

Tyfo® CRB

Sand-Coated FRP Bars

DESCRIPTION

The Tyfo® CRB are fabricated from high-strength carbon with an extremely durable epoxy resin using a pultrusion process combined with an in-line coating process for the sand surface.

USE

Reinforcement for concrete elements, especially where corrosion is a factor, such as waterfront structures. Additionally, Tyfo® CRB can be used where concrete elements are subjected to deicing salts or other corrosive agents, or when electrical or magnetic neutrality is required.

ADVANTAGES

- Non-corrosive
- More than twice the tensile strength of steel
- Consistent modulus of elasticity
- Same deformation patterns as steel
- Four times lighter than steel
- Non-metallic and non-conductive
- Pre-fabricated angles and bends to ACI standard is available
- Square or rectangle sections available

MECHANICAL PROPERTIES FOR THE TYFO® CRB CARBON/EPOXY SYSTEM

Bar Size	Tensile Modulus of Elasticity ¹		Ultimate Tensile Strength		Ultimate Strain in Tension
	E_f		f_u		E_{ft}
	GPa	Msi	GtPa	ksi	%
#3	124	18	2.07	300	1.7
#4	124	18	2.07	300	1.7

¹ Defined as E_f in the proposed ACI 440-1R-06 design recommendations

² Guaranteed tensile strength is the average ultimate tensile strength minus three times the standard deviation

PHYSICAL PROPERTIES FOR THE TYFO® CRB CARBON/EPOXY SYSTEM

Bar Size		Cross-sectional Area		Nominal Diameter	
		A_f , bar		db	
mm	in	mm ²	in ²	mm	in
#10	#3	71	0.11	9.5	3/8
#13	#4	129	0.2	12.7	1/2

Tyfo® CRB is manufactured to specific lengths for the project. Please contact Fyfe Co. LLC for further information.

DESIGN OF THE TYFO® CRB SYSTEM

DESIGN

Tyfo® CRB pre-fabricated angles and bends to the ACI standard is available. The Fyfe Co. LLC engineering staff will provide preliminary design at no obligation.

PLACEMENT AND ASSEMBLY

Placing of Tyfo® CRB is done in a similar fashion to steel bars. Unless otherwise specified in project specifications, the bars should be placed within the tolerances specified in ACI 117 ("Standard Tolerances for Concrete Construction and Materials"). Common placing practices should apply with the following exceptions:

Because it is lightweight, fibercarbon reinforcement should be adequately secured in the forms to prevent displacement by concrete placement or workers. Plastic or non-corrosive chairs can be used to elevate the rebar on spacing determined by the bar diameter.

Plastic or nylon ties, and plastic snap ties can be used in tying the bars in applications where corrosion resistance or total absence of metals is paramount. Standard metal tie wire, coated tie wire, and stainless steel tie wire can also be used. Fibercarbon rebar can also be lap spliced to metal rebar as long as mechanical fastening devices that could damage the bar are not used.

Whenever continuity is required in the reinforcement, lapped splices should be used. Mechanically connected or welded splices are not possible with composite reinforcing bars. The length of lap splices varies with concrete strength, type of concrete, rebar grade, size, spacing and cover. In the absence of other specifications, an overlap of forty (40) bar diameters should be utilized.

BENDS

Tyfo® CRB is a thermoset composite, and cannot be bent on the job site after it has been polymerized (cured). Bends can be produced during the manufacturing process in virtually any shape that can be obtained with steel rebar, although typically a little more generous bend diameter will be required. As a general guideline, multiplying the bar diameter (in inches) by a factor of 3.5 will give you an approximate minimum bend radius for a 90-degree bend. Similarly, multiplying the bar diameter by a factor of 7 will give you the minimum bend diameter for a 180-degree bend. In any job where bending dimensions are critical, contact should be made with the supplier to verify bending capability. Based on testing, approximately 50-60% of the guaranteed design strength of a straight bar is retained after making a 90 degree bend.

STORAGE CONDITIONS

Avoid placing Tyfo® CRB directly on the ground during storage. If stored outdoors for extended periods of time, the bars should be covered with opaque plastic or other types of cover to protect the bars ultraviolet rays and chemical substances.

CAUTION!

HANDLING

Care is advised in the handling Tyfo® CRB during storage and placement. Reinforcing bars should be handled with heavy duty working gloves to avoid hand cuts and injuries from sharp edges.

SAFETY PRECAUTIONS

When cutting, use of an approved particle mask is recommended for possible airborne particles. Gloves are recommended when handling. Safety carbones are recommended to prevent eye irritation.

FIRST AID

If serious cuts or abrasions are caused during handling, seek medical attention immediately.

CLEANUP

Dispose of in accordance with local disposal regulations.

**CONSULT MATERIAL SAFETY DATA SHEET (MSDS) FOR MORE INFORMATION.
KEEP OUT OF REACH OF CHILDREN.
FOR INDUSTRIAL USE ONLY.**

Fyfe Co. LLC

Tyfo® Fibrwrap® Systems

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