

Fortress 4000

Hi-Temp Toughened Structural Adhesive

Data Sheet

DESCRIPTION:

Fortress 4000 is a toughened, high temperature structural epoxy adhesive designed for the bonding of Carbon Fiber to concrete as well as other materials. It is a two phase (toughened) epoxy resin produced using an elastomer with a flexible epoxy resin backbone for maximum stress and fatigue resistance. 4000 bonds with an immediate high tack consistency, and offers a quick cure. 4000 may be applied at ambient temperatures ranging from 55°F (13°C) to 100°F (38°C). The working life at 77° F (25° C) is 60 minutes (working time increases with lower ambient temperatures), with full cure occurring between 12 – 16 hours depending on ambient temperature.

Unlike most epoxy adhesives, 4000 adhesive cured at ambient temperatures provides heat resistance well in excess of most engineering limits with an HDT of 105° C (220°F). The material mixes at 100:35 by weight (resin to hardener). The convenient color-coded components form a uniform color when properly mixed. Fortress 4000 adhesive is designed for high production meter/mix ram dispensing and it offers very fast application rates, although highly thixotropic. 4000 adhesive is solvent free and 100% solids.

SUGGESTED USES:

Use Fortress 4000 adhesive to bond carbon fiber to itself, and other materials such as concrete, metal, wood, and many plastics. Fortress 4000 adhesive is highly recommended as a “tack coat” for applying epoxy resin saturated reinforcement materials to vertical and overhead substrate such as concrete, or steel in the areas of seismic retrofit and structural upgrades.

ADDITIONAL BENEFITS:

Fortress 4000 adhesive is formulated to improve the bond between the epoxy adhesive and cured carbon fiber laminate. This formulation technique results in increased physical properties due to better surface wetting and increased bond strength to carbon fiber. In effect, the greatest significance of Fortress 4000 is the retention of these physical properties after exposure to heat, water and cycle fatigue as well as adverse environmental reagents such as salt spray, acid rain, etc. This technology offers the fabricator not only a superior adhesive today, but more importantly, increased product life and long term durability.

SURFACE PREPARATION:

All surfaces should be mechanically abraded, or, in the case of fiberglass laminate(s), the use of peel ply on the bonding surfaces is acceptable. All dust, grease, and standing water must be removed prior to the application of Fortress 4000 Adhesive.

RECOMMENDED CURING OF FORTRESS 4000 ADHESIVE:

- Gel at ambient + 8 hours at 120°F
- Gel at ambient + 6 hours at 160°F
- Gel at ambient + 7 days at ambient

HOW SUPPLIED:

Fortress 4000 Adhesive is available in 450ml Tubesets, 900ml Tubesets and 3 gallon (11.5 liter) kits. Shipped FOB Holland,MI.

(continued)

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PHYSICAL PROPERTIES OF FORTRESS 4000 RESIN WITH 4000 FAST & SLOW HARDENERS:

Fortress Material	4000 Resin	w/4000 Hardener
Density at 25°C	1.1 – 1.2 g/cm ³ (9.7 – 9.8 lbs)	1.03 – 1.04 g/cm ³ (8.65 – 8.75 lbs)
Viscosity	Thixotropic Gel	Thixotropic Gel
Color	Yellow	Blue
Color Mixed	-	Green
Mix Ratio by Weight	100	35
Working Life, 1000 grams at 77°F	-	55 – 60 minutes
Initial Cure Time	-	6 – 8 hours
Shore D Hardness	-	87
Heat Deflection Temperature	-	105°C (220°F)
Tensile Lap-Shear (DIN EN 1465)	-	10.5 MPa
Peeling Resistance (DIN 53282)	-	2.3 N/mm (minimum)

ADHESION AND FAILURE MODE FORTRESS 4000 ADHESIVE:

Epoxy Laminate to itself	Laminate fails prior to adhesive failure
Polyester Laminate to itself	Laminate fails prior to adhesive failure
Galvanized Steel to itself	Galvanized coating fails prior to adhesive failure
Carbon Steel to Epoxy Laminate	Laminate fails prior to adhesive failure
Carbon Steel to Polyester Laminate	Laminate fails prior to adhesive failure
Epoxy Laminate to Concrete	100% Concrete failure

SAFETY PRECAUTIONS:

Health Considerations: Consult the Fortress Stabilization Systems, LLC Material Safety Data Sheets.

This chemical system requires the use of proper safety equipment and procedures. Please follow the Fortress product MSDS and Safety Manual for detailed information and handling guidelines.

For Your Protection:

The information and recommendations in this publication are, to the best of our knowledge, reliable. Suggestions made concerning the products and their uses, applications, storage and handling are only the opinion of Fortress Stabilization Systems, LLC. Users should conduct their own tests to determine the suitability of these products for their own particular purposes and of the storage and handling methods herein suggested. The toxicity and risk characteristics of products made by Fortress Stabilization Systems, LLC will necessarily differ from the toxicity and risk characteristics developed when such products are used with other materials during a manufacturing process. The resulting risk characteristics should be determined and made known to ultimate end-users and processors. Because of numerous factors affecting results, **Fortress Stabilization Systems, LLC makes no warranty of any kind, express or implied**, other than that the material conforms to its applicable current Standard Specifications. Fortress Stabilization Systems, LLC hereby disclaims any and all other warranties, including but not limited to those of merchantability or fitness for a particular purpose. No statements made herein may be construed as a representation or warranty. The liability of Fortress Stabilization Systems, LLC for any claims arising from or sounding in breach of warranty, negligence, strict liability, or otherwise shall be limited to the purchase price of the material.

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