

# Basalt Volcanic Composites

## What are Basalt Fibers?

They are **Pultruded** fibers made from volcanic rock melted in high heat furnaces. Pultrusion is a manufacturing process for producing continuous lengths of FRP (fiber reinforced polymer) structural shapes. Raw materials include a liquid resin mixture (containing resin, fillers and specialized additives) and reinforcing fibers. The process involves pulling these raw materials (rather than pushing as is the case in extrusion) through a heated forming die using a continuous pulling device.

## Basalt FRP is a Composite Rebar (BCR)

Basalt rebar is made as a continuous spiral formed by winding fibers into a highly durable compound. These fibers form a strong composite offering a wide range of applications for construction. Basalt rebars are resistant to corrosion and aggressive chemical liquids and are extremely light (4 times lighter than steel), producing considerably longer life expectancy in construction.

## The Main Uses of Basalt Products are

### Textile applications for fire protection :

Basalt does not melt nor shrink in flame and when not mechanically stressed, keeps its geometric integrity.

Basalt is exceptionally suited to block fire. Basalt products resist open flame. A fabric made of Basalt, with a Bunsen burner pointed at it (1100 - 1200°C) becomes red hot as a metal fabric would. This can last for hours. For reference, an E-glass fabric of the same surface density gets pierced by the same flame in a matter of seconds.

### High Temperature Insulation (HTI) :

Basalt fibers, at present, exhibit a resistance to temperature superior to E glass fibers in the range -260° to +560°C. A perfect high temperature insulation material chopped Basalt fibers and non-woven Basalt needled mats find their place in the construction of auto and motorcycle exhaust mufflers and ovens. They are also used as the heat insulation of gas turbines, including nuclear plant locations, as basalt is known to resist degradation caused by radiation, unlike synthesized materials such as glasses. Basalt is also functional to very low temperatures (down to - 260°C). Other useful applications are insulation of liquid nitrogen tanks and pipes, and cryogenics.

*continued on page 2 >>*



## Top Ten Reasons to use Basalt Fibers

1. Stronger than fiberglass in tensile strength
2. Non-respirable, inert and safe to work with
3. 18% better elastic modulus
4. UV immune
5. Non-conductive
6. Will not harbor bacterial or microbial growth
7. Better impact resistance, does not shatter like carbon fibers
8. Ten times better electrical insulator than fiberglass
9. Very resistant to aggressive liquids, acids and alkalies
10. Has great sound attenuation properties

Oh yes! There are more reasons...cont. pg 4 >>

## The Main Uses of Basalt Products *continued*

### As reinforcement in composite materials :

The great mechanical properties of Basalt (strength & rigidity), easy wetting of the filament surface and recyclability make them particularly suitable for composites applications.

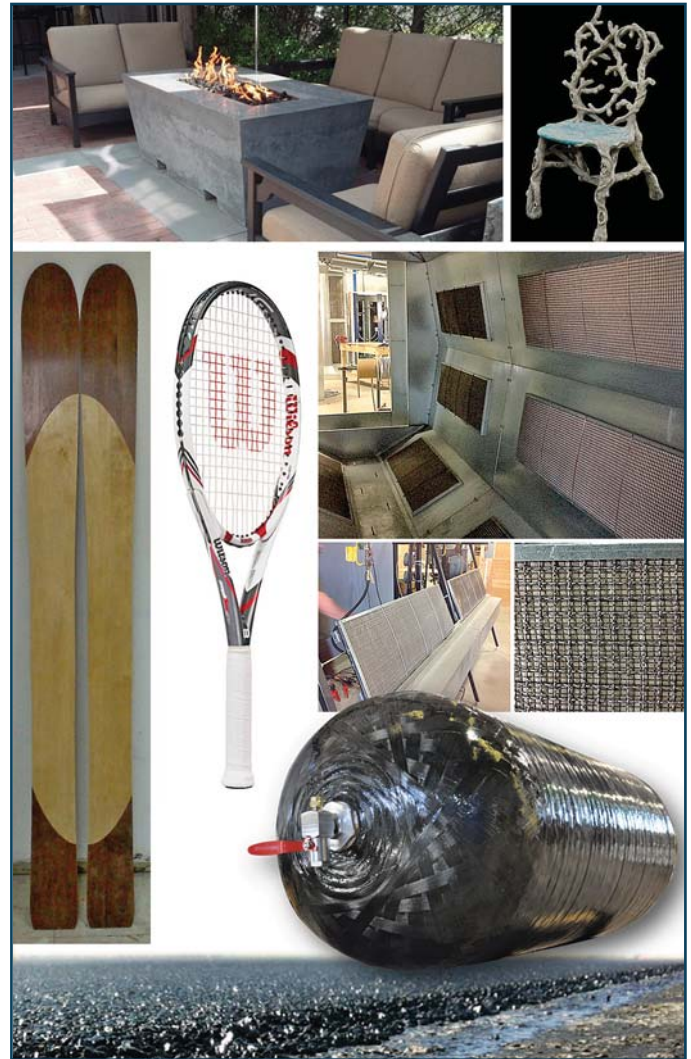
UV resistance, better acid resistance, better alkaline resistance and very low water absorption of Basalt fibers ensure excellent weatherability for outdoor Basalt fiber reinforced composites.

Higher thermal insulation and equally high electrical resistivity of Basalt fibers also allow making reinforced composites with good dielectric properties and better heat diffusion. Basalt is ten times better electrical insulator than fiberglass.

Basalt fiber reinforced injection molded parts have a better surface finish. This allows direct utility as an automotive interior decorative component.

Basalt continuous fibers have a melting temperature higher than that of the flame, which allows separation of the composite constitutions by fire at the recycling stage (e.g. in automotive industry). There is no disposal issue at the recycling stage after separation, being a natural product.

*For more Basalt Product Uses  
go to [www.basalt.guru](http://www.basalt.guru)*



## **NEW! – Bio-Mid & Basalt Fabric**

Smarter Building Systems is proud to announce the next generation of fibers made from renewable materials using Basalt fibers and a cellulose fiber Bio-Mid, made from certified sustainable wood. Bio-Mid and Basalt volcanic rock fibers are compatible with most common resin systems.

These fibers have unique advantages to traditional natural fibers – they offer the same lightweight and sustainable advantages, but with a substantial increase in thermal resistance, fiber uniformity, and fiber alignment. Results are a much higher in-plane loading and higher fiber content in laminates.

Breaking strengths are higher than most E-glass yarns of similar weight. 100% renewable content.

Cellulose is the world's most abundant renewable material, and basalt mines contain many millions of cubic yards of volcanic rock.

No fertilizers, pesticides or extraordinary irrigation are required to produce these fibers. They do not compete or displace lands suitable for food crops. All this makes for a much lower carbon footprint in stark contrast to traditional natural or man-made synthetic or petroleum based fibers that often generate thousands of tons of CO<sub>2</sub> due to post harvesting and mining processes.

Manufacturing with a conscience, with technology that can create superior performance, while remaining earth-friendly.

Fabrics are available in standard 40-inch (1 meter) widths and can be supplied in other widths ranging from 30-80 inches (76 cm up to 2 meters). Combined as a unique hybrid, the Bio-Mid/Basalt fibers are particularly useful as the different properties are advantageous.

*Phone (401) 481 8422 or email Nick  
today for more Information.*

## Selection of Basalt Products



## BASALT PRODUCTS: Weaves, Weights, Dimensions, etc.

### UNI-DIRECTIONAL FABRIC

Plain: 200 grams/m<sup>2</sup>; 300 grams/m<sup>2</sup>; 13 micron roving

Black: 200 grams/m<sup>2</sup>; Black 13 micron roving

### MULTI-DIRECTIONAL FABRIC

Bi-Axial: 450 grams/m<sup>2</sup>; fiber angles +45°, - 45°; 13 micron roving.

Bi-Axial: 450 grams/m<sup>2</sup>; fiber angles 0°, 90°; 13 micron roving.

Bi-Axial: 650 grams/m<sup>2</sup>; fiber angles 0°, 90°; 13 micron roving.

Tri-Axial: 980 grams/m<sup>2</sup>; fiber angles 0°, +45°, - 45°; 13 micron roving.

Quad-Axial: 680 grams/m<sup>2</sup>; fiber angles 0°, 90°, +45°, -45°; 13 micron roving.

### PLAIN WEAVE FABRIC

15x15: 108 grams/m<sup>2</sup>; 9 micron fibers. 65 grams/m<sup>2</sup>; 13 micron fibers.

180 grams/m<sup>2</sup>; 13 micron fibers. 200 grams/m<sup>2</sup>; 9 micron fibers.

7.2x7.2 : 220 grams/m<sup>2</sup>; 19 micron fibers.

5x5: 325 grams/m<sup>2</sup>. 11 micron fibers.

5x3.5: 400 grams/m<sup>2</sup>; 11 micron fibers.

5x3: 650 grams/m<sup>2</sup>; 13 micron fibers.

### TWILL WEAVE FABRIC

8x7: 200 grams/m<sup>2</sup>. 9 micron fibers.

5x5: 350 grams/m<sup>2</sup>. 13 micron fibers.

6x6: 900 grams/m<sup>2</sup>. 13 micron fibers.

**SATIN WEAVE FABRIC:** 220 grams/m<sup>2</sup>. 300 grams/m<sup>2</sup>. 9 micron fibers.

**COATED FABRIC:** Aluminum Coated one side – 200 grams/m<sup>2</sup>.

220 grams/m<sup>2</sup>. 650 grams/m<sup>2</sup>.

**SURFACE VEIL (WET-LAID NON-WOVENS):** 30 grams/m<sup>2</sup>. 40 grams/m<sup>2</sup>.

**WOVEN TAPE:** 25mm. 50mm. 75mm. 100mm. 135mm.

Heavy weight 25mm x 2mm thick.

**TWILL WOVEN TAPE:** 50mm. Plain or Aluminum coated one side

**BI-AXIAL BRAIDED SLEEVING:** Diameter 5 cm. 7 cm. 10 cm. 15 cm.

**CHOPPED STRAND MAT:** 200 grams/m<sup>2</sup>. 350 grams/m<sup>2</sup>.

**CHOPPED FIBER:** Length 3mm. 6mm. 9mm. 12mm. 18mm. 24mm.

30mm. 36mm. 50mm. 63mm. 90mm.

**CONTINUOUS ROVING:** 9 micron/136 tex. 13 micron/800 tex.

13 micron/1200 tex. 16 micron/2400 tex. 16 micron/4800 tex.

**3-PLY ROPE:** 3 plies of 6400 tex 16 micron roving, total tex 19,200

**GUN ROVING:** 15 micron/2400 tex

**REBAR:** Diameter 4mm. 6mm. 8mm. 10mm. 12mm. 25mm.

**MESH:** Plain or Resin Coated. Window size 5mm x 5mm. 10mm x 10mm.

25mm x 25mm. 50mm x 50mm.

**NEEDLE FELT MAT:** Thickness 6mm. 8mm. 12mm. 25mm.

**RIGID BOARD:** Thickness 6mm. 12mm. 18mm.

## More Reasons to use Basalt Fibers!

- Much higher heat and extreme cold – cryogenics are made with basalt and so are fire curtains
- Much better pricing than S-glass, Kevlar and carbon fiber
- A beautiful golden color
- Supple – many weights and weaves available. Plain, satin, coated.
- Many times lighter than steel and yet 2-3 times stronger than steel
- Will not corrode
- Does not interfere with RF signals
- Ballistic impact properties
- Made from rock the concrete basalt products expand and contract at the same rate unlike others
- Great for making tool molds as basalt takes heat and does not conduct and does not move
- Basalt sleeves with no seams come in many sizes – used as spark plug covers for example
- Basalt boards with a fire retardant resin are a perfect backer with fire and insulation properties
- Basalt twine rope acts like a flexible rebar – a ten pound box of over a thousand feet!

### Industries Currently Testing Basalt

Cryogenics  
 Prosthetics  
 Filament Winding  
 Thermoplastics  
 Mold (Tool) Making  
 Asphalt  
 Ballistics  
 Bridge Wraps  
 Manholes

**What Application do you have that needs Better Performance at a Better Price?**

### Comparative Technical Characteristics of Filament Made from E-Glass, Basalt and Silica

Properties	SI Units	Basalt Filaments	Fiberglass	Silica Filament
<b>Thermal</b>				
Maximum application temperature	(°C)	650°	600°	1100°
Sustained operating temperature	(°C)	600°	480°	1000°
Minimum operating temperature	(°C)	-260°	-60°	-170°
Thermal conductivity	(W/m K)	0.031-0.038	0.034-0.04	0.035-0.04
Melting temperature	(°C)	1450°	1120°	1550°
Vitrification conductivity	(°C)	1050°	600°	1300°-1670°
Glow loss	(%)	1.91	0.32	1.75
Thermal expansion coefficient	(ppm/ °C)	8.0°	5.4°	0.05°
<b>Physical/Mechanical</b>				
Density	(g/cm3)	2.75	2.6	2.15
Filament diameter	(microns)	9-23	9-13	9-15
Tensile strength	(M Pa)	4840	3450	4750
Compression	(psi)	550,000	440,000	510,000
Elastic modulus	(G Pa)	89	77	66
Linear expansion coefficient	(x10 /K)	5.5	5	0.5
Elongation at break	(%)	3.15	4.7	1.2
Absorption of humidity (65%RAH)	(%)	<0.1	<0.1	<0.1
Stability at tension (20 C°)	(%)	100	100	100
Stability at tension (200 C°)	(%)	95	92	94
Stability at tension (400 C°)	(%)	82	52	80
<b>Acoustics</b>				
Sound absorption coefficient	(%)	0.9-0.99	0.8-0.93	0.85-0.95
<b>Electrical</b>				
Specific volume resistance	(ohm.m)	1*10×12	1*10×11	1*10×11
Loss angle tangent frequency	(1 MHz)	0.005	0.0047	0.0049
Relative dielectric permeability	(1 MHz)	2.2	2.3	2.3
<b>Chemical Resistance</b>				
% weight loss after 3 hrs boiling in:				
H2O	(%)	0.2	0.7	0.05
2n NaOH (Sodium Hydroxide)	(%)	5.0	6.0	5.0
2n HCl (Hydrochloric acid)	(%)	2.2	38.9	15.7
<b>Price Comparison</b>		\$	\$	\$\$\$\$

#### Basalt Sample Packs Order Online

A wide assortment of our products are available in **Sample Packages** to allow you a chance to physically feel and see them before deciding on future purchases. Order online at [www.smarter-building-systems.com/basalt-sample-packs/](http://www.smarter-building-systems.com/basalt-sample-packs/).

We can also put together **Custom Sample Packs**.  
 Phone (401) 481 8422 or email Nick today  
 for more Information and Technical Data.

#### Basalt Woven Fabric can be supplied with the following coating on one or both sides

COATING TYPE	PURPOSE
Thermoblocker	Intumescent barrier
Flock	Skin contact barrier
Silicon	Splatter protection
Acrylic	Splatter protection
PUR or EVA	Fatigue resistance