



# TYFO® S-T Epoxy

## High Temperature Saturant Epoxy

### DESCRIPTION

The Tyfo® S-T Epoxy is a two-component epoxy matrix material for high temperature applications. It is a high elongation material which gives optimum properties as a matrix for the Tyfo® Fibrwrap® Systems. It provides a short working time for application, with no offensive odor.

### USE

The Tyfo® S-T Epoxy matrix material is combined with the Tyfo® fabrics to provide a wet-layup composite system for strengthening structural members.

### ADVANTAGES

- Excellent high temperature properties
- Short working time
- High elongation
- 100% solvent-free

### PACKAGING

Order pre-measured units:  
Part A: 5-gallon container  
Part B: 1-gallon container  
One kit yields 3.75 gallons

### MIX RATIO

100.0 parts of component A to 33.1 parts of component B by volume. (100 parts of component A to 26.6 parts of component B by weight).

### SHELF LIFE

Two years in original, unopened and properly stored containers.

### STORAGE CONDITIONS

Store at 60° to 90° F (16° to 32° C). Avoid freezing.

### 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.

# HOW TO USE THE TYFO® S-T Epoxy

### INSTALLATION

Tyfo® Systems 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. Mechanical anchors are incorporated in some designs. The FyfeFRP LLC engineering staff will provide the proper specifications and details based on the project requirements.

### MIXING

Use 100.0 parts of component A to 33.1 parts of component B by volume (100 parts of component A to 26.6 parts of component B by weight). Do not thin; solvents will prevent proper cure. Mix thoroughly for five minutes with a low speed mixer at 400-600 RPM until uniformly blended. When using as a prime coat or finish coat, Tyfo® S-T Epoxy may be thickened in the field to the desired consistency.

### APPLICATION

Tyfo® S-T Epoxy is applied to a variety of Tyfo® fabrics using approved hand-applied methods. Hand saturation is allowable, provided the epoxy is applied uniformly and meets the specifications. Tyfo® S-T Epoxy can also be applied as a prime coat by brush or roller. Epoxy must be properly post cured to achieve desired properties. Contact FyfeFRP LLC engineers for cure schedule.

### LIMITATIONS

Minimum application temperature of the epoxy is 68° F (20° C). DO NOT THIN; solvents will prevent proper cure.

Epoxy Material Properties		
Property	ASTM Method	Typical Test Value*
Cure Schedule		8 hrs. @ 82 - 85° C or 4 hrs. @ 86 - 93° C
Glass Transition Temperature (T <sub>g</sub> )	E1356	214° F (101° C)
Tensile Strength at Yield	D638 Type 3	11,400 psi (78.6 MPa)
Proportional Limit**	D638 Type 3	6,000 psi (41.4 MPa)
Modulus of Elasticity	D638 Type 3	400,000 psi (2.76 GPa)
Elongation at Break	D638 Type 3	5.0%
Complex Viscosity @ 73° F (23° C)***		5,500 - 6,000 cps
Gel Time @ 73° F (23° C)	(Shyodu Gel Timer)	237 min
Pot Life @ 73° F (23° C)	Time to 50% increase in viscosity	140 min
Color	Component A is clear to pale yellow Component B is clear	
Viscosity	Component A at 77° F (25° C) 11,000-13,000 cps Component B at 77° F (25° C) is 15-20 cps	
Density @ 68° F (20° C) (Pound/Gallon)	Component A = 9.7 (1.16kg/L) Component B = 7.8 (0.93kg/L) Mixed Product = 9.2 (1.10kg/L)	

\* Specification values can be provided upon request.

\*\* The stress at which a material exhibits a specified limiting deviation from the proportionality of stress to strain.

\*\*\* Complex viscosity recorded using an oscillating disk rheometer in oscillation mode at 10% strain and a frequency of 1 Hz. Complex viscosity was taken at time < 1.0 min. using parallel plate geometries and a testing gap of 1,000 µm.

# INSTALLATION THE TYFO® S-T EPOXY

## DESIGN

The Tyfo® S-T Epoxy 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-T 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-T Epoxy may be thickened by adding up to 7 percent by weight of fumed silica (such as Cab-o-sil TS-720) or approved filler such as HDPE fibers. DO NOT THIN. Solvents will prevent proper cure.

## APPLICATION

The Tyfo® S-T Epoxy is applied to the Tyfo® fabric using a saturator machine or by approved manual saturation methods (trowel, roller, or similar). Hand saturation is allowable, provided the epoxy is applied uniformly and meets the required fiber-to-epoxy ratio. Tyfo® S-T Epoxy is applied as a prime coat by brush or roller.

## 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!

## 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.

## 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. 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.

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