

OPTIPLUS®

040-8077

High Performance Low Shrink Tooling

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Type

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

Uses

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.

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.

Distinguishing Characteristics

OptiPLUS® tooling resin offers the following features:

- 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



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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.

Test	Typical Value
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.

Property	Typical Value
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

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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 shipment 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.

Disposal

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



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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.

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