

## Strengthening System for Buildings & Bridges Structures

### Grade of Carbon Fiber is 3 Types “Standard Modulus” “Intermediate Modulus” & “Ultra High Modulus”

#### **Build Seal® Prepreg**

is a Flexible Laminates Plate Carbon Fiber of Pultruded Oriented, continuous carbon filaments which are held in position by a lightweight, Flexible Laminates Plate of **Build Seal® Prepreg** has robust handling and rapid wet-out characteristics which make it ideal for on-site strengthening of structural of buildings, bridges, beams, columns and marine structures. Additionally, **Build Seal® Prepreg** is compatible with all commonly used adhesive systems, which can be applied using a variety of wet-out/adhesive infusion techniques.

#### **Build Seal® Prepreg**

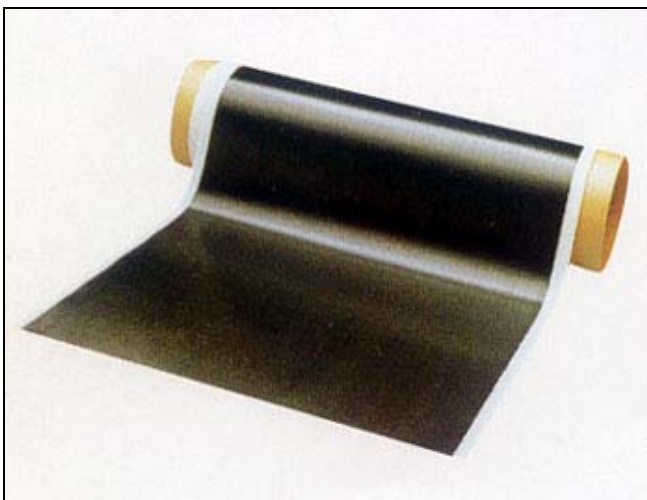
is a Carbon Fiber Flexible Laminates Plate, composite materials are finding applications for the reinforcement of new and the strengthening of existing structures. The materials excellent resistance to most of forms of corrossions and the ability to dissipate energy as required in earthquake scenarios make them eminently suitable for a wide rage of applications and they contribute significantly to lowering life cycle costs and increasing safety.

#### **History Carbon Fiber**

is produced by the controlled oxidation, carbonization and graphitisation of carbon-rich organic precursors, which are already in fiber form. The most common precursor is polyacrylonitrile (PAN), because it gives the best carbon fiber properties, but fibers can also be made from pitch or cellulose. Variation of the graphitisation process produces either high strength fibers (@ 2,600 °C) or high modulus fibers (@ 3,000 °C) with other types in between. Once formed, the carbon fiber has a surface treatment applied to improve matrix bonding and chemical sizing which serves to protect it during handling

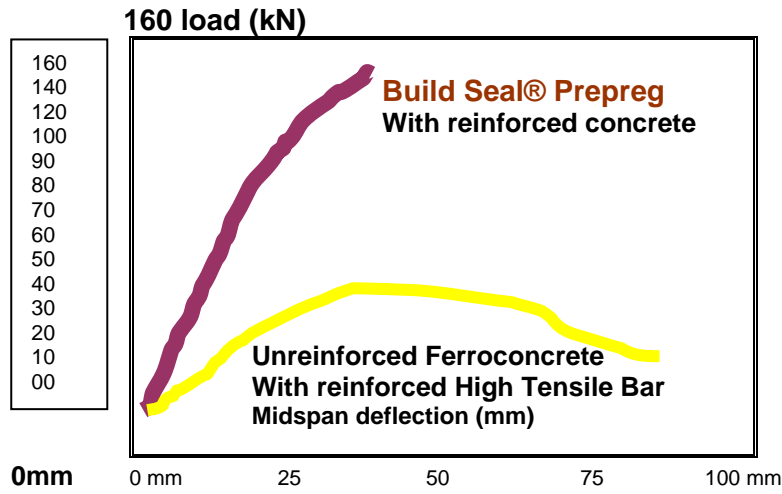
#### **Key Properties**

Ultra High Tensile Modulus, High Tensile Strength, High Thermal Conductivity, Light Weight, Electrical Conductivity, Excellent Fatigue Resistance, Excellent Corrosion Resistance, Low Friction and Wear, Low Thermal Expansion, Resistance to High Temperatures, Good Creep and Damping Properties, Transparent to X-Rays

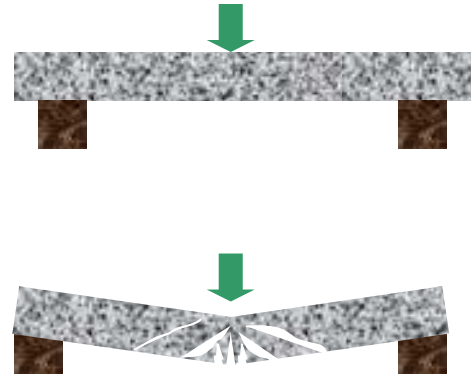


#### **“Build Seal Prepreg” Roll Size**

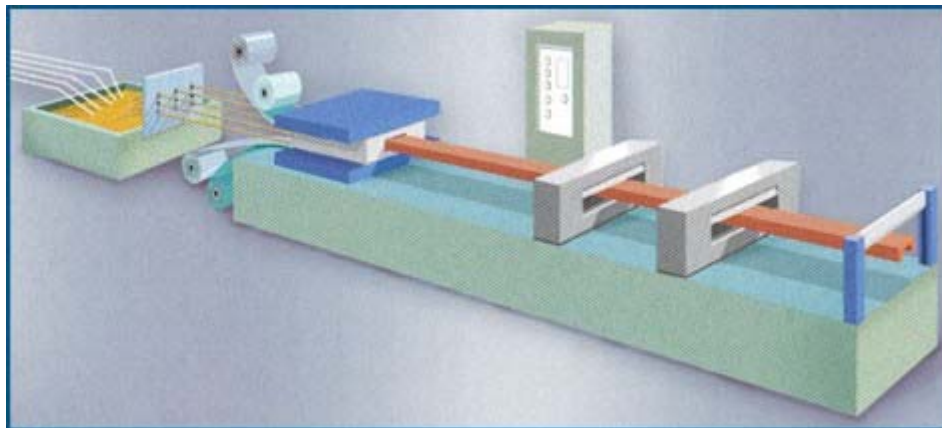
**Functional Reinforcement**



(Fig. 01) Non Micron Cracks  
**Build Seal® Prepreg**



(Fig. 02) Large Fine Cracks  
**Unreinforced Ferroconcrete**



**Putrusion Machinery of Build Seal Prepreg**

## Build Seal® Prepreg

### Mechanical Properties of Specification for Cured Plate/Laminates

Type of Products	Tensile Modulus Gpa	Tensile Strength Mpa	Flexural Modulus Gpa	Flexural Strength Mpa	I L S S Mpa	Density g/cm³	Elongation at Break
<b>Standard Modulus</b>							
Build Seal Prepreg HTA 150	137.0	2060	127.0	1620	103	1.60	1.8%
Build Seal Prepreg HTA 200	137.0	2060	127.0	1620	103	1.60	1.8%
Build Seal Prepreg HTA 300	137.0	2060	127.0	1620	103	1.60	1.8%
<b>Intermediate Modulus</b>							
Build Seal Prepreg IM 600-175	162.0	2750	157.0	1670	98	1.60	1.4%
<b>Ultra High Modulus</b>							
Build Seal Prepreg UM 55-150	309.0	1670	289.0	1130	74	1.70	0.74%

### Grade of Build Seal® Prepreg Available & Primer with Adhesive Consumption

Grade of Carbon Fiber Prepreg	thickness mm	width mm	roll length meter	carbon fiber weight per g/m2	binder weight per g/m2	Total weight per g/m2	Primer require kg per linear meter	Adhesive require kg per linear meter
<b>Standard Modulus</b>								
Build Seal Prepreg HTA 150	0.155	400	50	150	88	238	0.25	4.00
Build Seal Prepreg HTA 200	0.195	400	50	200	99	299	0.25	4.00
Build Seal Prepreg HTA 300	0.310	400	50	300	169	469	0.25	4.00
<b>Intermediate Modulus</b>								
Build Seal Prepreg IM 600-175	0.165	400	50	175	75	250	0.25	4.00
<b>Ultra High Modulus</b>								
Build Seal Prepreg UM 55-150	0.119	400	50	150	50	200	0.25	4.00

### Imperial/Metric Conversion Table

Note: The bold figures in the central column can be either the U.S or the S.I measure.

Msi		Gpa	ksi		Mpa Or N/mm2	Msi		Mpa Or N/mm2	Gpa		Mpa Or N/mm2	Msi		ksi
0.145	1	6.895	0.145	1	6.895	0.000145	1	6895	0.001	1	1000	0.001	1	1000
0.290	2	13.790	0.290	2	13.790	0.000290	2	13790	0.002	2	2000	0.002	2	2000
0.435	3	20.685	0.435	3	20.685	0.000435	3	20685	0.003	3	3000	0.003	3	3000
0.580	4	27.580	0.580	4	27.580	0.000580	4	27580	0.004	4	4000	0.004	4	4000
0.725	5	34.475	0.725	5	34.475	0.000725	5	34475	0.005	5	5000	0.005	5	5000

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**Photo: 1  
Failed Column**



**Photo: 2  
By Physical Tested**



**Photo: 3  
Completed Laying with  
Build Seal Prepreg**



**Photo: 4 (Patching with Repair Mortar)**



**Photo: 5 (Patching with Repair Mortar)**



**3,250 sq. meter "Build Seal Prepreg" Applied at Bridge Column, Beam & Slabs**



**3.250 sq. meter Install with Build Seal Prepreg on Bridges**



## **Application Method**

### **Surfaces Preparation**

Reinforced concrete surfaces shall be clean, structurally sound and free from foreign materials, contaminants, oily and other debris. Concrete surfaces shall not more than 4% moisture content and the temperature of the substrate must be at least 3 °C which above, the current dew point temperature.

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For filing surface irregularities such as blowholes, honeycombs & etc. Please hacking or cutting – off unloose concrete, air blowing those dust, and clean all concrete surfaces, keep over night for dry.

Using patching method of Polymer Cementitious Mortar or pumping of High Strength Cementitious Grout. But only for concrete surfaces cracks 0.25mm, must be injected with Low Viscosity of Epoxy Resin for filled. Using high pressure Air-Less Pump for injecting and penetration into structural crack lines, to achieve load bearing and adhesion bonding system.

Once patching, pumping or injecting works have been done, before laying Carbon Fiber Fabric Sheet, all surfaces must be Hammer Test for Polymer Cementitious Mortar, High Strength Cementitious Grout and Pull-Off Test for Cracks Lines. For achievement of strength requirement please consult your local Engineer.

### **Over Head Application**

#### **Vertical Application**

Applied on Over Head or Vertical Beam and Slab, either Primer, Adhesive & Resin, Waste of materials are approximately 15%.

### **Mixing of Primer**

Use a low speed (300 to 500 rpm) electric drill fitted with a paint mixer or a wing type paddle Pour one unit of Part A & B into drum and mix for at least 3 minutes until the mix is uniform and free. Note: Once been mixed, the Primer must be applied within 30 minutes of Pot Life.

### **For Uneven Surfaces**

#### **Mixing of Paste Putty**

Use a low speed (300 to 500 rpm) electric drill fitted with a paint mixer or a wing type paddle. Pour one unit of Part A & B into drum and mix for at least 5 minutes until the mix is uniform and free. Note: Once have been mixing, the Paste Putty must be applied within 60 minutes of Pot Life.

### **Mixing of Adhesive**

Use a low speed (300 to 500 rpm) electric drill fitted with a paint mixer or a wing type paddle. Pour one unit of Part A & B into drum and mix for at least 5 minutes until the mix is uniform and free. Note: Once have been mixing, the Paste Putty must be applied within 60 minutes of Pot Life.

**Easy Installation**

The easy to use Carbon Fiber system components assure fast, user friendly installation. A complete system is installed in only four (4) steps to properly prepared surfaces within appropriate working conditions.

**System Recommended  
Use Resin Component**

**Epo Bond 340 Adhesive** is Epoxy Solvent Free  
Two Component of Part A & Part B.  
Sag Resistance until 6mm thick.  
Up to 15 Mpa **Shear Strength**  
Up to 4 Mpa **Peel Strength**  
Suitable for applied on Over Head or Vertical Surfaces

**Grade of Adhesive Recommendation**, Please refer pages: 10

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**1. Roll "Epo Bond CF Primer"**

Apply **Epo Bond CF Primer**, at rate applied 0.20 kg/m<sup>2</sup> to 0.30 kg/m<sup>2</sup>, is a low viscosity of **Primer Resin** that can be applied using a roller.  
(Wait for ½ to 1 hours curing)

**2. Apply "Epo Bond 340 Adhesive"**

Apply **Epo Bond 340 Adhesive**, at rate applied 0.34 kg/meter linear to 1.5 kg/meter linear, paste adhesive is a high solids, non sag paste Epoxy Based or Polyurethane Based material that is applied using a Spatula Tools to level concrete surfaces.

**Note: Min of Thickness of Adhesive Shall be at least 0.5 mm**  
(Curing time: ½ hour to 4 hours depend of whether temperature)

**3. Apply Carbon Fiber of "Build Seal® Prepreg"**

Within the open time of the adhesive, place immediately the **Build Seal® Prepreg** Laminates onto the adhesive surfaces, using roller or other tools to press the laminates into the adhesive until is forced out on both sides of the laminates.

**Before the adhesive curing. Immediately remove surplus adhesive on both sides**

Clamp The **Build Seal® Prepreg**. The joint component should be assembled and clamped as soon as the Adhesive has been applied. An even contact pressure throughout the joint area will ensure optimum cure.

**4. Apply Optional Topcoat**

Where required, the Carbon Fiber high solids, high gloss, corrosion-resistant topcoat provides a protective/aesthetic outer layer. (Refer to Painting Manufacture)

**Note: In the case of two layers and several layers of "Build Seal Prepreg" of Carbon Fiber Laminates. For multiple plies repeat steps 1, 2 and 3.**

**Protected by Fireproofing Using Epoxy Adhesive  
(Special Grade Epo Bond 765)**

Where required, the Carbon Fiber Strip Laminates to protection of Fireproofing system. Please call our technical for advice.

**System Recommended Use Resin Component**

Grade of Carbon Fiber	Grade of Adhesive Recommendation	Shear Strength	Peel Strength (Cleavage)
<b>Build Seal Strip</b> Type: 1CF, 2CF & 3CF	<b>Epo Bond 340 Adhesive (Standard)</b> <b>High Shear &amp; Peel Strength</b>	15 N/mm <sup>2</sup>	4 N/mm <sup>2</sup>
<b>Build Seal Strip</b> Type: 1CF, 2CF & 3CF	<b>Epo Bond 335 Adhesive (Slow or Fast)</b> <b>Ultra High Shear &amp; Peel Strength</b>	35 N/mm <sup>2</sup>	12 N/mm <sup>2</sup>
<b>Build Seal Strip</b> Type: 1CF, 2CF & 3CF	<b>Epo Bond 765 Adhesive (Slow or Fast)</b> <b>Fire Retardant System</b>	25 N/mm <sup>2</sup>	6 N/mm <sup>2</sup>

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