FYFE
Tyfo® FIBRWRAP® Systems

ISO 9001:2008 REGISTERED FIRM

Tyfo® SCH-11UP Composite
using Tyfo® S Epoxy

DESCRIPTION
The Tyfo® SCH-11UP Composite is comprised of Tyfo® S Epoxy and Tyfo® SCH-11UP reinforcing fabric. Tyfo® SCH-11UP is a custom, uni-directional 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 24" x 24" x 27" (610mm x 610mm 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

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)
Weight per sq. yd.	9.3 oz. (315 g/m^2)

COMPOSITE GROSS LAMINATE PROPERTIES

PROPERTY	ASTM METHOD	TYPICAL TEST VALUE	DESIGN VALUE*
Ultimate tensile strength in primary fiber direction, psi	D-3039	143,000 psi (986 MPa) (1.5 kip/in. width)	121,000 psi (834.3 MPa) (1.3 kip/in. width)
Elongation at break	D-3039	0.93%	0.79%
Tensile Modulus, psi	D-3039	15.3 x 10^6 psi (105.4 GPa)	13.0 x 10^6 psi (89.6 GPa)
Ultimate tensile strength 90 degrees to primary fiber, psi	D-3039	0	0
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 Fyfe Co. 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*
T_g	D-4065	180° F (82° C)
Tensile Strength[1], psi	D-638 Type 1	10,500 psi (72.4 MPa)
Tensile Modulus, psi	D-638 Type 1	461,000 psi (3.18 GPa)
Elongation Percent	D-638 Type 1	5.0%
Flexural Strength, psi	D-790	17,900 psi (123.4 MPa)
Flexural Modulus, psi	D-790	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
* Specification values can be provided upon request.

HOW TO USE THE TYFO® S COMPOSITE SYSTEM

DESIGN
The Tyfo® 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 Fyfe Co. LLC engineering staff will provide preliminary design at no obligation.

INSTALLATION
Tyfo® System to be installed by Fyfe Co. LLC trained and certified applicators. Installation shall be in strict compliance with the Fyfe Co. 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® FibrAnchors™ are incorporated in some designs. The Fyfe Co. 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
Feed fabric through the Tyfo® Saturator and apply using the Tyfo® wrapping equipment or approved hand methods (see data sheet on this equipment). Hand saturation is allowable, provided the epoxy is applied uniformly and meets the specifications.

LIMITATIONS
Application temperature of the epoxy is a minimum 40° F (4° C) and maximum of 100° F (38° C). 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!

COMPONENT A - Irritant: Prolonged contact to the skin may cause irritation. Avoid eye contact.

COMPONENT B - Irritant: Corrosive. Contact with skin may cause severe burns. Avoid eye contact. Product is a strong sensitizer. Use of safety goggles and chemical resistant gloves recommended. Remove contaminated clothing. Avoid breathing vapors. Use adequate ventilation. Use of an organic vapor respirator recommended.

SAFETY PRECAUTIONS
Avoid breathing vapors. Avoid contact with eyes and skin. Use of an approved respirator with an organic absorption cartridge is recommended for possible vapors. Rubber gloves, rubber boots, and protective suits are recommended for handling and application of this material. Safety glasses or a face shield are recommended to prevent eye contact.

FIRST AID
In case of skin contact, wash thoroughly with soap and water. For eye contact, flush immediately with plenty of water; contact physician immediately. For respiratory problems, remove to fresh air. Wash clothing before reuse.

CLEANUP
Collect with absorbent material, flush with water. Dispose of in accordance with local disposal regulations. Uncured material can be removed with approved solvent. Cured materials can only be removed mechanically.

SHIPPING LABELS CONTAIN
- State specification number with modifications, if applicable
- Component designation
- Type, if applicable
- Manufacturer's name
- Date of manufacture
- Batch name
- State lot number, if applicable
- Directions for use
- Warnings or precautions required by law

KEEP CONTAINER TIGHTLY CLOSED.
NOT FOR INTERNAL CONSUMPTION.
CONSULT MATERIAL SAFETY DATA SHEET (MSDS) FOR MORE INFORMATION.
KEEP OUT OF REACH OF CHILDREN.
FOR INDUSTRIAL USE ONLY.

Fyfe Co. LLC

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