FAQ’s

Basalt Reinforced Composites

*Basalt Fiber Reinforced Rebar (BFRP)*

1. What is Basalt?
   Basalt is the most common rock on the planet and defined as an extrusive igneous (volcanic) rock that is low in silica content, dark in color, and comparatively rich in iron and magnesium. By way of comparison, basalt fiber is similar to carbon fiber or fiberglass, but basalt has superior mechanical properties than fiberglass, and has a significantly lower cost than carbon fiber (10 – 15X lower).

2. What’s the difference between Basalt Rebar and fiberglass rebar?
   Basalt and Glass are both FRP’s and similar in price, but with some major exceptions as reinforcement:
   - Basalt has twice the working temperature (400°C vs. 200°C)
   - Basalt has 20 – 40% better mechanical properties and puncture resistance
   - Basalt has a much greater resistance to chemicals, alkali and UV
   - Basalt is very Eco-Friendly; with a dramatically lower environmental impact (10:1)

3. Is it a Green product?
   Basalt Rebar (BFRP) is very Eco-Friendly. According to ACMA, the American Composite Manufacturing Association has demonstrated that the production of Basalt Rebar has less than 1/10th the carbon footprint of steel, and basalt has the lowest environmental impact in a Life-Cycle Assessment compared with other FRP (Fiber Reinforced Polymer) rebars. Basalt fiber is all natural and produced from stone; having no additives that are typically found in other materials such as glass fiber.

   Additional LEEDs contributions are found in the transportation and handling. Steel requires 4 Truckloads vs. 1 for Basalt Rebar; steel requires special equipment to unload vs. none for Basalt Rebar, and 50% more time & labor is expended to receive and unload the exact same number of steel rebar compared with Basalt Rebar!

4. How does Basalt Fiber Reinforced Polymer (BFRP) Rebar compare with steel rebar?
   BFRP is a sustainable, rust proof alternative to traditional steel reinforcement, with 25% of the weight of steel and a specific tensile strength that is 2.5 times greater (bar for bar). It’s also impervious to attacks from alkali, chemicals or water, which causes steel to corrode (iron oxide hydrate or rust).

5. How does one directly compare the performance between Basalt Rebar and steel?
   Calculations for Steel’s performance are based on long existing standard (or stipulated) data, and therefore selected according to its guaranteed tensile strength (Example: Grade 60 = 60,000 psi). Calculations for Basalt Rebar are dependent upon data generated and Certified from a 3rd Party accredited laboratory. Although the engineering for FRP’s is different than steel, the mechanical data for either product is used similarly to determine the proper amount of reinforcement in a cross section of concrete.
Basalt Reinforced Composite Rebar provides proprietary software that allows the design professional to directly compare the standards and calculations for BFRP use in ACI 440, with the standards and calculations outlined in ACI 318 for steel. This “Code Normalization” demonstrates the selection of Basalt Rebar can be an excellent alternative to steel, thus making it easier for a designer to select BFRP and capture all the benefits not available when selecting steel rebar.

6. How does Basalt Rebar pricing compare with steel pricing?
This varies depending on the current cost of steel. One of the values of selecting Basalt Rebar, is that its pricing is stable compared with steel. Typically, steel pricing is good for a week at a time, forcing larger buy-ups to secure best pricing.

Normally, “off the shelf” pricing of steel from large wholesalers, is cheaper than FRP’s. However, steel rebar and BFRP rebar are clearly not “apples to apples” as reinforcing products – and shouldn’t be compared that way. More often than not, you will save money using Basalt Rebar on a sizeable project based on the final “in-place cost” - everything considered. Additionally, the Total Cost of Ownership is greatly reduced by choosing Basalt Rebar over steel rebar.

7. Can you bend Basalt Rebar at the jobsite?
Hard bends at the jobsite are not possible. All hard bends (90’s, stirrups, angles, etc.) are fabricated during production; according to your design and delivered to the job site along with the straight bars. This practice saves the installer significant time, and eliminates waste for a quicker and easy installation.

8. Does Basalt FRP have its own governing body like Steel?
Yes. ACI (American Concrete Institute) 440.1R-15 offers general information on the history and use of all FRP reinforcement, a description of the unique material properties of FRP, and guidelines for the design and construction of structural concrete members reinforced with FRP bars. You will also find specific information about the selection and use of FRP’s in AC454, Fiber-reinforced Polymer (FRP) Bars for Internal Reinforcement of Concrete Members Acceptance as part of the ICC-ES, and FDOT’s Spec 932-3.

9. What testing of significance has been performed on Basalt Rebar bar?
Outside of multiple ASTM testing criterion, Basalt Rebar has passed the equivalent of AC 454 testing protocol (Fiber-reinforced Polymer (FRP) Bars for Internal Reinforcement of Concrete Members Acceptance), as specified within the Basalt Rebar Certificate of Compliance, most recently published in January of 2021.

10. What are typical applications for Basalt Rebar (BFRP)?
Although Basalt Rebar can be used in any cubic yard (or meter) of concrete, the most attractive applications are usually those harshest applications where steel rebar is not really part of the solution…for example:

- Hydraulic Structures & Precast
- Freeze Thaw Environments
- Thin Wall & Panel Systems
- Harsh Chemical Environments
- Architectural Precast
- Bridge Decking
- Sea Walls and Marine Applications
- High Heat Applications
- Shielding Concrete
11. What are the main advantages of Basalt Rebar (BFRP)?

100% Corrosion and Rust Proof – This eliminates spalling and cracking experienced by selecting traditional steel reinforcement and further eliminates the costs and need for special coatings or treatments on your concrete. You can even consider a reduction in the overall concrete depth or wall thickness – also saving money and time on the project. All in all, by using Basalt Rebar you are reducing the Total Cost of Ownership and creating a 100+ year useful lifecycle!

12. What tool is used to cut it?

Any jobsite saw will cut our material, but a simple handheld grinder is what we use to cut the bar.

13. Check your Shear strength vs. Steel

See certification representing performance data. As a side note, FDOT found the transverse shear strength of tested BFRP Rebar proved to be 116 % stronger than GFRP bars. (GFRP is glass fiber rebar) - the shear strength of rebar is not a factor in concrete design in that codes don’t define the shear strength of the bars themselves.

14. What is Basalt Rebar cost Comparison with Steel?

Basalt Rebar is not really an “apples to apples” comparison in many ways – especially where corrosion is concerned. Depending on the size of the project and its requirements, the final “in place cost” can vary a great deal. With off the shelf cost comparison of Black Steel, Basalt Rebar is generally 15% higher, however, the “in place cost” can ultimately be lower when you consider the freight and handling of the materials. On the backside, there are never any added costs for preventative measures or ongoing maintenance. Basalt Rebar is the type of product that literally pays for itself over time.

Additionally, steel has undergone serious procurement issues, along with regular price increases that can change from day to day. By contrast, Basalt Rebar is much more stable, in that our product is component stable. No need “buy up” inventory to avoid a coming price increase.

15. How do you tie it?

The method of tying is the same, however we always recommend the use of non-metallic ties, like zip ties, to maintain a non-corrosive continuity in the design; however, it can be tied the same as black steel. CRSI Manual of Standard Practice, Chapter 4 “Suggested Specifications for Reinforcing Steel” notes epoxy-coated reinforcing bars shall be tied with plastic-coated or epoxy-coated steel wire; or other acceptable material. Zinc-coated (galvanized) reinforcing bars shall be tied with zinc-coated steel wire, non-metallic-coated tie steel wire or other acceptable material.

16. Will the Basalt Composite Mesh lay flat or does it come in rolls? Need to flatten?

The Basalt Composite Mesh comes in roll form, however it's not as stiff as typical WWM, so it lays much flatter that steel and easier to handle – significantly better than steel counterpart.

17. Can you do a combo of steel and Basalt - steel for bent shapes?

Yes. We would suggest HDG or SS bar at a minimum to provide some protection from oxide jacking.

18. Strength comparison with WWM? 1:1?

This is a 2-part answer.

A. For the use of corrosion-proof Basalt Mesh to replace WWM, it depends on the individual wire size of the WWM in question. Basalt Mesh is designed at 50 kN/m2 in both Warp and Weft, and can be a 1:1 replacement for most WWM. Basalt Mesh can also be designed for 100 kN strength to replace larger wire sized (>0.250) WWM.
B. Basalt Composite Fiber Mix is also an excellent choice to replace WWM in precast and slabs-on-grade; as they absorb internal and external stresses to the concrete, limiting cracking and adding to the flexural strength and capacity of the concrete. It also provides a significant enhancement to the concrete’s surface. Just throw the fiber in, degradable/soluble bag and all, and the fiber will mix thoroughly throughout the mix and be perfectly positioned as it comes down the chute and pours into the form.

In short, both products are stronger than steel wire of comparable size and designed for tight crack control. They both are significantly lighter and a lot easier to handle than steel WWM and neither product will ever rust, corrode or cause cracking of concrete.

• **75% Lighter than Steel** – The lighter weight makes Basalt Rebar safer and easier to unload, handle and place, saving time on the jobsite. Also, it requires no special equipment to unload the truck. Trucking is also a huge advantage with less trips (4 x 1) for the same linear footage of bar.

• **Stronger than Steel** – Basalt Rebar has a specific tensile strength of 2.5 X greater than steel rebar. This attribute allows you to go down a bar size in secondary reinforcement applications!

• **Non-Conductive** – Basalt Reinforced Composites entire family of reinforcing products are all non-conductive, and do not interfere with RF signals – unlike carbon and steel reinforcement.

• **Natural Resistance** – Basalt Rebar is naturally resistant to heat, chemicals, UV, alkali and moisture. Basalt Rebar can be considered for even the harshest environments and applications.

19. **Does salt water affect BFRP?**
   Test results show that the static strength of the BFRP shows negligible degradation after prolonged aging in the salt solution, making Basalt Rebar an excellent choice for salt-water concrete applications.

20. **Are there bad applications for BFRP’s?**
   Pretty much anywhere you have selected up to a #8 (25 mm or 1.0” diameter) rebar, you can consider Basalt Rebar as an alternative. At this time, FRP’s are not recommended as the main structural members for primary vertical reinforcement in high rises of more than 4 stories – although, neither is #8 steel in most cases. This is due to a lower modulus vs. steel. It is however, approved for use in the internal walls and flooring to reduce the weight of the structure.

21. **Is Basalt Rebar manufactured in the USA?**
   Yes. Basalt Reinforced Composites family of reinforcing products are produced in the USA. With expansion plans to grow into several manufacturing plants throughout the US and Internationally.

22. **What sizes of Basalt Rebar are available?**
   Basalt Reinforced Composites manufactures and stocks Basalt Rebar in #2 - #8 Bar sizes; which is equal to ¼” – 1.0” in diameter. Standard stocked bar lengths are 10’, 20’ and 40’ (3M, 6M and 12M). Longer length coils are available up through #4 (1/2”) diameter size bar; with custom cut sizes available upon request. Watch for announcements in the second half of 2021 as Basalt Reinforced Composites will then be commercializing #9 & #10 (1.128” & 1.270”) Basalt Rebar. Special stirrups, bends and shapes are engineered and can be produced from any size of bar (#2 - #8).
23. What other types of reinforcing products does Basalt Reinforced Composites produce?
In addition to Basalt BFRP Rebar, the company proudly produces a line of Basalt Fiber (Micro and Macro), as well as, a line of Basalt GeoGrid Mesh.

**Basalt Composite Mix** is a blend of chopped basalt fibers that provide, 3-dimensional, secondary isotropic reinforcement. Basalt Mix (Micro Fiber) and Basalt Mix-M (Macro Fiber) are engineered to impart toughness to any concrete element at a range of 0.1% – 0.3% by volume respectively.

Basalt Mix delivers 100’s of millions of individual, high tenacity fibers that control the formation of plastic shrinkage cracking by absorbing the stresses associated with volumetric changes in fresh and hardened concrete; leaving you with a fiber-free finish. Basalt Mix greatly improves the surface performance and durability of your concrete through impact and fatigue resistance, and through freeze/thaw cycles.

**Basalt Composite Mesh** is a Geo Grid Mesh made from Basalt Fiber Reinforced Polymers, and is used as an alternative to traditional welded wire mesh in walls, flatwork, and precast – especially in reinforcing applications where coverage and depth of application or shadowing are of concern.

24. What is Modulus strength?
Often known as, Young’s Modulus, or Tensile Modulus, it is a mechanical property of linear elastic materials, or its stiffness. It evaluates the elasticity of rigid or solid material, which is the relation between the deformation of a material and the power needed to deform it or the stress in a material just before it yields in a flexure test. Modulus is typically measured in GPa’s (Gigapascals).

25. What is Tensile strength?
Tensile strength is the maximum load that a material can support without rupture when being overextended (in short, an ability to withstand a pulling force), divided by the original cross-sectional area of the material. Tensile strengths are typically measured in pounds per square inch or psi.

26. Why is tensile strength so important?
Often a reduction in ductility and an increase in brittleness are related to an enhanced corrosion rate, which subsequently can change the failure of a material from a ductile failure (beyond the limits of tensile strength) to a perilous brittle failure. As noted in the paragraph above and as a point of common sense, steel rusts and corrodes.

27. What is Pultrusion and how is it compared with Extrusion?
Pultrusion is a process where fibers, in this instance, basalt fibers, are pulled through a resin matrix and a precise die; then heated at specific temperatures where the resin is cured in and around the fibers. Extrusion melts resin pellets and pushes them through a die to create fibers and profiles.