

**subor<sup>®</sup>**

**GLOBAL SOLUTION PARTNER  
IN PIPE SYSTEMS**



**MAKE A GOOD START  
FOR A SUSTAINABLE FUTURE**

# **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 25 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 60 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 15.000 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 100 mm and 4000 mm in diameter, up to 40 bar pressure and 1.000.000 N/m<sup>2</sup> 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.

# MAKE A GOOD START FOR SUSTAINABLE FUTURE!

Subor's approach to a more sustainable business to undertake today's projects with respect to future generations' needs.

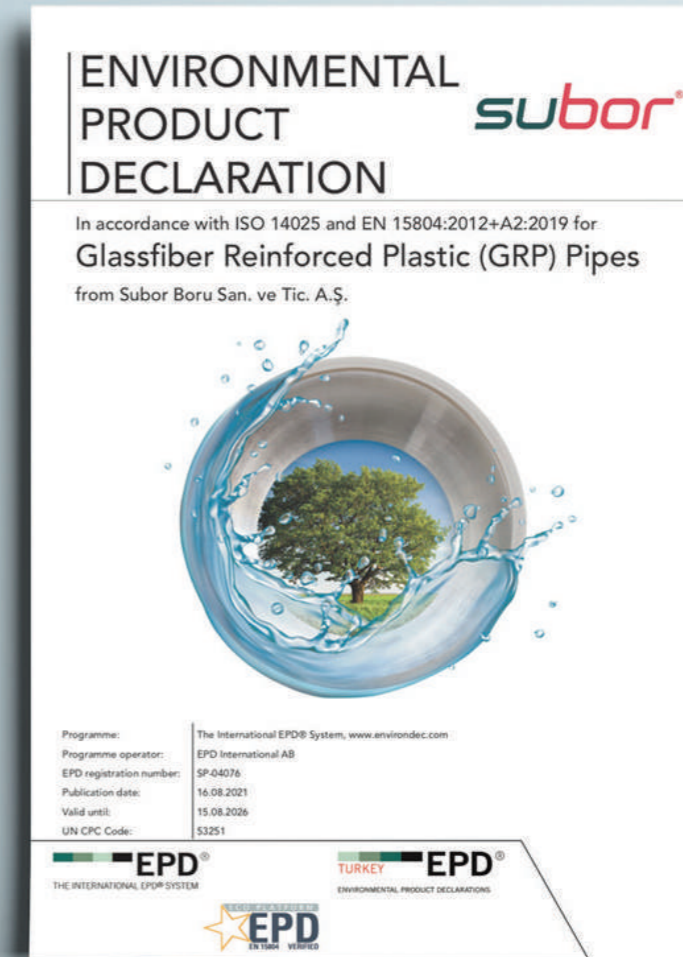
Sustainable development must consider the effects it has on the economy, society, and environment as a whole. Subor, as a pipe manufacturer calculates the influence of its outputs on these elements at every step of its decision-making process for a sustainable business.

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.



# ENVIRONMENTAL PRODUCT DECLARATION



As Subor, we are proud to be entitled to the international EPD (Environmental Product Declaration) Certificate issued in accordance with ISO 14025 and EN 15804:2012+A2:2019, which examines the environmental impact of our products throughout their life cycle and transparently reveals our environmental responsibility and sustainability policy!

Adopting the principle of respecting the environment and nature in all of its processes and providing eco-friendly, sustainable and innovative solutions, SUBOR's priority is -and will always be- to contribute to a better future with its low carbon footprint products.

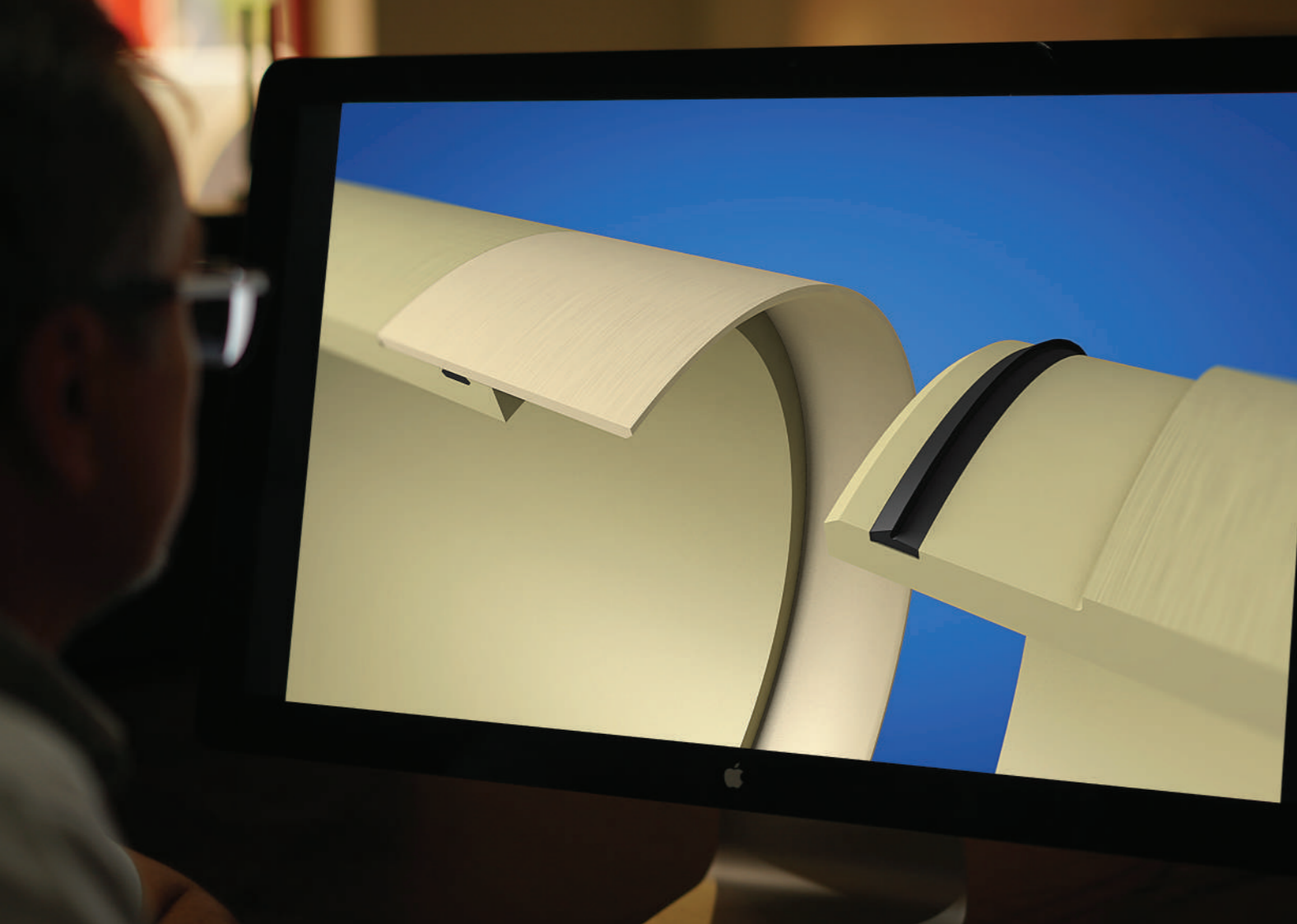
Please refer to the following link to browse the document:  
<https://www.environdec.com/library/epd4076>

# 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 your Subor representative for further information.





## GRP A SOLID CHOICE FOR LONG SERVICE LIFE

SUBOR's approach is to have a more sustainable business to undertake today's projects for 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 pipe anchoring and support requirements
- Calculation of concrete thrust blocks
- GRP tank, silo, manhole and spool design
- Buried pipe design
- Hydraulic & static calculations



# 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, ISO 45001 OHS, ISO/IEC 27001 Information Security, ISO 50001 Energy Management Systems and ISO/IEC 17025 General requirements for the competence of testing and calibration laboratories** certificates as a result of the audits of international institutions.

Subor GRP Pipes are designed to meet the requirements of international product standards such as **AWWA, ASTM, DIN, ISO** and **EN**.

Additionally, our products are also approved by country-specific standards.

\* For more information, please contact with your Subor representative.



## INTERNATIONAL STANDARDS

<b>ISO 23856</b>	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
<b>ISO 25780</b>	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
<b>ISO 16611</b>	Plastics piping systems for drainage and sewerage without pressure - Non-circular pipes and joints made of glass-reinforced thermosetting plastics (GRP) based on unsaturated polyester resins (UP) — Dimensions, requirements and tests
<b>NSF/ANSI 61</b>	Drinking Water System Components
<b>AWWA C950</b>	Fiberglass Pressure Pipe
<b>ASTM D3517</b>	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Pressure Pipe
<b>ASTM D326</b>	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer Pipe
<b>ASTM D3754</b>	Standard Specification for "Fiberglass" (Glass-Fiber-Reinforced Thermosetting-Resin) Sewer and Industrial Pressure Pipe

# NON-PRESSURE PIPES SUPERIOR RESISTANCE FOR SEWER LINES!

Subor Non-Pressure GRP Pipes offer an effective solution with a special liner designed and manufactured to be highly resistant against corrosive and chemical substances commonly found in wastewater lines.

Designed for superior acid resistance, Non-Pressure Pipes are typically used for sewers, drainage systems, storm water applications and conveyance of aggressive chemicals of industrial lines.\*

Subor Non-Pressure Pipes offer:

- Water jetting resistance in accordance with DIN 19523 standard
- Abrasion resistance in accordance with CEN/TR 15729 standard
- Long term performance over 50 years. (According to the long term monitoring carried out for more than 10.000 hours.)

\* For additional information about chemical resistance, please get in contact with your Subor representative.



## THE APPLICATION AREAS OF NON-PRESSURE PIPES

- Sewer lines
- Wastewater treatment plants
- Rainwater & stormwater lines
- Industrial applications
- Storage and overflow tanks
- Circular & non-circular relining

## PRODUCTION RANGE

Diameter range (DN): 100 – 4000 mm

Pressure (PN): 1 bar

Standard lengths: 3 & 6 & 12 meters

Stiffness (SN): 2500 - 5000 - 10000 - 16000 - 20000 and up to 1.000.000 N/m<sup>2</sup>

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

# PRESSURE PIPES THE SAFE WAY TO CONVEY WATER!

The proven advanced continuous filament winding technology and the benefits of composite materials enable Subor to provide solutions for pressure pipe systems up to 40 bars with a cost advantage against conventional materials.

With the benefit of Subor GRP Pipes' structure, lower wave celerity than other piping materials mean less cost while designing for surge pressure and water hammer phenomenon.



## THE APPLICATION AREAS OF SUBOR PRESSURE PIPES

- Irrigation
- Water supply
- Penstock systems
- Power plants
- Industrial applications
- Pressure sewer

## PRODUCTION RANGE

Diameter range (DN): 100 – 4000 mm

Pressure (PN): Up to 40 bar

Standard lengths: 6 & 12 meters

Stiffness (SN): 2500 - 5000 - 10000 N/m<sup>2</sup>

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

# JACKING PIPES INNOVATIVE SOLUTION FOR URBAN AREAS!

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.

## THE APPLICATION AREAS OF SUBOR JACKING PIPES

- Construction of new sewer and pressure pipelines
- Replacement of old sewers, road culverts in transport engineering
- Relining using the micro-tunnelling and slip-lining methods

## PRODUCTION RANGE

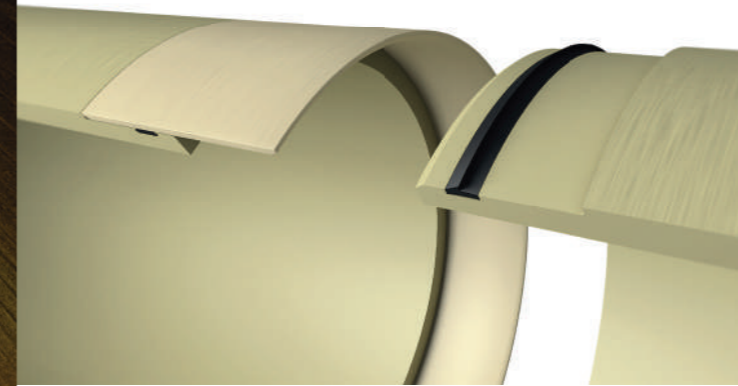
Diameter range (OD): 100 – 4000 mm

Pressure (PN): Up to 16 bar

Standard lengths: 1 – 12 meters

Stiffness (SN): Up to 1.000.000 N/m<sup>2</sup>

## JOINT TYPES



### SGR JOINT

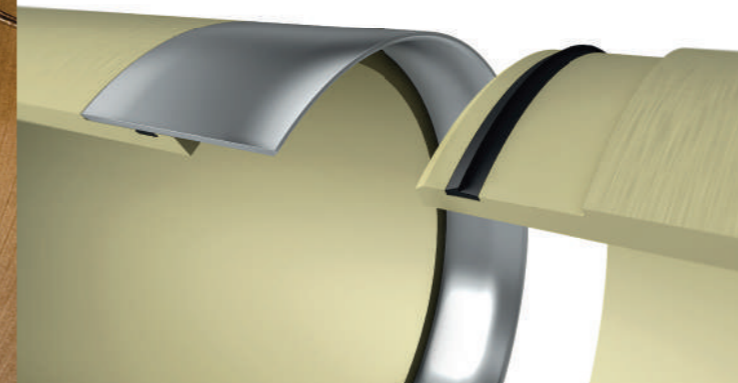
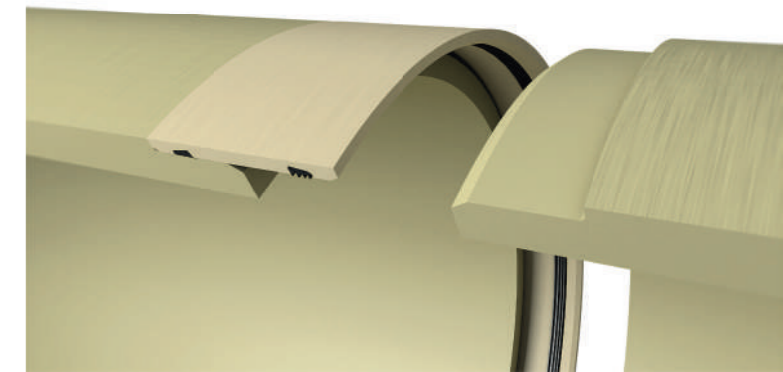
- Includes a GRP sleeve with EPDM rubber gasket that fits into the grooves in the pipe spigots.
- Suitable for use in pressure and non-pressure applications.
- Can be produced in any diameter to suit your project and installation needs.

**MAX. PN:** 6 BAR

### SPC JOINT

- Includes a GRP pressure coupling design.
- Suitable for use in pressure applications.
- Suitable for installations with lower jacking forces.

**MAX. PN:** 16 BAR



### SSR JOINT

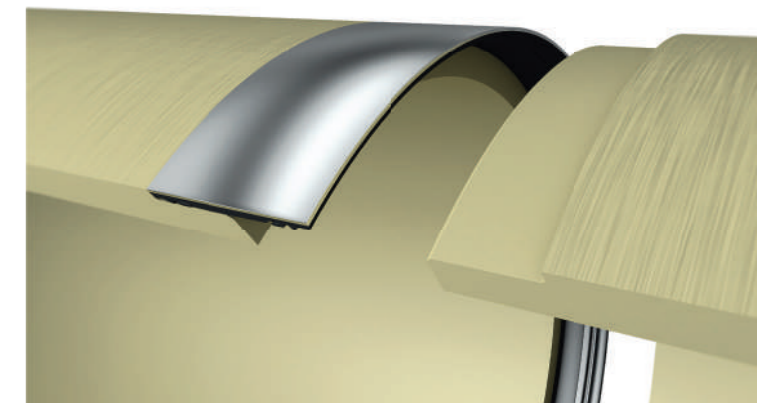
- Includes a stainless steel sleeve whose inner surface fits tightly to the EPDM rubber gasket in the groove on the pipe spigot.
- Suitable for pressure and non-pressure applications.
- Often preferred for smaller diameter pipes.

**MAX. PN:** 6 BAR

### SSE JOINT

- Includes a stainless steel sleeve with an integrated EPDM rubber seal.
- Suitable for pressure and non-pressure applications.
- Resistant to high jacking forces during installation.

**MAX. PN:** 10 BAR





JAROCIN POLAND  
RAIN WATER PROJECT

# NON-CIRCULAR PIPES YOU SHAPE IT, WE MAKE IT!

Subor Non-Circular GRP Pipes are primarily designed and developed for use in buried installations and reconstruction of existing old city pipelines.

Subor carries out the design and manufacturing processes of non-circular pipes with its own R&D and technology.

## The application areas of SUBOR NC pipes are:

- Sanitary sewer and old city sewer relining
- Storm water conveyance
- Chemical lines

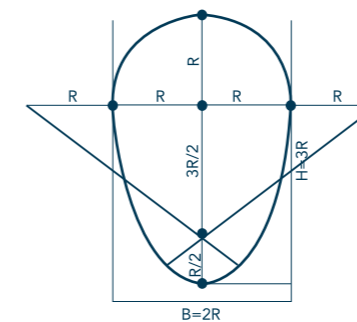
## Subor NC Pipes offer the following advantages to the end-users:

- 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
- No need for traffic interruption
- Environmental friendly



# NC GRP PIPE SHAPES and PRODUCT RANGE

## EGG SHAPE



### Nominal Length:

Up to 3 Meters

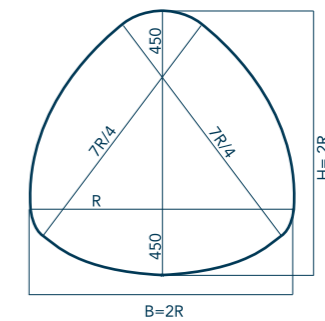
### Nominal Height (H):

Up to 4000 mm

### Nominal Breadth (B):

Up to 4000 mm

## MOUTH SHAPE



### Nominal Length:

Up to 3 Meters

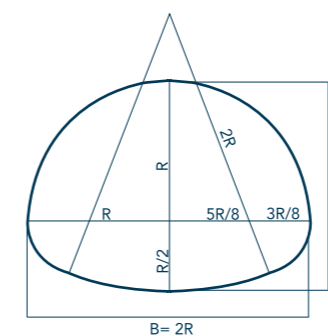
### Nominal Height (H):

Up to 4000 mm

### Nominal Breadth (B):

Up to 4000 mm

## ARCH SHAPE



### Nominal Length:

Up to 3 Meters

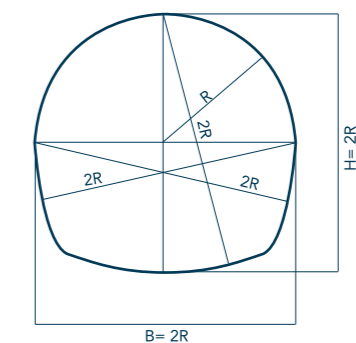
### Nominal Height (H):

Up to 4000 mm

### Nominal Breadth (B):

Up to 4000 mm

## HORSESHOE SHAPE



### Nominal Length:

Up to 3 Meters

### Nominal Height (H):

Up to 4000 mm

### Nominal Breadth (B):

Up to 4000 mm

## CUSTOMIZED SHAPE

Apart from the commonly used ones as mentioned above, SUBOR can also produce other profiles on request with dry weather channel or extraordinary profile shapes.

# BIAXIAL PIPES

## REINFORCED PIPES TO RESIST PRESSURE END THRUST AND BENDING LOADS!

Subor Biaxial Pipes are designed and produced to resist forces in axial direction as well as circumferential direction in order to eliminate thrust block needs.

Loads are transferred from one pipe to the next with restrained joints such as butt-wrap lamination, lock joint or flanges.

Depending on the project requirements, Subor Biaxial Pipes can be produced in full glass or mortar.

Stress analysis study which is necessary for biaxial systems can be performed by Subor Engineering Team.



## THE APPLICATION AREAS OF SUBOR BIAXIAL PIPES

- Power plants
- Desalination plants
- Cooling water lines
- Discharge and intake lines
- Water transmission lines
- Industrial applications

## PRODUCTION RANGE

Diameter range (DN): 100 – 4000 mm

Pressure (PN): Up to 32 bar

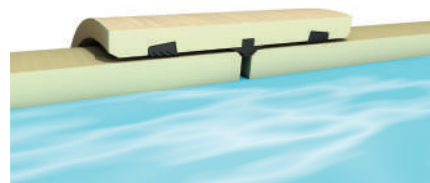
Standard lengths: 1-12 meters

Stiffness (SN): 2500 - 5000 - 10000 N/m<sup>2</sup>

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

# COUPLINGS EASY TO INSTALL

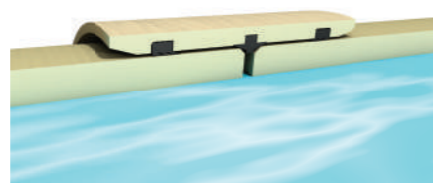
SUBOR GRP Pipes are assembled using the GRP coupling connection system which offers perfect leak tightness. The GRP REKA couplings manufactured with the same technique as the GRP pipes and they are subjected to a hydrostatic pressure test following preparation in the cutting and grooving machine. Tightness of the coupling connections is provided by the gaskets made of elastomeric material. The flexibility of the gaskets allows a certain angular deviation of the couplings, thus preventing direct load on the pipe, which could result from ground subsidence and soil activity such as earthquakes. Compared to its alternatives, SUBOR GRP 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.

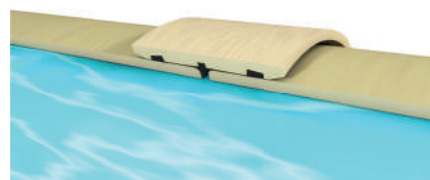
DN100 – DN4000 mm diameter range,  
PN40 bar pressure



## SEWER COUPLING

Common applications include sewer and storm water systems.

DN100 – DN4000 mm diameter range,  
PN1 bar pressure



## ANGLED COUPLING

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

DN100 – DN4000 mm diameter range,  
up to PN16 bar pressure



## BIAXIAL LOCK JOINT

Common applications include industrial cooling and desalination systems.

DN100 – 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



# GRI PIPES

## HIGHER IMPACT RESISTANCE FOR TOUGH CONDITIONS!

Subor provides a safe and more reliable option to engineers and contractors, who need higher impact resistant pipes for 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.

Gri Pipe technology allows to have same connection type and production range with standard pressure pipes.

Subor Gri offers a product improvement in materials, liner construction and manufacturing process to offer a better pipe performance and allows to use larger backfill particles (natural materials or large crushed rocks) up to 64 mm particle size for backfill on the largest pipes and ensures the pipe a longer lifetime even if the water carries abrasive materials like gravel and sand.

Subor Gri Pipe is designed suitable for applications utilizing water jet cleaning, with conformance to DIN 19523 standard.



## THE GRI LAMINATE OFFERS BETTER PIPE PERFORMANCE WITH:

- Higher impact resistance
- Higher abrasion resistance
- Better ease of installation
- Better operational performance
- Longer pipe lifetime

## PRODUCTION RANGE

Diameter range (DN): 100 – 4000 mm

Pressure (PN): Up to 40 bar

Standard lengths: 6 & 12 meters

Stiffness (SN): 2500 - 5000 - 10000 N/m<sup>2</sup>

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

**NEW PRODUCT**

# HIGH ABRASION RESISTANCE (HAR) PIPES

## PIPE WITH THE HIGHEST WEAR RESISTANCE!

Subor has designed its new product HAR Pipe, for the tough conditions where higher wear resistance is required.

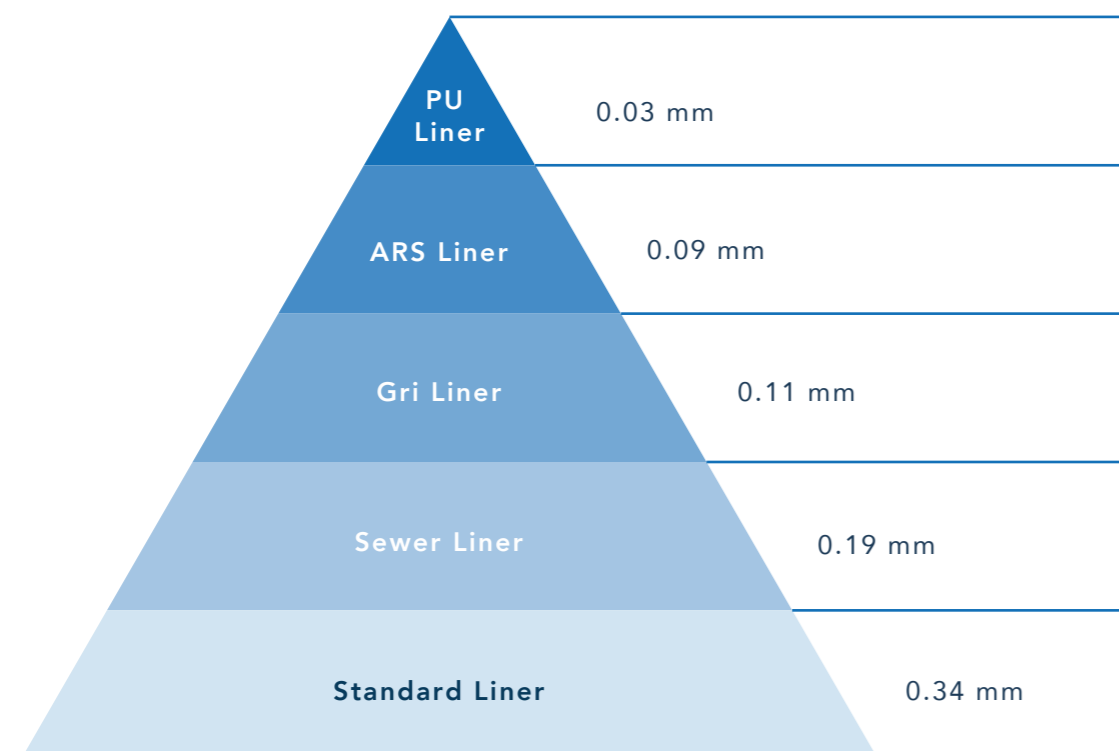
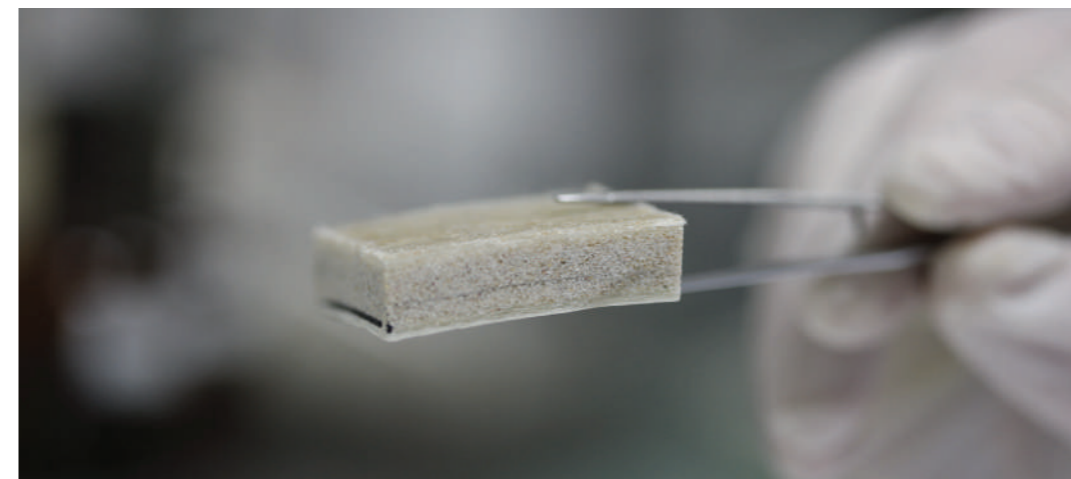
With our new innovative product HAR Pipe, the resistance of GRP pipes against corrosive chemicals is increased up to 2 times depending on the chemical type.

Thanks to the special elastic liner design of the HAR pipe, the wear resistance of the inner liner of GRP pipes is increased 10 times compared to the standard GRP Pipe.

Subor High Abrasion Resistance (HAR) Pipe is produced with 2 different technologies in order to meet the needs of the different projects:

- PU liner
- ARS liner

ARS Liner Pipe provides better abrasion resistance than Gri Pipe, while it is a less costly option than Polyurea Liner Pipe.



Estimated loss in liner thickness for 100.0000 cycle

## THE APPLICATION AREAS OF SUBOR HAR PIPES

- Mining industry
- Lines conveying highly abrasive particulate liquids
- Chemical lines
- Industrial applications
- Rainwater & stormwater lines

## PRODUCTION RANGE

Diameter range (DN): 100 – 4000 mm

Pressure (PN): Up to 40 bar

Standard lengths: 6 & 12 meters

Stiffness (SN): Up to 1.000.000 N/m<sup>2</sup>

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

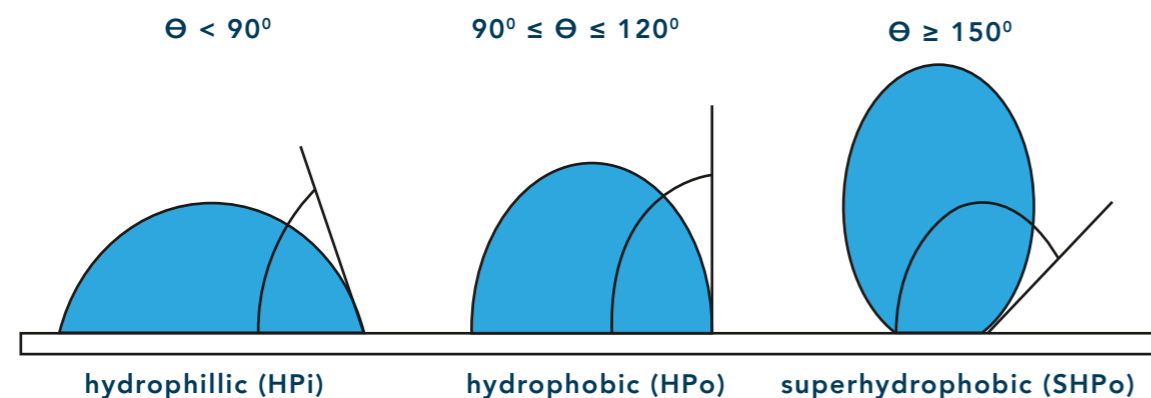
**NEW PRODUCT**

# NANO PIPES DESIGNED TO RESIST HIGH VELOCITIES IN WATER SUPPLY PROJECTS!

With the rapidly increasing technology applications and the use of technological raw materials and additives worldwide, innovative companies that use these materials in their products become leaders in the market.

Subor offers a new product to meet the needs of the market with Nano Pipe, which is suitable for use in different processes thanks to its high abrasion resistance and high strength.

Subor Nano Pipes have the lower inner surface energy with increasing contact angle similar to the performance of Hydrophobic (HPo) surface.



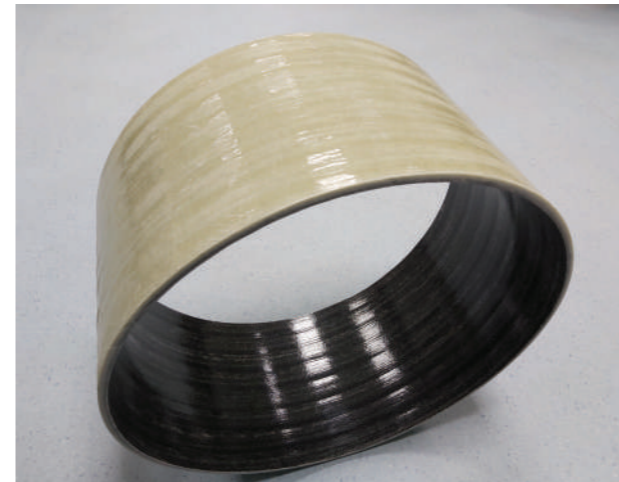
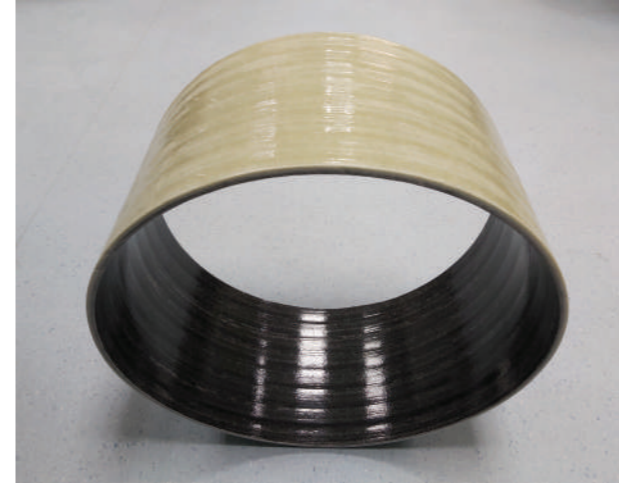
The contact angle of the bare polyester resin increased with the addition of the nano powders. The contact angle increased respectively from  $70.6^\circ$  to  $104.1^\circ$  in the nano particles composite and reached its highest value. The surface of the material has switched from hydrophilic (CA  $90^\circ$ ) structure, eventually. With the addition of nano particles, the friction coefficient decreased up to 20%.

Thanks to the nano-technological particles used in our new product, the accumulation of static electricity encountered in pipe systems has been reduced / eliminated.

**We don't cover the surface, we add it in!**

The nano-tech material is included into the resin, which makes the lifetime of the nano-tech material equivalent to the lifetime of the pipe.

As a result of these innovations in the product, Nano Pipe can be applied in different industries.



## THE APPLICATION AREAS OF SUBOR NANO PIPES

- Power plants
- Petrochemical industry
- Cooling water lines
- Water transmission lines
- Industrial applications
- Tanks and silos

## PRODUCTION RANGE

Diameter range (DN):	100 – 4000 mm
Pressure (PN):	Up to 40 bar
Standard lengths:	6 & 12 meters
Stiffness (SN):	2500 - 5000 - 10000 N/m <sup>2</sup>

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



HERFORD GERMANY  
JACKING PROJECT

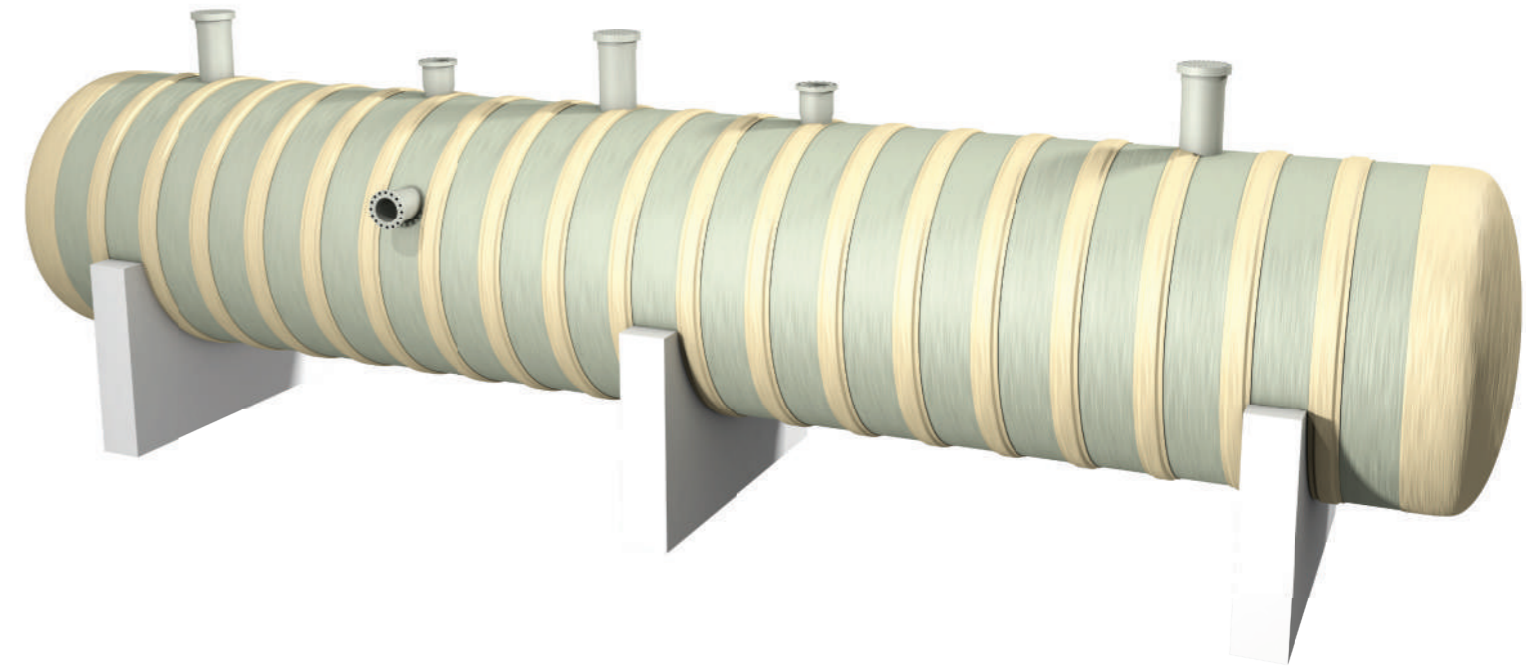
# SLIP-LINING

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/m<sup>2</sup>)**
- **GRP or steel flush joint connection**



# TANKS, SILOS AND GALLERIES

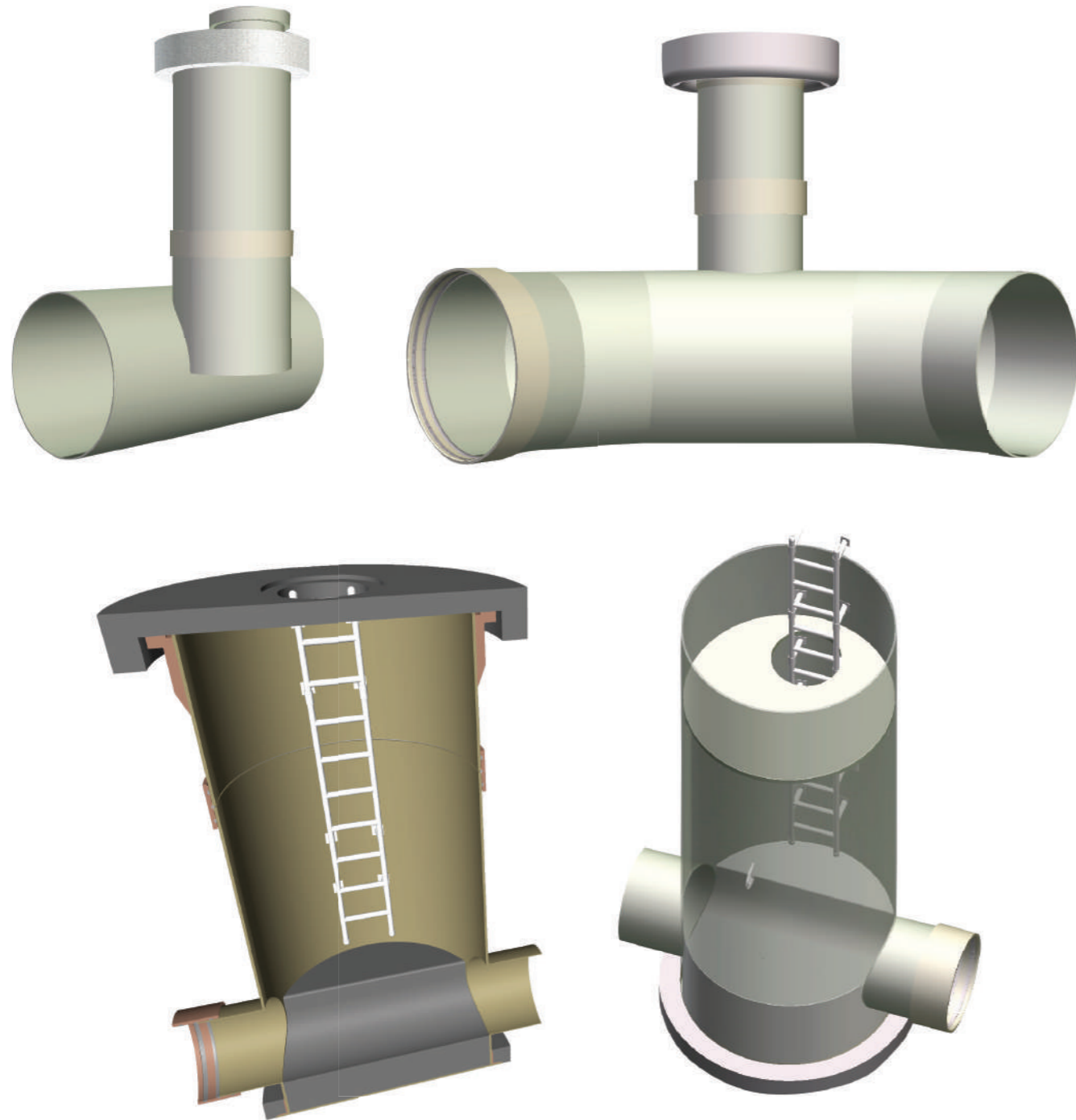
Subor Tanks and Silos are designed according to project needs and they can be used for gas, fuel oil, airplane fuel, potable water or waste water, various chemical fluid storing and many other purposes.

Since GRP Material is not affected by corrosion, GRP tanks have a relatively long service life without additional maintenance costs in comparison to other materials.

# 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

# 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 on request.

For fitting production, firstly pipes are cut at the desired angles and forms. Then, the cut pipes are attached by connecting glass fiber and polyester resin.

Subor offers wide solution opportunities with over 200.000 different types of fitting design.



## SUBOR FITTING TYPES

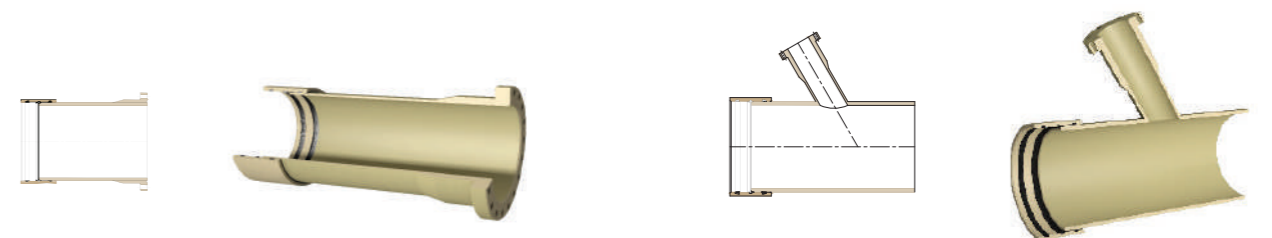


CONCENTRIC & TANGENTIAL TEE



CONCENTRIC REDUCER

ECCENTRIC REDUCER



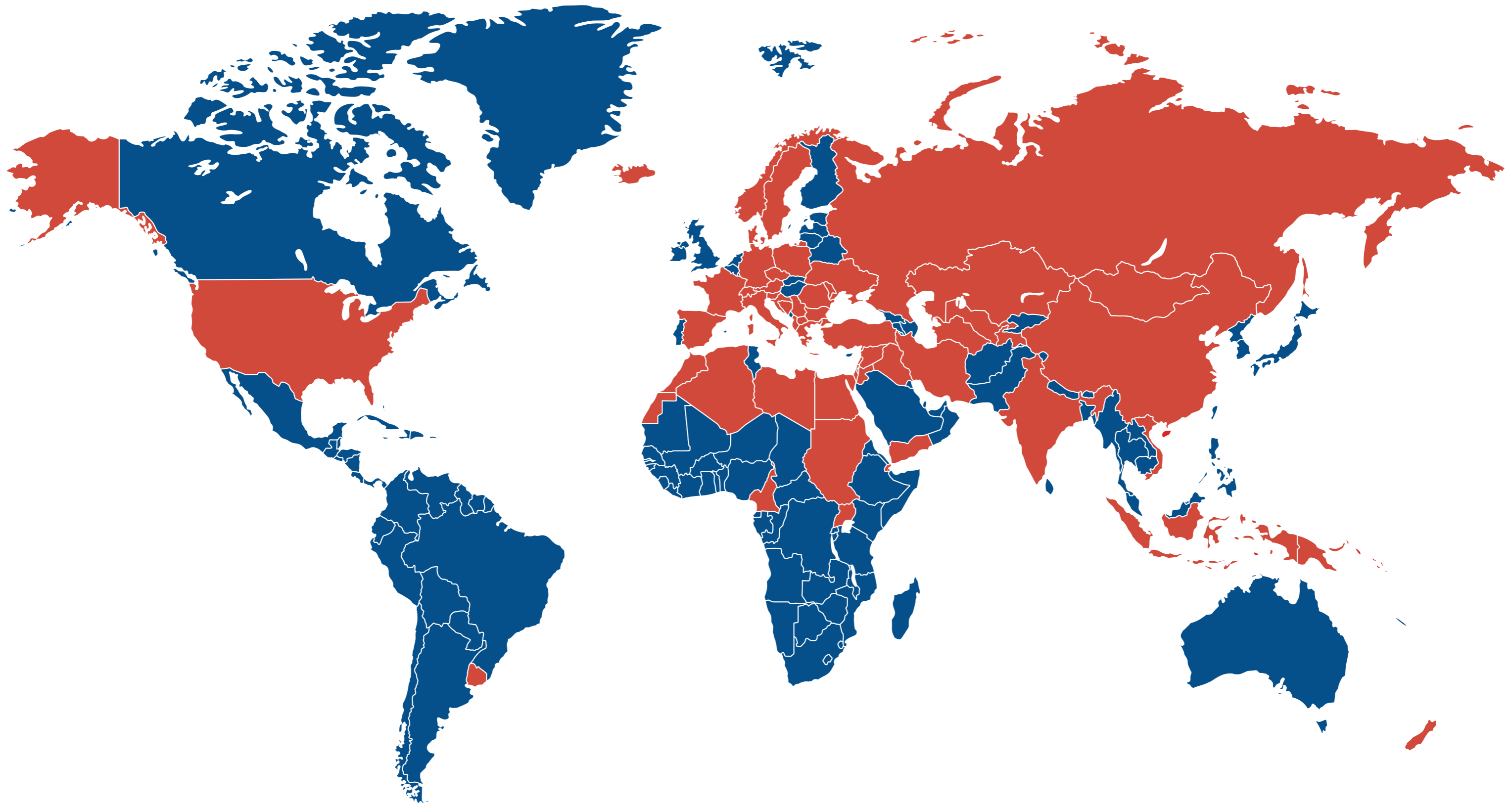
FLANGE

WYE



ELBOWS

**5 CONTINENTS,  
60+ COUNTRIES,  
2000+ PROJECTS.**





MAKE A **GOOD START**  
FOR A **SUSTAINABLE FUTURE**

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