



NON-PRESSURE PIPES

GLASSFIBER REINFORCED
PLASTIC (GRP)

Strong, Superior, Sustainable

subor[®]
Make a **Good Start**

SUBOR: A GLOBAL AND RELIABLE SOLUTION PARTNER

SUBOR is a pioneer company in Glassfiber Reinforced Plastic (GRP) pipes manufacturing, founded in 1996. Having the privilege of using the Advanced Continuous Filament Winding Technology over 20 years, SUBOR offers long-term solutions for various infrastructure applications with its wide variety of product and service portfolio. As a reputable brand name with successful references in 5 continents and over 50 countries since its establishment, SUBOR continues to improve its global presence to enhance the quality of people's lives.



THESSALONIKI GREECE
SEWER PROJECT

WHY SUBOR?



PRESENCE IN 5 CONTINENTS

Reliable and long-life piping solutions enable civilizations in different territories to reach clean water and energy.



EXPERIENCE

More than 10.000 km of SUBOR Pipes in various applications are serving the development of humankind, worldwide.



FIELD SERVICE

By aiming to extend the service life of the pipe system with the correct installation in a cost-effective way, SUBOR is providing site supervision service all over the world ensuring the conformity with the technical specifications and standards.



ENGINEERING AND R&D

SUBOR's in-house engineering department delivers the design works and calculations according to piping principles in each project, develops researches and innovates new products.



HIGH PRODUCTION CAPACITY

With an installed manufacturing capacity of over 1.000 km pipes per year, SUBOR is one of the world's leading GRP pipe producers.



EFFICIENT USE OF TRANSPORTATION

Wide experience in cost-efficient transportation solutions by means of truck, container, bulk-shipment, train and their combinations, together with the lightweight of GRP pipes enable the end-user to reach attractive freight charges globally.



WIDE RANGE OF PRODUCTS IN PIPE SYSTEMS

SUBOR provides accurate solutions for a wide variety of projects by manufacturing pipes in a range between 200 mm and 4000 mm in diameter, up to 40 bar pressure and 1.000.000 N/m² stiffness.



NON-CORROSIVE MATERIALS

Corrosion, the major environmental risk imposed by pipeline projects is not a problem with GRP pipes. When it comes to long term use, GRP is your go-to option for both environmental and financial impact.



ENVIRONMENT FRIENDLY

By aiming to leave a better world to the future, SUBOR accepts the principle of respecting the environment and nature in all of its processes within the awareness of environmental responsibility.



QUALITY ASSURANCE

SUBOR GRP Pipes are designed and tested in compliance with the world's fundamental and acknowledged standards such as AWWA, ASTM, ISO, EN, DIN, BS.



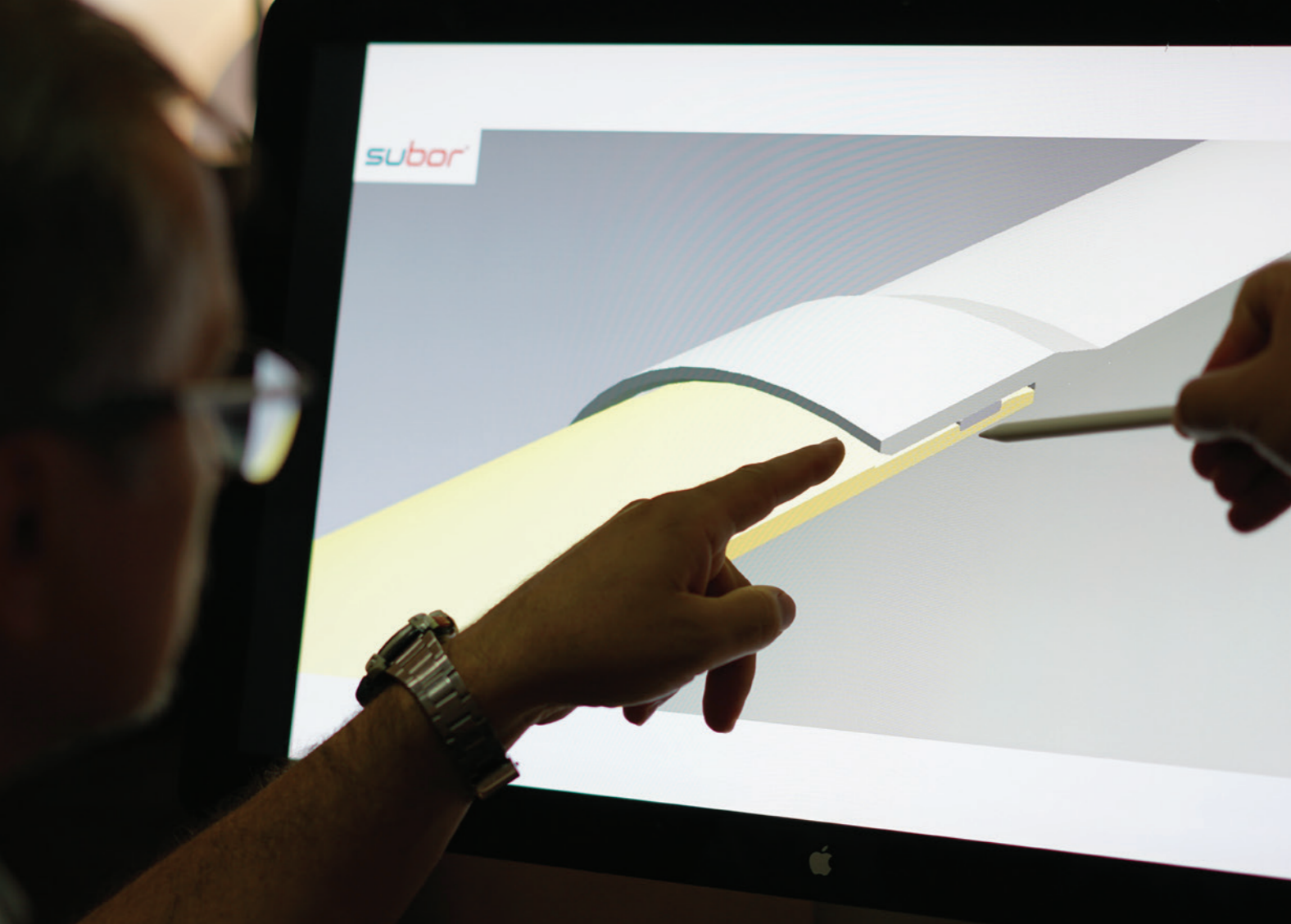
PROJECT FINANCE

SUBOR provides soft loan by international Export Credit Agencies to projects in order to accelerate the investment return.



SUSTAINABLE INVESTMENT

Having a very low carbon footprint due to their high level of material efficiency, SUBOR GRP products are the best choice for the environment, compared to conventional pipe technologies.



GRP: A SOLID CHOICE FOR LONG SERVICE LIFE

SUBOR's approach to a more sustainable business to undertake today's projects with respect to future generations' needs. Sustainable development must consider the effects it has on the economy, society, and environment as a whole. SUBOR, as a pipe manufacturer calculates the influence of its outputs on these elements at every step of its decision-making process for a sustainable business.

The superior properties of GRP in terms of excellent hydraulic characteristics resulting in higher energy productivity and less pumping energy, high efficient production and transportation methods together with its long life cycle enable SUBOR to offer the utmost quality with better sustainability to the future. As a result of having very low environmental impact compared to conventional pipe technologies due to its high level of material efficiency, SUBOR GRP products have low carbon footprint and offer the best choice for the environment.

OUR ENGINEERING SERVICES: SUCCESS IS TEAMWORK

SUBOR provides engineering support to the customers before and after the procurement phase to ensure correct and efficient use of the products and technology offered with its in-house expert engineers by looking out for their maximum benefit.

- Stress and Flexibility Analysis of pipelines and stress isometric drawings
- Engineering drawings
 - Piping layout and isometric drawings
 - GRP component shop drawings
 - Conceptual support and clamp drawings
 - Connection detail with different materials
- Calculation of pipe anchoring and support requirements
- Calculation of concrete thrust blocks
- GRP tank, silo, manhole and spool design
- Buried pipe design
- Hydraulic calculations





JAROCIN POLAND
RAIN WATER PROJECT

GRP SUPERIOR FEATURES

-  **Corrosion/abrasion resistance**
-  **Lightweight**
-  **Superior hydraulic properties**
-  **Long service life**
-  **Fast and easy installation**
-  **High load capacity**
-  **High UV resistance**
-  **High chemical resistance ***
-  **Simple handling**
-  **Numerous fittings**

*Please get in contact with SUBOR for further information.



NON-PRESSURE PIPES

SEWAGE AND DRAINAGE

PIPE SYSTEMS WITH

SUPERIOR RESISTANCE!

Thanks to their composite structure made of glass fiber, resin, sand and additives, GRP pipes are much more resistant to corrosion and abrasion caused by acidic environments, compared to the conventional pipes made of concrete, steel, iron, etc.

SUBOR GRP Non-Pressure Pipe Systems are designed and manufactured with a special liner material that is highly resistant against corrosive and acidic substances commonly found in wastewater lines. Non-Pressure Pipes are also used for conveyance, drainage or storage of rainwater and stormwater lines.

In addition, they offer an effective solution for the conveyance of chemicals with their superior durability even against aggressive environments of industrial lines.*

* For additional information about chemical resistance, please contact your SUBOR representative.



BEST CHOICE FOR

NON-PRESSURE LINES

Designed for superior acid resistance, SUBOR Non-Pressure GRP Pipes are typically used for sewers, drainage systems and stormwater applications.

They can also be specially designed and produced for different types of applications, according to your needs.

The application areas of SUBOR Non-Pressure pipes are:

- Sewer lines
- Rainwater & stormwater lines
- Rainwater storage tanks
- Stormwater overflow tanks
- Circular & Non-circular relining
- Wastewater treatment plants
- Industrial lines

NON-PRESSURE (SEWER) PIPES

The wide product portfolio of SUBOR also offers special designed GRP pipes for sewer applications. In order to be resistant enough against severe corrosive and aggressive effects during their service life, SUBOR Sewer Pipes are manufactured with special inner layer.

PRODUCTION RANGE

Diameter Range (DN): 200-4000 mm

Pressure (PN): 1 bar

Stiffness (SN): 2500 – 5000 -10000 -16000 – 20000 N/m²

Standard Nominal Lengths (L): 12, 6, 4, 3, 2, 1 m

Custom lengths, diameters, pressure and stiffness classes are available upon request.

WATER JETTING RESISTANCE

The pipe is manufactured to resist against high pressurized water throughout its service life, suitable to the cleaning the inner surface with water jetting applications.

The resistance of the pipe is tested in accordance with **DIN 19523** standard.

ABRASION RESISTANCE

The abrasion resistance of the pipe is tested according to **CEN/TR 15729**. The method for this test has been released by Darmstadt University. The test is carried out by adding a gravel mixture with water inside the pipe sample and cycling it within certain times to determine the abrasion level of liner layer of the pipe.

LONG-TERM PERFORMANCE

In addition to in-process product and performance tests, SUBOR also performs short and long term tests in order to determine qualification, pipe design criteria and monitor the long term condition of the material. The long term monitoring is carried out for more than 10.000 hours in **"SUBOR Long Term Laboratory"**, aiming at reviewing the performance of the pipe over 50 years.



NON-PRESSURE PIPES

GRAVITY SEWER PIPE & COUPLING DIMENSION												
PRESSURE CLASS			GRAVITY SEWER PIPE						GRAVITY SEWER COUPLING			
			SN 2.500 N/m²		SN 5.000 N/m²		SN 10.000 N/m²					
STIFFNESS CLASS			ID _{min}	W _{min}	ID _{min}	W _{min}	ID _{min}	W _{min}	OD _{nom}	Length	ID _{min}	W _{min}
DN		OD _{nom}	ID _{min}	W _{min}	ID _{min}	W _{min}	ID _{min}	W _{min}	OD _{nom}	Length	ID _{min}	W _{min}
mm	inch	mm	mm	(kg/m)	mm	(kg/m)	mm	(kg/m)	mm	mm	mm	(kg/pcs)
200	8"	221,5					208,0	7,0	259,0	175,0	223,0	3,0
250	10"	272,5					258,8	10,8	304,0	175,0	275,1	4,1
300	12"	324,9	313,5	10,0	311,4	12,2	309,3	15,8	356,1	240,0	327,5	6,9
350	14"	376,8	364,0	13,4	361,7	16,4	358,9	20,3	417,8	240,0	379,4	8,0
400	16"	427,7	413,5	17,2	411,1	20,8	407,6	26,3	458,9	240,0	430,3	9,0
450	18"	478,6	463,3	21,2	460,6	26,0	456,8	32,6	509,8	240,0	481,2	10,0
500	20"	530,5	514,2	25,7	511,4	31,1	506,6	39,7	561,7	240,0	533,1	11,0
600	24"	617,4	599,1	34,2	595,5	42,3	590,7	53,0	649,2	240,0	620,0	13,1
700	28"	719,4	698,8	46,1	694,5	57,1	688,6	72,3	752,4	240,0	722,0	15,9
800	32"	821,4	798,5	59,8	793,4	73,5	786,3	94,1	855,4	240,0	824,0	18,7
900	36"	923,4	898,0	75,6	892,8	91,9	884,3	119,5	958,2	240,0	926,0	21,5
1000	40"	1025,4	997,8	91,9	991,5	112,7	984,1	141,9	1060,8	240,0	1028,0	24,2
1100	44"	1127,4	1097,6	109,8	1090,7	136,8	1081,5	173,5	1163,2	240,0	1130,0	26,9
1200	48"	1229,4	1197,0	131,1	1189,8	161,8	1180,1	204,5	1278,8	270,0	1230,5	48,2
1300	52"	1331,4	1296,5	154,0	1288,7	191,7	1279,3	234,4	1381,3	270,0	1332,5	52,8
1400	56"	1433,4	1396,2	177,1	1387,4	220,8	1377,5	271,5	1483,7	270,0	1434,5	57,2

Please get in contact with SUBOR for higher stiffness classes (up to SN 1.000.000 N/m²).

NON-PRESSURE PIPES

GRAVITY SEWER PIPE & COUPLING DIMENSION												
PRESSURE CLASS			GRAVITY SEWER PIPE						GRAVITY SEWER COUPLING			
STIFFNESS CLASS			SN 2.500 N/m²		SN 5.000 N/m²		SN 10.000 N/m²					
DN		OD _{nom}	ID _{min}	W _{min}	ID _{min}	W _{min}	ID _{min}	W _{min}	OD _{nom}	Length	ID _{min}	W _{min}
mm	inch	mm	mm	(kg/m)	mm	(kg/m)	mm	(kg/m)	mm	mm	mm	(kg/pcs)
1500	60"	1535,4	1495,9	202,6	1487,0	252,1	1475,7	311,7	1586,2	270,0	1536,5	61,7
1600	64"	1637,4	1595,1	232,6	1585,9	287,1	1574,0	353,9	1688,6	270,0	1638,5	66,5
1700	68"	1739,4	1694,7	261,6	1684,8	324,2	1672,4	398,8	1791,0	270,0	1740,5	71,1
1800	72"	1841,4	1794,7	292,8	1783,9	362,2	1770,6	445,9	1893,4	270,0	1842,5	75,8
1900	76"	1943,4	1894,4	324,6	1883,0	401,5	1868,6	496,1	1995,8	270,0	1944,5	80,5
2000	80"	2045,4	1993,8	360,1	1982,1	443,8	1967,2	549,4	2098,2	270,0	2046,5	85,4
2100	84"	2147,4	2093,5	395,6	2081,2	488,4	2065,5	604,4	2200,6	270,0	2148,5	90,3
2200	88"	2249,4	2193,2	432,9	2179,8	534,5	2163,4	660,2	2303,0	270,0	2250,5	95,3
2300	92"	2351,4	2292,6	473,7	2279,1	585,3	2262,0	724,1	2405,4	270,0	2352,5	100,2
2400	96"	2453,4	2392,4	514,7	2378,2	635,4	2360,5	785,7	2507,8	270,0	2454,5	105,3
2500	100"	2555,4	2492,1	556,8	2477,0	691,4	2458,8	851,8	2610,1	270,0	2556,5	110,5
2600	104"	2657,4	2591,6	603,7	2576,0	746,9	2556,9	922,7	2729,9	300,0	2660,5	166,2
2700	108"	2759,4	2691,3	648,6	2675,1	804,3	2655,2	994,4	2832,6	300,0	2762,5	174,1
2800	112"	2861,4	2790,7	698,8	2774,2	863,3	2753,4	1069,0	2935,2	300,0	2864,5	182,3
2900	116"	2963,4	2890,4	747,8	2873,3	924,0	2851,8	1144,6	3037,8	300,0	2966,5	190,4
3000	120"	3065,4	2990,1	797,9	2972,5	986,6	2949,4	1224,6	3140,4	300,0	3068,5	198,5

BIG PROJECTS
REQUIRE BIG THINKING



COUPLINGS: EASY TO INSTALL

SUBOR Sewer Pipes are assembled using the GRP coupling connection system which offers perfect leak tightness. The tightness of the coupling connections is provided by the gaskets made of elastomeric material. The flexibility of gaskets allows a certain angular deviation of the couplings, thus preventing direct load on the pipe, which could result from ground subsidences and soil activities such as earthquakes. Compared to the alternatives, SUBOR couplings offer fast, easy and safe installation in any ground and weather conditions.



PRESSURE COUPLING

Common applications include irrigation, water supply, pressure sewer and HPP penstock systems.

DN200 – DN4000 mm diameter range,
PN40 bar pressure



SEWER COUPLING

Common applications include sewer and storm water systems.

DN200 – DN4000 mm diameter range,
PN1 bar pressure



ANGLED COUPLING

Cost effective coupling solution for increased angular deflections up to 3 °C.

DN200 – DN4000 mm diameter range,
up to PN16 bar pressure



BIAXIAL LOCK JOINT

Common applications include industrial cooling and desalination systems.

DN200 – DN4000 mm diameter range,
up to PN16 bar pressure

SUBOR BLUE TAPE COUPLING

No stain, no dirt, no rust! To have an easier and faster installation, **just remove the blue!**

In order to prevent EPDM Gaskets from direct UV effect of the sunlight, it is recommended to supply them separately and store them in a proper place. SUBOR's new innovative product BLUE TAPE offers a perfect solution for the installers and avoids the need for storage space. SUBOR Blue Tape also provides long-lasting protection against both UV and environmental effects like dust and dirt.

JUST REMOVE
THE BLUE



QUALITY MANAGEMENT SYSTEM

SUBOR's approach to the quality concept is not limited to the production process and its product. The management mindset of SUBOR in all activities is an insight that considers the satisfaction of all stakeholders, especially customers and adopts environmental awareness, occupational health and safety, and information security as the fundamental policy.

Establishing its management systems on these foundations, SUBOR has obtained **ISO 9001 Quality**, **ISO 14001 Environment**, **OHSAS 18001 Occupational Health and Safety**, **ISO 17025 Testing and Calibration Laboratories** and **ISO 27001 Information Security Management Systems** certificates as a result of the audits of international institutions.



INTERNATIONAL STANDARDS

SUBOR Non-Pressure GRP Pipes are designed to meet the requirements of the product standards **AWWA**, **ASTM**, **DIN**, **ISO** and **EN**.

Additionally, our products are also approved by the local or country-specific standards such as **CSTB** (France), **GOST** (Russia), **ZAG** (Slovenia), **IGH** (Croatia) and **HAYA WAYER** (Oman).

SUBOR Non-Pressure Pipes fulfil the requirements of the following prior international standards.

ISO 25780	Plastics piping systems for pressure and non-pressure water supply, irrigation, drainage or sewerage
EN 14364	Plastics piping systems for drainage and sewerage with or without pressure
EN 1796	Plastics piping systems for water supply with or without pressure
ASTM D 3754	Standard specification for sewer and industrial pressure pipe
ASTM D 3262	Standard specification for "fiberglass" sewer pipe
ISO 10639	Plastics piping systems for pressure and non-pressure water supply
ISO 10467	Plastics piping systems for pressure and non-pressure drainage and sewerage



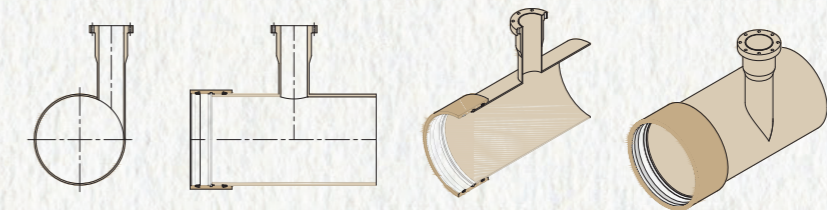


FITTING PRODUCTION AREA

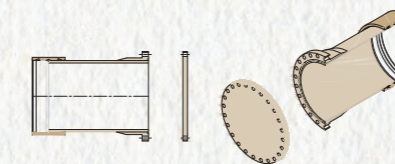
FITTINGS: FREEDOM TO CHOOSE

SUBOR GRP Pipes are also used to fabricate fittings such as elbow, tee, reduction, flange, marine lugs etc., as well as special spools that can be designed upon request. For the fitting production, firstly the pipes are cut at the desired angles and forms. Then, the cut pipes are attached by connecting glass fiber and polyester resin.

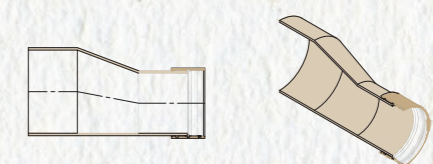
SUBOR Sewer Pipes allow the production of standard fittings as well as non-standard ones in a very wide range. SUBOR offers wide solution opportunities with over 200.000 different types of fitting design.



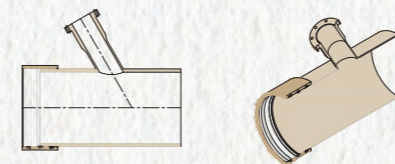
CONCENTRIC & TANGENTIAL TEE



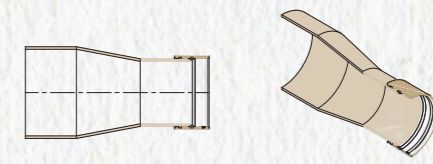
FLANGE & BLIND FLANGE



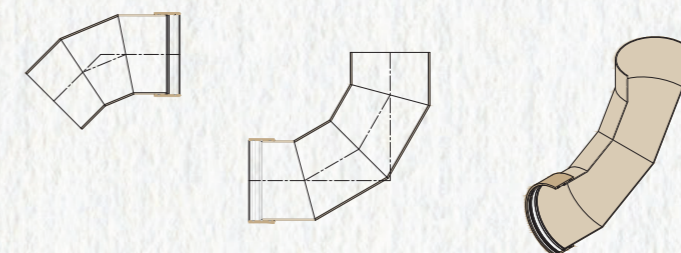
ECCENTRIC REDUCER



WYE



CONCENTRIC REDUCER



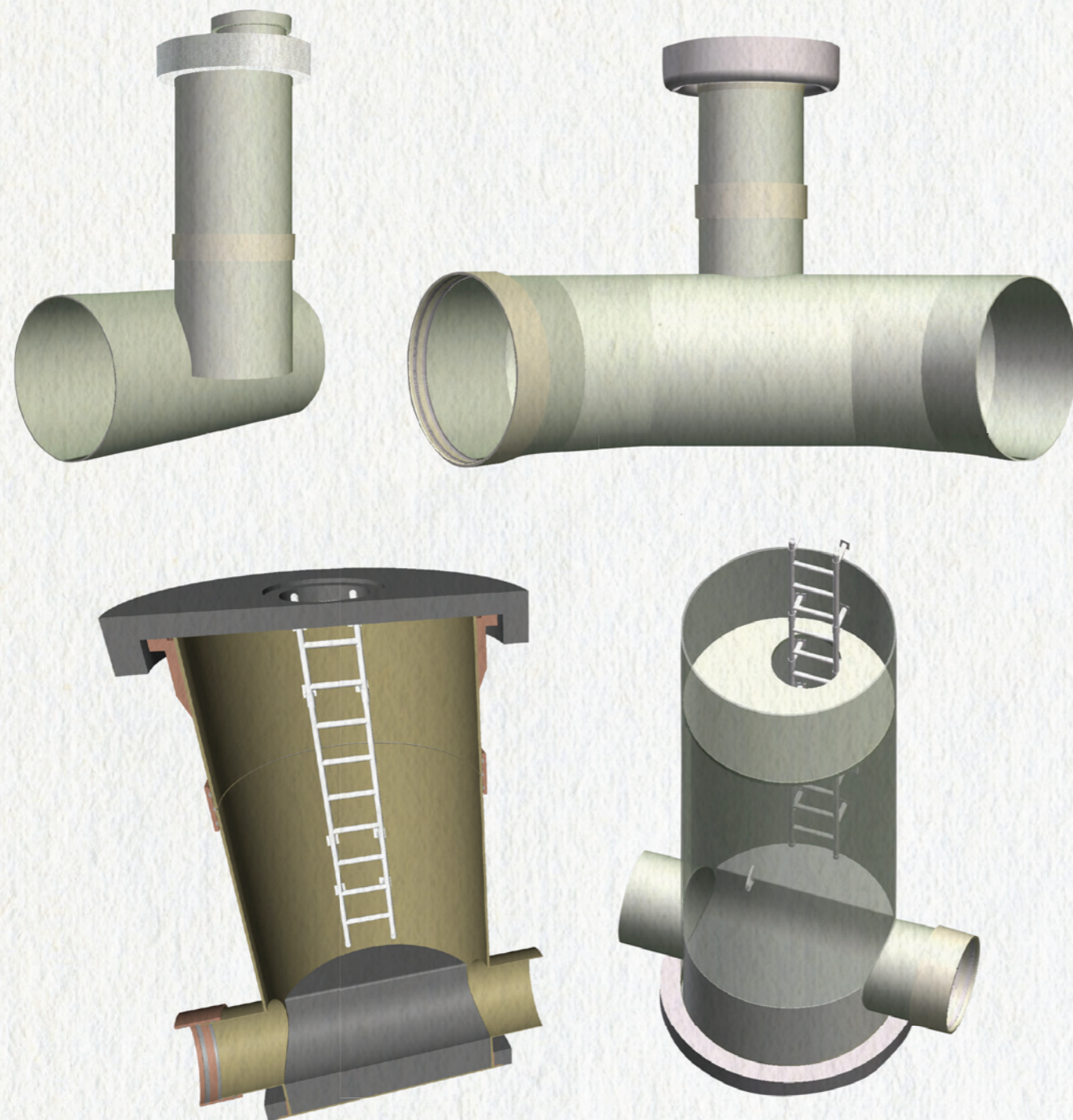
ELBOWS



MANHOLES

Similar to fitting fabrication, manholes are made of SUBOR GRP Pipes. In order to have a long service life, high performance and safe service conditions, likewise the whole pipeline system, the GRP pipes are precisely cut and joined with glass fiber and polyester resin.

With the benefit of non-corrosive characteristic, light weight, durability and easy installation advantages; SUBOR manholes are used for ventilation, inspection and maintenance, cleaning and flushing of drains or sewers and pumping stations.



ISRAEL, SHARONIM
SEWAGE TREATMENT PROJECT

SLIP-LINING

As a result of the advanced manufacturing technology and use of composite materials, SUBOR GRP Pipes meet the requirements for the replacement and rehabilitation of existing pipelines in the urban areas where it is improper to open trench excavations.

Thanks to our capability to produce custom diameters truly suitable for slip-lining the existing pipelines, SUBOR products provide easy installation and maximum flow capability for the pipeline.

You can easily apply slip-lining method with the pipes of different properties and connection types:

- **Non-pressure or pressure pipes**
- **High stiffness pipes (up to 1 million N/m²)**
- **GRP or steel flush joint connection**



GRI PIPES

SUBOR provides a safe and more reliable option to engineers and contractors, who need higher resistant pipes for their tough project conditions. The recently developed SUBOR GRI Pipes reach an excellent performance when they are subjected to high abrasion, outer impacts, and high pressurized water jet cleaning. SUBOR GRI Pipe technology allows to have same connection type and production range with standard pressure pipes.

SUBOR GRI Pipe offers:

- **High impact resistance**
- **High abrasion resistance**
- **High water jet cleaning resistance**

NON-CIRCULAR PIPES

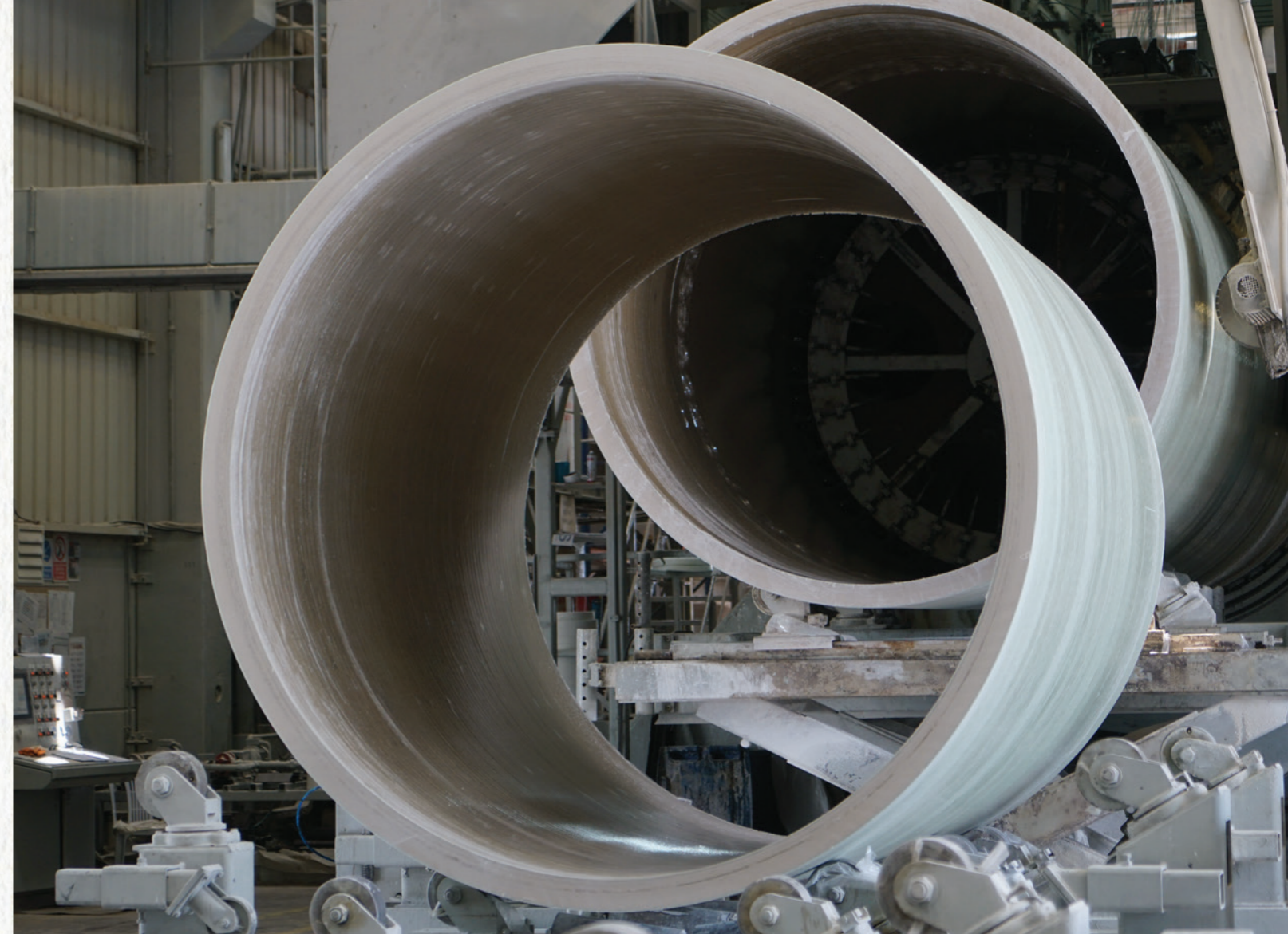
SUBOR NON-CIRCULAR (NC) GRP Pipes are primarily designed and developed for use in buried installations and commonly to reline existing non-circular pipelines.

The application areas of SUBOR NC pipes are:

- Sanitary sewer and old city sewer relining
- Storm water conveyance
- Chemically aggressive sewerwater

The SUBOR NC pipes offer the following advantages to the end-users:

- Custom pipe lengths and profiles
- Long and effective service life
- Excellent impact resistance
- Increased chemical and abrasion resistance
- No need for additional lining or corrosion protection
- Superior hydraulic characteristics
- Lightweight, easy joining and fast installation
- Environmental friendly



JACKING PIPES

SUBOR offers an innovative and reliable solution for urban areas with special design jacking pipes. SUBOR Jacking Pipes are used for the construction and renovation of underground pipelines using trenchless methods. High axial compressive strength of jacking pipes provides significant advantages compared to other pipe materials for micro-tunneling and slip-lining applications.

SUBOR Jacking Pipes are preferred in the construction of new sewer and pressure pipelines, replacement of old sewers, road culverts in transport engineering and relining using the micro-tunneling and slip-lining methods.

Depending on the project requirements, SUBOR Jacking Pipes are designed in custom lengths, with different joint types and up to 1.000.000 N/m² nominal stiffness. Compared to conventional pipe materials, SUBOR GRP Pipes enable installer to use smaller capacity jacking machines, to minimize the excavation volume, to reduce energy consumption and to increase installation speed.



5 CONTINENTS,
50+ COUNTRIES,
1000+ PROJECTS!





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