



## TYFO® SW-1S

### Underwater Saturant Epoxy

#### DESCRIPTION

Tyfo® SW-1S is a two part, 100% solids epoxy formulation consisting of epoxy resins, hardeners and inert fillers specifically designed for underwater applications on steel, concrete and masonry surfaces. Tyfo SW-1S is used in fiber wrap applications, with or without an aggregate, as a protective coating or repair mortar to protect against damage and erosion in splash zone areas. It can also be used as a saturant for Tyfo Fabrics.

#### USE

Tyfo® SW-1S is formulated for use as the patching material, primer and saturant in fiber wrap applications. Tyfo® SW-1S can also be used to coat or repair concrete and steel materials in underwater and splash zone applications providing protection against corrosion, erosion and deterioration from salt or fresh water.

#### ADVANTAGES

- Good high & low temperature properties
- 100% solids, solvent-free
- High elongation
- Ambient cure
- Low temperature cure
- Underwater cure

#### COVERAGE

Order SW-1S epoxy in 5-gallon pre-measured units in 5-gallon (19L) containers.

#### PACKAGING

Pre-measured 5-gallon units with a combined material volume of 5 gallons.

#### EPOXY MIX RATIO

100A:56B by Weight

100A:66.7B by Volume

#### SHELF LIFE

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

#### STORAGE CONDITIONS

Store epoxy at 50°F to 100°F (10°C to 38°C).

#### Epoxy Material Properties

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

Property	ASTM Method	Typical Test Value
Glass Transition Temperature, T <sub>g</sub>	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	84±3
Water Absorption (24 hours) Water Absorption (13 weeks)	D570	0.33% 1.98%
Adhesion Strength <sup>2</sup> Concrete (ASTM D7522) Steel Epoxy	D4541	>400 psi (concrete failure typ.) >1200 psi >1200 psi
Gel Time (65°F/18°C)	D3532	150-210 minutes

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

# HOW TO USE THE TYFO® SW-1S UNDERWATER SATURANT EPOXY

## 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 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 minimum concrete surface profile (CSP-3) surface roughness to prepare for bonding. Sharp and chamfered corners will be rounded off by grinding or using an approved repair mortar. 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 (19L) 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 56.0 parts of component B by weight; Tyfo® SW-1S 100.0 component A to 66.7 component B by volume. Mix thoroughly for five minutes with a low speed mixer at 400-600 RPM until uniformly blended.

## APPLICATION

Apply one prime coat of Tyfo® SW-1S 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 Tyfo® SW-1S epoxy and detail all fabric edges, including butt splice, termination points and jacket edges.

## PROTECTIVE COATINGS

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

Minimum application temperature of the epoxy is 40° F (4° C). DO NOT THIN, solvents will prevent proper cure.

## QUALITY CONTROL

### PREPARATION

Visit site to ensure that all patch work is completed and cured. Review project specifications in details. Verify ambient and concrete temperatures. No work shall proceed if the temperature of the concrete surface being repaired is less than 40°F (4°C) or greater than 100°F (38°C). In case of discontinuous wrapping surfaces such as walls, beams, slabs, etc, the bonding strength to substrate (concrete or repair mortar) should be greater than 200 psi (1.38 MPa) (this shall be verified by pull-off strength tests according to ASTM D4541-95).

### 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.

### SAMPLE PREPARATION

From a standard epoxy mix, saturate fabric according to specified fiber-resin ratio. On a smooth, flat, level surface covered with polyethylene sheeting, prime with epoxy resin. Prepare sample by placing two layers of saturated fabric with primary fibers oriented in the same direction. Apply additional topping of epoxy. Cover with plastic film and squeeze out all bubbles. Samples shall be stored in a sample box and not moved for a minimum of 48 hours after casting. A minimum of two samples shall be made daily. The two sample batches will be taken at appropriate times during the day.

### LABORATORY TESTING

The samples shall be given to pre-approved testing laboratory. Samples are to be post-cured for 48 hours at 140°F (60°C) before testing. Testing shall be in accordance with ASTM D3039 and FyfeFRP LLC sample preparation and testing procedures.

### CAUTION!

Do not thin or dilute Tyfo® SW-1S. Do not mix or apply below 40°F (4°C). Use only clean, oven dry aggregate to produce mortar. Tyfo® SW-1S is not designed to resist hydrostatic pressure from the negative side. Agitation of the product once under water should be minimized. When

applying in a splash zone, protection should be provided from wave action until the product has reached initial cure (8-10 hours). Due to the many variables which can exist in underwater applications, a test application under job site conditions is recommended prior to the start of every project to evaluate both application techniques and adhesion properties.

### COMPONENT A - Irritant:

Prolonged contact to the skin may cause irritation. Avoid eye contact.

### COMPONENT B - Irritant:

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

Use of an approved particle mask is recommended for possible airborne particles. Gloves are recommended when handling fabrics to avoid skin irritation. Safety glasses are recommended to prevent eye irritation.

### FIRST AID

In case of skin contact, wash thoroughly with soap and water. For eye contact, flush 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.

### TECHNICAL SERVICE

For application procedures or surface conditions not specified above, please contact FyfeFRP LLC.

### 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 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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