

OptiPLUS™
040-8077

HIGH PERFORMANCE, LOW SHRINK TOOLING RESIN

DESCRIPTION:

OptiPLUS™ 040-8077 has been formulated as a low profile additive modified, low shrink tooling resin designed specifically for dramatically improved surfaces, with minimal shrinkage in mold making and tooling applications that utilize room temperature cure processes. These applications, to name a few, include molds for the marine, automotive, RV, medical, and truck equipment parts that are produced by the hand-lay up and spray up processes.

OptiPLUS™ tooling resin has been employed as a replacement for isophthalic, vinyl esters, and epoxy resins in tooling applications for casting and FRP composite part processes, including high temperature thermoforming of thermoplastic sheets, such as acrylic and ABS.

OptiPLUS™ tooling resin is pre-promoted and pre-thixed, with no additives required other than peroxide initiator for cure. It is a clear amber liquid during application, and will remain clear during fiber wet-out. Upon cure, the laminate will turn a creamy white as an initial visual indicator of proper cure.

DISTINGUISHING CHARACTERISTICS:

- ▶ Surface and dimensional control for nearly perfect mold or master replication
- ▶ Excellent heat resistance
- ▶ Superior laminate mechanical properties
- ▶ Formulated for user friendliness and excellent fiber wet out
- ▶ Fast, stress free, laminate build-up, even at 0.500" thickness (wet on wet), or more
- ▶ Extended shelf life, with no loss of shrink control.

TYPICAL LIQUID PROPERTIES:

These values may or may not be manufacturing control criteria. They are listed for a reference guide only. Particular batches will not conform exactly to the numbers listed because storage conditions, temperature changes, age, testing equipment (type and procedure) can each have a significant effect on testing. Products with properties outside of these readings can perform acceptably. Final suitability of the product is in the end use performance.

<u>Test</u>	<u>Typical Value</u>
Viscosity @ 25°C, Brookfield	
RVT, Spindle #3, @ 5 rpm	750 cps
RVT, Spindle #3, @ 50 rpm	250 cps
Thixotropic Index	3.0
Weight per Gallon	8.80 lbs.
Solids	50.0%
Styrene Monomer	50.0%
Gel Time at 25°C	
50 Gram Mass, 1.50 % Norac MEKP-9	15.0 minutes
Peak Time	19.0 minutes
Peak Exotherm	200°C (400°F)

MECHANICAL PROPERTIES:

Typical physical properties for *OptiPLUS*™ tooling resins are shown below. Laminate schedule was four plies of 1.5 oz chopped strand mat made with 1.5% Norac MEKP 9 peroxide with *OptiPLUS*™ tooling resin.

<u>Property</u>	<u>Typical Value</u>
Tensile Strength	18,200 psi
Tensile Modulus	1,040,000 psi
Tensile Elongation	2.3 %
Flexural Strength	30,200 psi
Flexural Modulus	875,000 psi
Izod Impact, Notched	20.5 ft.-lbs
Izod Impact, Unnotched	32.0 ft.-lbs.
Glass Content	38.0 %

CAUTION:

Adherence to proper process controls, **particularly temperature and peroxide initiator levels**, is necessary to provide the intended performance of this product. Deviations may negatively impact the gel and cure characteristics of *OptiPLUS™*, resulting in poor or non-existent shrink control and loss of surface and mechanical properties.

The *OptiPLUS™* product line is formulated to be used at 65°F to 90°F, with Norac MEKP-9, ATOFINA DDM-9, or Witco HiPoint 90 (or equivalents) at 1.5% based on resin weight. In colder conditions (65°F to 75°F) for faster gel and cure, or for thinner (<0.125") laminate schedules, up to 2.0% of the suggested peroxides is permitted. In warmer conditions (80°F to 90°F) for slower gel and cure, or for thicker (>0.200") laminate schedules, reductions to 1.0% of the suggested peroxides is permitted. The use of peroxides below the levels suggested will cause under-cure of the laminate. The use of peroxides above levels suggested will cause poor cure and shrinkage control and may damage molds due to excessive heat generation. The use of an incorrect quantity or incorrect type of peroxide initiators could also negatively affect shrinkage control and mechanical properties.

Application temperatures outside of 65°F to 90°F are not suggested. Temperatures below 65°F will result in under-cure with no shrinkage control. Temperatures above 90°F will generate excessive heat that will cause poor cure, poor shrinkage control, and may cause mold damage. For processes that run above 90°F, contact a CCP *OptiPLUS™* technical service representative for alternative *OptiPLUS™* high temperature products.

Secondary bonding characteristics are excellent with *OptiPLUS™* tooling resin products, but should be tested if the secondary bonding is done after three or more days of the original lamination, or under very warm temperature conditions. *OptiPLUS™* drums and storage tanks should be mixed prior to use with paddle type mixers. The use of bubbled air is not suggested because of the possibility of oil and water contamination.

STORAGE LIMITATIONS:

OptiPLUS™ tooling resins have a storage life of 90 days from date of manufacture when stored at less than 77°F in the original container and out of direct sunlight. Some separation of the fumed silica thixotropic additive is common and expected, due to the low viscosity and chemistry involved with *OptiPLUS™*. Minimal mixing of the *OptiPLUS™* tooling resin prior to use is sufficient to reincorporate the thixotropic additive.

SHIPPING AND DISPOSAL:

Shipment is made in 450-pound drums.

Dispose of in accordance with local, state, and federal regulations. Do not incinerate closed containers. Incinerate in approved facilities only.

MD 06/03

POLYESTER SAFETY INFORMATION
(Revised 09/00, supersedes 06/92)

All sales of products manufactured by Cook Composites and Polymers Co. (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 polyester 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 polyester 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) has reclassified styrene as Group 2B, "possibly carcinogenic to humans." This new classification is 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 has 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 polyester 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.

If the label or Material Safety Data Sheet indicates lead or lead chromate is present, do not use on toys, furniture or surfaces that might be chewed by children. Wash hands thoroughly after using and before smoking or eating. Long-term overexposure by inhalation or ingestion of mists and dusts from products containing lead compounds and lead chromate can cause harmful effects to the urinary, blood, reproductive and nervous systems and may create risk of cancer. Use a respirator as explained in Paragraph 4 of this Information Sheet.

Some polyester 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, 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.

Polyester 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 polyester 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.

WARRANTY, DISCLAIMER, AND LIMITATION OF LIABILITY
(Rev. 12/02, supersedes 06/01)

Seller warrants to Buyer that, at the time of shipment, the products sold hereunder shall meet Seller's then-applicable specifications for such product. Seller's specifications may be changed at any time without notice to Buyer. To assert a warranty claim, Buyer must give Seller notice in writing of the alleged failure of the product to conform to the applicable specifications (together with all identifying details, including the product code(s), description and date of purchase) within thirty (30) days of the date of shipment of the product to Buyer and, upon Seller's request, shall return the alleged nonconforming product. The failure of Buyer to assert a claim within such period shall be an admission by Buyer and conclusive proof that such product is in every respect as warranted and shall release Seller from all claims for damage or loss in respect of such product. **THE WARRANTY DESCRIBED HEREIN SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.** Without limiting the generality of the foregoing, the warranty provided above does not extend to damage, loss, or injuries caused by or in any way related to misuse, misapplication, abuse, improper handling or storage of the product; normal weathering (including but not limited to cracking and blistering); or any cause beyond the control of Seller. Seller further disclaims any and all liability for Buyer's decision to modify, amend or reject any recommendation set forth herein. Seller does not warranty or guarantee that implementation of any of the recommendations set forth herein constitute compliance with any federal, state or local laws or regulations. Final determination of the suitability of the product for the use contemplated, the manner of use, and whether the use infringes any patents is the sole responsibility of Buyer.

Buyer's sole and exclusive remedy against Seller shall be, at Seller's option, the replacement of the nonconforming product or refund of the purchase price. **NO OTHER REMEDY SHALL BE AVAILABLE TO BUYER.** In no event shall Seller be liable for lost profits, lost sales or business opportunity, downtime, claims of Buyer's customers, injury to person or property, or any incidental, consequential, punitive, or special damages, or for labor or other costs in connection with testing, replacing, or returning product, whether such claim is made in contract, tort, strict liability, negligence or any other legal theory.