



TYFO[®] SCH-11UP COMPOSITE

using Tyfo[®] S Epoxy

DESCRIPTION

The Tyfo[®] SCH-11 UP Composite is comprised of Tyfo[®] S Epoxy and Tyfo[®] SCH-11UP reinforcing fabric. Tyfo[®] SCH-11UP is a custom, unidirectional carbon fabric. The Tyfo[®] S Epoxy is a two-component epoxy matrix.

USE

Tyfo[®] SCH-11UP Fabric is combined with Tyfo[®] epoxy to add strength to bridges, buildings, and other structures.

ADVANTAGES

- Good high & low temperature properties
- Long working time
- High tensile modulus and strength
- Ambient cure
- 100% solvent-free
- Rolls can be cut to desired widths prior to shipping

COVERAGE

Approximately 1,200 sq. ft. surface area with 3 to 4 units of Tyfo[®] S Epoxy and 1 roll of Tyfo[®] SCH-11UP Fabric when used with the Tyfo[®] Saturator.

PACKAGING

Order Tyfo[®] S Epoxy in 55-gallon (208L) drums or pre-measured units in 5-gallon (19L) containers. Tyfo[®] SCH-11UP Fabric typically shipped in 24" x 600 lineal foot (0.6m x 182.9m) rolls. Typically ships in 14" x 14" x 27" (356mm x 356mm x 686mm) boxes.

EPOXY MIX RATIO

100.0 component A to 42.0 component B by volume. (100 component A to 34.5 component B by weight.)

SHELF LIFE

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

Fabric – ten years in proper storage conditions.

STORAGE CONDITIONS

Store epoxy at 40° to 90° F (4° to 32° C). Avoid freezing. Store rolls flat, not on ends, at temperatures below 100° F (38° C). Avoid moisture and water contamination.

CERTIFICATE OF COMPLIANCE

- Will be supplied upon request, complete with state and federal packaging laws with copy of labels used.
- Material safety data sheets will be supplied upon request.
- Possesses 0% V.O.C. level.

Typical Dry Fiber Properties	
Property	Typical Test Value
Tensile Strength	550,000 psi (3.79 GPa)
Tensile Modulus	33.4 x 10 ⁶ psi (230 GPa)
Ultimate Elongation	1.7%
Density	0.063 lbs./in. ³ (1.8 g/cm ³)
Minimum weight per sq. yd.	11.6 oz. (393 g/m ²)

Composite Gross Laminate Properties			
Property ¹	ASTM Method	Typical Test Value	Design Value*
Ultimate Tensile Strength in Primary Fiber Direction	D3039	143,000 psi (986 MPa) (2.8 kip/in. width)	121,000 psi (834.3 MPa) (2.4 kip/in. width)
Elongation at Break		1.0%	0.85%
Tensile Modulus		13.9 x 10 ⁶ psi (95.8 GPa)	11.9 x 10 ⁶ psi (82 GPa)
Nominal Laminate Thickness		0.02 in. (0.51mm)	0.02 in. (0.51mm)

* Design and specification values will vary based on individual project requirements and applicable safety factors. Contact FyfeFRP LLC engineers to determine appropriate specification values.

Epoxy Material Properties		
Curing Schedule 72 hours post cure at 140° F (60° C).		
Property	ASTM Method	Typical Test Value
Glass Transition Temperature, T _g	D4065	180°F (82°C)
Tensile Strength ¹ , psi	D638 Type 1	10,500 psi (72.4 MPa)
Tensile Modulus, psi		461,000 psi (3.18 GPa)
Elongation Percent		5.0%
Flexural Strength, psi	D790	17,900 psi (123.4 MPa)
Flexural Modulus, psi		452,000 psi (3.12 GPa)

¹ Testing temperature: 70° F (21° C)

Crosshead speed: 0.5 in. (13mm)/min. Grips Instron 2716-0055 - 30 kips

² Specification values can be provided upon request.

INSTALLATION OF THE TYFO® COMPOSITE SYSTEM

DESIGN

The Tyfo® Fibrwrap® System shall be designed to meet specific design criteria. The criteria for each project is dictated by the engineer of record and any relevant building codes and/or guidelines. The design should be based on the allowable strain for each type of application and the design modulus of the material. The FyfeFRP LLC engineering staff will provide preliminary design at no obligation.

INSTALLATION

Tyfo® System to be installed by FyfeFRP LLC trained and certified applicators. Installation shall be in strict compliance with the FyfeFRP LLC Quality Control Manual.

SURFACE PREPARATION

The required surface preparation is largely dependent on the type of element being strengthened. In general, the surface must be clean, dry and free of protrusions or cavities, which may cause voids behind the Tyfo® composite. Column surfaces that will receive continuous wraps typically require only a broom cleaning. Discontinuous wrapping surfaces (walls, beams, slabs, etc.) typically require a light sandblast, grinding or other approved methods to prepare for bonding. Tyfo® Composite Anchors are incorporated in some designs. The FyfeFRP LLC engineering staff will provide the proper specifications and details based on the project requirements.

MIXING

For pre-measured units in 5-gallon containers, pour the contents of component B into the pail of component A. For drums, premix each component: 100.0 parts of component A to 42.0 parts of component B by volume (100 parts of component A to 34.5 parts of component B by weight). Mix thoroughly for five minutes with a Tyfo® low speed mixer at 400-600 RPM until uniformly blended.

APPLICATION

Apply one prime coat of Tyfo® S epoxy on the substrate by using a roller. Saturate the fabric by feeding it through the Tyfo® Saturator or by approved hand methods (See the Tyfo® Saturator Manual). Prior to the application of the saturated fabric, fill any uneven surface. Saturate and apply subsequent layers of the fabric according to the Specifications and the Design Requirements. With the use of a roller or hand pressure, ensure proper orientation of fibers. Release or roll out entrapped air and ensure that each individual layer is firmly bedded and adhered to the preceding layer or substrate. Apply a final coat of thickened Tyfo® S Epoxy and detail all fabric edges, including butt splice, termination points and jacket edges.

PROTECTIVE COATINGS

In case of plaster final coating, apply sand by hand for better bonding surface while the final coat of epoxy is still tacky. In case of paint final coating, paint between 24 and 72 hours after final application of epoxy. If more than 72 hours after application, prepare the surface of the final coat of epoxy by light sandblast or hand sanding to slightly 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.

FIELD QUALITY CONTROL

Record batch numbers for fabric and epoxy used each day and note locations of installations. Measure square feet of fabric and volume of epoxy used each day.

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.

Statement of Responsibility: The technical information and application advice in this publication is based on the present state of our best scientific and practical knowledge. As the nature of the information herein is general, no assumption can be made as to the product's suitability for a particular use or application, and no warranty as to its accuracy, reliability or completeness, either expressed or implied, is given other than those required by State legislation. The owner, his representative or the contractor is responsible for checking the suitability of products for their intended use. Field service, where provided, does not constitute supervisory responsibility. Suggestions made by the FyfeFRP LLC, either verbally or in writing, may be followed, modified or rejected by the owner, engineer or contractor since they, and not the FyfeFRP LLC, are responsible for carrying out procedure appropriate to a specific application.