



POLY-TUFF SYSTEMS
INTERNATIONAL
HIGHWAY DIVISION

TuffWrap™ 600UD

Stitch-Bonded Uni-Directional FRP Fabric For PSI Structural Strengthening System

1.01 DESCRIPTION

TuffWrap™ is a 600 gram lightweight, high-tensile strength, stitch bonded, uni-directional carbon fabric that is produced from our continuous, tow-carbon fiber. It easily wets out with TuffSat™ saturate resin and can be installed using either the “wet lay-up” or “dry lay-up” technique. The light weight of the fabric allows dry application to TuffSat epoxy coated surfaces followed with a saturating with coat of TuffSat™, and finally by TuffCoat™ anti-carbonization and UV resistant topcoat significantly simplifying field application. PSI TuffWrap™ Systems are used to obtain a bonded FRP (fiber reinforced polymer) field laminate reinforcement system that will strengthen and enhance the performance of structural elements once installed. Please use the correct product grade that complies with VOC regulations as per federal, state, statutory bodies, county and city regulations/codes at the place of installation of product.

1.02 USES

- Increase load bearing properties in columns, walls, beams and slabs
- Rehabilitate structural integrity due to impact or deterioration
- Changes or increases in design criteria
- Increase seismic ductility and axial loads on concrete columns and elements
- Strengthen concrete bridges, silos, tunnels, parking garages and warehouse
- Blast mitigation
- Repair of structures damaged by fire

1.03 ADVANTAGES

- Easy installation
- Lightweight/ high strength to weight ratio
- Low impact aesthetics
- Flexibility to conform to shape variances
- High strength, alkali resistant, non-corrosive

1.04 TECHNICAL DATA

Complies with NSF/ANSI Std. 61 Requirements

1.05 COLOR

Black

1.06 PACKAGING

Roll Sizes:

- 12.5" x 300' Roll (312.5 sqft: 28.9 sqm)
- 25" x 300' Roll (625 sqft: 58 sqm)
- 50" x 300' Roll (1250 sqft: 116 sqm)

1.07 COVERAGE

See under section 1.11 of this Technical Data Sheet coverage rates.

1.08 PREPARATION

Surface may be dry or damp, but free of standing water and frost. Surface should be sound with no loose materials. Remove dust, laitance, grease, curing compounds, impregnations, waxes, foreign particles,

disintegrated materials and other bond inhibiting materials from the surface. Consult **TuffWrap™** Systems technical data sheets for additional information on surface preparation. Existing uneven surfaces must be filled with an appropriate repair mortar like **TuffPaste™** epoxy or **TuffPatch™ VOH** concrete repair. The adhesive strength of the concrete should be verified after surface preparation by random pull-off testing (ACI 503R) at the discretion of the engineer. Minimum tensile strength, 200 psi (1.4 MPa) with concrete substrate failure. Use shotblast, blast clean, **GlassBlast™** or another approved mechanical means to provide an open roughened texture. Some applications are at the engineer's discretion; the contact between the substrate and the fabric may be determined to be non-critical. In these cases, a thorough cleaning of the substrate using low pressure sand or water blasting is sufficient.

1.09 MIXING

Ready to use, no mixing required.

1.10 APPLICATION

TuffWrap™ 600UD is only applied as a component of the **TuffWrap™** System.

1. **The TuffWrap™ 600UD** material should be cut to the proper dimensions specified using heavy duty shears or a utility knife.
2. Cut sections of **TuffWrap™ 600UD** can be temporarily stored by carefully rolling fabric into a tight roll. Do not fold or crease the fabric. Fabric should be kept free of dust, oils, moisture and other contaminants at all times.
3. Apply the **TuffWrap™ 600UD** fabric directly into uncured **TuffSat™** saturate applied on the substrate. There is no need to “pre-wet” the **TuffWrap™ 600UD** fabric with **TuffSat™** saturate prior to applying the fabric against the substrate.
4. Using a rib roller or squeegee, press the fabric against the substrate until visual signs of **TuffSat™** saturate are observed bleeding through the fabric. The rib roller or squeegee should only be run along the direction of the primary fibers in the fabric.
5. Apply a layer of **TuffSat™** saturate over the top of the **TuffWrap™ 600UD** fabric to completely encapsulate the fabric. Consult with the **TuffSat™** saturate data sheet on details for applying **TuffWrap™**

saturate. If Required: Apply a second layer of fabric while the saturate is still tacky. When tack free, coat the exposed surface of final fabric layer using a protective layer of **TuffCoat™**.

1.11 CURING/DRYING TIME

Varies with temperature and humidity.

1.12 STORAGE AND SHELF LIFE

Store in a dry facility between 40-95°F (5-35°C) away from direct sunlight and sources of heat. Shelf life of properly stored, unopened containers is 24 months.

1.13 CLEAN UP

Clean tools and equipment with Xylene or PSI's **EnviroClean™**.

1.14 LIMITATIONS

PSI recommends design calculations be made by a certified independent licensed PE. Encapsulation of Concrete with **TuffWrap™** is not recommended in freeze/thaw zones, as the system is a vapor barrier.

1.15 SAFETY

Obtain, read, and understand the Safety Data Sheet (SDS) before use of this or any other Poly-Tuff Systems International (PSI) product. With **TuffWrap™ 600UD**, gloves are recommended to be worn to protect against skin irritation. When cutting **TuffWrap™ 600UD** fabric protect against airborne carbon dust generated by the cutting procedure by use of an appropriate, NIOSH approved respirator.

READ SDS PRIOR TO USING PRODUCT. KEEP OUT OF THE REACH OF CHILDREN.

1.16 CERTIFICATION: Installation of TuffWrap products should be performed only by PSI specially trained & certified contractors. **TuffWrap™** Fabrics are manufactured in accordance with PSI's written and published data. A Certificate of Conformance is provided with each shipment.

1.17 PHYSICALS	
0° Carbon Fiber: TuffWrap 600UD	18.63 oz/sqy (632 g/sm)
A-Glass Veil: C-LA 1812	1.20 oz/sqy (41 g/sm)
Polyester Stitch 167dtex	0.53 oz/sqy (18g/sm)
Total Fabric Weight	20.36 oz/sqy (691 g/sm)
Fabric Construction:	
Stitch Length	0.13" (3.2 mm)
Stitch Pattern	Tricot
Dry Thickness	0.039" (0.99 mm)
Standard Roll Length	267 ft (81 m)
Dry Roll Width	50" (1270 mm)
Typical Fiber Properties (Dry):	
Tensile Strength (ASTM D4018)	638 ksi (4,400 MPa)
Tensile Modulus (ASTM D4018)	37 Msi (255 GPa)
Ultimate Elongation at Break (ASTM D4018)	1.70%
Composite Average Properties*	
Tensile Strength (ASTM D3039)	170 ksi (1,173 MPa)
Modulus of Elasticity (ASTM D3039)	13.5 Msi (93 GPa)
Elongation at Break (ASTM D3039)	1.3%
Composite Design Properties**	
Tensile Strength (ASTM D3039)	142 ksi (978 MPa)
Modulus of Elasticity (ASTM D3039)	11.2 Msi (77GPa)
Elongation at Break (ASTM D3039)	1.0%

*Average values shown. Typical fiber Volume Fraction (FVF) is 41.9% values shown are TuffWrap 600UD without protective coating.

** Based on ACI 440.2R Document; Average - 3 Standard Deviations

Please read all information in the General & Safety Guidelines, Technical Data Sheets, Guide Specifications and Safety Data Sheets (SDS) before applying material. PSI Products are for "Professional Use Only" and preferably applied by professionals who have prior experience with the PSI Products or have undergone training in application of PSI Products. Published technical data and instructions are subject to change without notice. Contact your local PSI representative or visit our website for current technical data, instructions, and project specific recommendations.

LIMITED WARRANTY

PSI warrants its products to be free of manufacturing defects and that they will meet PSI current published physical properties. With preapproval, PSI warrants that its products, when properly installed by a state licensed waterproofing contractor according to PSI guide specifications and product data sheets over a sound, properly prepared substrate, will not allow water migration for a period of 12 months. Seller's sole responsibility shall be to replace that portion of the product which proves to be defective. There are no other warranties by PSI of any nature whatsoever expressed or implied, including any warranty of merchantability or fitness for a particular purpose in connection with this product. PSI shall not be liable for damages of any sort, including remote or consequential damages resulting from any claimed breach of any warranty whether expressed or implied. PSI shall not be responsible for use of this product in a manner to infringe on any patent held by others. In addition, no warranty or guarantee is being issued with respect to appearance, color, fading, chalking, staining, shrinkage, peeling, normal wear and tear or improper application by the applicator. Damage caused by abuse, neglect and lack of proper maintenance, acts of nature and/or physical movement of the substrate or structural defects are also excluded from the limited warranty. PSI reserves the right to conduct performance tests on any material claimed to be defective prior to any repairs by owner, general contractor, or applicator.

DISCLAIMER

All guidelines, recommendations, statements, and technical data contained herein are based on information and tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. It is the users responsibility to satisfy himself, by his own information and test, to determine suitability of the product for his own intended use, application and job situation and user assumes all risk and liability resulting from his use of the product. We do not suggest or guarantee that any hazard listed herein are the only ones which may exist. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements, whether in writing or oral, other than those contained herein shall not be binding upon the manufacturer, unless in writing and signed by a corporate officer of the manufacturer. Technical and application information is provided for the purpose of establishing a general profile of the material and proper application procedures. Test performance results were obtained in a controlled environment and PSI makes no claim that these tests or any other tests, accurately represent all environments.