Kevlar® and Epoxy Overlay Installation Guide

Fortec*5680-BD Kevlar® Fiber Unidirectional Fabric (with Fortec 526 Epoxy)
Crack Repair, Water-Proofing, and Structural Reinforcement

Fortec Lo-Mod 526 Flexible Epoxy
A Low Viscosity, Low Modulus, 100% Solids, Two-Part Fiber Matrix Epoxy for bonding FRP systems and moisture control

This document describes the current methodology for applying Fortec Stabilization strengthening systems to concrete and masonry structures including, but not limited to preparation, priming, and filling substrates.

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**Fortec Stabilization Systems is a sister company to Fortress Stabilization Systems and the two company names may be used interchangeably throughout this document.*

 February 2020 Edition

1. **References**

   This document is in general accordance with the latest edition of the following:

   American Concrete Institute (ACI) 224.1, "Causes, Evaluation and Repair of Cracks in Concrete Structures."

   American Concrete Institute (ACI) 440.2, "Guide for the Design and Construction of Externally Bonded FRP Systems for Strengthening Concrete Structures."

   American Concrete Institute (ACI) 546 "Concrete Repair Guide."

   International Concrete Repair Institute (ICRI) Technical Guideline 310.1 "Guide for Surface Preparation for the Repair of Deteriorated Concrete resulting from Reinforcing Steel Corrosion."

   International Concrete Repair Institute (ICRI) Technical Guideline 310.2 "Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, and Concrete Repair."

   International Concrete Repair Institute (ICRI) Technical Guideline 320.2 "Guide for Selecting and Specifying Materials for Repair of Concrete Surfaces."

2. **Work Area and Technician Preparation**

   Define an area of sufficient size and adequate configuration to complete the work in an accurate and efficient manner while protecting all remaining, adjacent surfaces with plastic sheeting.

   Review, then post all Safety Plans and Material Safety Data Sheets (MSDS) at a conspicuous location near the work area.

   Obtain and stage all tools, materials, and documentation required to complete the work including but not limited to plans, specifications, product data sheets, and instructions.

   Double check to ensure the correct product types and that quantities are sufficiently available onsite to ensure the intended product is applied in a continuous, uninterrupted manner.

   Wear protective clothing, gloves, respirators, and/or dust masks as required for the work and materials used. Revisit instructions and MSDS to verify protective gear will mitigate any exposure issues noted for each product.

3. **Surface Preparation**

   Sound the substrate to which FRP products will be applied and identify areas of delamination, spalling, or otherwise unsound concrete.

   Remove all weak, contaminated, or deteriorated concrete, asphaltic or bituminous materials, oils, dirt, rubber, curing compounds, paint, carbonation, laitance, and any other potentially detrimental materials.

Remove unsound concrete in accordance with ICRI 310.1 by grinding, chipping, scarifying, shot blasting, sand blasting, and/or water jetting. If corroded steel reinforcement is discovered, engineer a solution and repair, or replace per ICRI 310.1 prior to application of patching material.

DO NOT COVER CORRODED REINFORCING STEEL OR UNSOUND CONCRETE WITH FORTEC FRP PRODUCTS; THEY ARE NOT DESIGNED TO ADHERE TO THESE TYPES OF SURFACE CONDITIONS.

For Bond Critical (structural) applications, the surface of the substrate must be prepared using abrasive blasting and/or disc grinding to a minimum profile of ICRI CSP 3 as described by ICRI 310.2. This includes, but is not limited to removal of paint, grease, wax, oil, and any other films or coatings by mechanical means and/or application of an appropriate solvent. Remove any dust, laitance, and/or debris in and around the application area that could inadvertently contaminate the product during application.

Uneven surface irregularities such as out-of-plane variations (including form lines) must be ground and smoothed to a profile of less than 0.04 in (1 mm).

Cracks in the concrete substrate greater than 0.010 in (0.3 mm) wide must be injected with an approved epoxy in accordance with ACI 224.1.

Where fibers are oriented to wrap a rectangular section perpendicular to its respective edges (perpendicular to the span), round such edges to a minimum of 0.5 inches. No rounding is required where fibers will run parallel to these edges for this fiber orientation.

Use oil-free compressed air to remove any dust debris immediately prior to application of epoxy resins or patching mixtures.

SURFACES MUST BE CLEAN, SOUND, AND DRY prior to commencing with the work. Substrate temperatures shall comply with the epoxy resin specifications.

4. Epoxy Resin Preparation

Epoxy resins, including primers, fillers, saturants, and protective coatings, are supplied as two separate components.

For best results, condition the components to 75°F (24°C) for 24 hours prior to mixing. For epoxy supplied in cartridges, use the attached static mixer. No further mixing is required.

Precut and label Fortec fabric, strap, or laminate prior to beginning the mixing and application processes.

Mix only the quantity of resin for which it is feasible to apply within the stated pot life as noted in the resin instructions. Pot life is temperature-sensitive i.e., longer at lower temperatures and shorter with higher temperatures. It is also to mixing quantities with larger volumes corresponding to

shorter pot lives. Keep containers closed when not in use. Do not use any epoxy that has exceeded its pot life.

Component parts of a two-part epoxy must be accurately measured and once combined, mixing should be completed in a vigorous and thorough manner prior to application and in accordance with the instructions. Do not dilute with epoxy components with solvents.

Stir each component prior to blending. Proportion each component in the quantity specified into a clean container with flat wall and bottom. Mix thoroughly for a minimum of three (3) minutes using a low-speed drill (400-600 rpm) and a mixing paddle (e.g., a Jiffy® or Plunge Mixer™). Keep the paddle below the surface of the material to avoid entrapment of air. CAUTION: WEAR EYE PROTECTION.

Carefully transfer the mixture into a second, clean container. Scrape contents from the sides and bottom of the first container into the second. Mix for another 90 seconds. The epoxy is thoroughly mixed when the color of the mixture is uniform, without streaking. CAUTION: PROLONGED EXPOSURE TO EPOXY CAN CAUSE SKIN IRRITATION.

5. AMINE BLUSH

AMINE BLUSH CAN HINDER THE ADHESION OF A SUCCESSIVE APPLICATION OF EPOXY.

Amine Blush is the phenomenon where a wax-like or greasy film is formed on the surface of cured epoxy exacerbated by favorable temperatures and humidity during the cure of epoxy resins. It usually forms after the initial set of the epoxy. Minimal blush may be hard to detect visually or by touch but is more noticeable in cool, damp, or humid conditions.

Remove amine blush before applying additional layers laminate, straps, or epoxy resin. If a second layer of epoxy cannot be applied within 12 hours after the previous application, remove any blush that may have occurred. Light sandblasting between epoxy coats is the recommended procedure for surface preparation to remove blush as well as other contaminants with the potential to create inter-coat adhesion problems.

Some amine blushes are water soluble. Test with a soap and water pressure wash at a minimum 750 psi with sufficient Dawn® dishwashing detergent (usually 2-3%) to remove and clean the surface of contaminates. As an alternative, manually scrub the surface between applications with a soap and water solution of Dawn® dishwashing detergent. Rinse with plenty of fresh water to thoroughly remove the dissolved blush and allow to dry completely before application of the next layer of epoxy. **Do not use solvents to remove the blush**.

Evaluate a small test area of successive epoxy applications for proper preparation and bond before proceeding with a full-scale application.

6. **Epoxy Working Times**

Establishing set times for epoxies is a difficult subject. There are four major factors that influence the set time prior to opening to traffic: Product temperature, substrate temperature (influenced by the sun and during nighttime operations), aggregate color (neutral or a dark), and induction of mixed material in the mixing container. Set time is influence by temperature. Using 77° F as a guideline, a 10° increase should accelerate the set by one-third, a 10° drop should lengthen the set by one-third. The following is based on Fortec's 526 overlays. Fortec's product has the reputation of providing sufficient working time to mix 20- to 30-gallon units coupled with unusually fast strength development not available in other epoxy overlay materials.

Example: Product and substrate is 77°F, set time is approx. 2-3/4 hr. If the substrate is warmed by the sun to 85°F, the set time would be about 2 hours. If the aggregate is dark and possibly warmed to 95°F plus, the set time would 1-1/2 hours.

Warm Temperatures:

Set times can be improved to approximately 1-1/2 hrs. with a deck substrate warmed to more than 100°F by exposure to the sun.

Cooler Temperatures:

A substrate temperature of 65°F and a product temperature of 77°F, the set would be approx. 3-1/2 hours, when exposed to the sun approximately 3 hours, and with a dark aggregate exposed to the sun approximately 2-3/4 hours.

Nighttime operations:

More and more applications are being placed during nighttime operations, without any benefit of warming of the substrate by the sun's rays. At night, assuming a substrate temperature of 75 F (substrate temperature will not drop significantly with lower ambient temperatures due to the mass of the concrete) with a product temperature of 75°F the set time is usually in the 2-3/4 hr. range. With a product temperature of 85-90°F, the set time will improve to approximately 2 hrs. On nighttime operations with substrate and product temperatures in the 50°F range the set time will be approximately 3 to 4 hours. The set time can only be improved by warming of the materials or induction.

Induction of epoxy for cold weather applications: Induction is simply a procedure of mixing the epoxy components, allowing the mass of material to remain in the mixing material for a prescribed time with a resultant increase in temperature due to the exothermic reaction. This time in the mixing container with the resultant exothermic reaction accelerates the polymerization, with reduced working time providing rapid strength development. When the material is placed on a cold substrate, the substrate acts as a heat sink in reverse providing sufficient working time to spread the epoxy and broadcast the aggregate over large areas. The induction of the epoxy has accelerated the polymerization producing improved set times. Induction works best with product temperatures between 50-75°F. Best set times are with the temperature of materials in the upper range. The rules are simple, DO NOT USE THIS PROCEDURE WHEN PLACING INDUCTED

MATERIAL ON SUBSTRATES IN EXCESS OF 75-80°F (polymerization will be accelerated from the warm substrate leaving minimum time to spread the epoxy and broadcast the aggregate).

Induction Procedure:

Measure out equal volumes of both epoxy components. Record the product temperature, start a timer, and set for 8 minutes. Mix thoroughly for 3 minutes, allow to remain in the mixing container for an additional 5 minutes or until a temperature increase of 10° is recorded, whichever comes first. CAUTION: Use only Fortress 526 with the above induction procedure. Not all epoxies are formulated to work with the above procedure and may produce adverse results. Note: Exothermic or the beginning of early polymerization with rapid strength development is not available with automatic mixing and metering equipment with the mixing measured in seconds prior to placement on the cold substrate. Set time is established by placing a blunt object (a coin, key etc.) against the top profile of the aggregate. The epoxy overlay is sufficiently set to open to traffic if the aggregate chips or breaks away at the top edge or the aggregate does not move in the base epoxy.

Weather Considerations:

Weather plays a very important role in the application of epoxies. Warm weather normally indicates ease of application for spreading, troweling, etc. and faster set-up. Warm weather thins the epoxy material with the restriction of less working time. Cold weather indicates difficulty in spreading, troweling and slower set-up. Cold weather will rapidly thicken the epoxy resin. The thickened epoxy is more difficult to apply, and the applicator will wish he'd never started the job during cold weather. The following is a list of some of the Do's and Don'ts, Rumors, etc. of the role that weather plays.

Wet or Damp Concrete:

True Moisture Insensitive Epoxies have now been developed that can be installed underwater providing tenacious bonds and good cures within a totally submerged condition. This type of technology is used with all of Fortec's Moisture Insensitive Epoxies. For exterior applications on/or above grade, moisture and dampness provides more difficult problems, particularly when exposed in the elements with the direct rays of the sun. The sun can convert moisture, dampness, etc. to vapor which can interfere with the proper bond of the epoxy to the substrate. Moisture in the concrete under hydrostatic pressure conditions can exert the same type of problems, thus creating bond problems. For exterior non-submerged exposures DO NOT APPLY EPOXIES to substrates that are wet or have puddled water.

Humidity:

Fortress Moisture Insensitive Epoxies have been developed, tested, and evaluated in Florida, which is one of the most humid areas in the United States. High humidity has very little effect on Fortec's Moisture Insensitive Construction Products. A noticeable effect during extremely high humidity may be an amine blush (sticky feeling) and/or a slightly reduced working time. High humidity may affect some construction and electronic, potting, casting epoxies, etc. by creating amine blush, imperfections, etc.

Temperatures:

Temperatures play a very distinctive role in the ease of application, curing, etc. of epoxies. There are Three different temperature considerations: Product temperature, ambient temperature, and surface temperature. Surface temperature is not normally cooler than ambient temperature but can be much warmer than ambient temperature due to the effect of heating of the surface by the sun's rays. Fortress 526 Lo-Mod Epoxy Overlay provides good cures at temperatures as low as 40ºF (cure takes much longer). We make this statement to indicate that this epoxy will cure at low temperatures. We do not recommend application at low temperatures due to the increase in viscosity, slowness of cure, and the degree of difficulty in placing the application.

Warm Weather Applications:

Warm weather applications are based on ambient and product temperature of 75ºF to 100ºF and with a maximum substrate temperature of 115ºF. Warm temperature thins the product. A thin product spreads easier and more rapidly than a heavy thick product. A warm product provides better penetration. A warm surface can thin a relatively cool product, thus providing ease of application for spreading and penetration. Example: A warm product placed on a warm surface provides rapid acceleration of the cure. A product temperature of 80ºF with a minimum surface temperature of 90ºF would provide sufficient cure (hardness) to permit power brooming usually within 1-1/2 hours after the application. A cool product of approximately 60ºF applied during an ambient temperature range of 60-65ºF. with a surface heated by the sun's rays to 75-80ºF. will thin considerably, provide ease of application and initial cure for power brooming, usually within 2-1/2 hours after application.

Cold Weather Applications:

Fortec 526 Lo-Mod Epoxy has been tested for cure as low as 40ºF. It is not recommended to apply the epoxy on substrates below 40ºF. due to possible frostline problems, and/or an extremely cold surface that has been slightly warmed by the sun, which could create condensation on the surface. A product temperature below 58ºF thickens substantially making it most difficult to spread, flow, penetrate, etc. This is the apparent limitation for product and substrate temperature: At temperatures below 58ºF. additional problems may occur, making the product sufficiently thick that the aggregate must be pressed into the surface. This is done by broadcasting the aggregate in the normal manner and placing plywood over the surface and using rollers to press the aggregate into the epoxy. For cold weather applications, it is recommended that the aggregate and epoxy be stored in a heated trailer, warehouse, etc. and removed from this heated condition just prior to use. The temperature in the heated warehouse should be a minimum of 80-100ºF.

There are two different situations for cold weather applications:

a) Cold substrates when the substrate is similar to ambient temperature due to an overcast or cloudy environment. This is an application where the ambient temperature and the surface temperature may be as cool as 58º. and there is little or no possibility of warming the substrate by the sun's rays. Within minutes after placement of warm epoxy on a cold substrate, the epoxy will obtain the same temperature as the substrate. The substrate works as a heat-sink. Under this scenario it is recommended that the minimum temperature of the substrate be 58ºF.

b) A substrate that is warmed by the sun's rays on sunny days. Substrates of 58ºF. can be warmed by the sun to approximately 65º-68ºF. Within minutes after the application of the warmed epoxy on this substrate, the epoxy will obtain the same temperature as the substrate. Applications of epoxy on a substrate in the 63º-68º range will note some thickening of the epoxy but can be spread with a minimum of difficulty. Example: The following scenario has worked many times. Ambient temperature 55ºF, substrate temperature 55ºF and warmed by the sun to 64ºF. Product temperature of 80ºF (the product is conditioned and stored in a warm environment for a minimum of 24 hours at 80ºF temperature or higher). Under this scenario, the epoxy spreads quite easily, aggregate can be spread into the wet epoxy and the surface should be ready for power brooming within 3 hours after application.

Attached is a schedule from AASHTO/Task Force 34 Re: Minimum Curing Time for Overlay Courses. This schedule is based on the same temperatures for substrate, ambient, and epoxy.

Pot Life/Gel Time:

This is a laboratory test based on a given mass of material at a specified temperature, (usually 75ºF.) The mass is usually 100 grams and/or 3 oz. etc. or approximately 2-1/2" thick. The pot life and gel time test is normally produced in an unwaxed 8 oz. paper cup. A gel time in the lab of 30 minutes at 75ºF means that at a temperature of 75º with a thickness of 2-1/2" the product has gelled or become unusable.

Erroneously, many contractors misinterpret this laboratory test to indicate the working time in the field. Many unexperienced people who have worked with epoxy are amazed that when they mix 10 gallons that the working time that is supposed to be 30 minutes might be 10 minutes. Other users produce a small quantity in a coffee cup and then pour a casting specimen, perhaps 1/2" thick are amazed that it will take almost 80 minutes to gel.

This scenario indicates that mass or thickness of the material plays a very important role in the gel or set time of the epoxy.

Example: Fortress 526, based on a volume of approximately 3 oz. or a depth of 2-1/2" in an 8 oz. unwaxed paper cup, has a gel time or set time of approximately 20 minutes at 75ºF.

Many contractors mix 20 gallons of this product at a time in a 30-gallon drum. If this material as mixed was allowed to remain in a 30-gallon drum, it is estimated that at 75ºF, it would become rigid and unusable in approximately 10-12 minutes.

Based on a product temperature of 75ºF (more on temperature, later) the contractor will mix the product for 2 to 3 minutes to ensure correct mixing. The material would then be taken and poured out on the road surface so it may be squeegeed and spread out. This may take an additional 3-4 minutes. In cool weather the road surface acts as a heat-sink in reverse and cools the product rapidly. This cooling on a road surface of 70º would permit the contractor approximately 50 minutes to broadcast his aggregate.

This same batch of epoxy that was mixed at 75ºF., mixed for 3 minutes, plus 3 minutes to pour, would have an approximate temperature of 95ºF when poured out. When placed on a hot surface in excess of 100ºF, the surface would act as an accelerator. Some unexperienced applicators think

that the working time would be substantially less than in the container, but this is not true. Since the product is spread to a very thin film, the heat can readily escape into the atmosphere, whereas in a thick mass, the heat is contained in the core of the mass and multiplies the intensity of the reaction, thus creating more heat.

In a thin film application, the heat is dissipated into the atmosphere and with the above scenario the contractor would have approximately 35 minutes to broadcast the aggregate.

Temperature has a very important role in the gel time of an epoxy. Quite often the effects of higher or lower product temperature are not normally indicated or required in lab tests. To understand the role of temperature, it is best to go back to the laboratory testing. This same mass of epoxy at 75ºF in an unwaxed paper cup, with a gel time of 20 minutes, would be affected by temperature as follows:

At 85ºF, the gel time would be approximately 14 minutes.

At 95ºF, the gel time would again be almost cut in half for approximately 8 minutes.

At 105ºF, the gel time would be approximately 6 minutes.

At a temperature of 65ºF. the working time would almost be doubled, thus the 20 minutes for 75ºF would become approximately 38 minutes. At 55ºF, the gel time would almost be doubled again and would be approximately 65 minutes. Temperature is most important. Warm temperatures thin a product making it easier to apply, warm temperatures speed up the reaction providing faster cures. Cold temperature thickens the product making it difficult to apply, lengthens the working time, and lengthens the closure of road lanes.

Experience on Nighttime Operations:

Millions of square feet of Fortress 526 have been applied in nighttime operations where quite often the substrate is in the 65-75ºF range. It requires approximately 3 minutes for the cross-linking to be coupled between the two components of epoxy. This a minimum required at all temperature ranges. Once sufficient crosslinking has occurred, elevated temperatures speed the reaction and shortens the gel time. Most contractors use heated trailers and heat the epoxy to an approximate summer daytime temperature of 90ºF.

Example: 20 gallons is mixed for 3 minutes. The 3 minutes is picked to ensure thorough and accurate blending of the epoxy. The 3 minutes is also chosen to allow induction time for the resin/hardener to react together and start the exothermic chain reaction.

In cool weather applications, the contractor will use a thermometer and wait until the product reaches 95ºF.

Example: An epoxy at 75º at commencement of mixing; mixed and blended for 3 minutes, would require an additional 4-5 minutes to obtain 95ºF. Once the epoxy reaches 95º, it must be poured out on the road surface immediately, using an additional 2 minutes for pouring and 20-25 minutes to broadcast aggregate before the working time ends. If the product, however, was 80ºF when the mixing operation started, add 3 minutes for mixing and 2 minutes as a holding period, the product temperature would be approximately 95ºF. Under this scenario the epoxy

product must always be poured out from commencement of mixing before an elapsed time of 9 minutes has occurred.

7. **Fortec 5680-BD Kevlar® Fabric Installation**

Precut and label laminate and/or straps prior to beginning the mixing and application processes.

After surface preparation is complete and if necessary, fill joints with a filler specified for the project. Using a roller or squeegee, apply Fortec 526 Lo-Mo epoxy resin to the substrate on both sides of the joint. Cut the Fortec 5680-BD Kevlar® fabric to length with heavy duty, sharp scissors. Lay down the Fortec 5680-BD Kevlar® fabric over joints with 4 inches on either side and saturate the Fortec 5680-BD Kevlar® fabric with Fortec 526 Lo-Mod epoxy resin in place over the joint. Completely wet the Kevlar® fabric fibers with epoxy resin, pressing out all wrinkles and air voids. Allow the resin to squeeze through the fibers to assure a proper bond.

Epoxy Overlay

Where used with a two-lift epoxy overlay system, the Kevlar® fabric is placed in first application of epoxy resin. If the second epoxy resin is to be applied after the first application has cured, broadcast aggregate specified by the Engineer prior to the first application has cured to avoid amine blush.

Hot-Mix Asphalt Overlay

Where used with a hot-mix asphalt overlay, a high-temperature epoxy resin as specified by the Engineer is used with the Kevlar® fabric.

8. **Surface Coating**

Because Kevlar® and all other aramid fibers degraded by ultraviolet light, the finished Fortec 5680-BD Kevlar® crack treatment system must be protected from UV light. Fortec 105 Superstick Hi-Build 100% epoxy is an excellent, corrosive resistant coating designed for this application. Apply Fortec 105 Superstick Hi-Build as directed.

9. **Splices and Terminations**

Lap Splices

Lap splices may be used to create a long span consisting of multiple, connected lengths of laminate or strap. Lap splices are ONLY allowed when expressly stated within the project specifications. Minimum lap lengths are project specific and as such shall be specified within the project specification and/or on the design drawings. Lap splices on multiple layer applications are project specific and as such shall be specified within the project specification and/or on the design drawings. Lap splices shall be configured to match the direction and orientation of the fibers.

Terminations

Laminates and straps shall be terminated at the location illustrated on the design drawings. Termination points of plies for multiple layer applications shall be tapered. Successive plies shall be terminated not less than 6 inches (150 mm) from the point of termination of the previous ply or as illustrated on the design drawings.

Termination anchors shall be installed where specified.

10. Quality Control and Assurance

Supervision

Preparation of substrates and installation of laminates shall be performed or supervised by a Fortec-trained, certified installer.

The onsite supervisor on site shall inspect materials, including but not limited to laminate and strap products, epoxy components and mixtures, and anchors. The supervisor shall be present throughout the course of the work, document progress, and maintain a presence to ensure a carefully prepared substrate, prevention or removal of amine blush, adequate epoxy coating of the substrate and laminate, continuous contact between plies and the substrate, accurate alignment of fibers, and proper location of lap splices and terminations.

Inspection

Allow at least 24 hours for resins to cure prior to final inspection by the onsite supervisor. Once cured, perform a visual inspection and sounding of the laminate surfaces, documenting the size, number, and category of delamination and/or voids.

Each delamination and void shall be marked to correspond with the supervisor's documentation compiled during the inspection and sounding processes.

The bond strength of the laminate and/or straps to the substrate may be verified by pull testing per ASTM D4541. The required minimum pull testing strength is 200 psi (1.4 MPa).

Pull test locations may be patched by first filling the void with Fortec 526 Lo-Mod epoxy resin or 4000 filler matrix epoxy resin and repaired per Section 11.0. Perform strength tests of field sample or witness panels if required on the design drawings and/or by the specifications.

11. Repairs

Unless provide otherwise by the project specifications, small delaminations less than 2 in^2 (1,300 mm^2) may remain without repair, unless there are more than 10 such delaminations in a 10 ft^2 (1 m^2) area **and** the sum of the small delamination areas is less than 5 percent of the total laminate area.

Delaminations greater than 2 in^2 (1,300 mm^2) and less than 25 in^2 (16,000 mm^2) shall be repaired by injection with resin or by cutting and replacing with overlapping patches depending on the size and number of delaminations.

Large delaminations greater than 25 in^2 (16,000 mm^2) shall be repaired by cutting away the affected sheet and applying an overlapping patch of equivalent plies.

Patches shall overlap a minimum of 6 inches (150 mm) in the direction of the fibers, unless described otherwise in the project plans and specifications.

12. Qualifications

The information contained herein is included for illustrative purposes only and is, to the best of our knowledge, accurate and reliable. Fortec Stabilizations Systems (Fortec) cannot however under any circumstances make any guarantee of results or assume any obligation or liability in connection with the use of this information. As Fortec has no control over the use to which others may put its product, the products are to be tested to determine if suitable for a specific application and to verify if our information is valid for a particular application. Responsibility remains with the specifier, contractor, installer, user, and owner for the design, application, and proper installation of each product. Fortec reserves the right to change the properties of its products without notice. **Prior to each use of any Fortec product, the user must always read, understand, and follow the warnings and instructions on the product's most current Technical Product Data Sheet, product label and Material Safety Data Sheet available at www.FortecStabilization.com .**

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