



# Basalt

International™



# Basalt

CATALOG – Q1 2025







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## WE ARE

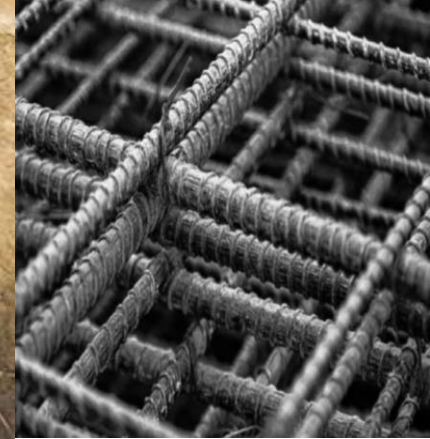


**Basalt**  
International™

- Global Citizens
- Idealists
- Creative Collaborators
- Experts
- Authentic
- Responsible
- Accountable
- Growth-Minded
- Relentless



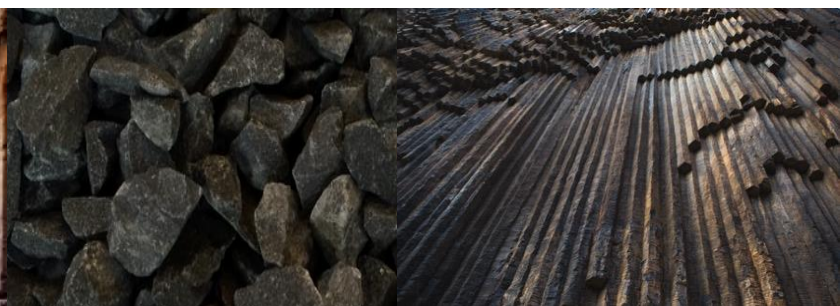




**OUR MISSION IS TO  
CHAMPION & DELIVER  
SUSTAINABLE BASALT-  
BASED COMPOSITE  
SOLUTIONS TO THE  
WORLD**

We're here to help our partners  
build better, stronger, and  
greener.

And we know that basalt-based  
composites are the key to truly  
sustainable material solutions  
across regions, industries, and  
products.





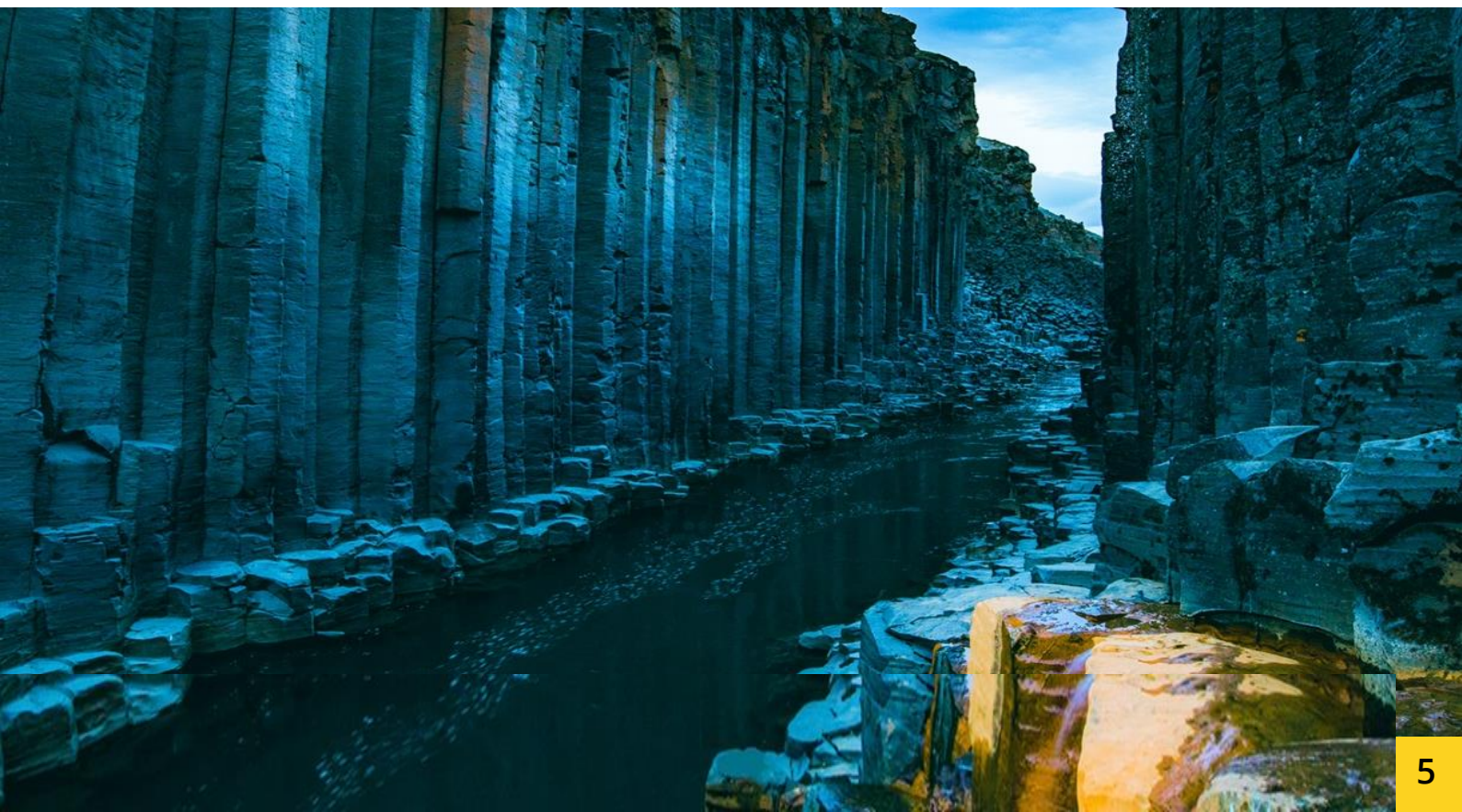


## WHAT IS BASALT?

Basalt is a rock formed during a volcanic eruption.

Due to its unique properties, such as strength and durability, basalt in the form of basalt continuous fiber (BCF) surpasses modern alternatives such as fiberglass or carbon fiber.

It is a pure and natural material, which makes it an ideal base for the manufacturing of environmentally friendly building materials.





# What is Basalt Fiber?



SUSTAINABLE AND RECYCLABLE

PLENTIFUL & LASTS FOR GENERATIONS

APPLICABLE ACROSS INDUSTRIES

STRONGER THAN STEEL AND GLASS

NON-COMBUSTIBLE & NON-REACTIVE

---

HIGH-PERFORMANCE SUSTAINABLE  
FIBER, FORGED FROM THE EARTH'S  
FURNACE

---





## THE BASALT PRODUCTION PROCESS

1



Basalt rock is quarried & crushed

2



Crushed basalt rock is melted & homogenized

3



The melt is drawn through specialized bushings as continuous fibers

4

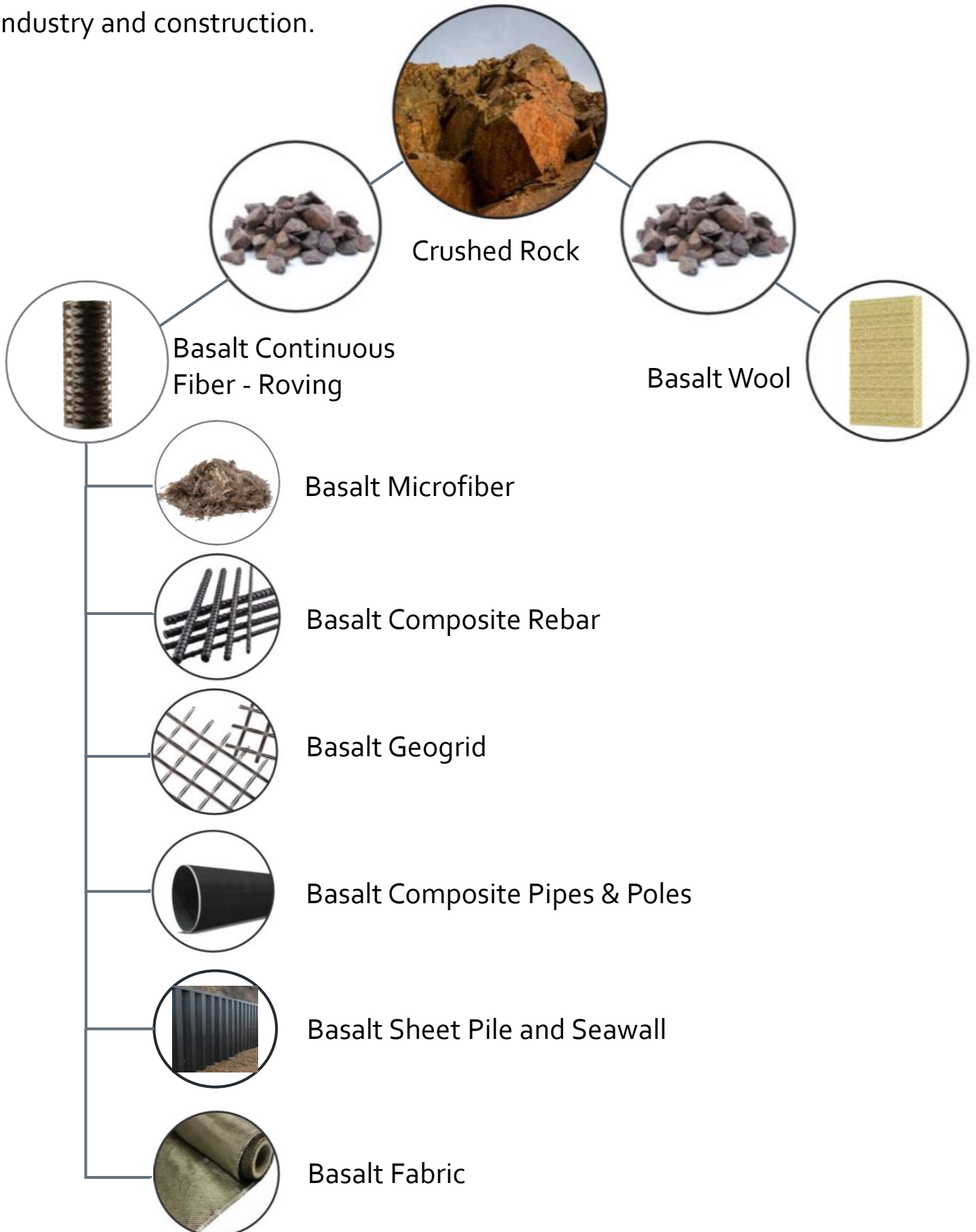


The extracted fibers have sizing applied, and are wound into packages, ready for their next use



## FROM QUARRY to DURABLE HIGH-PERFORMANCING PRODUCT

Each type of the company's products is made of high-quality basalt raw materials, which ensures high performance and durability. Basalt materials are also environmentally friendly, which makes them attractive for use in various fields of industry and construction.







# BASALT ROVING

Basalt roving is a man-made inorganic material obtained by melting natural basalt minerals and then converting them into fiber. Basalt roving production is performed by generating basalt melt in furnaces and then free flowing this melt through specially designed bushings, in the form of thousands of continuous threads.

Basalt roving is an untwisted thread that consists of basalt continuous fibers. In terms of physicochemical and mechanical properties, Basalt Continuous Fiber (BCF) is superb as a reinforcing material in special concretes and composites as a polymer matrices, operating in aggressive environments.



# BASALT TECHNICAL SPECIFICATIONS

| Mechanical Properties      | Measurement Units | Value                     | Standard          |
|----------------------------|-------------------|---------------------------|-------------------|
| Linear density             | tex               | 600, 1200, 2400, 4800     | GOST 6943.1-2015  |
| Filament diameter          | micron            | 9-22                      | GOST 6943.2-2015  |
| Specific tensile strength  | mN / tex          | No less than 600          | GOST 6943.10-2015 |
| Average elastic modulus    | hPa               | 80                        | --                |
| Elongation at break        | %                 | 2.0-4.5%                  | GOST 6943.10-2015 |
| Moisture contents          | %                 | No more than 2%           | GOST 6943.8-2015  |
| Mass loss on ignition      | %                 | No less than 0.4%         | GOST 6943.8-2015  |
| Application temperature    | -∞C               | -250 to 850               | --                |
| Designed for use in sizing | --                | Epoxy and phenolic resins | --                |
| Drum outer diameter        | mm                | 230 / 300                 | GOST 29101        |
| Drum inner diameter        | mm                | 150 / 220                 | GOST 29101        |
| Drum height                | mm                | 250 / 250                 | GOST 29101        |
| Drum weight, approximate   | kg                | 9 / 15                    | GOST 29101        |





# ADVANTAGES of BCF TECHNOLOGIES



To produce Basalt Continuous Fiber (BCF) a single-component, nature-prepared, environmentally friendly raw material is used – basalt rocks. Unlike competing materials, there is zero waste in the production process: *One ton of rock produces one ton of fiber.*

BCF production is single-step process as nature has already performed the primary enrichment, melting and homogenization of basalt. Basalt is heated and melted in the furnace only once, which makes it possible to obtain the required product – BCF, with a minimum of energy consumption.

Further processing of BCF into materials is carried out using “cold technologies”. BCF production technologies are environmentally friendly, energy-saving and rely on nanotechnology to ensure the production of continuous fibers with diameters of 6 – 22 microns and length up to 60 km, with high specifications in terms of strength, elasticity, chemical and thermal resistance.

## Advantages of Basalt Roving

- Application temperature: from -250 to +850 °C
- Structural strength over the entire temperature range
- Resistance to aggressive media (alkalis and acids)
- Environmentally friendly material
- Low hygroscopicity

## Benefits of Basalt Roving

- Durability
- Wide range of applications
- No toxic binders used in production
- Compatibility with other materials





## COMPARATIVE CHARACTERISTICS of BASALT ROVING

Basalt is competitively priced to provide our customers higher margins with better performance

| No.                                                        | Parameter (characteristic)                 | Fiberglass      | Basalt (BCF)    |
|------------------------------------------------------------|--------------------------------------------|-----------------|-----------------|
| <b>Mechanical characteristics</b>                          |                                            |                 |                 |
| 1                                                          | Apparent density, kg/m <sup>3</sup>        | 12 - 25         | 15 - 23         |
| 2                                                          | Elementary per diameter, μm                | 4 - 12          | 9 - 22          |
| 3                                                          | Fiber length, mm                           | 15 - 50         | 1875            |
| 4                                                          | Elastic modulus, kgf/mm <sup>2</sup>       | to 7200         | 9100 ... 11000  |
| 5                                                          | Compaction factor during operation         | 1.6             | 1.2             |
| <b>Residual tensile strength (after heat treatment), %</b> |                                            |                 |                 |
| 6                                                          | 20 °C                                      | 100             | 100             |
|                                                            | 200 °C                                     | 92              | 98              |
|                                                            | 400 °C                                     | 52              | 85              |
|                                                            | 600 °C                                     | sintering       | 76              |
| <b>Temperature characteristics</b>                         |                                            |                 |                 |
| 7                                                          | Application temperature range, °C          | -60 ... +250    | -250 ... +850   |
| 8                                                          | Thermal conductivity coefficient, W / m °C | 0.038 ... 0.042 | 0.031 ... 0.034 |
| 9                                                          | Sintering temperature, °C                  | 600             | 1100            |
| <b>Acoustic characteristics</b>                            |                                            |                 |                 |
| 10                                                         | Sound absorption coefficient               | 0.8 ... 0.92    | 0.95 ... 0.99   |
| <b>Chemical resistance (weight loss), %</b>                |                                            |                 |                 |
| 11                                                         | In water                                   | 6.2             | 1.6             |
|                                                            | In an alkaline environment                 | 6               | 2.75            |
|                                                            | In an acidic environment                   | 38.9            | 2.2             |
| 12                                                         | Water absorption in 24 hours, %            | 1.7             | 0.02            |



01



02



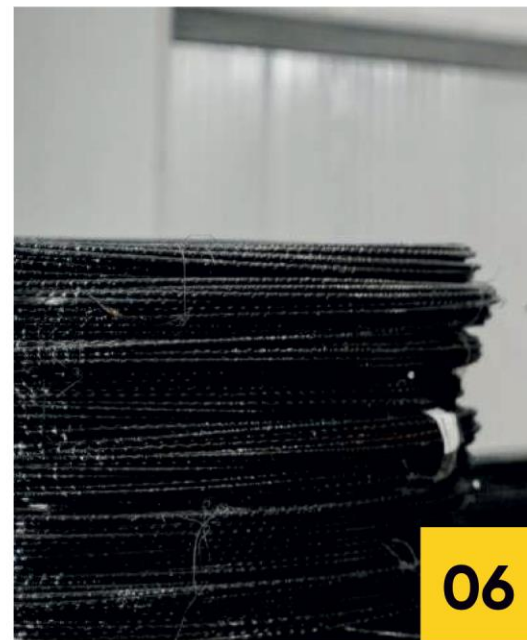
03



04



05



06

## APPLICATION AREAS of BASALT ROVING

1. Knitted fabrics made of basalt roving
2. Chopped basalt fiber
3. Basalt roving cord
4. Geotextile materials
5. Basalt composite pipe
6. Production of profiled basalt fiber reinforced polymers.





# BASALT GEOGRID

Basalt geogrid consists of basalt rovings (unwound threads) of infinite length, placed freely atop one another and stitched together with polyester or nylon thread using chain stitches on knitting machines.

Basalt fiber exhibits exceptional resistance to chemically aggressive substances (five times greater than glass fiber), making it durable in contact with saline solutions and capable of enduring various operational conditions without compromising its effectiveness.

## ADVANTAGES of BASALT GEOGRID

- **Chemically Inert.** Unlike polyester geogrid, basalt mesh is resistant to aggressive chemicals
- **Environmentally Safe.** Thanks to natural raw materials – basalt stone – the material is 100% safe
- **Optimized Price-Performance Ratio.** Basalt road grid has the highest performance properties at lowest cost
- **Year-round Installation.** Due to its resistance to scorching sun and frost, road construction using basalt grid can be carried out in any weather
- **Mechanical Stability.** Even at subzero temperatures, basalt road grid does not lose its physical and mechanical characteristics

## WHY BASALT ROAD GRID IS BETTER THAN METAL?

| Parameters                                     | Aluminum                            | Steel      |
|------------------------------------------------|-------------------------------------|------------|
| Lower Density                                  | 1.4 times                           | 3.9 times  |
| Greater Thermal Tensile Strength               | 4.2 times                           | 7.7 times  |
| Reduced Conductivity                           | 400 times                           | 128 times  |
| Electrical Resistance (basalt is an insulator) | Conductor                           | Conductor  |
| High Corrosion Resistance                      | Susceptible to electrical corrosion | Not stable |



## Construction Basalt Geogrid Technical Parameters

| BASALT GEOMESH UNITS                                                          |        | BASALT FACADE |            | BASALT MASONARY |           | BASALT UNIVERSAL |            |
|-------------------------------------------------------------------------------|--------|---------------|------------|-----------------|-----------|------------------|------------|
|                                                                               |        | 30 (50x50)    | 30 (25x25) | 30 (25x8)       | 50 (25x8) | 50 (50x50)       | 50 (25x25) |
| Weight per unit area, g / sq.m.                                               |        | 140           | 140        | 140             | 275       | 270              | 270        |
| Breaking load, not less, kN/M                                                 | along  | 30            | 30         | 30              | 50        | 50               | 50         |
|                                                                               | across |               |            |                 |           |                  |            |
| The elongation at break of not more than %                                    | along  | 4             | 4          | 4               | 4         | 4                | 4          |
|                                                                               | across |               |            |                 |           |                  |            |
| Permissible loss of tensile strength after 25 freeze cycles, not more than, % |        | 10            | 10         | 10              | 10        | 10               | 10         |
| Mass fraction of substances removed during calcination, not less than, %      |        | 18            | 18         | 18              | 18        | 18               | 18         |
| The dimensions of the lumen side of the cells (+2%), mm                       |        | 50x50         | 25x25      | 25x8            | 18        | 50x50            | 25x25      |
| Maximum roll width (+2%), cm                                                  |        | 540           | 540        | 540             | 540       | 540              | 540        |

## Road Basalt Geogrid Technical Parameters

| BASALT GEOMESH UNITS                                                               |        | BASALT ASPHALT CONCRETE |             |             | BASALT GROUND |             |             |
|------------------------------------------------------------------------------------|--------|-------------------------|-------------|-------------|---------------|-------------|-------------|
|                                                                                    |        | 50 (40x40)              | 100 (40x40) | 150 (40x40) | 50 (40x40)    | 100 (40x40) | 150 (40x40) |
| Weight per unit area, g/sq.m.                                                      |        | 280                     | 550         | 850         | 300           | 570         | 870         |
| Breaking load, not less, kN/m                                                      | along  | 50                      | 100         | 150         | 50            | 100         | 150         |
|                                                                                    | across |                         |             |             |               |             |             |
| The elongation at break of not more than %                                         | along  | 4                       | 4           | 4           | 4             | 4           | 4           |
|                                                                                    | across |                         |             |             |               |             |             |
| Permissible loss of tensile strength after 25 freeze-thaw cycles, not more than, % |        | 10                      | 10          | 10          | 10            | 10          | 10          |
| Mass fraction of substances removed during calcination, not less than, %           |        | 18                      | 18          | 18          | 18            | 18          | 18          |
| The dimensions of the lumen side of the cells (+2%), mm                            |        | 40                      | 40          | 40          | 40            | 40          | 40          |
| Maximum roll width (+2%), cm                                                       |        | 540                     | 540         | 540         | 540           | 540         | 540         |

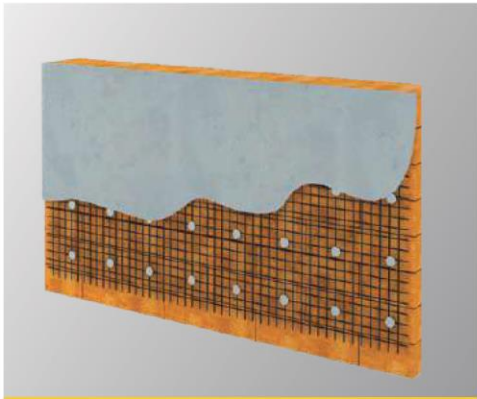
# APPLICATION AREAS of BASALT GEOGRID



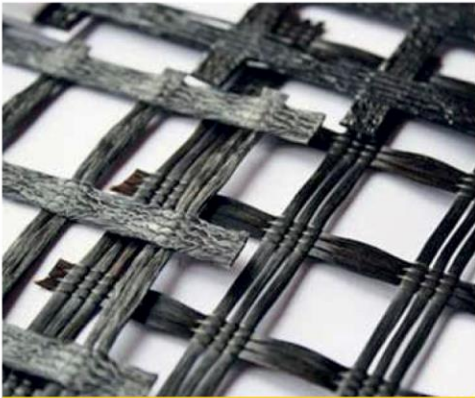
CONSTRUCTION GEOGRID



GEOGRID - MASONRY



GEOGRID - FACADE



ROAD GEOGRID



GEOGRID - ASPHALT CONCRETE



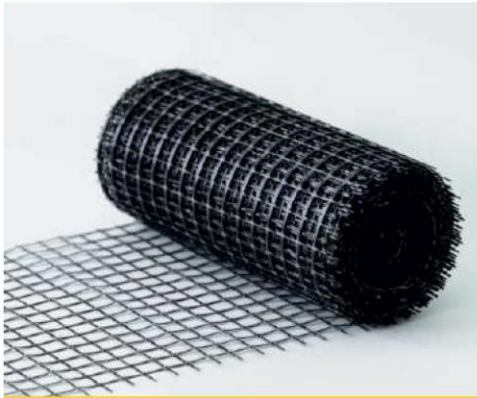
GEOGRID - GROUND



ENCLOSING GEOGRID



GEOGRID - UNIVERSAL



GEOGRID - UNIVERSAL





# BASALT MICROFIBER

Basalt microfiber is a short fiber additive for various concrete types, asphalt concrete, and cement or gypsum-based mixtures.

It can enhance nearly all structures and building materials, including plasters, putties, tile adhesives, screeds, bases, reinforced concrete products, and structures.

Microfiber acts as a reinforcing agent in diverse concrete, asphalt, and mortar mixtures.

Adding fiber helps reduce cracking and minimizes chipping on product edges while significantly enhancing appearance and surface finish quality.

# TECHNICAL SPECIFICATIONS of BASALT MICROFIBER

|                                                                                                      |                                     |
|------------------------------------------------------------------------------------------------------|-------------------------------------|
| Cut length, mm                                                                                       | (3, 6, 13, 15, 18, 25, 27, 50) ±1.5 |
| Elementary fiber diameter, μm                                                                        | (9, 13, 17) ±1.5                    |
| Humidity, %                                                                                          | <2.0                                |
| Content of substances removed during ignition, %                                                     | >0.3                                |
| Non-penetration of the batch weight, %                                                               | <5.0                                |
| Elastic modulus, kg/mm <sup>2</sup>                                                                  | 9100 - 11000                        |
| Thermal conductivity coefficient W / mK                                                              | 0.031 – 0.038                       |
| Chemical stability, weight loss, %, after 3 hours of boiling.<br>H <sub>2</sub> O / 2N NaOH / 2N HCl | 2 / 6.0 / 2.2                       |
| Application temperature of fiberglass products, to C                                                 | from -250 to +850                   |

## ADVANTAGES OF BASALT MICROFIBER

- ✓ Does not absorb liquid.
- ✓ Slows down the delamination of concrete and mortars.
- ✓ Reduces labor intensity compared to classic reinforcement.
- ✓ Does not require changes in preparation of mixtures.
- ✓ The cost of basalt microfiber is much lower than metal mesh.
- ✓ Abrasion resistant concrete surface.
- ✓ Increases the flexural and axial tensile strength of the concrete structure.
- ✓ Mitigates explosive spalling due to fire.
- ✓ Increases compressive strength in concrete.
- ✓ Increases impact resistance and splitting resistance in structures.



# COMPARATIVE CHARACTERISTICS of BASALT MICROFIBER

| INDEX                              | BASALT MICROFIBER | PROPYLENE FIBER | GLASS FIBER                    | STEEL FIBER       |
|------------------------------------|-------------------|-----------------|--------------------------------|-------------------|
| Material                           | Basalt fiber      | Polypropylene   | Fiberglass S or E              | Carbon steel wire |
| Tensile strength, MPa              | 3500              | 150 to 600      | 1500 to 3500                   | 600 to 1500       |
| Elastic modulus, hPa               | Not less than 80  | 35              | 75                             | 190               |
| Elongation coefficient, %          | 2 to 4.5          | 20 to 150       | 4.5                            | 3 to 4            |
| Melting temperature, C°            | 1450              | 160             | 860                            | 1550              |
| Resistant to alkalis and corrosion | High              | Questionable    | Only S fiberglass is resistant | Low               |
| Density, g/cm                      | 2.6               | 0.91            | -                              | -                 |

## BASALT MICROFIBER APPLICATIONS



# BASALT MICROFIBER APPLICATIONS



**FOOTING AND WALLS**



**CONSTRUCTION PRODUCTS**



**CEMENT-SAND SCREED**



**ARCHITECTURAL  
PRODUCTS FROM EXTRA  
STRONG CONCRETE**



**ASPHALT CONCRETE PAVEMENT**



**CELLULAR CONCRETE  
BLOCKS (GAS CONCRETE,  
FOAM CONCRETE)**



**CONCRETE AND  
CONSTRUCTION CEMENT-  
SAND MORTARS**



**CELLULAR CONCRETE  
BLOCKS (GAS CONCRETE,  
FOAM CONCRETE)**





# BASALT

## MiniBars™



**MiniBars™** are a high-performance fiber reinforced polymer (FRP) composite macrofiber, based on an alkali-resistant glass or basalt fiber and engineered to provide high post-cracking strength to concrete while at the same time increasing toughness, impact and fatigue resistance of concrete. In this way, MiniBars™ macrofiber can be used as secondary and/or as primary reinforcement.



# MiniBars™ HIGH PERFORMANCE COMPOSITE



The MiniBars™ solution has been specifically designed to reduce or replace secondary and/or primary steel reinforcement in many structural applications requiring flexural tensile and post-crack performance (wall panels, pipes, water tanks, tunnel segments, marine structures, raft foundations, etc.)

## ADVANTAGES

- Improves post-cracking mechanical properties of hardened concrete
- Fast and uniform dispersion during mixing
- Does not affect concrete pumpability when following recommended practices
- Allows for high dosages with minimum effect on processability (mix dependent)
- Do not corrode
- No additional water demands
- Easy to handle



## Slab-on-Grade Suggested Minimum Dosage Rates for MiniBars™ FRP Macrofiber Reinforced Concrete

| Design Category                                         | Residential                   |                        | Commercial                    |                        | Light Industrial              |                         | Heavy industrial              |                         |
|---------------------------------------------------------|-------------------------------|------------------------|-------------------------------|------------------------|-------------------------------|-------------------------|-------------------------------|-------------------------|
|                                                         | Imperial                      | Metric                 | Imperial                      | Metric                 | Imperial                      | Metric                  | Imperial                      | Metric                  |
| Concrete Strength (f'c)                                 | >3600 psi                     | >25 Mpa                | >4000 psi                     | >28 Mpa                | >4300 psi                     | >30 Mpa                 | >5800 psi                     | >40 Mpa                 |
| Point Load (Pu)                                         | <1100 lbs                     | <500 kg                | <3300 lbs                     | <1500 kg               | <4400 lbs                     | <2000 kg                | <6600 lbs                     | <3000 kg                |
| Rolling Load                                            | ~                             | ~                      | Car/1T Forklift               | Car/1T Forklift        | <11,000 lbs                   | <5T Forklift            | <97,000 lbs                   | <44T HGV                |
| Ultimate Design Load (Wu)                               | <30 psf                       | <150 kg/m <sup>2</sup> | <100 psf                      | <500 kg/m <sup>2</sup> | <300 psf                      | <1500 kg/m <sup>2</sup> | <600 psf                      | <3000 kg/m <sup>2</sup> |
| <b>Dosage Rates</b>                                     | <b>Minimum Slab Thickness</b> |                        | <b>Minimum Slab Thickness</b> |                        | <b>Minimum Slab Thickness</b> |                         | <b>Minimum Slab Thickness</b> |                         |
| <b>6.5 pcy MiniBars™ 43mm</b><br>3.8 kg/m <sup>3</sup>  | 3.25 in.                      | ~<br>80 mm             | 4.0 in.                       | ~<br>100 mm            | 4.75 in.                      | ~<br>120 mm             | 6.0 in.                       | ~<br>150 mm             |
| Jointless Area                                          | 323 ft <sup>2</sup>           | 30 m <sup>2</sup>      | 323 ft <sup>2</sup>           | 30 m <sup>2</sup>      | 323 ft <sup>2</sup>           | 30 m <sup>2</sup>       | 323 ft <sup>2</sup>           | 30 m <sup>2</sup>       |
| Maximum Joint Spacing                                   | 18 ft                         | 5.5 m                  | 18 ft                         | 5.5 m                  | 18 ft                         | 5.5 m                   | 18 ft                         | 5.5 m                   |
| <b>8.0 pcy MiniBars™ 43mm</b><br>4.75 kg/m <sup>3</sup> | 3.25 in.                      | ~<br>80 mm             | 4.0 in.                       | ~<br>100 mm            | 4.5 in.                       | ~<br>110 mm             | 5.0 in.                       | ~<br>130 mm             |
| Jointless Area                                          | 1076 ft <sup>2</sup>          | 100 m <sup>2</sup>     | 1076 ft <sup>2</sup>          | 100 m <sup>2</sup>     | 1076 ft <sup>2</sup>          | 100 m <sup>2</sup>      | 1076 ft <sup>2</sup>          | 100 m <sup>2</sup>      |
| Maximum Joint Spacing                                   | 32 ft.                        | 10 m                   | 32 ft                         | 10 m                   | 32 ft.                        | 10 m                    | 32 ft.                        | 10 m                    |
| <b>9.6 pcy MiniBars™ 43mm</b><br>5.7 kg/m <sup>3</sup>  | 3.25 in.                      | ~<br>80 mm             | 3.25 in.                      | ~<br>80 mm             | 4.0 in.                       | ~<br>100 mm             | 4.75 in.                      | ~<br>120 mm             |
| Jointless Area                                          | 2153 ft <sup>2</sup>          | 200 m <sup>2</sup>     | 2153 ft <sup>2</sup>          | 200 m <sup>2</sup>     | 3500 ft <sup>2</sup>          | 324 m <sup>2</sup>      | 3500 ft <sup>2</sup>          | 324 m <sup>2</sup>      |
| Maximum Joint Spacing                                   | 46 ft.                        | 14 m                   | 46 ft.                        | 14 m                   | 59 ft.                        | 18m                     | 59 ft.                        | 18m                     |
| Equivalent Steel WWR Mesh                               | 6x6 W4.4xW4.4                 | A189                   | 6x6 W4.4xW4.4                 | A189                   | 4x4 W4xW4                     | A257                    | 2 x 4x4 W4xW4                 | 2 x A257                |



# How to use basalt MiniBars™

MiniBars™ fibers can be introduced into the wet mix at the batching plant or directly into the concrete truck on-site. For optimal dispersion and performance, using a blower system is recommended, but only for a brief mixing period. Dosage rates vary based on the application and desired performance. A reduction of 25% in large aggregate (max. 16mm) is advisable to ensure the best dispersion.

## ENVIRONMENTAL PRODUCT DECLARATION

Declaration Number: NEPD-3317-1954-EN. The full EPD is available upon request.

## TECHNICAL CHARACTERISTICS

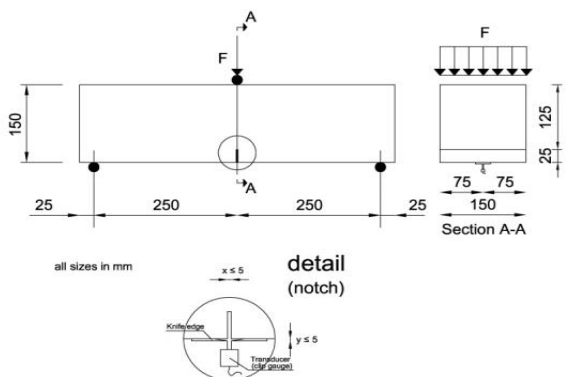
| Materials                                               | Fiber Length                    | Fiber Diameter      | Specific Gravity | Modulus of Elasticity   | Tensile Strength            |
|---------------------------------------------------------|---------------------------------|---------------------|------------------|-------------------------|-----------------------------|
| Basalt or Alkali-resistant glass fiber+ thermoset resin | 43 +/-2 mm*<br>1.7 +/- 0.08 in. | 0.70 mm<br>0.03 in. | 2.1 ± 0.1        | 42 GPa<br>6,091,585 psi | > 1400 MPa /<br>200,000 psi |

\* Shorter or longer fibers , from 24-55mm are available on request

## MECHANICAL PERFORMANCE

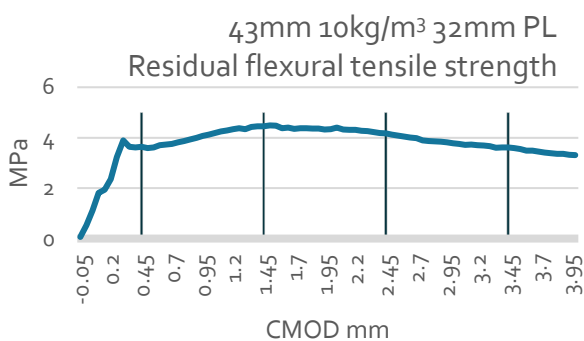
The fundamental mechanical performance of fiber reinforced concrete can be obtained from a three-point bending test performed on a prismatic beam of 150x150x550mm (6x6x22in.) including a notch at mid-span (EN 14651). The displacement-controlled testing system introduces a specific deflection or CMOD (Crack Mouth Opening Displacement) rate, and records load and displacement up to a CMOD limit of 3.5 mm (0.14 in). The fiber reinforced concrete performance is evaluated by means of residual flexural strength values at 0.5, 1.5, 2.5, and 3.5mm (0.02, 0.06, 0.10, and 0.14in.) of CMOD, namely  $f_{R1}$ ,  $f_{R2}$ ,  $f_{R3}$  and  $f_{R4}$ , respectively.

According to the fib Model Code 2010, the constitutive law of the material in tension is defined by means of the tensile stresses  $f_{Fts}$  and  $f_{Ftu}$  calculated from  $f_{R1}$  and  $f_{R3}$  for service and ultimate limit state, respectively.



The sketch shows the basic configuration of the test.

The following curve shows a typical Load-CMOD response of a B35 concrete reinforced with 10 kg/m<sup>3</sup> (17 lbs/yd<sup>3</sup>) of MiniBars™. The table presents the mean values of residual strength.



| Mean flexural performance (Prism 150x150x600mm) | MPa (mean) | psi (mean) |
|-------------------------------------------------|------------|------------|
| $f_c$ (100 mm / 4-inch cube)                    | 56         | 8122       |
| $f_L$                                           | 3.89       | 564        |
| $f_{R1}$                                        | 3.61       | 523        |
| $f_{R2}$                                        | 4.49       | 651        |
| $f_{R3}$                                        | 4.13       | 599        |
| $f_{R4}$                                        | 3.56       | 516        |
| $ARS = (f_{R1} + f_{R2} + f_{R3} + f_{R4}) / 4$ | 3.95       | 572        |



# BASALT FRP REBAR



Basalt fiber reinforced polymer (FRP) Rebar is made from basalt roving (in the form of strands), which are laid parallel to each other and are fused with resin. The strands have a spiral surface as the relief on the basalt shaft provides better adhesion to concrete. Made of volcanic stone, Basalt FRP Rebar is strong, lightweight, and corrosion resistant.



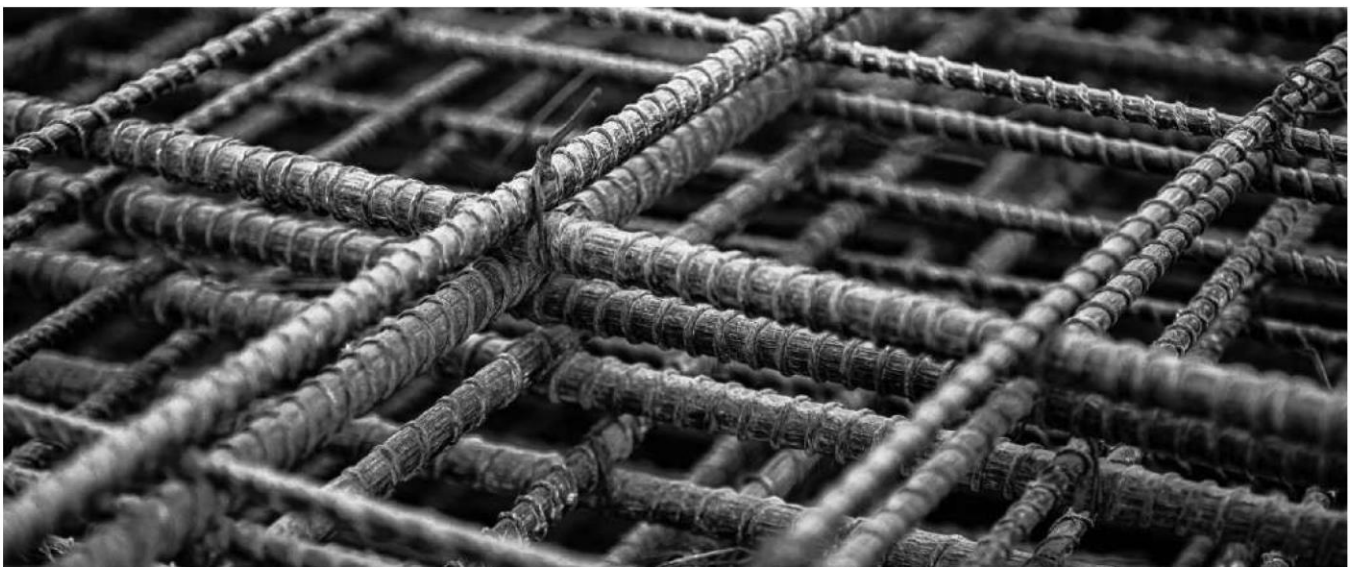


## TECHNICAL SPECIFICATIONS of BASALT FRP REBAR

| No. | Outer diameter (mm) | Weight for 1 running meter (g) | Qty of running meters in MT | Package          |
|-----|---------------------|--------------------------------|-----------------------------|------------------|
| 1   | 4                   | 30                             | 33,333                      | Coil of 200 rm   |
| 2   | 6                   | 50                             | 20,000                      | Coil of 200 rm   |
| 3   | 7                   | 75                             | 13,333                      | Coil of 200 rm   |
| 4   | 8                   | 90                             | 11,111                      | Coil of 200 rm   |
| 5   | 10                  | 125                            | 8,000                       | Coil of 200 rm   |
| 6   | 12                  | 195                            | 5,128                       | Whips norm 11.7m |
| 7   | 14                  | 270                            | 3,704                       | Whips norm 11.7m |
| 8   | 16                  | 350                            | 2,857                       | Whips norm 11.7m |
| 9   | 18                  | 450                            | 2,222                       | Whips norm 11.7m |
| 10  | 20                  | 550                            | 1,818                       | Whips norm 11.7m |
| 11  | 22                  | 630                            | 1,587                       | Whips norm 11.7m |
| 12  | 24                  | 760                            | 1,316                       | Whips norm 11.7m |

# ADVANTAGES of BASALT FRP REBAR

- \$ 40%+ Cheaper than Steel Equivalent
- 💧 Corrosion Resistant
- ⚖️ 4-6 Times Lighter than Steel Equivalent
- 🚚 4x Transportation Savings
- 🔧 3-5 Times Faster Installation / Less Labor
- 🕒 100+ Years of Service Life
- 🏠 Non-Ferrous – Behaves as an Insulator
- 🌱 Improves Concretes EPD by 30%





# COMPARATIVE CHARACTERISTICS of BASALT FRP REBAR

| PROPERTIES                 | BASALT REBAR                                                                              | STEEL REBAR                                                                                                               |
|----------------------------|-------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|
| DENSITY                    | 2 T/m <sup>3</sup>                                                                        | 7.5 T/m <sup>3</sup>                                                                                                      |
| CORROSION                  | Corrosion-resistant material of the first group of chemical resistance                    | It breaks down with the release of corrosion products                                                                     |
| THERMAL CONDUCTIVITY       | 0 W/m <sup>2</sup> °C                                                                     | 48 W/m <sup>2</sup> °C                                                                                                    |
| TENSILE STRENGTH           | 1200 MPa                                                                                  | 390 MPa                                                                                                                   |
| WORKING TEMPERATURE        | from -70 to +100°C                                                                        | from -70 to +50°C                                                                                                         |
| ELECTRICAL PROPERTIES      | Dielectric                                                                                | Electrically Conductive                                                                                                   |
| ECOLOGICAL SAFETY          | Environmentally friendly - does not emit harmful and toxic substances                     | Fails and is difficult to extract and recycle                                                                             |
| SHAPE RETENTION UNDER LOAD | Straight line with elastic linear dependence under load before failure                    | Curved line with yield plate under load                                                                                   |
| TRANSPORTATION             | Coils of size D = 1.15 m                                                                  | Rods 6-12 m long                                                                                                          |
| SAVING RESOURCES IN USE    | Stable prices; Savings in transportation due to weight reduction; No welding machine used | No price stability; Expensive to transport and handle; Needs a welding machine as well as fire safety office when cutting |
| DURABILITY                 | Predicted durability of at least 80 years                                                 | Based on building codes                                                                                                   |

# APPLICATIONS of BASALT FRP REBAR

Residential and non-residential construction



Road and railroad construction



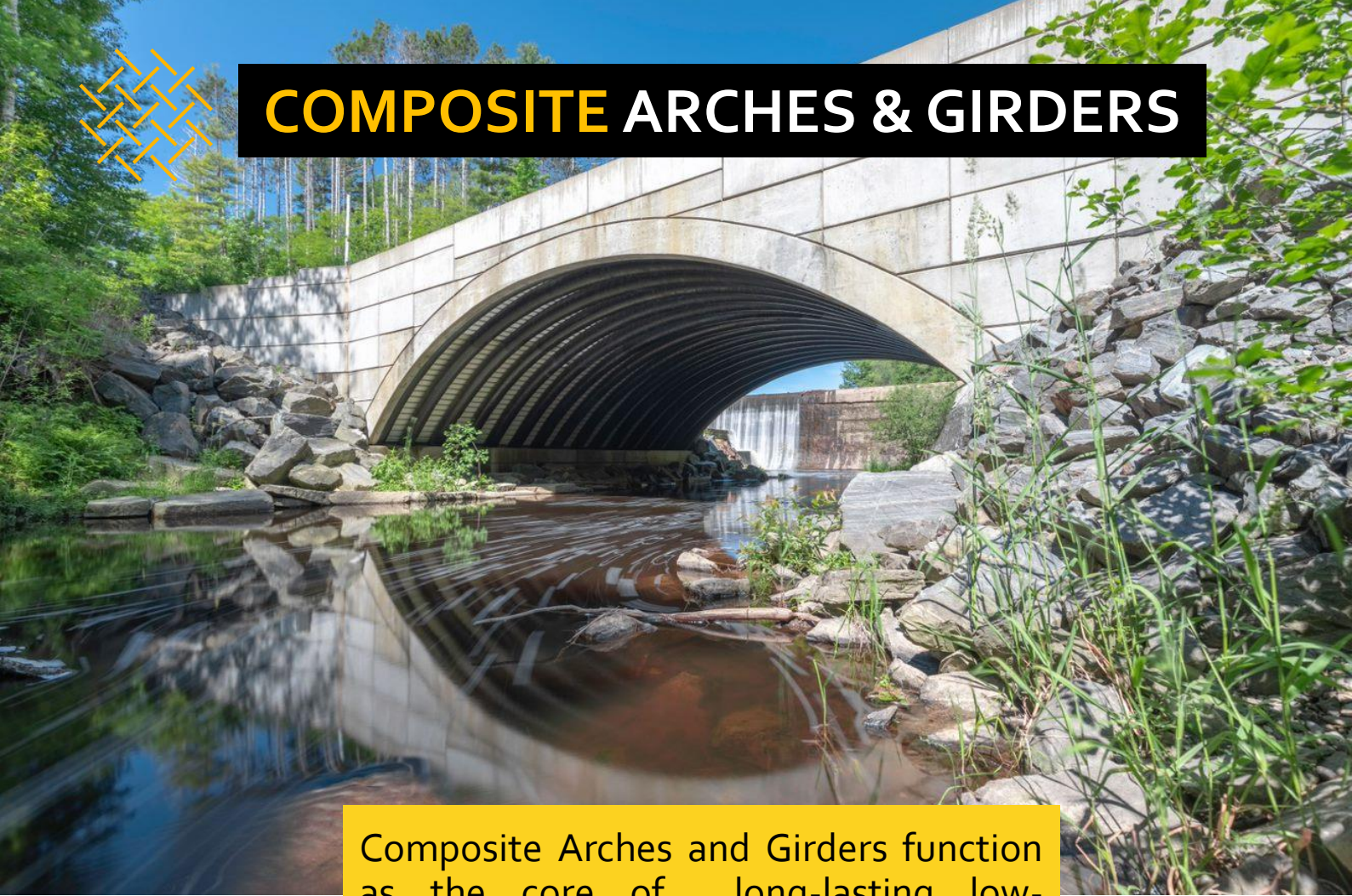
Concrete products







# COMPOSITE ARCHES & GIRDERS



Composite Arches and Girders function as the core of long-lasting low-maintenance bridge and platform structures. These are built to AASHTO LRFD bridge design specifications.

With over a 100-year service life, these arches, girders, and associated decking are light weight and non-corrosive and can be fully customized to your needs.



# Composite Solutions for Resilient Infrastructure

## Key Advantages

- Non-corrosive
- 100+ year lifecycle
- Favorable in skew locations
- Lighter than steel and concrete
- Accelerated-Bridge-Construction Ready

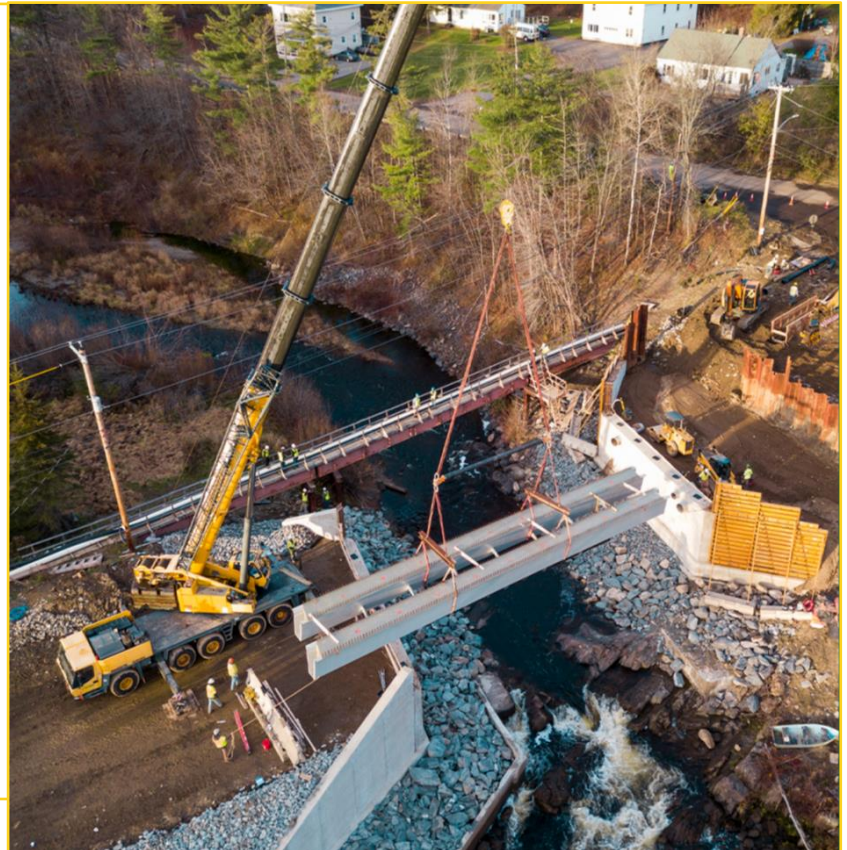
## Key Benefits

- Meets seismic codes
- Designed with AASHTO LRFD bridge design specifications
- Competitively priced
- Customizable to site limitation requirements

The AIT Composites and Bridge teams joined Basalt International in 2024, and now serve as part of our global BI Design & Engineering team

BI-Design & Engineering has completed over 50 composite bridges projects across the country. The technology we use was developed at the University of Maine's Advanced Structures and Composites Center (ASCC).

BI-AIT bridge materials have been tested and proven to last over 100 years with little to no maintenance, offering life beyond any competitive technologies. BI offers highly customizable composite arch and composite beam bridge systems.







# COMPOSITE ARCH BRIDGE SYSTEMS

SUSTAINABLE **COMPOSITE** SOLUTIONS DELIVERED



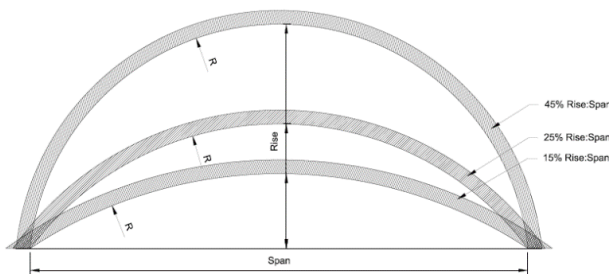




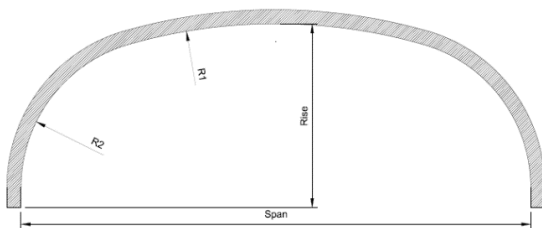
# COMPOSITE ARCH BRIDGE SYSTEMS

## BENEFITS

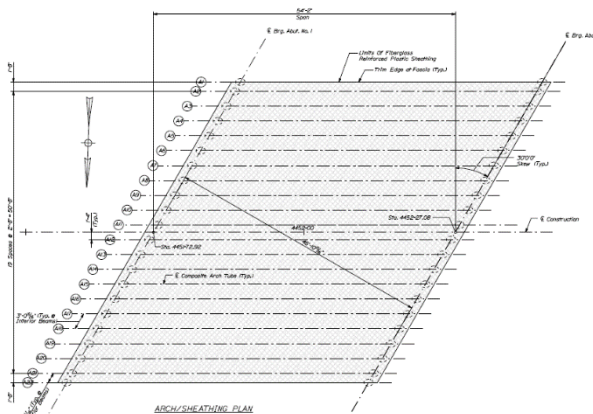
- 100+ year service life
- Little to no lifetime maintenance
- Non-corrosive lightweight FRP arch tubes that are filled with concrete on site
- Can be handled with small, light weight equipment
- Reduces concrete needed by about 20% compared to concrete span bridge
- Spans up to 80' and are highly customizable based on project requirements



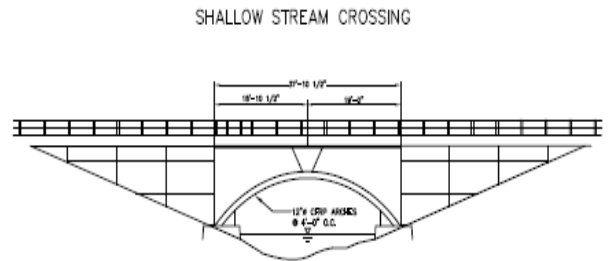
*Single-radius arches with rise/span from 15%-50%*



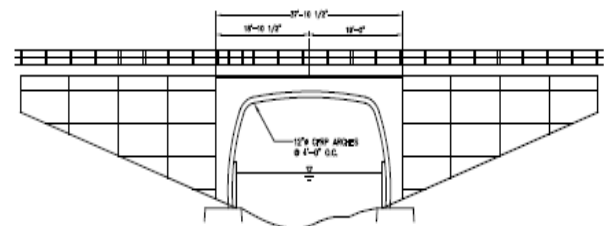
*Variable radius arches*



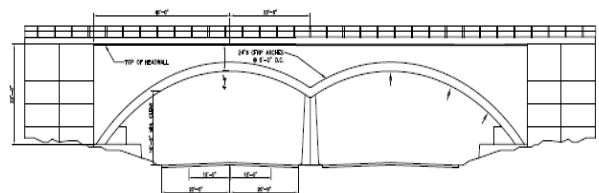
*Skewed bridges*



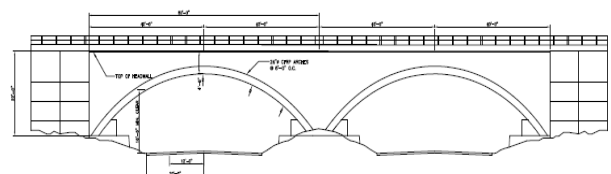
DEEP STREAM CROSSING



INTERSTATE OVERPASS  
NORTH AND SOUTH DIRECTIONS  
MINIMAL MEDIAN



INTERSTATE OVERPASS  
NORTH AND SOUTH DIRECTIONS  
40' MEDIAN



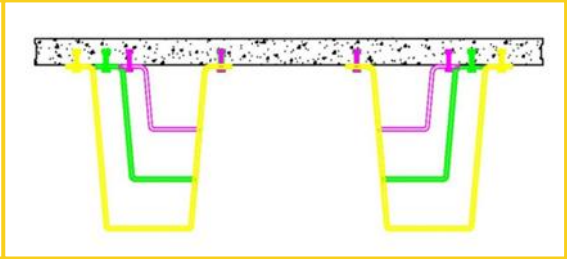
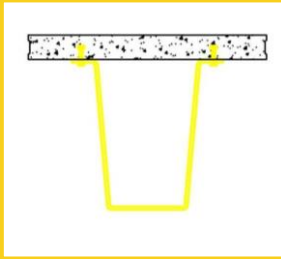


# HANDLING & SHIPPING ADVANTAGES





# COMPOSITE GIRDER BRIDGE SYSTEMS





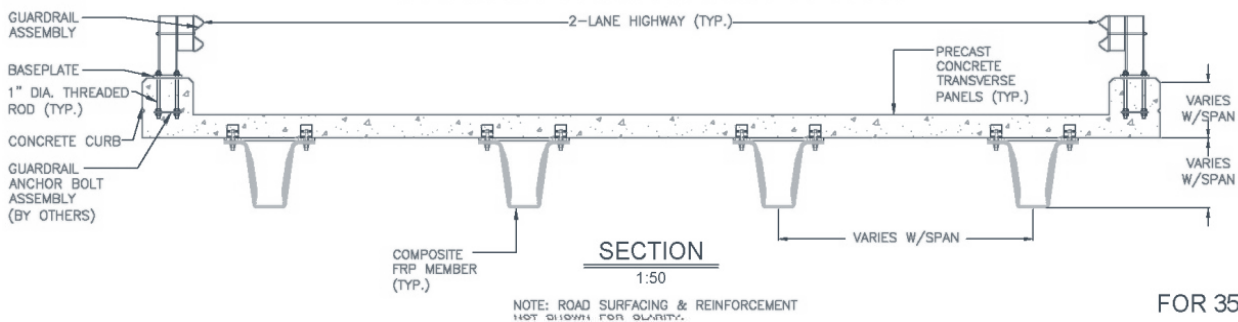
# COMPOSITE GIRDER BRIDGE SYSTEMS



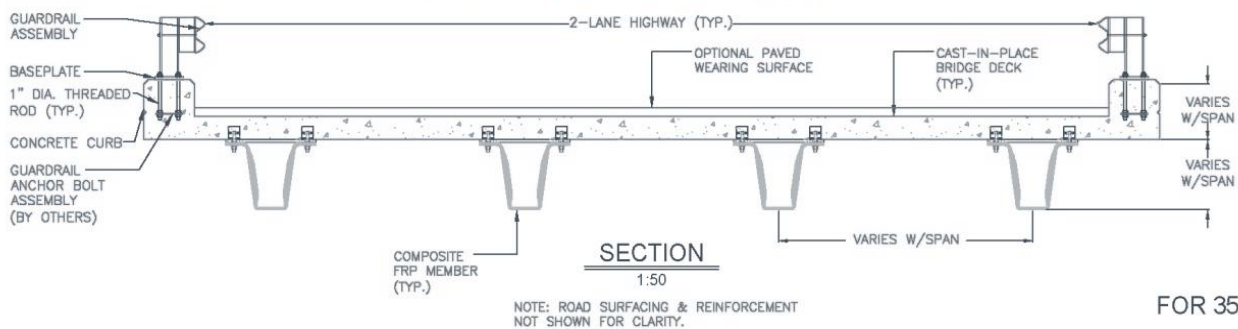
Typical uses: Short to Medium Span Bridges, Parking Structures, Coastal Bridges

- Least cost alternative
- 50% lighter than steel
- Reduced carbon footprint
- Accelerated construction
- Little to no lifetime maintenance
- Great for replacing and building bridge structures requiring short and medium spans up to 120'
- Require no concrete fill, making them significantly lighter than traditional concrete or steel beams
- Cast-in-place, precast transverse, and precast longitudinal deck options
- Depth and camber are easily adjusted based on project requirements

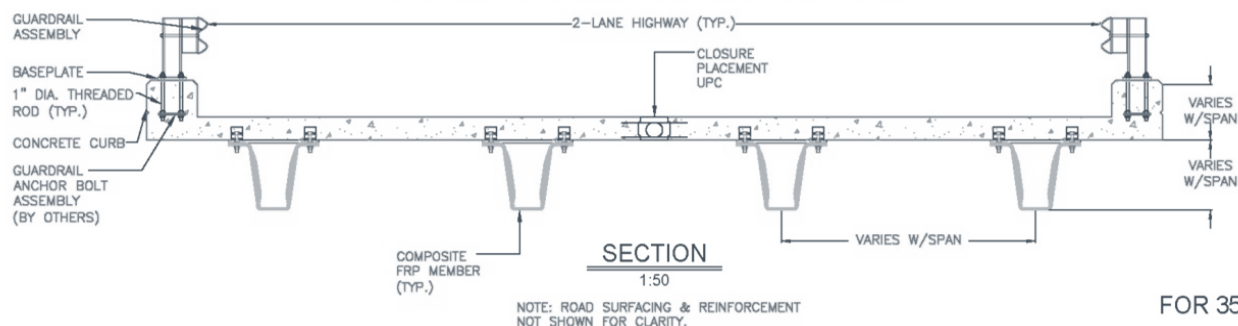
## PRECAST TRANSVERSE OPTION



## CAST-IN-PLACE DECK OPTION



## PRECAST LONGITUDINAL OPTION



## GIRDER FABRICATION - QUALITY CONTROL QUALITY ASSURANCE

- MaineDOT and UMaine ASCC developed 1-week American Composites Manufacturing Association (ACMA) Certified Composites Technician in Vacuum Infusion Process (CCT-VIP) course available to Fabrication and Maintenance Engineers. The course can be tailored to fabrication inspection, maintenance inspection, non-destructive inspection techniques, or repair procedures
- Witness Panel Testing following ASTM D3039, D6641, and D8067 for Tensile, Compressive, and Shear Strengths



**Mold used to make 30'-60' Spans**





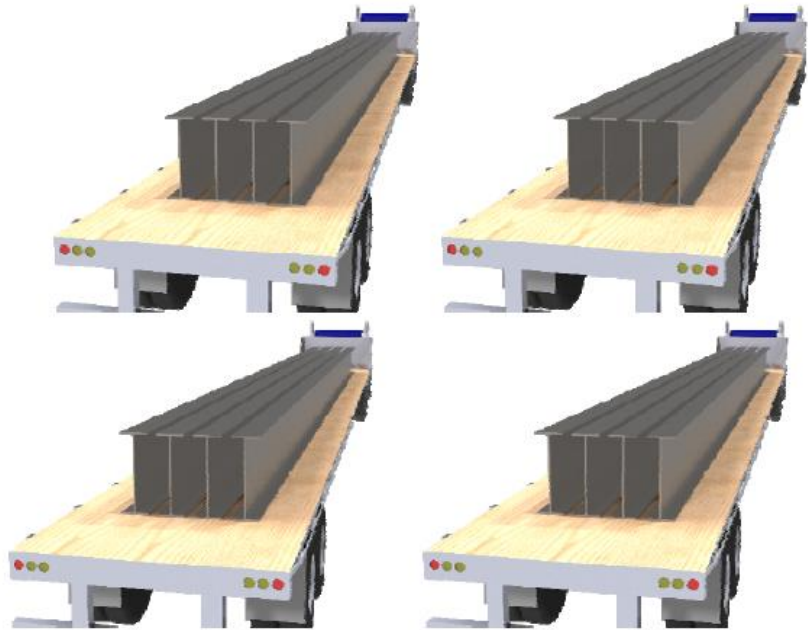
# GIRDER SHIPPING & HANDLING ADVANTAGE

16 Girders – 4 Bridges  
Fit on One Truck – 42,496 lb.



2,656 lb/girder

16 Steel Girders  
Due to Weight Limitations  
Need Four Trucks - 151,200 lb.



9,450 lb/girder





# COMPOSITE DECKING



Composite Decking is designed to support Transportation Structures, Saltwater, Freshwater, & Seismic Environments



## ADVANTAGES

- **100+ Year Service Life.** BI-Composites FRP Decking is corrosion resistant which aids in designing a structure with a much longer service life than steel or concrete decking
- BI-Composites Decking is a pultruded FRP decking product that **eliminates the need for a concrete deck** on a buried arch structure. We utilize advanced composite materials to create a durable, strong, lightweight, corrugated FRP deck. This robust decking **efficiently supports heavy loads**
- **Can be manufactured to any length**, and is easily attached with self-drilling screws
- Composite Decking **exceeds competitors standards** by utilizing an improved resin system that provides higher durability, UV protection, and better alkali resistance characteristics

## Significant Weight Savings & Exceptional Strength

- The Composites Decking mechanical properties are one step ahead of alternative solutions

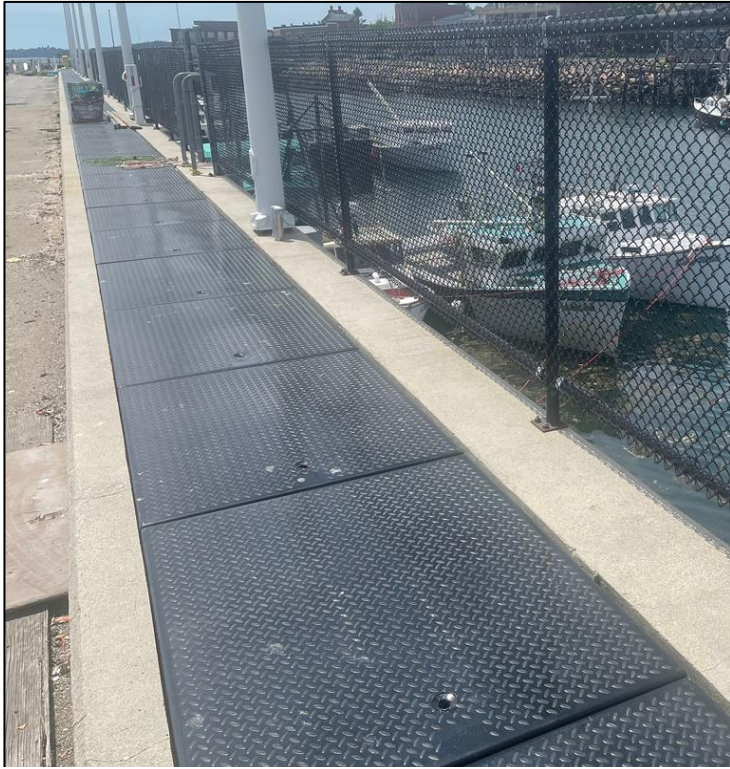
## Test Setup & Results

| Sample #                | Load @ First Load Drop, lb: | Deflection @ First Load Drop, lb: | Peak Load, lb: | Deflection @ Peak Load, in |
|-------------------------|-----------------------------|-----------------------------------|----------------|----------------------------|
| 1                       | 12,828                      | -0.285                            | 20,718         | -0.620                     |
| 2                       | 13,267                      | -0.303                            | 23,251         | -0.763                     |
| 3                       | 15,931                      | -0.428                            | 21,034         | -0.971                     |
| 4                       | 16,147                      | -0.572                            | 16,918         | -0.620                     |
| 5                       | 12,575                      | -0.260                            | 21,957         | -0.733                     |
| 6                       | 16,019                      | -0.447                            | 22,958         | -0.804                     |
| 7                       | 11,243                      | -0.206                            | 20,136         | -0.608                     |
| 8                       | 11,147                      | -0.219                            | 25,755         | -0.685                     |
| 9                       | 14,646                      | -0.381                            | 24,522         | -0.942                     |
| 10                      | 10,101                      | -0.231                            | 24,566         | -1.113                     |
| # of Specimens:         | 10                          | 10                                | 10             | 10                         |
| Mean Value:             | 13,390                      | -0.333                            | 22,181         | -0.786                     |
| St. Dev.:               | 2,211                       | 0.120                             | 2,605          | 0.172                      |
| COV:                    | 0.160                       | 0.464                             | 0.110          | 0.229                      |
| Data confidence factor: | 0.839                       | 0.569                             | 0.889          | 0.772                      |
| Nominal value:          | 9,554                       | -0.594                            | 17,746         | -0.472                     |
| Characteristic value:   | 8,016                       | -0.338                            | 15,779         | -0.364                     |





# COMPOSITE TRENCH COVERS



TRENCH COVERS ON THE PIER EASTPORT, ME



## BENEFITS

- Designed for the harshest winters and aggressive salt-water environments with large climate variations, where aluminum and steel panels often fail
- Designed to handle demanding loads: Weight Rated to 16,000 lb. tire load.
- Will not rust, rot, or get water-logged
- Diamond plate texture to increase traction (slip-resistance) and reduce wear
- Ideal for piers
- Will handle cranes

## SIZE & WEIGHT

- Dimensions: Span 3' \* Width 4'
- Skew: 0°
- Less than 1/3<sup>rd</sup> the weight of typical steel covers
- Easy to transport and install and move, when needed







# COMPOSITE PEDESTRIAN BRIDGES



Owner: City of Lewiston



## SIZE & WEIGHT

These bridges can be customized to your needs. In this example

- Dimensions: Span 16' \* Width 4'
- Skew: 0°
- Weight 2,000lbs

## DESIGN

- 1.5" thick composite decking supported by built-up FRP I-beams founded on helical piles
- 5 I-Beams using our pultruded composite C-Channel technology
- This bridge was created in our shop and was designed to be easy to transport and install. *Especially important in boggy and areas with poor road access, such as this site*

## BENEFITS

- Ideal as a safe, maintenance-free, multi-use trail bridge, often used on trail systems
- Can accommodate MT-7 sidewalk clearing machines for both summer and winter trail maintenance activities
- Can support snow vehicle weights to around 13,000 lbs.





# COMPOSITE TRAIL BRIDGES



## DESIGN

- Uses our composite decking supported by our pultruded composite C-Channels
- In this example: the C-Channels were founded on concrete abutments

## BENEFITS

- Exceptionally durable: These composite components will not rot or rust, or get eaten by insects

## SIZE & WEIGHT

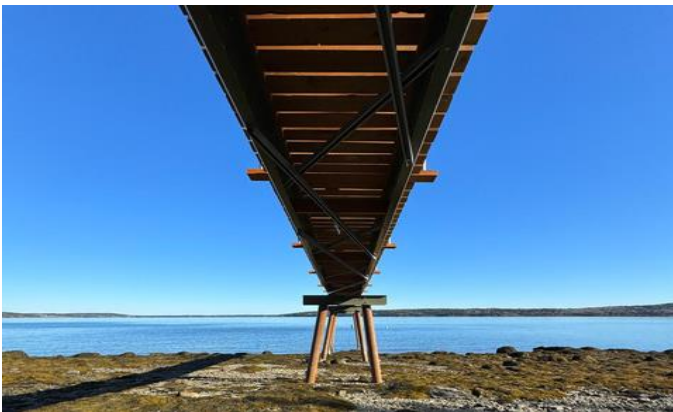
These bridges can be customized to your needs. In this example

- Dimensions: Span 30' \* Width 4'
- Skew: 0°
- Very lightweight. For this installation, the instructions were to "leave no trace" during installation. The channels were HAND CARRIED across ½ mile rough terrain by 5-6 people per beam. The rest of the materials were hand-carted in. No machinery was used to construct this structure. *Try doing this with steel...*





# COMPOSITE PIERS WITH POLES



## SIZE

This pier can be customized to your needs. In this example

- Dimensions: Span 160' \* Width 4'
- Skew: 0°

## DESIGN

- Uses our pultruded composite utility poles; these do not rust or corrode
- Uses our pultruded composite C-Channels as the main load carrying members, that also do not rust or corrode
- In this example: we reused the existing cedar decking – for others we have used composite decking
- The structure was elevated approximately 18 inches to accommodate sea level rise and further improve the durability and functionality of the structure

## BENEFITS

- Exceptionally durable: This example has already survived two 100-year storms, with no damage to the FRP structure.
- No maintenance is required for the FRP components. Ever



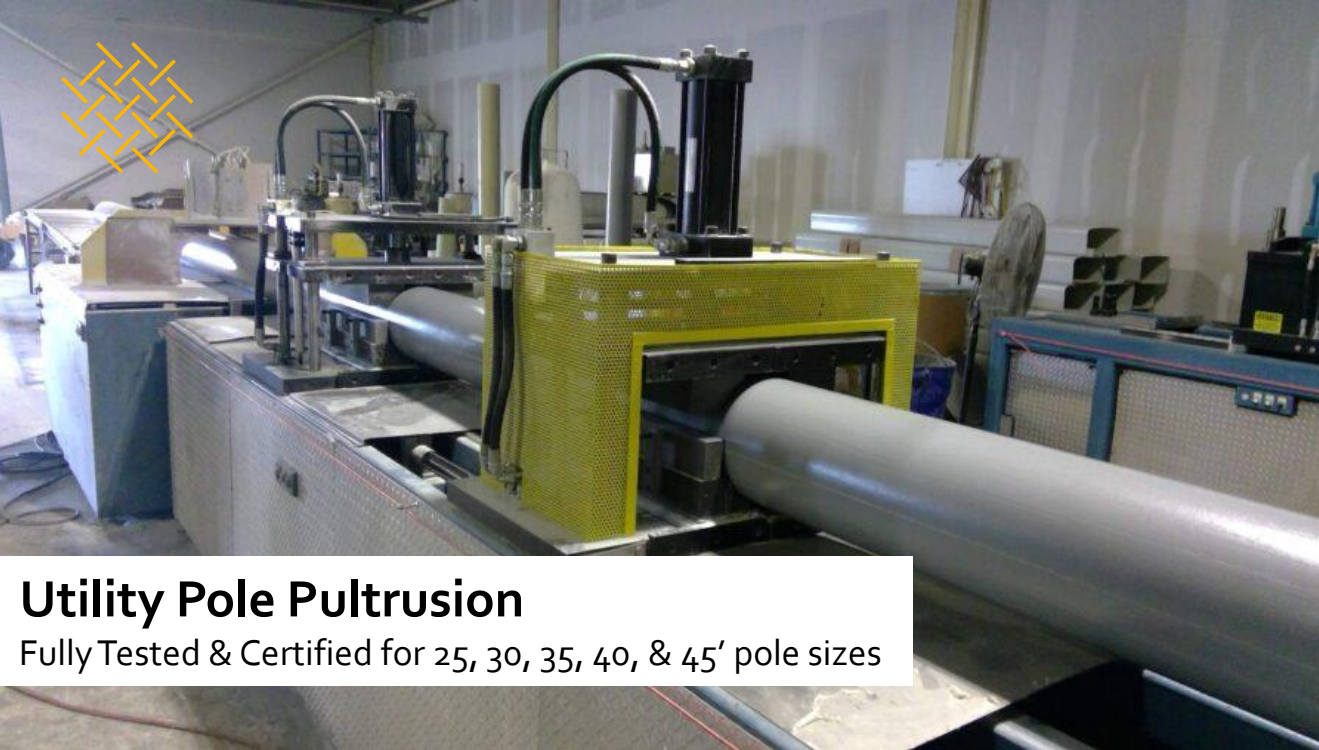


# COMPOSITE UTILITY POLES

The BI Utility Pole is an FRP composite utility pole with unique built-in features designed to provide the safest, lowest weight, lowest cost and most attractively warranted alternative to wood, steel, ductile iron, concrete and other FRP poles.

- ✔ Is 80% lighter than wood and 20% lighter than other composite poles
- ✔ Is safer than steel and ductile iron because FRP does not conduct electricity
- ✔ Does not support combustion, so it will not add to forest fires
- ✔ Will not rot in coastal or marshy installations - great for piers & trailways
- ✔ Is not damaged by insects and doesn't attract wood-peckers
- ✔ 100+ Year service life - has a low carbon footprint (e.g., 100 years = 1 BI Utility Pole vs. 3 wood poles)
- ✔ Does not need hazardous wood preservatives, so no leaching of hazardous chemicals into the soil
- ✔ Optional internal ground wire to deter copper theft
- ✔ Needs minimal inspections or maintenance
- ✔ Is recyclable at its end of life





No Chemical Leaching



Impervious to Termites

## Utility Pole Pultrusion

Fully Tested & Certified for 25, 30, 35, 40, & 45' pole sizes

### ADVANTAGES of BI UTILITY POLES

#### LOW COST

- Lowest initial installed cost FRP
- Rapid storm recovery
- Fire-proof/self-extinguishing
- 50-year replacement warranty
- Approved for RUS financing

#### HARDEN THE GRID

- UV protection maintains strength
- Minimum Class 3
- 'Bend Don't Break' composite material survives 90 mph sustained winds

#### LOW MAINTENANCE

- No bug/woodpecker damage
- Theft-proof internal ground wire
- Annual inspections not needed

#### ENVIRONMENTALLY SAFE

- No leaching of hazardous chemicals
- Use in sensitive wetlands
- 100-year life = 3 trees saved to remove CO<sub>2</sub>
- Recyclable

#### SAFE AND CONVENIENT FOR LINEMEN

- Lightest by hundreds of pounds
- Climbable
- Hand carry reduces property damage
- Direct burial with foam or back-fill
- Non-conductive, safe for live wire work
- Field-drillable





# TECHNICAL SPECIFICATIONS of BI UTILITY POLES

Fiber Reinforced Polymer / 10" OD / 0.25" wall / 30 to 45 feet / Class 3 minimum

**Fully tested and certified to ASTM, ACMA and NESC standards**

| TEST               | STANDARDS REF. | TEST SOURCE                    | RESULTS                   |
|--------------------|----------------|--------------------------------|---------------------------|
| Tip Load           | ASTM D1036     | EDM International              | Class 3                   |
| Deflection         | ASTM/ANSI      | EDM International              | Class 3                   |
| Dielectric         | ASTM D1049     | Applied Technical Services     | Nonconductive             |
| Leakage Current    | ASTM F711      | Applied Technical Services     | Imperceptible             |
| Flammability       | ASTM D635      | Element Materials Technology   | Self-extinguishing        |
| Flexural Strength  | ASTM D790      | Element Materials Technology   | Exceeds standards         |
| Flexural Modulus   | ASTM D790      | Element Materials Technology   | Exceeds standards         |
| Interlaminar Shear | ASTM D2344     | Element Materials Technology   | Exceeds standards         |
| Tensile Strength   | ASTM D3039     | Element Materials Technology   | Exceeds standards         |
| Tensile Modulus    | ASTM D3039     | Element Materials Technology   | Exceeds standards         |
| Tear-Through       | 5,000 lb. Min. | Element Materials Technology   | 9,000 lbs.                |
| Extreme Wind       | NESC 90 mph    | PLOAD 7, Whitworth Engineering | Survives 3X Expected Load |

## When ordering, please consider the following options

- ✓ Pole rating
- ✓ Length
- ✓ Cross arm
- ✓ Holes for pegs
- ✓ Paint / Color
- ✓ Fire-proofing
- ✓ Internal Ground wire





# COMPOSITE SEAWALL

BI manufactures industry-leading Basalt and Glass FRP composite sheet piling for the harsh marine environment. We combine various strength-based resins with appropriate shaped profiles and engineering expertise to deliver economical, durable, and sustainable marine solutions. Our products are tailored to fit the needs of individual homeowners and businesses, military, and city governments to address climate change and sea level rise.

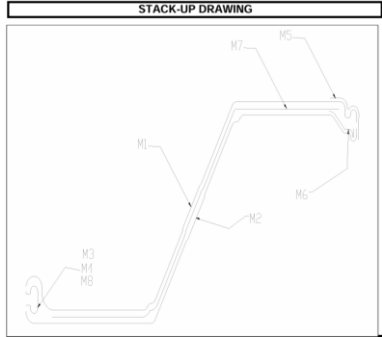
- ✓ 100+ years of service life
- ✓ Non-corrosive
- ✓ Lighter - easy to bulk-transport
- ✓ Easier to install
- ✓ Less expensive
- ✓ A variety of profiles available





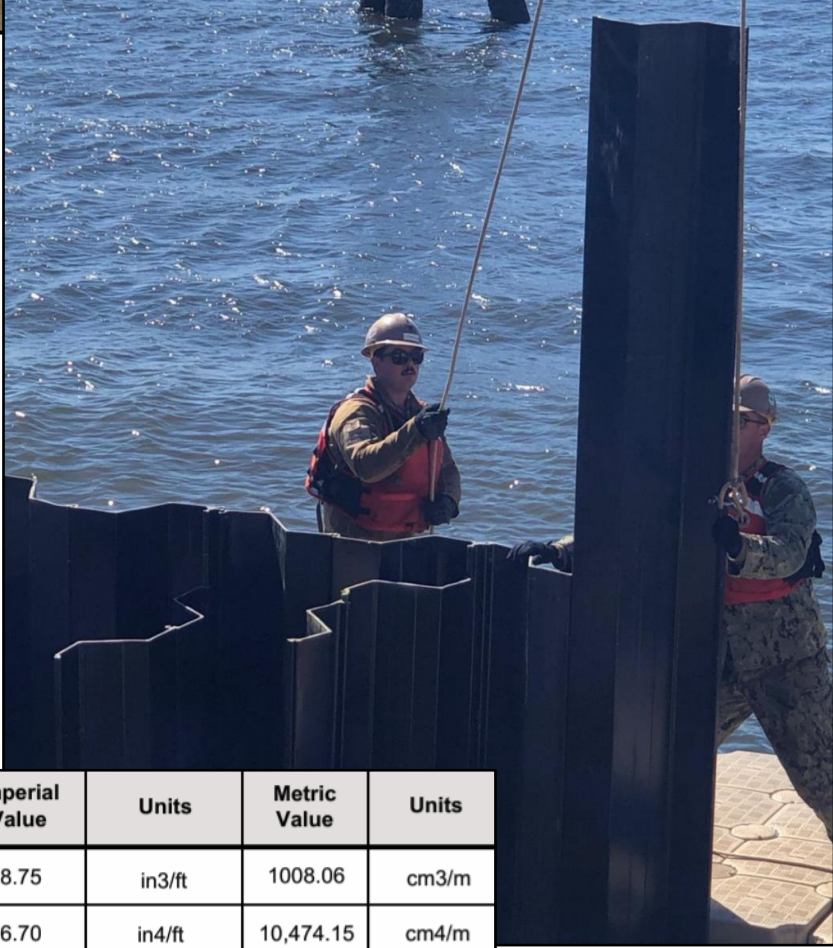


Our high strength mil-spec formulation was designed in collaboration with the US Army Corps of Engineers to maximize strength and longevity.



**Sustainable and eco-friendly seawalls**

Our proprietary Basalt FRP composite sheet piling products are sustainably produced. We manufacture UV-resistant, lighter weight and greener alternatives, reducing shipping costs and carbon footprint. Our Seawall does not rot or rust. Doesn't require cathodic protection as compared to conventional wood and metal seawall materials. We want you to build it once and reduce ecological impact and long-term protection.



**Physical Properties**

| Physical Properties           | Imperial Value | Units               | Metric Value | Units              |
|-------------------------------|----------------|---------------------|--------------|--------------------|
| Section Modulus               | 18.75          | in <sup>3</sup> /ft | 1008.06      | cm <sup>3</sup> /m |
| Moment of Inertia             | 76.70          | in <sup>4</sup> /ft | 10,474.15    | cm <sup>4</sup> /m |
| Typical Thickness             | 0.25           | in                  | 6.35         | mm                 |
| Depth of Sheet                | 8.00           | in                  | 203.2        | mm                 |
| Width of Sheet                | 18.00          | in                  | 457.2        | mm                 |
| Weight                        | 5.75           | lbs/ft              | 8.56         | Kg/m               |
| Web Angle                     | 31             | °                   | 31           | °                  |
| Cross Sectional Area of Sheet | 7.19           | in <sup>2</sup>     | 46.93        | cm <sup>2</sup>    |



# BASALT COMPOSITE PIPE



Basalt Composite Pipe is one of the most important innovative and promising representatives of the group of basalt composite products.

High physical and mechanical properties and resistance to aggressive environments have determined their wide application in key areas of industry.

The solution to the urgent issue in the fight against corrosion of pipelines is to switch to Basalt Composite Pipes.



## TECHNICAL SPECIFICATIONS of BASALT COMPOSITE PIPE

### Nominal diameters

Nominal diameters are designated by the abbreviation *DN* and are indicated in millimeters. The company manufactures products of the following.

### Nominal pressure

The pressure classes are designated by the abbreviation *PN* and are indicated in bar. Nominal pressure classes – PN<sub>1</sub> (free-flow), PN<sub>6</sub>, PN<sub>10</sub>, PN<sub>16</sub>, PN<sub>20</sub>, PN<sub>25</sub>, PN<sub>32</sub>. It is possible to manufacture products with nonstandard pressure parameters.

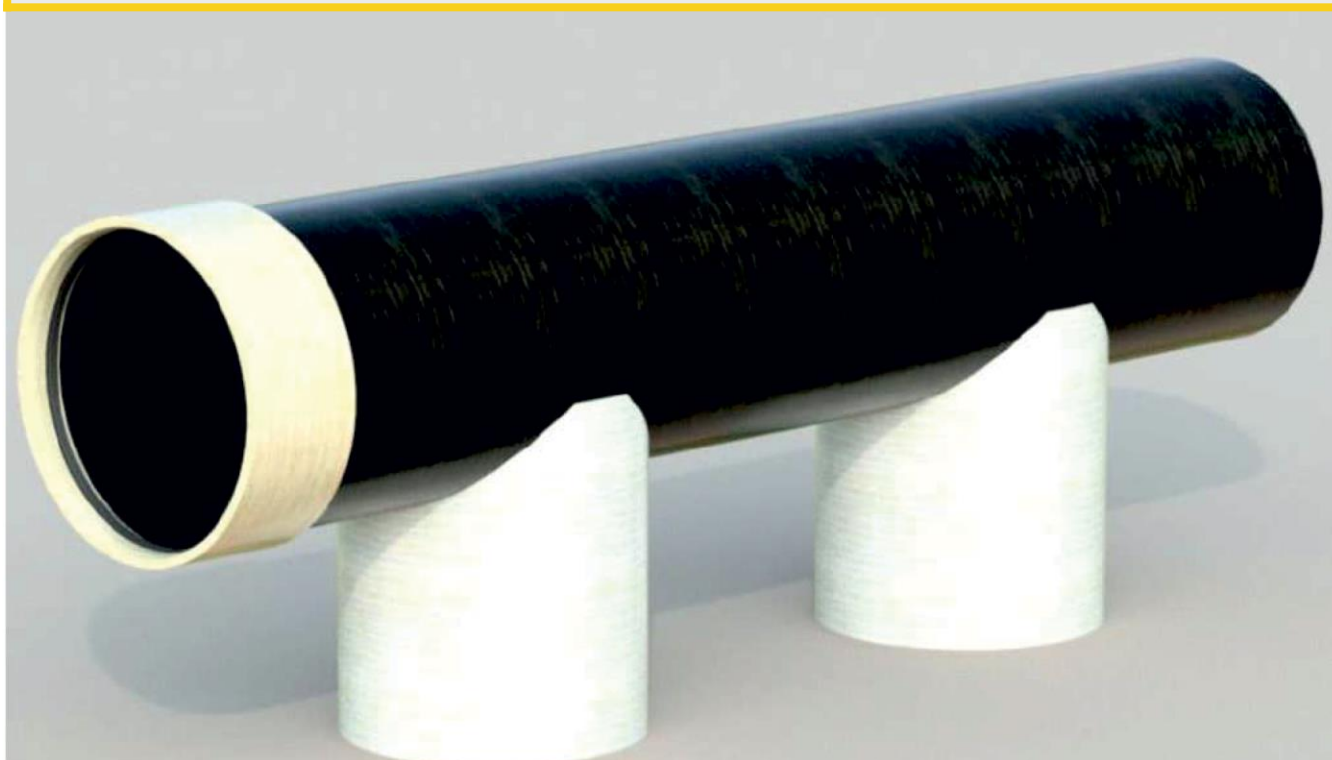
### Nominal ring stiffness

Stiffness classes are designated by the abbreviation *SN* and are indicated in N/m. Standard grades are SN<sub>2500</sub>, SN<sub>5000</sub>, SN<sub>10000</sub>. Depending on the conditions of the project, we can manufacture products with other stiffness indicators.

| Diameters, mm |                    | Nominal stiffness (SN), Pa           |      |                             |      | Nominal stiffness (SN), Pa  |       |                             |       |
|---------------|--------------------|--------------------------------------|------|-----------------------------|------|-----------------------------|-------|-----------------------------|-------|
|               |                    | 5,000                                |      | 10,000                      |      | 5,000                       |       | 10,000                      |       |
| Nominal       |                    | Nominal pressure (PN), atm.          |      | Nominal pressure (PN), atm. |      | Nominal pressure (PN), atm. |       | Nominal pressure (PN), atm. |       |
|               |                    | 1, 2, 4                              | 10   | 10                          | 16   | 1, 2, 4                     | 10    | 10                          | 16    |
| Outer         | Wall thickness, mm | Pipe weight without coupling, kg / m |      |                             |      |                             |       |                             |       |
| 300           | 314.0              | 5.1                                  | 4.9  | 5.2                         | 5.1  | 9.2                         | 8.6   | 9.4                         | 9.2   |
| 350           | 366.0              | 5.9                                  | 5.7  | 5.9                         | 5.7  | 12.4                        | 11.7  | 12.4                        | 12.1  |
| 400           | 412.5              | 6.8                                  | 6.4  | 6.6                         | 6.4  | 16.0                        | 14.8  | 15.5                        | 15.1  |
| 450           | 463.5              | 7.6                                  | 7.1  | 7.2                         | 7.0  | 20.2                        | 18.5  | 19.2                        | 18.7  |
| 500           | 514.5              | 8.5                                  | 7.7  | 7.9                         | 7.6  | 24.9                        | 22.3  | 23.2                        | 22.6  |
| 600           | 616.5              | 10.1                                 | 9.1  | 9.2                         | 8.9  | 35.8                        | 31.6  | 32.5                        | 31.5  |
| 700           | 718.5              | 11.8                                 | 10.5 | 10.5                        | 10.2 | 48.7                        | 42.5  | 43.3                        | 42.0  |
| 800           | 820.5              | 13.5                                 | 11.8 | 11.8                        | 11.5 | 63.5                        | 55.0  | 55.7                        | 53.9  |
| 900           | 922.5              | 15.2                                 | 13.2 | 13.1                        | 12.7 | 80.3                        | 69.1  | 69.5                        | 67.4  |
| 1 000         | 1,024.5            | 16.9                                 | 14.6 | 14.5                        | 14.0 | 99.1                        | 84.8  | 85.0                        | 82.3  |
| 1 200         | 1,228.5            | 20.3                                 | 17.1 | 17.1                        | 16.5 | 142.6                       | 119.7 | 120.4                       | 116.6 |
| 1 400         | 1,432.5            | 23.7                                 | 19.9 | 19.7                        | 19.1 | 194.0                       | 162.1 | 162.0                       | 156.8 |
| 1 600         | 1,636.5            | 27.1                                 | 22.6 | 22.4                        | 21.6 | 253.2                       | 211.0 | 209.8                       | 203.0 |
| 1 800         | 1,840.5            | 30.4                                 | 25.3 | 25.0                        | 24.2 | 320.4                       | 266.4 | 263.8                       | 255.2 |
| 2 000         | 2,044.5            | 33.8                                 | 28.1 | 27.6                        | 26.7 | 395.4                       | 328.1 | 323.9                       | 313.2 |
| 2 200         | 2,248.5            | 37.2                                 | 30.6 | 30.2                        | 29.2 | 478.3                       | 393.7 | 390.1                       | 377.3 |
| 2 400         | 2,452.5            | 40.6                                 | 33.4 | 32.9                        | 31.8 | 569.1                       | 468.1 | 462.6                       | 447.2 |

## BASIC TECHNICAL DATA of BASALT COMPOSITE PIPE

| Indicators                                                          | Unit of measurement    | Indicator value                |
|---------------------------------------------------------------------|------------------------|--------------------------------|
| Rigidity                                                            | N/m <sup>2</sup>       | 2500, 5000, 10,000             |
| Density                                                             | g/cm <sup>3</sup>      | 1.7 – 1.9                      |
| Hydraulic coefficient Hazen-Williams                                | -                      | 150                            |
| Ambient temperature                                                 | °C                     | from -50 to +50                |
| Temperature of the transported medium                               | °C                     | from -40 to +50<br>(up to +70) |
| Coefficient Thermal linear expansion                                | 10 <sup>-6</sup> m/1°C | 24 - 30                        |
| Coefficient of thermal conductivity                                 | BT/(M·°C)              | 0.25 – 0.33                    |
| Poisson's ratio (axial / annular) v <sub>hl</sub> / v <sub>lh</sub> | -                      | 0.08-1/0.22-0.29               |
| Circumferential tensile strength                                    | N/mm <sup>2</sup>      | 220 - 440                      |
| Axial tensile strength                                              | N/mm <sup>2</sup>      | 110- 130                       |
| Circumferential bending strength                                    | N/mm <sup>2</sup>      | 330 - 370                      |
| Peripheral exural modulus                                           | N/mm <sup>2</sup>      | 8,130 – 23,800                 |
| Axial tensile modulus                                               | N/mm <sup>2</sup>      | 3,600 - 14,000                 |
| Peripheral modulus of elasticity in tension                         | N/mm <sup>2</sup>      | 5,100 - 29,000                 |



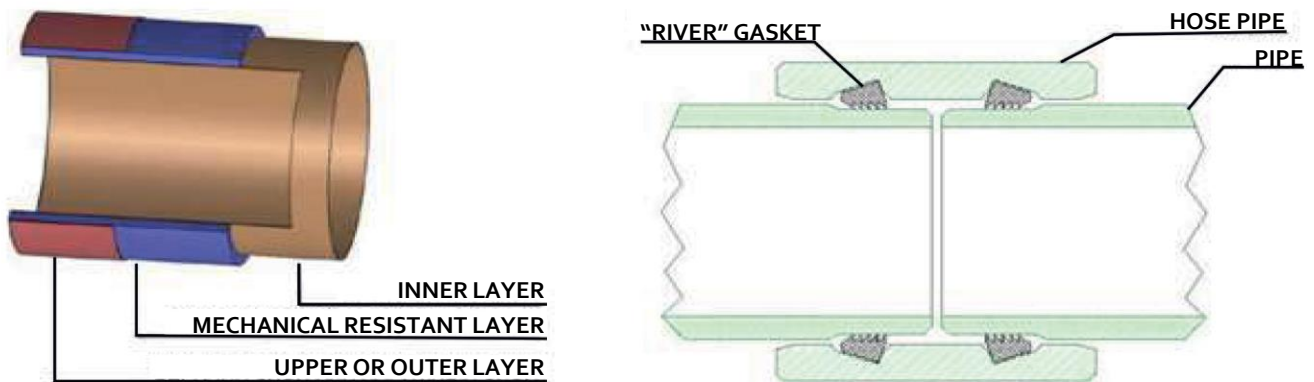


## BASALT COMPOSITE PIPE CONNECTION TYPES

The production line is equipped for the production of couplings designed for operating pressures up to 25 bar. For higher pressures, special connections must be used (e.g., laminated, flanged, or other types of connections).

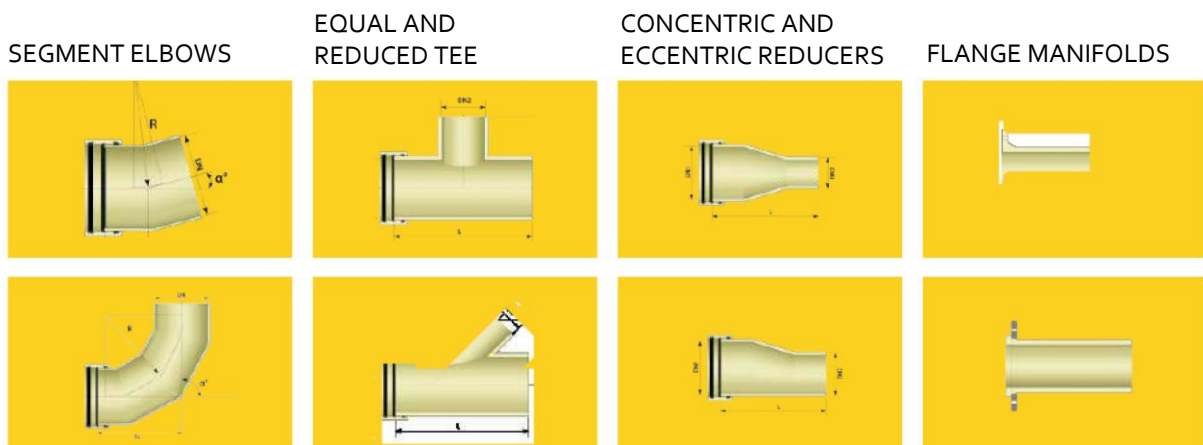
## ADVANTAGES OF THE COUPLING WITH "RIVER" TYPE GASKET

- ✔ Flexibility of piping systems – allows axial movements up to 3°, depending on the pipe diameter.
- ✔ Installation time is very short, and no special tools are required.
- ✔ Specially designed 'River' type coupling gasket ensures tightness of pipe joints.



## SHAPED PRODUCTS (ELBOWS)

The production technology allows us to offer a wide range of fittings of a standard nomenclature and to produce customized products. Fittings are standardly equipped with a sleeve fitted at one end. When ordering fittings of large diameters, carefully review the technical considerations of transporting the finished product or assembling it on site. Below are the standard fittings.



# PIPE COMPARISON TABLE

| Indicator                      | Basalt Composite Pipe                                                                                                                            | Cast iron pipe                                                                                                                                                              | Epoxy coated steel pipe                                                                                                                                                     | PVC pipe                                                                              | High-density polyethylene (HDPE) pipe                                                |
|--------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| <b>Corrosion resistance</b>    | Good                                                                                                                                             | Very poor corrosion resistance. A cement coating of the inner layer is required. Bituminous or other coating of the outer surface of the pipe. Cathodic protection required | Very poor corrosion resistance. A cement coating of the inner layer is required. Bituminous or other coating of the outer surface of the pipe. Cathodic protection required | Bad in an alkaline environment                                                        | Good                                                                                 |
| <b>Maintenance</b>             | Not required                                                                                                                                     | The outer coating may peel off over time due to damage during shipping, installation and the environment. Periodic maintenance required                                     | The outer coating may peel off over time due to damage during shipping, installation and the environment. Periodic maintenance required                                     | Periodic maintenance is required                                                      | Periodic maintenance is required                                                     |
| <b>Lifetime</b>                | More than 80 years                                                                                                                               | Due to pipe corrosion, the service life is 20 - 30 years                                                                                                                    | Due to pipe corrosion, the service life is 20 - 25 years                                                                                                                    | The service life of PVC pipes is 15 - 20 years, depending on the operating conditions | The service life of PE pipes is 20 - 30 years, depending on the operating conditions |
| <b>Underground application</b> | Optimal design for specific conditions based on internal pressure and rigidity requirements is achieved through a flexible manufacturing process | Service life is reduced by corrosion on the outer surface of the pipe                                                                                                       | Service life is reduced by corrosion on the outer surface of the pipe                                                                                                       | Not suitable for inground applications                                                | Uneconomic design due to very large pipe wall thickness                              |
| <b>Internal roughness</b>      | Hazen-Williams coefficient (C) = 150. Lower flow rate for fluid transfer.                                                                        | C=120. The fluid transfer rate is higher.                                                                                                                                   | C=120. The fluid transfer rate is higher.                                                                                                                                   | C=150                                                                                 | C=150                                                                                |
| <b>Specific gravity</b>        | 1.8 - 1.9                                                                                                                                        | 7.05                                                                                                                                                                        | 7.85                                                                                                                                                                        | 1.4 - 1.45                                                                            | 0.95                                                                                 |
| <b>Weight</b>                  | A light weight                                                                                                                                   | 6 times heavier than basalt composite                                                                                                                                       | 3-4 times heavier than basalt composite                                                                                                                                     | Heavier than basalt composite due to thicker pipe wall                                | Heavier than basalt composite due to thicker pipe wall                               |
| <b>Manipulation</b>            | Very easy handling due to the light weight of the pipe                                                                                           | Difficult, due to the large weight of the pipe                                                                                                                              | Difficult, due to the large weight of the pipe                                                                                                                              | Very easy                                                                             | Easy                                                                                 |
| <b>Wall thickness</b>          | Shallow wall thickness due to optimal design.                                                                                                    | At a certain pressure, the wall thickness is more than that of basalt composite pipes                                                                                       | At a certain pressure, the wall thickness is more than that of basalt composite pipes                                                                                       | At a certain pressure, the wall thickness is more than that of basalt composite pipes | The wall thickness is more than that of basalt composite pipes                       |
| <b>Tensile strength</b>        | 600-800 Mpa                                                                                                                                      | Minimum 420 Mpa                                                                                                                                                             | Minimum 420 Mpa                                                                                                                                                             | 50 Mpa                                                                                | 35 - 60 Mpa                                                                          |
| <b>Elastic modulus</b>         | 50 GPa                                                                                                                                           | 150 - 170 GPa                                                                                                                                                               | 210 - 240 GPa                                                                                                                                                               | 3 GPa                                                                                 | 5 GPa                                                                                |
| <b>Hydraulic impact</b>        | The best indicator among pipes made of other materials                                                                                           | Large hydraulic impact. Special device required                                                                                                                             | Large hydraulic impact. Special device required                                                                                                                             | Not good enough to cope with hydraulic impact                                         | Not good enough to cope with hydraulic impact                                        |



# ADVANTAGES of BASALT COMPOSITE PIPE

## Corrosion resistance

- Long-term efficient operation.
- No need for cladding, insulation, cathodic and other forms of corrosion protection.
- Low maintenance costs.
- Almost constant hydraulic characteristics over time.

## Light weight (1/4 weight of steel, 1/8 weight of cast iron, 1/10 weight of concrete)

- Low transportation costs (pipe in pipe).
- There is no need to use expensive equipment for loading and installing pipes.

## Large standard lengths (6, 12 m)

- Fewer connections reduces installation time.
- Lower cost of transporting long pipes.

## Excellent hydraulic performance

- Extremely smooth bore.
- Hazen-Williams coefficient,  $c = 150$ .
- Manning's coefficient,  $n = 0.009$ .
- Colebrook-White coefficient,  $k = 0.001$ .
- Low friction losses reduce pumping costs and operating costs.
- Minimal deposits reduce cleaning costs.
- Excellent abrasion resistance.

## Couplings with "RIVER" type sealing system

- Impermeable joints to prevent infiltration and leakage.
- Ease of pipe connection shortens installation time.
- Suitable for small deviations in the direction of the pipeline and for soil settlement without the use of additional fittings.

## Flexible manufacturing process

- Customized pipe diameters to maximize flow rates and simplify installation in pull-through pipeline rehabilitation projects.
- Custom pipe lengths available for maximum flexibility in direct procurement of pipes or pull-through piping.

## Advanced tube design technology

- Various stiffness and pressure grades to meet engineering requirements for pipe structures.
- Features of the material can reduce the cost of pipes when they are calculated for a pressure wave or water hammer.
- Compliance of products with strict quality standards (ISO, AWWA, ASTM, DIN-EN, etc.).

## APPLICATIONS of BASALT COMPOSITE PIPE

1. Drinking water pipelines
2. Pressure and non-pressure systems of domestic and industrial sewerage
3. Piping systems for irrigation and melioration
4. Drainage pipelines and wells
5. Storm sewage systems
6. Technical pipelines
7. Sea water intakes and outlet collectors
8. Wastewater treatment pipelines
9. Cooling and engineering systems of power plants
10. Fire extinguishing pipelines
11. Renovation of pipelines







# BASALT WOOL

BasaltWool with a density of 50–200 kg/m<sup>3</sup> – these are rather rigid slabs that can be used to insulate between floors, load-bearing structures, upper layers in a load-bearing roof devices and other load-bearing structures. BasaltWool has special characteristics that combine heat resistance with long-term stability. It is made from molten basalt rock, which is converted into fiber with characteristics that no other insulation material has. In particular, the characteristics of this thermal insulation material are:

- Energy savings
- Reduction of pollution
- Noise absorption
- Reduces the risk of fires
- Protection of life and property in case of fire

The main difference between BasaltWool and other types of insulating materials is the fact that basalt-based heat-insulating material can withstand temperatures exceeding 1000°C. Thus, this product has a higher fire resistance than other insulating materials. This factor becomes decisive in critical situations, for example, in the event of a fire, when people have to leave the premises, and firefighters extinguish the fire before the building is completely engulfed in flames and destroyed.

## WHAT IS THE DIFFERENCE OF BASALTWOOL FROM ROCK AND GLASS WOOL

BasaltWool can have different technical characteristics. Depending on the raw material, it can be made from basalt, glass or slag. All three have different performance characteristics and costs. Basalt products will last much longer. Even after decades, BasaltWool does not shrink; and unlike its competition, it retains thermal insulation. BasaltWool is also a good noise insulator and is desirable in buildings and structures near highways and railways. Glass wool is often chosen for temporary structures because it is cheaper. Slag materials can be suitable for a limited budget but should not be used in very humid environments.

## HOW TO CUT BASALTWOOL

In production, the material is cut on machines. At home, you can use a sharp knife. Although the knife be sharp enough, it is only suitable for slabs of limited thickness. Thicker mats must be cut with a special metal hacksaw. It is necessary to cut carefully, without pulling the fibers. Measure with a ruler and mark with a pencil the lines along which the cut will go.

## PRECAUTIONS DURING OPERATION

Insulation materials are environmentally friendly, but you need to be careful when working with them. When tiles are cut, microparticles are released into the air and can enter the lungs. You should wear a respirator or at least a gauze bandage. It is also recommended to protect your eyes with special glasses or a mask. In general, basalt is not dangerous. When it gets on the skin, it does not cause allergies, itching or other symptoms.





# ADVANTAGES of BASALTWOOL

## Thermal insulation

Basalt fiber has high porous qualities, so the material has excellent thermal insulation characteristics. Basalt-based stone wool retains heat well, keeping it warm in winter and cool in summer.

## High noise absorption

BasaltWool has a high soundproofing ability. This is due to the fact that basalt fibers are woven chaotically, and the space is filled with air, due to which sound waves are retained.

## High temperature resistance

BasaltWool has high temperature resistance to sudden changes in temperature, which makes it suitable for use in extreme conditions.

## Non-flammable and high fire resistance (1000°C)

BasaltWool does not burn under any circumstances. During production, the material is subjected to high heat treatment, therefore it can withstand temperatures up to 1000 °C.

## Durability

Basalt insulation will serve you for many years. Having made the insulation with this material, you will forever forget about the problems with the cold.

## Moisture resistance

The material is impregnated with water-repellent compounds, which ensures high moisture resistance. In addition, high vapor permeability allows excess water vapor to be removed from the room.

## Geometry, good compression resistance

BasaltWool retains its geometric dimensions, the expansion of the fibers does not occur throughout the entire service life.

## Environmental friendliness

The last and most important property of basalt insulation is environmental friendliness. The material is harmless to both people and the environment. In addition, basalt wool has biological and chemical resistance.

## Easy and fast installation

Ready-made BasaltWool is easily handled and can be quickly installed, while not requiring special knowledge and skills.

# APPLICATIONS of BASALTWOOL



**WOOL FOR FACADE**



**WOOL FOR VENT FACADE**



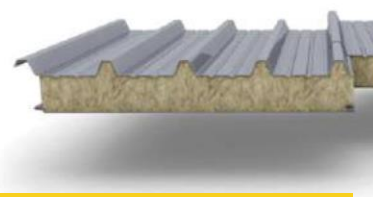
**WOOL FOR ROOF**



**WOOL FOR FLOOR**



**UNIVERSAL WOOL**



**WOOL FOR SANDWICH PANELS**

# TECHNICAL SPECIFICATIONS of BASALTWOOL

| PRODUCTS                | THERMAL CONDUCTIVITY AT 25 S, W/(M*K) | HUMIDITY % BY WEIGHT, MAX | WATER ABSORPTION INTO WATER, % BY WEIGHT | COMPRESSIVE STRENGTH AT 10% LINEAR DEFORMATION, KPA MIN. | TEAR-OFF STRENGTH OF LAYERS, KPA MIN. | ORGANIC MATTER CONTENT, % BY WEIGHT, MAX |
|-------------------------|---------------------------------------|---------------------------|------------------------------------------|----------------------------------------------------------|---------------------------------------|------------------------------------------|
| <b>UNIVERSAL</b>        |                                       |                           |                                          |                                                          |                                       |                                          |
| 50 kg/m <sup>3</sup> ≥  | 0.032                                 | 0.3                       | 10                                       | -                                                        | -                                     | 1.5                                      |
| 60 kg/m <sup>3</sup> ≥  | 0.032                                 | 0.3                       | 7                                        | 10                                                       | -                                     | 1.3                                      |
| <b>VENT</b>             |                                       |                           |                                          |                                                          |                                       |                                          |
| 80 kg/m <sup>3</sup> ≥  | 0.023                                 | 0.2                       | 6                                        | 23                                                       | 5.8                                   | 3.8                                      |
| 100 kg/m <sup>3</sup> ≥ | 0.022                                 | 0.2                       | 3                                        | 28                                                       | 5.9                                   | 3.5                                      |
| <b>FACADE</b>           |                                       |                           |                                          |                                                          |                                       |                                          |
| 100 kg/m <sup>3</sup> ≥ | 0.022                                 | 0.2                       | 3                                        | 28                                                       | 5.9                                   | 3.5                                      |
| 120 kg/m <sup>3</sup> ≥ | 0.027                                 | 0.4                       | 8                                        | 32                                                       | 7.5                                   | 3.8                                      |
| 150 kg/m <sup>3</sup> ≥ | 0.032                                 | 0.5                       | 6                                        | 37                                                       | 10.2                                  | 4.0                                      |
| <b>ROOF</b>             |                                       |                           |                                          |                                                          |                                       |                                          |
| 110 kg/m <sup>3</sup> ≥ | 0.027                                 | 0.4                       | 8                                        | 32                                                       | 7.5                                   | 3.8                                      |
| 140 kg/m <sup>3</sup> ≥ | 0.032                                 | 0.5                       | 6                                        | 37                                                       | 10.2                                  | 4.0                                      |
| 160 kg/m <sup>3</sup> ≥ | 0.032                                 | 0.5                       | 7                                        | 45                                                       | 10.2                                  | 4.0                                      |
| 190 kg/m <sup>3</sup> ≥ | 0.033                                 | 0.5                       | 7                                        | 48                                                       | 11.6                                  | 4.1                                      |
| <b>FLOOR</b>            |                                       |                           |                                          |                                                          |                                       |                                          |
| 130 kg/m <sup>3</sup> ≥ | 0.027                                 | 0.4                       | 8                                        | 32                                                       | 7.5                                   | 3.8                                      |
| 190 kg/m <sup>3</sup> ≥ | 0.033                                 | 0.5                       | 7                                        | 48                                                       | 11.6                                  | 4.1                                      |



# BASALT INTERNATIONAL

## HOW TO ORDER

| CONTINUOUS FIBER             | PRODUCT                                    | USD \$/ KG          |
|------------------------------|--------------------------------------------|---------------------|
|                              | 300 TEX                                    |                     |
|                              | 600 TEX                                    |                     |
|                              | 1200 TEX                                   |                     |
|                              | 2400 TEX                                   |                     |
|                              | 4800 TEX                                   |                     |
|                              | 9000 TEX                                   |                     |
| CHOPPED FIBER                | PRODUCT                                    | USD \$/ KG          |
|                              | 3 MM                                       |                     |
|                              | 4.5 MM                                     |                     |
|                              | 12 MM                                      |                     |
|                              | 24 MM                                      |                     |
| MINIBAR                      | PRODUCT                                    | USD \$/ KG          |
|                              | 24 MM                                      |                     |
|                              | 43 MM                                      |                     |
|                              | 50 MM                                      |                     |
| GRID / SCRIM / MESH          | PRODUCT                                    | USD \$/ METRE       |
|                              | 25 MM X 25MM                               |                     |
|                              | 50 MM X 50MM                               |                     |
| BFRP REBAR                   | PRODUCT                                    | USD \$/ METRE       |
|                              | 4 MM                                       |                     |
|                              | 6 MM                                       |                     |
|                              | 8 MM                                       |                     |
|                              | 10 MM                                      |                     |
|                              | 12 MM                                      |                     |
|                              | 14 MM                                      |                     |
|                              | 16 MM                                      |                     |
|                              | 18 MM                                      |                     |
|                              | 20 MM                                      |                     |
|                              | 22 MM                                      |                     |
|                              | 24 MM                                      |                     |
| ARCHES AND BRIDGES           | PRODUCT                                    |                     |
|                              | CALL & WE WILL DISCUSS<br>DESIGN AND BUILD |                     |
| POLES/SHEET PILE / SEA WALL  | PRODUCT                                    | USD \$/ METRE       |
| IN INVENTORY & MADE TO ORDER | POLES & ACCESSORIES                        |                     |
|                              | MIL SPEC                                   |                     |
|                              | LIGHT COMMERCIAL<br>CONNECTORS             |                     |
| BASALTWOOL                   | PRODUCT                                    | USD \$/ CUBIC METRE |
|                              | 80 CUBIC METRE                             |                     |

**Pricing Is Based On Volume & Shipping Point**



**BASALT INTERNATIONAL INC**

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