

## 2023 ACI FRP Composites Competition

### Reinforcement Identification Guide and Product Datasheets

	BasaFlex™ , BFRP Rebar, Basanite Industries <a href="https://www.basaniteindustries.com/products.html">https://www.basaniteindustries.com/products.html</a>
	MST Rebar, Inc., Structural Rebar <a href="https://www.mstrebar.com/products">https://www.mstrebar.com/products</a>
	GBar , AIT Composites Advanced Infrastructure Technologies, <a href="https://www.aitcomposites.com/gbar">https://www.aitcomposites.com/gbar</a>
	PINKBAR® Fiberglas™ Rebar, Owens Corning Infrastructure Solutions <a href="https://www.owenscorning.com/en-us/composites/products/product-types/fiberglass-rebar">https://www.owenscorning.com/en-us/composites/products/product-types/fiberglass-rebar</a>

# BasaFlex™

BFRP Composite Rebar



**BasaFlex™ BFRP Composite Rebar** is a sustainable, rust proof alternative to traditional steel reinforcement. Comparatively, it's only 25% of the weight of steel, and has a Specific Tensile Strength that is 2.5 times greater! This equates to enhanced Jobsite Safety, with significant savings in transportation and handling costs.

**BasaFlex™** is made from volcanic rock, and has a Coefficient of Thermal Expansion similar to concrete. This homogeneous behavior reduces the cracking mechanism during extreme temperature fluctuations and / or concurrent disparity.

**BasaFlex™** is Engineered to last for >100 years, and an excellent choice when considering continuous reinforcement that will never rust, or require long-term maintenance costs. Unlike steel or other FRP's, BasaFlex is highly resistant to attacks from alkali, chemicals or water.

## Non-Corrosive Benefits

- No added maintenance cost during the service life of the structure, unlike steel and other FRP's.
- Reductions in the overall concrete cover (*usually required due to degradation from steel corrosion*) can now be considered.
- Similarly, expensive waterproof sealants, coatings and/or special concrete additives are no longer necessary to resist or prevent steel corrosion.
- Even chloride contaminated concrete constituents, such as water (saltwater) and aggregates, as well as chloride-based accelerators and cement without chloride limits can now be used without detriment.



## Typical Applications

### Concrete Containment Structures

- Waste Water Treatment Facilities
- Swimming Pools; Petro Chemical Tanks

### Concrete Exposed to De-Icing or Marine Chlorides

- Bridges & Railings; Median Barriers
- Parking Structures
- Continuously Reinforced Concrete Paving
- Precast Elements; Sea Walls; Dry Docks; Port Aprons

### Reduced Weight in Architectural Elements

### Masonry Strengthening

- Seismic, Wind or Blast Strengthening
- Strengthening for "Event & Cycle Loading"

### Tunneling & Mining

- Temporary Reinforcement; Rock Bolts

### Concrete Exposed to High Voltage and Electromagnetic Fields

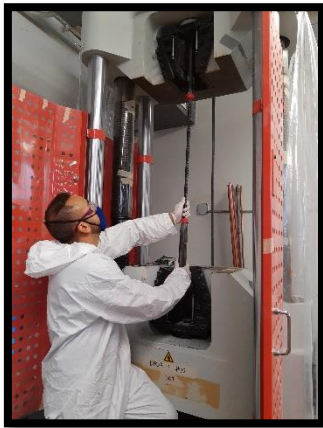
- High Voltage Substations; Radio Frequency Sensitive Areas
- Hospital MRI Areas, Cable Ducts and Banks
- Aluminum Smelters and Steel Mills

## APPROVALS & GOVERNED USE:

**BasaFlex™** is an approved reinforcement product according to ACI 440R-07 covering Basalt, Glass, Carbon and Aramid FRP's. It's used as per ACI 440.1R-06, and its construction use is dictated by Code 440.6-08, and tested according to ASTM D7205, and 5 other ASTM methods; demonstrating BasaFlex exceeds all performance requirements of ACI 440.6-08.

**BasaFlex™** can be placed to meet code requirements (or equivalent) by using the calculations and installation guidelines for BFRP reinforcement of concrete as defined in ACI 440.6-08. Recommendations for maximum deflection and shear of concrete elements reinforced with FRP rebars are presented in ACI 440.1R-06, and specified by 440.5-08.

The use of BFRP is further Approved under the ICC Evaluation Service, Acceptance Criteria for Fiber-Reinforced Polymer (FRP) Bars, for Internal Reinforcement of Concrete Members [AC454] dated June 2016.



### ASTM Standards

- D570 Standard test method for water absorption of plastics
- D619 Standard practice for conditioning plastics for testing
- D695 Standard test method for compressive properties of rigid plastics
- D7205 Standard test method for tensile and tensile modulus
- D790 Standard test method for flexural properties of unreinforced and reinforced plastics
- D792 Standard test method for density and specific gravity
- D2734 Void content of reinforced plastics
- D3410 Standard test method for compressive properties of polymer matrix composite materials

**Design Manual:** Isis Design Manual #3: Reinforcing concrete structures with fiber reinforced polymers (FRP's)

### Performance Properties of BasaFlex #3 Bar

Ultimate Tensile Strength	1125.1	MPa
Peak Load	79.9	kN
Guaranteed Peak Load	74.5	kN
Modulus of Elasticity	56.7	GPa
Transverse Shear Strength	267.0	MPa
Horizontal Shear Strength	55.8	MPa
Peak Force	6.0	kN
Ultimate Strain	2.0	%

### Key Values and Benefits

- Stronger, Tougher and Lighter than steel
- Rust Proof; 100+ Year Reinforcement
- Naturally resistant to alkali and acids
- No need for special coating like GFR Rods
- Does not conduct electricity; non-magnetic
- No interference with RF signals; UV Stable
- #3 BasaFlex Composite Rebar replaces #4 Steel Rebar for all types of Secondary Reinforcement & Crack Prevention
- Excellent for harsh environments

#### Disclaimer of Warranties & Limitation of Liability

Seller and Manufacturer do not make any warranty of any kind regarding this product, either express or implied, including without limitation, any implied warranty of merchantability, fitness for a particular purpose, condition, design, or quality. Buyer's exclusive remedy, and the seller's and the manufacturer's exclusive liability for any claims, losses, damages, or injuries resulting from the use of this product, shall be limited to the replacement of the product with respect to which damages are claimed. In no case shall the seller or the manufacturer be liable for direct, consequential, special, incidental, punitive, or indirect damages resulting from the purchase or use of this product. Buyer accepts this product subject to this foregoing disclaimer, and purchases and uses this product at buyer's own risk. No employee, or agent of seller, or the manufacturer is authorized to vary the terms of this disclaimer in any manner.



# MST-BAR® Grade III GFRP

IMPERIAL		#2	#3	#4	#5	#6	#7	#8	#9	#10	#11
METRIC		6	10	13	16	20	22	25	29	32	36
Minimum Tensile Load	kN	33	74	132	202	285	390	507	650	819	1000
	lbf	7419	16636	29675	45411	64070	87675	112180	146126	184118	224810
Cross Sectional Area	mm <sup>2</sup>	32	71	132	201	285	387	491	645	819	1007
Weight	kg/m	0.12	0.22	0.35	0.5	0.7	0.9	1.22	1.4	1.72	2.15

<b>Guaranteed Tensile Strength</b>	>1000 MPa >145 Ksi
<b>Young's Modulus , E</b>	>60GPa >8702KSI
<b>Ultimate Strain , ε<sub>fu</sub></b>	>1.7%
<b>Transverse Shear Strength , τ</b>	>220 MPa 31.9 ksi
<b>Bond Strength to Concrete</b>	20 MPa Minimum 2900 Psi Minimum

<b>Strength of Bend (Straight Portion)</b>	>900 MPa
<b>Strength of Bend (Bend Portion with Minimum Radius Bend : 4x Diameter of Bar)</b>	>600 MPa
<b>Young's Modulus , E (Bend Bar)</b>	50 GPa
<b>Glass Transition Temperature, T<sub>g</sub>°</b>	125C°

## The #1 Solution to Concrete Reinforcement

sales@mstbar.com  
www.mstbar.com  
416-740-0344

MST-BAR® Manufactured by MST Rebar Inc.



AIT Composites **GBar®** is a **non-corrosive** and **high-performance** FRP rebar superior to basic steel rebar.



ASTM D7957	Units	#3 (10mm)	#4 (13mm)	#5 (16mm)	#6 (19mm)
Guaranteed Ultimate Tensile Force (ASTM D7205)	kN	71.80	130.00	177.80	207.10
	kip	16.10	29.20	39.70	46.60
Mean Tensile Modulus (ASTM D7205)	GPa	74.97	71.23	71.05	67.38
	ksi	10873.50	10331.04	10304.93	9772.64
Guaranteed Ultimate Transverse Shear (ASTM D7617)	MPa	191	143	182	176
	ksi	27.80	20.74	26.40	25.53

Available in sizes #3 - #10



Visit our website to learn more and view our full product line.



[www.aitcomposites.com](http://www.aitcomposites.com)

The background image shows a manufacturing process for composite materials. Numerous long, thin, white fibers are being pulled from a machine and are being laid out on a metal frame. The fibers are bundled together and appear to be in the process of being woven or layered. The overall scene is industrial and focused on the production of composite materials.

**Innovative  
Composite  
Solutions.**

**Delivered.**



# INFRASTRUCTURE SOLUTIONS



## PINKBAR®+ FIBERGLAS™ REBAR LESS WEIGHT. MORE STRENGTH.™

PINKBAR®+ Fiberglas™ Rebar is a stronger, lighter weight, rustproof concrete reinforcement designed to meet the codes and standards you trust, help you increase on-site productivity and deliver more durable structures.

- GLAS-POWERED™ by Owens Corning corrosion-resistant Advantex® Fiberglas™

**STRONGER. LIGHTER. CODE-APPROVED. RUSTPROOF.**

### Product Advantages Compared to Steel



#### STRONGER

- 2x stronger in tensile strength compared to the same size diameter



#### LIGHTER

- Up to 7x lighter in concrete flatwork applications<sup>1</sup>
- 4x lighter compared to the same size diameter



#### RUSTPROOF

- PINKBAR®+ will never rust, enabling more durable structures



#### ENHANCED PRO EXPERIENCE

- Scratch-free, heat-free handling
- High-visibility color
- Non-conductive

<sup>1</sup> #3 PINKBAR® replaces #4 steel rebar in flatwork applications requiring reinforcement for shrinkage crack mitigation.

### Code-Approved and Proven Performance

#### ASTM D7957 & CSA S807

- PINKBAR®+ Fiberglas™ Rebar by OCIS complies with ASTM D7957 and CSA S807 material standards.

#### ACI 332 & ACI 440

- PINKBAR®+ Fiberglas™ Rebar by OCIS can be used in residential concrete, including footings and foundation walls, as prescribed in ACI 332 using ACI 440 design methodology.

#### ICC-ES AC454

- Meets or exceeds ICC-ES AC454 acceptance criteria, including bond strength, tensile strength, and tensile modulus of elasticity.

#### TMS 402/602

- PINKBAR®+ Fiberglas™ Rebar by OCIS can be used with TMS 402/602-22 Appendix D as reinforcement for masonry walls.

### Applications

PINKBAR®+ Fiberglas™ Rebar by OCIS is designed to reinforce concrete in:

RESIDENTIAL	COMMERCIAL/ INDUSTRIAL	TRANSPORTATION	MARINE	HIGH VOLTAGE & ELECTROMAGNETIC FIELDS
<ul style="list-style-type: none"> <li>• Driveways</li> <li>• Sidewalks</li> <li>• Pool Decks</li> <li>• Basement Floors</li> <li>• Basement Walls</li> <li>• Footings</li> <li>• Concrete Masonry</li> <li>• ICF Construction</li> </ul>	<ul style="list-style-type: none"> <li>• Parking Slabs</li> <li>• Warehouse Floors</li> <li>• Agricultural Slabs</li> <li>• Loading Docks</li> <li>• Architectural Precast</li> <li>• Truck Aprons</li> <li>• Pour Back Slabs</li> </ul>	<ul style="list-style-type: none"> <li>• Bridge Decks</li> <li>• Traffic Barriers</li> <li>• Civil Roadways</li> <li>• Soft-Eye for Tunnels</li> </ul>	<ul style="list-style-type: none"> <li>• Seawalls</li> <li>• Piles</li> </ul>	<ul style="list-style-type: none"> <li>• Light &amp; Heavy Rail</li> <li>• MRI Rooms</li> </ul>

## Physical & Mechanical Properties

Bar Size	NOMINAL DIAMETER		NOMINAL CROSS-SECTIONAL AREA		UNIT WEIGHT/LENGTH		GUARANTEED ULTIMATE TENSILE FORCE		GUARANTEED ULTIMATE TENSILE STRENGTH		ULTIMATE TENSILE STRAIN	MEAN TENSILE MODULUS OF ELASTICITY		FIBER MASS CONTENT
	in	mm	in <sup>2</sup>	mm <sup>2</sup>	lb/ft	kg/m	kip	kN	ksi	MPa	%	Msi	GPa	%
#3	0.375	10	0.11	71	0.11	0.16	16.0	71.00	145.0	1003	1.86%	6.80	46.88	≥70
#4	0.500	13	0.20	129	0.18	0.27	24.70	110.00	124.5	852	1.82%	6.80	46.88	≥70
#5	0.625	16	0.31	199	0.32	0.47	41.8	186	135	930	1.5%	8.7	60.3	≥80
#6	0.750	19	0.44	284	0.47	0.70	57.3	255	130	898	1.5%	8.7	60.3	≥80
#7	0.875	22	0.60	387	0.63	0.94	78.3	348	131	900	1.5%	8.7	60.3	≥80
#8	1	25	0.79	510	0.82	1.2	101.9	453	129	889	1.5%	8.7	60.3	≥80

FIBER MASS CONTENT*	MOISTURE ABSORPTION IN 24 H at 50°C [122°F]*	MOISTURE ABSORPTION TO SATURATION AT 50°C [122°F]**	MEAN GLASS TRANSITION TEMPERATURE (DSC)*		MEAN APPARENT HORIZONTAL SHEAR*		MEAN TRANSVERSE SHEAR STRENGTH*		BOND STRENGTH	
%	%	%	°F	°C	psi	MPa	ksi	MPa	psi	MPa
≥80	≤0.2	<0.75	≥212	≥100	≥6525	≥45	≥22	≥152	≥1102	≥7.6

## Handling & Placement

Handling and installation of PINKBAR®+ Fibreglas™ Rebar by OCIS is the same as for steel bars, with a few notes and exceptions:

- Cutting: Do not shear fiberglass bars. Field-cut fiberglass bars using a fine-blade saw, grinder, and carborundum or diamond blade. Sealing the ends of fiberglass bars is not necessary.
- Chairing: Place chairs at a spacing that ensures adequate concrete cover.
- Tying: Use same tying methods as for steel rebar. Tie wire material based on contractor preference.
- Concrete cover should be greater than two bar diameters to avoid thermal reflective cracking.
- Can easily be field-formed into large radius curves. See web pages for minimum field bend radius.

As with any reinforcement placement, be sure to follow best practices in all phases of your concrete project, from planning to construction, including pouring, curing, joint cutting, and maintenance for optimal performance.

## Packaging

PINKBAR®+ Fibreglas™ Rebar by OCIS ships from multiple locations in the U.S. Master bundles are available in standard sizes.

BAR SIZE	WEIGHT PER 20-FT BAR (lb)	NO. OF BARS PER MASTER BUNDLE	WEIGHT PER MASTER BUNDLE (lb)	NO. OF BARS IN A FULL TRUCK LOAD (FTL)	WEIGHT PER FTL (lb/ton)
#3	2.18	240	523	20,160	43892/22
#4	3.58	240	501	12,000	43056/22
#5	6.38	250	1595	6500	41470/21
#6	9.38	250	2345	4500	42210/21
#7	12.58	250	3145	3250	40885/20
#8	16.38	250	4095	2500	40950/20

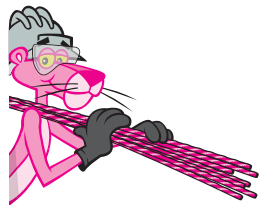
Stock bent bars are available on request.

## Labeling & Certificates

Production lot certificates are available upon request – traceable by bar marks imprinted on the bar in intervals showing the bar diameter, stock order, and production date.

## Storage

PINKBAR®+ Fibreglas™ Rebar by OCIS is durable in the outdoor environment. Discoloration, fading, or chalking of the surface can occur due to oxidation or UV exposure. However, this is cosmetic only and will not affect the performance of the bar. For prolonged exposure under direct sunlight, protective cover is recommended to minimize these effects.



## HOW WE BUILD NOW™

## OWENS CORNING INFRASTRUCTURE SOLUTIONS

### Owens Corning Infrastructure Solutions, LLC

One Owens Corning Parkway

Toledo, OH 43659 USA

Ph: 1-855-OC-Rebar

[www.owenscorning.com/pinkbar+](http://www.owenscorning.com/pinkbar+)

**CALCULATE SAVINGS IN FLATWORK**



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