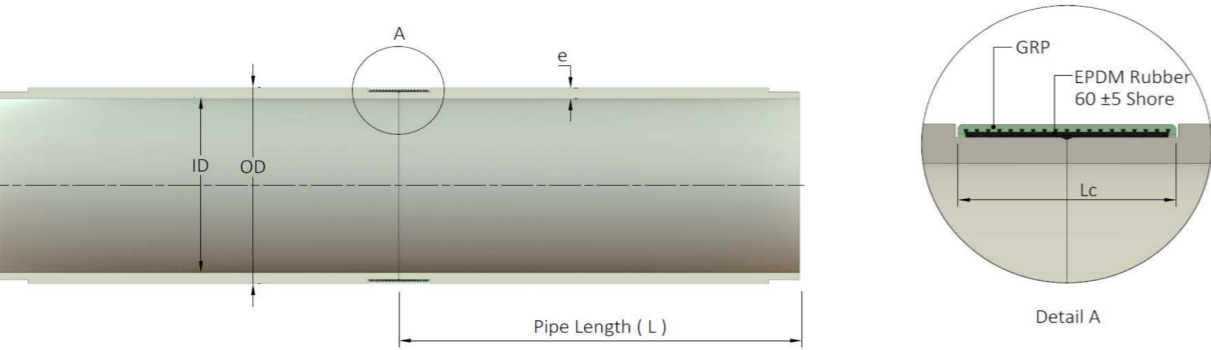


CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : SN 20 000 – 80 000

OD (mm)	PIPE STIFFNESS SN (N/m ²)																							
	20 000				32 000				40 000				50 000				64 000				80 000			
	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
345	323.0	11.0	23	11	323.0	11.0	23	11	321.8	11.6	24	24	319.4	12.8	27	50	317.2	13.9	29	74	315.2	14.9	31	96
376	352.6	11.7	27	17	352.6	11.7	27	17	350.6	12.7	29	41	348.0	14.0	32	72	345.8	15.1	34	98	343.6	16.2	37	124
427	404.0	11.5	30	12	400.4	13.3	35	62	398.0	14.5	38	95	395.4	15.8	41	130	392.8	17.1	44	166	390.2	18.4	47	201
478	452.2	12.9	38	59	448.0	15.0	44	124	445.6	16.2	47	161	442.6	17.7	51	207	440.8	18.6	54	234	438.8	20.6	59	294
515	487.2	13.9	44	98	482.8	16.1	50	171	480.0	17.5	55	217	476.8	19.1	59	270	474.6	20.2	63	305	470.4	22.3	69	374
530	501.6	14.2	46	111	497.0	16.5	53	190	494.0	18.0	58	241	490.8	19.6	63	295	487.4	21.3	68	352	484.4	22.8	73	402
550	520.4	14.8	50	137	515.7	17.2	57	220	513.0	18.5	62	268	509.2	20.4	68	335	505.8	22.1	73	394	502.6	23.7	78	449
618	584.8	16.6	63	276	579.5	19.3	72	382	576.0	21.0	79	451	572.2	22.9	86	526	568.4	24.8	92	601	565.0	26.5	98	667
650	615.0	17.5	70	277	609.0	20.5	81	403	606.0	22.0	87	466	601.8	24.1	95	553	597.8	26.1	102	635	594.0	28.0	109	713
718	679.6	19.2	84	387	673.0	22.5	98	540	669.6	24.2	105	619	664.8	26.6	115	728	660.4	28.8	125	829	656.0	31.0	134	928
760	718.0	21.0	97	454	712.6	23.7	110	587	708.8	25.6	118	679	703.6	28.2	130	805	699.0	30.5	140	916	694.4	32.8	150	1.026
820	776.0	22.0	110	485	769.0	25.5	127	670	764.6	27.7	138	786	759.2	30.4	151	927	754.0	33.0	163	1.062	749.4	35.3	174	1.181
860	814.0	23.0	121	566	806.0	27.0	141	788	802.0	29.0	151	898	796.4	31.8	165	1.052	790.8	34.6	179	1.204	785.8	37.1	192	1.340
924	874.0	25.0	141	730	866.0	29.0	163	969	862.0	31.0	174	1.087	855.6	34.2	191	1.276	850.0	37.0	206	1.440	844.0	40.0	222	1.614
960	908.0	26.0	153	822	900.0	30.0	175	1.070	895.0	32.5	189	1.224	889.0	35.5	206	1.408	883.0	38.5	223	1.590	877.0	41.5	239	1.771
1.026	971.0	27.5	172	981	962.0	32.0	200	1.279	957.0	34.5	215	1.444	950.0	38.0	236	1.673	943.6	41.2	255	1.881	938.0	44.0	271	2.062
1.099	1.040.0	29.5	198	1.196	1.030.0	34.5	231	1.552	1.025.0	37.0	247	1.728	1.017.6	40.7	270	1.987	1.011.0	44.0	292	2.217	1.004.0	47.5	314	2.458
1.127	1.066.6	30.2	208	1.279	1.056.2	35.4	243	1.658	1.051.0	38.0	260	1.846	1.043.0	42.0	286	2.134	1.036.6	45.2	307	2.362	1.029.8	48.6	329	2.603
1.229	1.163.0	33.0	248	1.624	1.153.0	38.0	284	2.021	1.146.0	41.5	309	2.297	1.138.0	45.5	338	2.611	1.130.2	49.4	366	2.914	1.123.0	53.0	391	3.193
1.290	1.220.0	35.0	276	1.875	1.209.0	40.5	318	2.334	1.202.4	43.8	343	2.607	1.194.4	47.8	373	2.936	1.186.6	51.7	402	3.254	1.178.4	55.8	432	3.587
1.348	1.275.0	36.5	301	2.094	1.264.0	42.0	344	2.573	1.257.0	45.5	372	2.876	1.248.0	50.0	408	3.263	1.240.0	54.0	439	3.605	1.231.6	58.2	471	3.961
1.399	1.323.4	37.8	323	2.295	1.311.4	43.8	373	2.837	1.304.2	47.4	402	3.160	1.295.0	52.0	440	3.571	1.286.6	56.2	474	3.943	1.278.2	60.4	508	4.312
1.434	1.357.0	38.5	337	2.420	1.344.0	45.0	393	3.022	1.337.0	48.5	422	3.344	1.327.6	53.2	461	3.774	1.318.8	57.6	498	4.173	1.310.0	62.0	534	4.570
1.499	1.418.6	40.2	368	2.699	1.405.0	47.0	429	3.358	1.398.0	50.5	459	3.695	1.388.0	55.5	503	4.173	1.379.0	60.0	542	4.600	1.369.0	65.0	585	5.071
1.536	1.453.4	41.3	388	2.813	1.439.6	48.2	450	3.098	1.432.0	52.0	485	3.472	1.422.0	57.0	529	3.962	1.412.0	62.0	574	4.448	1.402.0	67.0	618	4.931
1.638	1.550.0	44.0	440	2.757	1.536.0	51.0	508	3.499	1.527.0	55.5	552	3.972	1.516.0	61.0	604	4.546	1.506.4	65.8	650	5.044	1.496.0	71.0	699	5.579
1.720	1.628.0	46.0	484	3.240	1.612.0	54.0	565	4.130	1.603.2	58.4	609	4.615	1.592.0	64.0	666	5.229	1.582.0	69.0	715	5.774	1.572.0	74.0	765	6.315
1.842	1.743.0	49.5	557	3.898	1.726.0	58.0	650	4.910	1.717.0	62.5	698	5.442	1.705.0	68.5	763	6.146	1.694.0	74.0	822	6.788	1.683.0	79.5	880	7.425
1.944	1.839.4	52.3	621	4.476	1.822.0	61.0	721	5.569	1.812.0	66.0	778	6.193	1.800.0	72.0	846	6.937	1.787.0	78.5	920	7.737	1.774.0	85.0	992	8.531
2.046	1.936.0	55.0	688	5.079	1.918.0	64.0	797	6.269	1.907.0	69.5	863	6.991	1.894.0	76.0	940	7.839	1.882.0	82.0	1.011	8.617	1.870.0	88.0	1.082	9.389
2.160	2.044.0	58.0	766	5.794	2.026.0	67.0	881	7.051	2.014.0	73.0	957	7.883	2.000.0	80.0	1.045	8.847	1.987.0	86.5	1.126	9.736				
2.250	2.129.0	60.5	832	6.410	2.110.0	70.0	958	7.792	2.097.0	76.5	1.044	8.730	2.083.0	83.5	1.136	9.734	2.069.6	90.2	1.223	10.689				
2.453	2.321.0	66.0	989	6.977	2.300.0	76.5	1.142	8.642	2.286.0	83.5	1.243	9.743	2.273.0	90.0	1.336	10.760								
2.553	2.416.0	68.5	1.069	7.687	2.393.0	80.0	1.242	9.584	2.379.0	87.0	1.347	10.731	2.369.0	92.0	1.422	11.545								
2.658	2.515.0	71.5	1.161	8.531	2.493.0	82.5	1.334	10.421	2.478.0	90.0	1.451	11.700												
2.758	2.610.0	74.0	1.247	9.314	2.586.6	85.7	1.438	11.400																
2.858	2.704.0	77.0	1.345	10.221	2.680.4	88.8	1.544	12.402																
2.962	2.803.0	79.5	1.439	11.088																				
3.065	2.901.0	82.0	1.536	11.986																				



Design Acceptance Criteria:

- * Nominal pressures for the jacking pipe and couplings are PN 1, PN 6 and PN 10.
- * Jacking force safety coefficient = 3.5
- * Ultimate compressive strength = 85 N/mm²
- * Pipe wall thicknesses and stiffness values are calculated theoratically. 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.

CONTINUOUS FILAMENT WINDING (CFW)
GLASS REINFORCED POLYESTER (GRP) ISO 25780
JOINT TYPE : FULLFACE GRP JACKING COUPLING



GRP JACKING PIPE TABLE : SN 100 000 – 1 000 000

OD (mm)	PIPE STIFFNESS SN (N/m ²)																											
	100 000				128 000				160 000				200 000				320 000				640 000				1 000 000			
	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax	ID	e	Mass	Fmax
	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN	mm	mm	kg / m	kN
345	312.6	16.2	33	124	310.0	17.5	36	152	306.8	19.1	39	186	304.0	20.5	42	215	296.8	24.1	49	289								
376	340.8	17.6	40	157	338.0	19.0	43	190	334.4	20.8	46	232	331.0	22.5	50	270	323.4	26.3	58	356	311.0	32.5	70	491	301.6	37.2	79	589
427	387.0	20.0	51	243	384.0	21.5	55	283	379.8	23.6	60	338	376.0	25.5	64	387	367.4	29.8	74	497	353.2	36.9	90	672	342.4	42.3	102	801
478	433.2	22.4	64	348	429.6	24.2	69	401	425.0	26.5	75	469	421.0	28.5	80	527	411.2	33.4	93	667	395.4	41.3	113	885	383.4	47.3	128	1 046
515	466.6	24.2	75	435	462.8	26.1	80	495	457.4	28.8	88	581	453.6	30.7	93	640	443.0	36.0	108	803	426.0	44.5	131	1 056	413.0	51.0	149	1 244
530	480.4	24.8	79	468	476.4	26.8	85	534	471.2	29.4	92	618	467.0	31.5	99	686	456.0	37.0	115	860	438.4	45.8	139	1 130	425.0	52.5	157	1 329
550	498.4	25.8	85	521	494.2	27.9	91	593	489.8	30.5	100	681	484.8	32.6	106	751	473.0	38.5	124	945	455.0	47.5	150	1 231	441.0	54.5	170	1 446
618	560.0	29.0	107	763	555.2	31.4	116	855	549.6	34.2	125	961	544.6	36.7	134	1 055	531.6	43.2	156	1 295	511.0	53.5	190	1 664	496.0	61.0	213	1 943
650	589.0	30.5	119	814	584.0	33.0	128	915	578.0	36.0	139	1 035	572.8	38.6	148	1 137	559.2	45.4	172	1 401	537.6	56.2	210	1 808	521.4	64.3	237	2 102
718	651.0	33.5	144	1 040	645.2	36.4	156	1 169	638.0	40.5	170	1 328	632.8	42.6	181	1 441	617.6	50.1	211	1 767	594.0	62.0	255	2 258	576.0	71.0	288	2 619
760	688.8	35.6	162	1 159	682.8	38.6	175	1 300	675.0	42.5	192	1 482	669.6	45.2	203	1 606	653.8	53.1	236	1 965	628.8	65.6	286	2 515	609.4	75.3	324	2 928
800	743.6	38.5	189	1 345	736.8	41.6	203	1 502	729.2	45.4	221	1 694	722.4	48.8	236	1 863	705.4	57.3	274	2 279	678.0	71.0	334	2 930	658.0	81.0	376	3 388
860	779.5	40.2	207	1 506	775.0	43.5	223	1 682	764.4	47.8	241	1 909	758.0	51.0	259	2 076	740.4	60.0	301	2 539	711.0	74.5	368	3 261				
924	837.2	43.4	240	1 810	830.2	46.9	258	2 010	821.6	51.2	281	2 254	814.0	55.0	300	2 467	795.0	64.5	348	2 992	764.0	80.0	424	3 621				
960	869.8	45.1	259	1 987	862.8	48.6	278	2 195	853.6	53.2	303	2 466	845.6	57.2	324	2 699	826.0	67.0	376	3 261	794.0	83.0	457	4 151				
1 026	930.0	48.0	295	2 318	922.0	52.0	318	2 572	921.0	56.0	347	2 887	904.0	61.0	370	3 136	882.4	71.8	430	3 798								
1 099	995.8	51.6	339	2 740	988.2	55.4	363	2 999	977.0	61.0	398	3 377	968.6	65.2	423	3 657	945.4	76.8	493	4 419								
1 127	1 012.2	52.9	357	2 906	1 013.0	57.0	383	3 192	1 002.0	62.5	418	3 572	992.6	67.2	447	3 894	969.4	78.8	519	4 675								
1 229	1 114.0	57.5	423	3 538	1 104.6	62.2	456	3 896	1 093.0	68.0	496	4 333	1 082.6	73.2	531	5 31												
1 290	1 160.0	60.5	467	3 966	1 160.0	65.0	500	4 325	1 147.0	71.5	547	4 840	1 136.0	77.0	587	527												
1 348	1 221.6	63.6	510	4 382	1 211.0	68.5	550	4 824	1 198.0	75.0	600	5 361	1 187.0	80.5	641	5 812												
1 399	1 267.8	65.2	549	4 767	1 257.0	71.0	592	5 235	1 243.0	78.0	647	5 835	1 232.0	83.5	690	6 302												
1 434	1 299.2	67.4	578	5 054	1 289.0	72.5	620	5 507	1 274.8	79.6	673	6 313	1 264.0	85.0	720	6 602												
1 499	1 359.0	70.0	628	5 539	1 348.0	75.5	675	6 060	1 330.0	83.8	738	6 740	1 321.0	89.0	788	7 287												
1 530	1 374.0	72.0	649	5 641	1 368.0	77.4	698	6 168	1 368.0	85.0	765	6 641																
1 638	1 455.0	76.5	750	6 142	1 427.0	83.0	811	6 802	1 460.0	89.0	866	7 405																
1 720	1 539.0	80.5	829	7 013	1 546.0	87.0	892	7 706																				
1 842	1 670.0	86.0	948	8 173																								



ENVIRONMENTAL
PRODUCT
DECLARATION

TURKEY

EPD®

ENVIRONMENTAL PRODUCT DECLARATIONS

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for

GRP Pipes
from

SUPERLIT Pipe Industries

PIPE INDUSTRIES

Programme:	EPD Turkey, a fully aligned regional programme www.epdturkey.org	The International EPD® System www.environdec.com
Programme operator:	EPD Turkey: SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul, TURKEY	EPD International AB
EPD registration number:	S-P-01994	
Publication date:	14.12.2020	
Validity date:	13.12.2025	
Geographical scope:	Global	

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