

# NuTack<sup>®</sup>E<sup>®</sup>

## 046-4103

## Reactive Tackifier for Use with Epoxy Resins

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### Description

NuTack<sup>®</sup>E 046-4103 is a sprayable, polymeric based tackifier. It is designed for use in RTM, VARTM or vacuum bagging processes. NuTack<sup>®</sup>E 046-4103 provides enhanced positioning of coring materials and dry glass fiber or carbon fiber roll goods. NuTack<sup>®</sup>E 046-4103 is based on a reactive, toughened polymer technology specifically designed for use with epoxy resins. NuTack<sup>®</sup>E 046-4103 is a neutral for color sensitive applications.

### Features and Benefits

- Excellent adhesion to reinforcing glass fiber and carbon fiber roll goods as well as coring products
- Maintains inter-laminar strength between plies in the finished part
- Maintains the cure and flow properties of epoxy infusion resins
- Reactive chemistry allows broad application window
- Neutral (NuTack<sup>®</sup>E 046-4103) available for color sensitive applications
- Convenient aerosol packaging

### Application

1. Use NuTack<sup>®</sup>E as supplied in the aerosol can. Shake the can well before each use.
2. Wear safety glasses and protective clothing. Use NuTack<sup>®</sup>E only with adequate ventilation. Always point the spray tip away from body, hand, or face.
3. Protect surrounding surface areas from over-spray by using paper, plastic film or cardboard.
4. Hold the container about 8-10 inches from the surfaces to be tacked and spray a continuous film of NuTack<sup>®</sup>E on one or both surfaces. Use the minimum amount needed to hold the two surfaces together. Typical application thicknesses are 0.5-1.0 mils. One mil will weigh approximately 2.0-g/ft<sup>2</sup> while wet or 1.0-g/ft<sup>2</sup> after solvent evaporation. Use the blue dye color of NuTack<sup>®</sup>E as a visual thickness guide. One container of NuTack<sup>®</sup>E should allow coverage of 150-300 ft<sup>2</sup> if applied at the recommended 0.5 to 1.0 mils thickness.
5. Firmly press dry fiber plies or core materials into the NuTack<sup>®</sup>E tackifier.
6. Repeat steps 4 and 5 as often as needed to build proper laminate and core schedules. Re-apply



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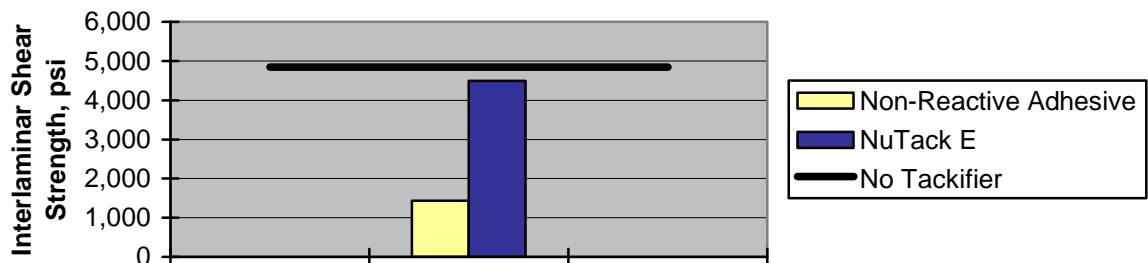
more NuTack® E after several hours if tack is too low or if dry goods require re-positioning.

- 7. Clean up can be done with a variety of solvents and paint thinners.

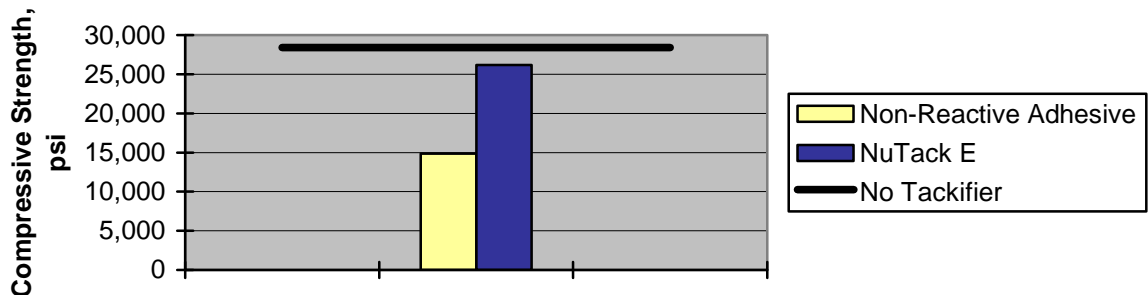
**Physical Properties**

Mechanical properties of laminates fabricated using NuTack® E and a popular non-reactive adhesive were evaluated for physical properties and compared to laminates fabricated without using tackifier. Non-reactive, rubberized, adhesive based products have been the standard for positioning reinforcements and core during the RTM, VARTM or vacuum bagging processes. Inter-laminar shear, compression and flexural testing were used to characterize adhesion between plies of an infused laminate. For both adhesion tests, NuTack® E and the non-reactive adhesive were applied per manufacturer's instructions. Test laminates were fabricated using 15 plies of 18 oz/ft<sup>2</sup> glass fiber woven roving. Tackifier was applied between each ply. The tackifier application thickness was limited to 1 mil. The laminates were then infused with Rhino R-1401-21 epoxy resin and H-4101-21 Fast Hardener (100 parts resin to 30 parts hardener). Test results are shown in Figures 1-4.

**Figure 1: Inter-laminar Shear Results**



**Figure 2: Compressive Strength**





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Figure 3: Flexure Strength

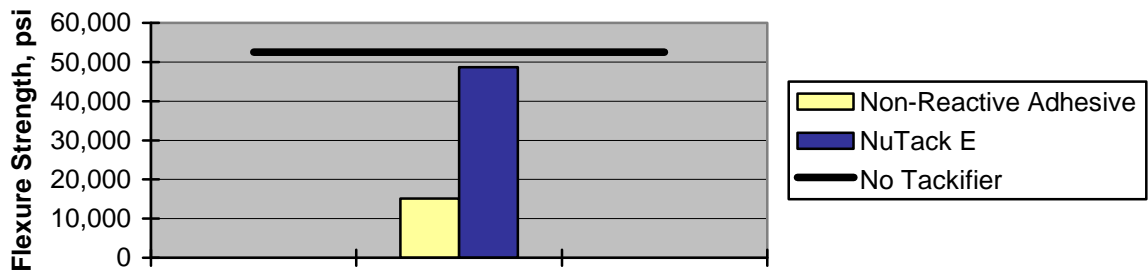
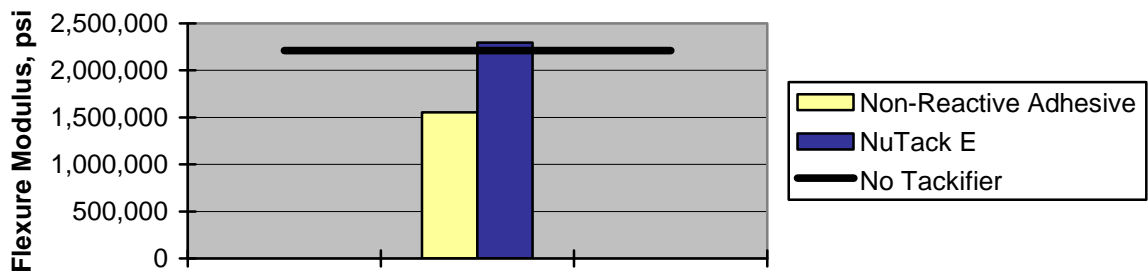


Figure 4: Flexure Modulus



Property retention of laminates fabricated with the non-reactive adhesive and NuTack® E are shown in the Table below.

Property Retention (versus No Tackifier)	Test Method <sup>(1)</sup>	Non-Reactive Adhesive	NuTack® E
Interlaminar Shear Strength	ASTM D2344	30%	93%
Compressive Strength	ASTM D695	52%	92%
Flexure Strength	ASTM D790	29%	93%
Flexure Modulus		70%	104%

<sup>(1)</sup>Tests conducted per internal CCP test methods similar to ASTM methods.

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Laminates tacked with NuTack® E had much higher physical properties than those tacked with the non-reactive tackifier. Laminates tacked with NuTack® E had very similar physical properties to laminates fabricated without tackifier. Use of the non-reactive tackifier resulted in significantly decreased physical properties.

For the testing reported above, the tackifier application was tightly controlled by weighing; however, tackifier application amounts may vary in manufacturing shops. The tackifiers themselves regulate under application. The affect of over application is a concern. Evaluation of the non-reactive adhesive showed that over application interrupted the resin flow resulting in laminates with dry glass and low physical properties. Over-application of NuTack® E had much less affect on resin flow and physical properties. While over application of NuTack® E is less problematic than with the non-reactive adhesive, CCP recommends that NuTack® E be applied at the minimum amount needed to hold reinforcements or coring materials.

The physical properties reported above demonstrate the performance of NuTack® E. However, each manufacturer should test the product using their specific laminate designs, materials and under their usage conditions.

NuTack® E 046-4103 is a pressure pot sprayable version available in 5-gallon and 55-gallon drums. It is intended for use in high volume applications.

### Caution

Read the MSDS for NuTack® E 046-4103 prior to use.

Keep cans of NuTack® E 046-4103 away from heat (>120°F), sparks flame and sources of static discharge. The cans are under aerosol pressure and could become unstable. Read all side panel safety precautions printed on the aerosol cans.

### Storage

Usage life of the NuTack® E 046-4103 aerosol product is >12 months in the original container stored at 80°F or below and out of direct sunlight. Shipment is in 23 oz. aerosol cans.

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**COMPOSITES SAFETY INFORMATION  
(October 2011)**

All sales of products manufactured by CCP Composites US (CCP), and described herein, are made solely on condition that CCP's customers comply with applicable health and safety laws, regulations and orders relating to the handling of our products in the workplace. Before using, read the following information, and both the product label, and Material Safety Data Sheet pertaining to each product.

Most products contain styrene. Styrene can cause eye, skin and respiratory tract irritation. Avoid contact with eyes, skin and clothing. Impermeable gloves, safety eyewear and protective clothing should be worn during use to avoid skin and eye contact. Wash thoroughly after use.

Styrene is a solvent and may be harmful if inhaled. Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage. Extended exposure to styrene at concentrations above the recommended exposure limits may cause central nervous system depression causing dizziness, headaches or nausea and, if overexposure is continued indefinitely, loss of consciousness, liver and kidney damage.

Do not ingest or breathe vapor, spray mists or dusts caused by applying, sanding, grinding and sawing products. Wear an appropriate NIOSH/MSHA approved and properly fitted respirator during application and use of these products until vapors, mists and dusts are exhausted, unless air monitoring demonstrates vapors, mists and dusts are below applicable exposure limits. Follow respirator manufacturer's directions for respirator use.

The International Agency for Research on Cancer (IARC) reclassified styrene as Group 2B, "possibly carcinogenic to humans." This revised classification was not based on new health data relating to either humans or animals, but on a change in the IARC classification system. The Styrene Information and Research Center does not agree with the reclassification and published the following statement: Recently published studies tracing 50,000 workers exposed to high occupational levels of styrene over a period of 45 years showed no association between styrene and cancer, no increase in cancer among styrene workers (as opposed to the average among all workers), and no increase in mortality related to styrene.

Styrene is classified by OSHA and the Department of Transportation as a flammable liquid. Flammable products should be kept away from heat, sparks, and flame. Lighting and other electrical systems in the work place should be vapor-proof and protected from breakage.

Vapors from styrene may cause flash fire. Styrene vapors are heavier than air and may concentrate in the lower levels of molds and the work area. General clean air dilution or local exhaust ventilation should be provided in volume and pattern to keep vapors well below the lower explosion limit and all air contaminants (vapor, mists and dusts) below the current permissible exposure limits in the mixing, application, curing and repair areas.

Some products may contain additional hazardous ingredients. To determine the hazardous ingredients present, their applicable exposure limits and other safety information, read the Material Safety Data Sheet for each product (identified by product number) before using. If unavailable, these can be obtained, free of charge, from your CCP representative or from: CCP Composites US, P.O. Box 419389, Kansas City, MO 64141-6389; 816-391-6053.

**FIRST AID:** In case of eye contact, flush immediately with plenty of water for at least 15 minutes and get medical attention; for skin, wash thoroughly with soap and water. If affected by inhalation of vapors or spray mist, remove to fresh air. If swallowed, get medical attention.

Those products have at least two components that must be mixed before use. Any mixture of components will have hazards of all components. Before opening the packages read all warning labels. Observe all precautions.

Keep containers closed when not in use. In case of spillage, absorb with inert material and dispose of in accordance with applicable regulations. Emptied containers may retain hazardous residue. Do not cut, puncture or weld on or near these containers. Follow container label warnings until containers are thoroughly cleaned or destroyed.

**FOR INDUSTRIAL USE AND PROFESSIONAL APPLICATION ONLY. KEEP OUT OF REACH OF CHILDREN.**

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Seller warrants that: (i) Buyer shall obtain good title to the product sold hereunder, (ii) at Shipment such product shall conform to Seller's specifications; and (iii) the sale or use of such product will not infringe the claims of any U.S. patent covering the product itself, but Seller does not warrant against infringement which might arise by the use of said product in any combination with other products or arising in the operation of any process. **SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, EVEN IF THAT PURPOSE IS KNOWN TO SELLER. ANY APPLICATION INFORMATION OR ASSISTANCE WHICH SELLER MAY FURNISH TO BUYER IS GRATUITOUS AND SHALL IN NO WAY BE DEEMED PART OF THE SALE OF PRODUCT HEREUNDER OR A WARRANTY OF THE RESULTS OBTAINED THROUGH THE USE OF SUCH PRODUCT.**

Without limiting the generality of the foregoing, if any product fails to meet warranties mentioned above, Seller shall at Seller's option either replace the nonconforming product at no cost to Buyer or refund the Buyer the purchase price thereof. The foregoing is Buyer's sole and exclusive remedy for failure of Seller to deliver or supply product that meets the foregoing warranties. Seller's liability with respect to this contract and the product purchased under it shall not exceed the purchase price of the portion of such product as to which such liability arises. Seller shall not be liable for any injury, loss or damage, resulting from the handling or use of the product shipped hereunder whether in the manufacturing process or otherwise. In no event shall Seller be liable for special, incidental or consequential damages, including without limitations loss of profits, capital or business opportunity, downtime costs, or claims of customers or employees of Buyer. Failure to give Seller notice of any claim within thirty (30) days of shipment of the product concerned shall constitute a waiver of such claim by Buyer. Any product credit received by Buyer hereunder, if not used, shall automatically expire one (1) year from the date the credit was granted. Notwithstanding any applicable statute of limitations to the contrary, any action by Buyer relation to a claim hereunder must be instituted no later than two (2) years after the occurrence of the event upon which the claim is based. All the foregoing limitations shall apply irrespective of whether Buyer's claim is based upon breach of contract, breach of warranty, negligence, strict liability, or any other legal theory.