# LOCTITE TYFO SCH COMPOSITE ANCHORS

## Carbon LOCTITE Tyfo Fiber Anchor Systems

### DESCRIPTION
The LOCTITE Tyfo Composite Anchors are custom, uni-directional reinforcing carbon fiber bundles that are combined with the LOCTITE Tyfo Epoxy for anchoring applications.

### USE
LOCTITE Tyfo SCH Composite Anchors are manually saturated with LOCTITE Tyfo S Epoxy and installed to improve end details, anchoring or development of tension or shear forces in various LOCTITE Tyfo designs.

### ADVANTAGES
- IAPMO UES ER-595 listed product
- System-compatible anchoring designs
- Excellent wet-out and handling properties
- 100% solids, solvent-free epoxy matrix
- Low viscosity, long working time
- Ambient cure application

### PACKAGING
Packaging and weight will vary based on anchor design requirements.

### CONSUMPTION RATE
Fiber-to-epoxy ratio by weight:
For Tyfo SCH Fiber Anchors: 1 : 1.35

### SHELF LIFE
Epoxy – two years in original, unopened and properly stored containers. Anchors – 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 | 620,000 psi (4.3 GPa) |
| Tensile Modulus | 36 x $10^6$ psi (250 GPa) |
| Ultimate Elongation | 1.7% |
| Density | 0.064 lbs/in3 (1.77 g/$cm^3$) |

### Composite Gross Laminate Properties

| Property[1 & 3] | ASTM Method | ACI 440.2 Properties | Design Value[2] |
|---|---|---|---|
| Ultimate Tensile Strength | | 131,000 psi (903 Mpa) | 110,000 psi (758 Mpa) |
| Tensile Modulus | D3039 | 14.6 x $10^6$ psi (100.7 GPa) | 12.66 x $10^6$ psi (87.3 GPa) |
| Elongation at Break | | 0.9% | 0.9% |
| Ultimate Shear Strength | | 50,000 psi (345 Mpa) | 50,000 psi (345 Mpa) |
| Bond Shear Strength in uncracked concrete | E488 | 3,000 psi (20.7 Mpa) | 3,000 psi (20.7 Mpa) |
| Bond shear Strength in cracked concrete, crack width = 0.012” | | 2,300 psi (15.9 Mpa) | 2,300 psi (15.9 Mpa) |
| Bond shear Strength in cracked concrete, crack width = 0.020” | | 1,600 psi (11.0 Mpa) | 1,600 psi (11.0 Mpa) |

[1] Strength is defined as the mean strength minus 3 standard deviations. Modulus is defined as the reported mean modulus, and elongation is defined as the calculated strain from the design strength and modulus.
[2] Design value of tensile strength determined from the tested values of the largest anchor diameter of 7/8”. Tensile modulus is defined as the 5th percentile value representing the 80% lower confidence bound of a 2 parameter Weibull distribution (ASTM D7290).
[3] Design values may require additional reduction factors based on expected exposure conditions, type of application, and design life assumptions.

### Anchor Construction Detailing

Use carbide-tipped masonry and concrete hammer bit meeting requirements of ANSI B212.15.

| Composite Anchor Diameter, in.[4] | Weight per unit length, oz./in. | Concrete Bit Size, in. |
|---|---|---|
| 1/4 | 0.02 | 3/8 |
| 3/8 | 0.04 | 1/2 |
| 1/2 | 0.08 | 3/4 |
| 5/8 | 0.12 | 7/8 |
| 3/4 | 0.17 | 1 |
| 7/8 | 0.23 | 1-1/8 |
| 1 | 0.29 | 1-1/4 |
| 1 - 1/8 | 0.37 | 1-3/8 |
| 1 - 1/4 | 0.44 | 1-1/2 |

[4] Anchor diameters of 1" or greater are available for project specific designs. Contact our engineering team for specific design details.

# INSTALLATION OF THE LOCTITE TYFO SCH ANCHORS

## DESIGN
The LOCTITE Tyfo SCH Anchors are designed to meet specific project criteria dictated by the engineer of record and any relevant building codes and/ or guidelines. LOCTITE Tyfo SCH Anchors are incorporated for additional development, anchorage, or end detailing of strengthening systems. The size and area of the LOCTITE Tyfo SCH anchors are directly correlated to the equivalent fiber area of the LOCTITE Tyfo SCH-41 and LOCTITE Tyfo SCH-41-2X laminates. The design shall be based on the amount of tension force transferred as described in the Fyfe Design Manual v12. Fyfe engineering staff may provide preliminary design, specification wording and application details based on the project requirements.

## INSTALLATION
The LOCTITE Tyfo system is to be installed by Fyfe trained and certified applicators in accordance with the Fyfe quality control manual, project specifications, and design requirements.

### Drilling
1. Drill anchor holes with rotary hammer drill and carbide bit to the required depth.
2. Grind edges around anchor holes for smooth transitions as required by the drawings.
3. HEPA-Vacuum the concrete dust generated during drilling, whenever possible.

### Cleaning
1. Vacuum the concrete dust from the anchor hole. Alternatively, blow out anchor hole with compressed air in combination with vacuum collection to clean the anchor hole.
2. Use a steel bristle brush to clean out the hole walls. Perform 5 insertions. (diameter of brush to be equal to or greater than concrete bit diameter)
3. Vacuum anchor hole.
4. Use the pipe brush to clean out the hole walls. Perform 5 insertions.
5. Vacuum anchor hole.

### Anchor Embedment
1. Prime the anchor hole with Thickened LOCTITE Tyfo S, using a syringe with flexible tip capable of filling from max depth of hole. Fill hole up to 75%.
2. Embed saturated anchor into hole to the specified depth with anchor insertion tool.
3. Keep tool inserted and anchor tensioned while free end is splayed as required.
4. Remove insertion tool and backfill cavity with thickened LOCTITE Tyfo S.
5. Apply skim coat of thickened LOCTITE Tyfo S over anchor hole and splay area.
6. Continue with installation as detailed in drawings

## 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 LOCTITE Tyfo S Epoxy may be thickened by adding up to 7 percent by weight of fumed silica (such as Cab-o-sil TS-720).

## APPLICATION NOTES
Manually saturate the LOCTITE Tyfo SCH Composite Anchors with LOCTITE Tyfo S Epoxy. The fully saturated anchor is then applied as detailed on the project drawings. Maintain an appropriate slope when transitioning fibers over uneven surfaces. If anchor penetrations are elevated from the bonding surface, use an appropriate transition to slope the anchors from the anchor penetrations onto the bonding surface. A typical slope requirement is a 4:1 transition. Refer to project drawings for the slope detail or contact Fyfe. Slope to be filled with a thickened epoxy or epoxy mortar. For slopes greater than 1" height, use an approved epoxy mortar.

## PROTECTIVE COATINGS
Apply a final coat of thickened LOCTITE 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°F (3°C) 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. Carbon fiber is electro-conductive.

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**FyfeCo.com | Fyfe-Info@Henkel.com**

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