



TYFO[®] BCC COMPOSITE

using Tyfo[®] S Epoxy

DESCRIPTION

The Tyfo[®] BCC Composite is comprised of the Tyfo[®] S epoxy and Tyfo[®] BCC reinforcing fabric. Tyfo[®] BCC is a custom, ±45° bi-directional carbon fabric. The Tyfo[®] S epoxy is a two-component epoxy matrix.

USE

Tyfo[®] BCC Fabric is combined with Tyfo[®] S Epoxy to provide an ambient-cure, wet-layup composite system for joints, connections, and strengthening applications for bridges, buildings, and other structures.

ADVANTAGES

- Used in joint transfer (JT) applications
- Proven long-term performance and durability
- Excellent wet-out and handling properties
- 100% solids, solvent-free epoxy matrix
- Low viscosity, long working time
- Ambient cure application

PACKAGING

Tyfo[®] BCC Fabric: 50" x 150 lineal ft. (625 sq.ft.). Typically ships in 12" x 13" x 54" boxes.

Tyfo[®] S Epoxy: Pre-measured 5-gallon units with combined material volume of 4 gallons or in 55-gallon drums.

COVERAGE

Approximately 4 to 5 units of Tyfo[®] S epoxy per 50" roll of the Tyfo[®] BCC Fabric.

CONSUMPTION RATE

Fabric-to-epoxy ratio by weight:
For Tyfo[®] SCH and BCC Fabrics: 1 : 1
For Tyfo[®] SEH Fabrics: 1 : 0.8

SHELF LIFE

Epoxy - two years in original, unopened and properly stored containers.

Fabric - ten years in proper storage conditions.

STORAGE CONDITIONS

Store epoxy at 60°F to 100°F (15°C to 38°C). Resin is susceptible to crystallization at temperatures below 50°F. If crystallized, epoxy must be reheated until clear. Store fabric rolls flat, not on ends, and at temperatures below 100°F (38°C). Avoid moisture and water contamination.

Typical Dry Fiber Properties

Property	Typical Test Value
Tensile Strength	740,000 psi (5.1 GPa)
Tensile Modulus	35.5 x 10 ⁶ psi (245 GPa)
Ultimate Elongation	2.1%
Density	0.064 lbs./in ³ . (1.78 g/cm ³)
Minimum weight per sq. yd.	18.5 oz. (628 g/m ²)
Fabric roll weight	81 lbs

Composite Gross Laminate Properties

Property ¹	ASTM Method	Typical Test Value	Design Value ²
Tensile Strength in Primary Fiber Direction, +45°	D3039	95,850 psi (661 MPa) (3.2 kip/in. width)	81,000 psi (558.5 MPa) (2.7 kip/in. width)
Tensile Modulus, psi		6.95 x 10 ⁶ psi (47.9 GPa)	5.9 x 10 ⁶ psi (40.68 GPa)
Elongation at Break		1.4%	1.19%
Tensile Strength -45° to Primary Fiber Direction		95,850 psi (661 MPa) (3.2 kip/in. width)	81,000 psi (558.5 MPa) (2.7 kip/in. width)
Laminate Thickness	D17771	0.034 in. (0.864 mm)	0.034 in. (0.864 mm)

¹ Contact FyfeFRP LLC for appropriate cure schedule.

² Contact FyfeFRP LLC engineers to confirm project specification values and design methodology (i.e. design values may vary slightly using ACI gross laminate methodology).

Epoxy Material Properties

Cure schedule: 72 hour post-cure at 140°F (60°C)¹

Property	ASTM Method	Typical Test Value
Glass Transition Temperature, T _g	D4065/ E1356	180°F (82°C)
Tensile Strength	D638 Type 1	10,500 psi (72.4 MPa)
Tensile Modulus		461,000 psi (3.18 GPa)
Elongation		5.0%
Compressive Strength	D695	12,500 psi (86.2 MPa)
Compressive Modulus		465,000 psi (3.2 GPa)
Flexural Strength	D790	17,900 psi (123.4 MPa)
Flexural Modulus		452,000 psi (3.12 GPa)
Shore D Hardness	D2240	87±3
Water Absorption (24 hours) Water Absorption (13 weeks)	D570	0.33% 1.98%
Adhesion Strength ² > Concrete (ASTM D7522) > Steel > Epoxy	D4541	> 400 psi (concrete failure typ.) > 1200 psi > 1200 psi

¹ Testing temperature: 73°F (23°C).

² Adhesion strength dependent on surface preparation and substrate thickness. Cure schedule: 7 days at 73°F (23°C).

INSTALLATION THE TYFO® BCC SYSTEM

DESIGN

The Tyfo® BCC system is designed to meet specific project criteria dictated by the engineer of record and any relevant building codes and/or guidelines. The design shall be based on the allowable strain for each type of application and the design modulus of the material. FyfeFRP LLC engineering staff may provide preliminary design, specification wording and application details based on the project requirements.

INSTALLATION

The Tyfo® system is to be installed by FyfeFRP LLC trained and certified applicators in accordance with the FyfeFRP LLC quality control manual, project specifications, and design requirements.

SURFACE PREPARATION

The required surface preparation is dependent on the type of element being strengthened. In general, the surface must be clean, dry and free of protrusions or cavities to prevent voids behind the Tyfo® system. Column surfaces that will receive continuous wraps typically only require a clean, sound substrate. Discontinuous wrapping surfaces (walls, beams, slabs, etc.) require a minimum CSP-2 profile to prepare for bonding, achieved by light sandblast, grinding or other approved methods per ICRI 310.2R-2013. Tyfo® Composite Anchors may be incorporated in the designs. FyfeFRP LLC engineering staff will provide the proper specifications and details based on project requirements.

MIXING TYFO® S EPOXY

For pre-measured units in 5-gallon containers, pour the contents of component B into the component A container. Mix thoroughly with a low speed mixer at 400 to 600 RPM until uniformly blended. Ensure epoxy is transferred between the A and B buckets. For 55-gallon drums, mix component A and component B per the appropriate weight or volumetric mix ratio. Resin may be heated to achieve desired viscosity (i.e. radiant heating, drum heaters, water bath). Mixed Tyfo® S Epoxy may be thickened by adding up to 7 percent by weight of fumed silica (such as Cab-o-sil TS-720). DO NOT THIN. Solvents will prevent proper cure.

APPLICATION

The Tyfo® BCC Fabric is manually saturated with Tyfo® S Epoxy. Fabric may be installed via dry layup method to minimize distortions to the fabric. It is recommended to apply epoxy to the back side of the fabric before setting in place when installing via dry layup to ensure proper saturation.

PROTECTIVE COATINGS

Apply a final coat of thickened Tyfo® S Epoxy to all fabric edges, including butt splice, termination points and jacket edges. Paint between 24 and 72 hours after final application of epoxy. If more than 72 hours after application, prepare the surface by light sandblast or hand sanding to lightly etch the surface.

LIMITATIONS

Recommended substrate temperature range is 50°F to 100°F (10°C to 38°C). All coating applications to be performed at a minimum of 5.4°F above the dew point. Maintain conditions for the first 48 hours of cure. Temperatures below 50°F will significantly increase the viscosity of the mixed product. Higher viscosity will reduce fabric penetration, introduce additional air into the system, and extend the cure times beyond 48 hours. DO NOT THIN. Solvents will prevent proper cure.

CAUTION!

CLEANUP

Collect with absorbent material. Dispose in accordance with local disposal regulations. Uncured material can be removed with approved solvent. Cured materials must be mechanically removed.

HAZARDS

Consult the Safety Data Sheets (SDS) for associated hazards. SDS will be supplied upon request.

Consult safety data sheet
(SDS) for more information.
For industrial use only.

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