

**MST iBAR**<sup>®</sup>  
COMPOSITE REBAR PRODUCTS

# 4EQ STRUCTURAL BAR™

## FOR FOUNDATION REINFORCEMENT

### PRODUCT TECHNICAL DATA

4EQ Structural Bar™ is a unique structural GFRP (Glass Fiber Reinforced Polymer) rebar from MST-BAR®, engineered to give your foundation the strongest reinforcement for generations. Manufactured using boron-free ECR Glass and high grade Vinyl Ester Resin, 4EQ Structural Bar™ replaces all steel rebar from the footing to the foundation walls increasing reinforcement strength and longevity.

### ADVANTAGES

- **Rust-Proof**  
Eliminates spalling and corrosion cracks.
- **200+ Years Service Life**  
Engineered to last for generations.
- **Quick & Simple Installation**  
Up to 50% labor savings compared to traditional steel rebar.
- **Transportation Savings**  
75% lighter than traditional steel rebar. Load on your truck's ladder rack, no Class-A CDL required.
- **High Performance in All Climates**  
Stronger reinforcement in freeze-thaw regions and guaranteed longevity in corrosive coastal regions.
- **No Field-Bending**  
Eliminate laborious field-bending of steel for less worker fatigue.
- **Stronger Than Steel**  
Over 4.5X stronger than Grade 40 rebar.
- **Only One Diameter Needed**  
Trim your rebar inventory down to one size for vertical and horizontal reinforcement.
- **Compatible with All Forming Systems**  
Works with any forming system from ICF systems to aluminum forms.
- **Strategic Reinforcement Design**  
Use 4EQ Structural Bar™ with our simple patent-pending design and reinforce with confidence.

### PHYSICAL & MECHANICAL PROPERTIES

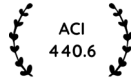
<b>BAR DIMENSIONS</b>	0.45 in Diameter 20 ft Length
<b>CROSS-SECTIONAL AREA</b>	0.16 in <sup>2</sup>
<b>BAR COMPOSITION</b>	Vinyl Ester Resin & ECR Glass Fiber
<b>BAR PROFILE</b>	Integral Rib Design (No Sand-Coating Required)
<b>GUARANTEED TENSILE STRENGTH</b>	185 ksi (1275 MPa)
<b>ELASTIC MODULUS</b>	8702 ksi (60 GPa)
<b>TRANSVERSE SHEAR STRENGTH</b>	31.9 ksi (220 MPa)
<b>GUARANTEED PULL-OUT CAPACITY</b>	2900 psi (20 MPa)

## SPECIFICATION COMPLIANCE

4EQ Structural Bar™ meets and exceeds all of (but not limited to) the following specifications and design criterions:



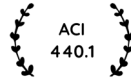
**ASTM D7957** "Standard Specification for Solid Round Glass Fiber Reinforced Polymer Bars for Concrete Reinforcement"



**ACI 440.6** "Specification for Carbon and Glass Fiber-Reinforced Polymer Bar Materials for Concrete Reinforcement"



**CSA S807** "Specification for Fibre-reinforced Polymers"



**ACI 440.1** "Guide for the Design and Construction of Structural Concrete Reinforced with FRP Bars"

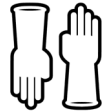


**AASHTO LRFD** "Bridge Design Guide Specifications for GFRP-Reinforced Concrete"

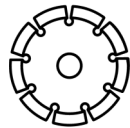


**CSA S806** "Design and Construction of Building Structures with Fibre-Reinforced Polymers"

## HANDLING & INSTALLATION



Working with 4EQ Structural Bar™ is quick and simple with our best practice guidelines. Always wear gloves when handling 4EQ Structural Bar™ to protect against fiberglass splinters. Direct contact to skin can cause irritation.



Use a diamond blade when field-cutting 4EQ Structural Bar™. Do not shear the bars. If lap-splicing is necessary, use contact lap splices. Lap length should be no less than 15 inches.

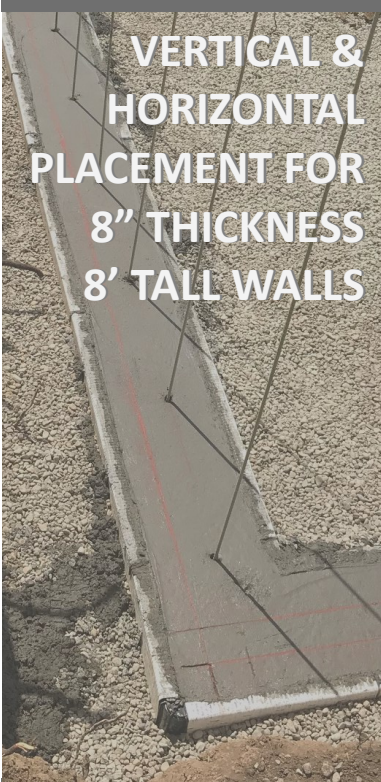


Tie and chair 4EQ Structural Bar™ as you would steel rebar. Tie wire, rebar clips, and plastic zip ties are acceptable methods of securing the bar. Beware of settlement of floating when using 4EQ Structural Bar™ with high slump concrete or when vibrating.

## FOOTINGS

- Install two parallel lengths of 4EQ Structural Bar™ in continuous footings.
- Use a minimum of 15 inches lap length when lap splicing 4EQ Structural Bar™.
- Overlap bars at each intersection.
- Chair and tie the reinforcement as you would steel.
- After pouring and striking off your footer, snap a chalk line in the fresh concrete to mark 1.5 inches away from the interior side of the basement wall, NOT CENTERED.
- Wet set your vertical reinforcement. Use spacing in tables 1 and 2.
- Setting the vertical reinforcement directly into the footing serves to connect the wall to the footings (eliminating the need for bent hoops, hooks, or dowels) and ensures proper placement every time.





**4EQ STRUCTURAL BAR MINIMUM REINFORCEMENT SPACING FOR 8' TALL BASEMENT WALLS<sup>b, c, d, e, f</sup>**

SOIL CLASSES<sup>a</sup> AND DESIGN LATERAL (psf per foot of depth)

MAX BACKFILL HEIGHT (feet)	WALL SEGMENT LENGTH (feet)	GW, GP, SW, SP 30 psf/ft		GM, GC, SM-SC, ML 45 psf/ft		SC, ML-CL, inorganic CL 60 psf/ft	
		HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL
		≤7' UNBALANCED BACKFILL HEIGHT	≤8	2 Rungs	1 Centered	2 Rungs	1 Centered
8-12	2 Rungs		1 Centered	2 Rungs	37" OC	2 Rungs	28" OC
12-16	2 Rungs		44" OC	2 Rungs	29" OC	2 Rungs	22" OC
16-24	2 Rungs		40" OC	2 Rungs	26" OC	2 Rungs	20" OC
≥24	2 Rungs		28" OC	2 Rungs	25" OC	2 Rungs	19" OC
8' UNBALANCED BACKFILL HEIGHT	≤8	2 Rungs	1 Centered	2 Rungs	46" OC	37" OC	34" OC
	8-12	2 Rungs	42" OC	2 Rungs	28" OC	37" OC	21" OC
	12-16	2 Rungs	34" OC	2 Rungs	22" OC	41" OC	17" OC
	16-24	2 Rungs	30" OC	2 Rungs	20" OC	2 Rungs	15" OC
	≥24	2 Rungs	29" OC	2 Rungs	19" OC	2 Rungs	14" OC

**Table 1**



**4EQ STRUCTURAL BAR MINIMUM REINFORCEMENT SPACING FOR 9' TALL BASEMENT WALLS<sup>b, c, d, e, f</sup>**

SOIL CLASSES<sup>a</sup> AND DESIGN LATERAL (psf per foot of depth)

MAX BACKFILL HEIGHT	WALL SEGMENT LENGTH	GW, GP, SW, SP 30 psf/ft		GM, GC, SM-SC, ML 45 psf/ft		SC, ML-CL, inorganic CL 60 psf/ft	
		HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL	HORIZONTAL	VERTICAL
		≤8' UNBALANCED BACKFILL HEIGHT	≤9	3 Rungs	62" OC	3 Rungs	46" OC
9-13.5	3 Rungs		38" OC	3 Rungs	28" OC	37" OC	19" OC
13.5-18	3 Rungs		30" OC	3 Rungs	22" OC	41" OC	15" OC
18-27	3 Rungs		27" OC	3 Rungs	20" OC	3 Rungs	13" OC
≥27	3 Rungs		26" OC	3 Rungs	19" OC	3 Rungs	13" OC
9' UNBALANCED BACKFILL HEIGHT	≤9	3 Rungs	49" OC	3 Rungs	32" OC	26" OC	24" OC
	9-13.5	3 Rungs	30" OC	3 Rungs	20" OC	26" OC	15" OC
	13.5-18	3 Rungs	24" OC	3 Rungs	16" OC	29" OC	12" OC
	18-27	3 Rungs	21" OC	3 Rungs	13" OC	3 Rungs	10" OC
	≥27	3 Rungs	20" OC	3 Rungs	13" OC	3 Rungs	10" OC

**Table 2**

For Sl: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound per square foot per foot = 0.1571 kPa2/m, 1 pound per square inch = 6.895 kPa.  
 1 Centered = One 4EQ Structural Bar™ located at the center of the wall segment length.  
 2 Rungs = One 4EQ Structural Bar™ within 12 inches of wall top, one at half height.  
 3 Rungs = One 4EQ Structural Bar™ within 12 inches of wall top, two bars at third points of wall height.

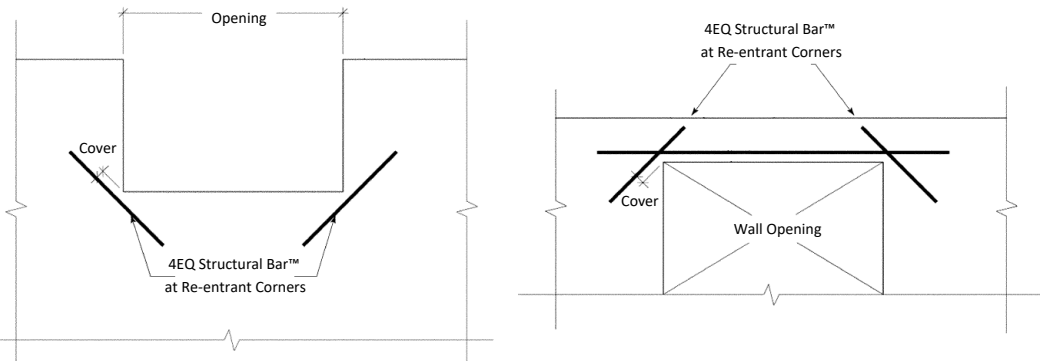
- a. Soil classes in accordance with Unified Soil Classification System.
- b. Table values are based on minimum concrete strength of 2500 psi and reinforcement located at 1.5 inches of clear cover from the interior side of the wall, NOT CENTERED.
- a. Deflection criterion is  $L/240$ , where  $L$  is the height of the basement wall in inches.
- b. Based on published strength and stiffness data as of February 2020.
- c. The serviceability requirements of residential concrete allow for crack development per ACI 332.
- d. We reserve the right to make improvements in the product and/or process which may result in changes to Table 1 and 2.

Additional engineering for other wall thicknesses and heights are available.



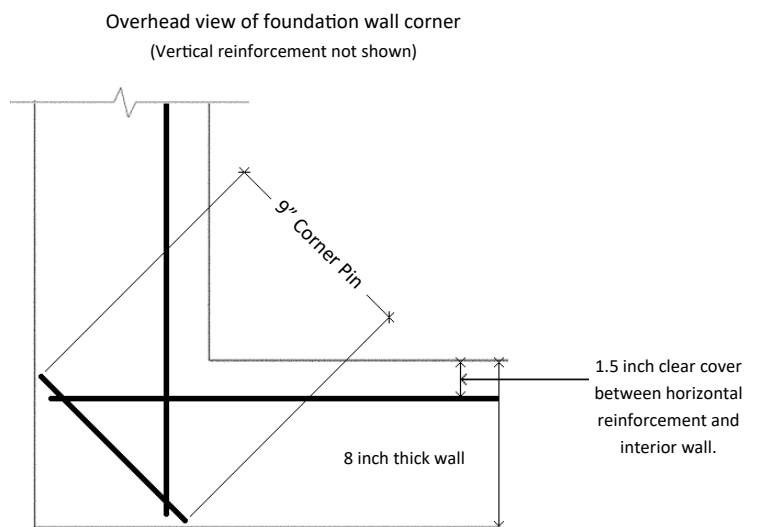
## RE-ENTRANT CORNERS

- When re-entrant corner reinforcement is required, place an additional 24" piece of 4EQ Structural Bar™ at re-entrant corners in walls, such as where window and doors occur, and where footing elevation differences create re-entrant corners in walls.
- Use 1.5 inches of clear cover for re-entrant corners, tie re-entrant reinforcement bars to horizontal and/or vertical reinforcement.
- Placement of 4EQ Structural Bar™ may be anchored as illustrated below:



## PATENT-PENDING CORNER PIN DESIGN

- At closing corners, the bending moment becomes negative which means tension develops on the outside of the foundation promoting potential vertical cracks at the foundation wall corners.
- The industry-leading bond strength of 4EQ Structural Bar™ allows straight cut reinforcement in the form of "Corner Pins" to be used as foundation wall corner reinforcement, eliminating need for bent corner bars.
- Allow at least a half inch clear cover from end to end of Corner Pins.
- For an 8" thick wall, cut 9" Corner Pins from straight lengths of 4EQ Structural Bar™ and tie them in a 45 degree position as illustrated below:



To learn more about MST-BAR® composite rebar products, give us a call or visit us on the web.

**TUF-N-LITE, LLC**  
**(513) 472-8400**  
[www.mstbarusa.com](http://www.mstbarusa.com)  
[www.tufn-lite.com](http://www.tufn-lite.com)