



STYPOL[®]

LSP

Standard Product Laminating Resins

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Type

CCP's **Stypol[®] LSP** standard product laminating resins are pre-promoted, thixotropic resins containing styrene monomer. The series is designed for open mold processes where hand lay up and spray up applications are used with neat resin. LSP resins demonstrate high tensile elongation and tensile strength, which will provide resistance to cracking and a lower exotherm which means faster production cycles. Along with these qualities LSP resins will yield good surface cosmetics, faster wet out and resistance to fiberglass pattern print-through.

Uses

Stypol[®] LSP standard product laminating resin is ideal when high tensile elongation and tensile strength are desired. LSP resins are normally used with a premium skin coat system.

Distinguishing Characteristics

LSP Series offers the following features:

- Good surface cosmetics
- Improved tensile elongation provides better crack resistance
- Lower exotherm equals faster laminate buildup

Application Characteristics

Regular viscosity & regular cure	Low viscosity & regular cure	High viscosity & regular cure	Low viscosity & trim cure
Regular viscosity & thin cure	Low viscosity & thin cure	High viscosity & thin cure	High viscosity & trim cure
Regular viscosity & thick cure	Low viscosity & thick cure	AHigh viscosity & thick cure	



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Viscosity and Cure (77°F)

Viscosity and cure properties of STYPOL® LSP series resins are shown below. 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 the results. Products outside of these readings can perform acceptably. Final suitability of this product is in the end use performance.

Viscosity

STYPOL® LSP products are available in three viscosity grades: regular, low and high.

Regular Viscosity	Low Viscosity	High Viscosity
<ul style="list-style-type: none"> Standard lamination with good wet out 	<ul style="list-style-type: none"> Superior wet out Maximum fiber wetting with high glass content 	<ul style="list-style-type: none"> For lamination of large vertical surfaces High ambient temperature Application

Values for Viscosity Classification (A-I)

Type	Viscosity	Thixotropic Index
Regular (A-C)	500 cps	2.8
Low (D-F)	400 cps	3.2
High (G-I)	600 cps	3.5

Values for Viscosity Classification (K-L)

Type	Viscosity	Thixotropic Index
Low (K)	450 cps	2.8 minimum
High (L)	575 cps	3.0 minimum

All Stypol® LSP resins meet the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) for Reinforced Plastic Composites Production. The following Stypol® LSP resins also meet the EPA NESHAP for Boat Manufacturing and California’s SCAQMD Rule 1162: A-C, G-I, K and L.

Cure

STYPOL® LSP products are available with four cure profiles depending on laminate thickness and trimming



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requirements.

Cure Profile	Characteristics
Regular Cure (125-180 mils)	<ul style="list-style-type: none"> Moderate Cure Time Single Stage or Multi-Pass Lamination Moderate Exotherm
Thin Cure (<125 mils)	<ul style="list-style-type: none"> Quickest Cure Designed for Multi-Pass Quick Barcol Development Made for High Glass Content Applications
Thick Cure (>180 mils)	<ul style="list-style-type: none"> Slower Cure than Regular Single Stage Lamination Reduced Exotherm
(Trim Cure)	<ul style="list-style-type: none"> Slower Cure and Reduced Exotherm Compared to Regular Profile for Longer Trim Time Faster Barcol Development Than Thick Cure More Uniform Cure with Laminate Thickness Variations

Standard Gel Times* (minutes)	12	17	22	27	32	37	42	45

* 100 g resin mass with 1.25% by weight MEKP catalyst

Physical Properties

The physical properties of **STYPOL® LSP** are shown below. Properties are shown for both neat resins casting and for a glass fiber reinforced laminates. These are typical values and are provided for reference only.

Note: The physical properties of thermoset resins evolve as the resin cures. The properties given below are for well cured castings and laminates. Resin and laminates at different stages of cure will have varying properties.



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Test	Clear Cast	2 ply Laminate
		1.5 oz. Chopped Strand Mat
Tensile Strength	7500 psi	12,000 psi
Tensile Modulus	0.60 x 10 ⁶ psi	1.31 x 10 ⁶ psi
Tensile Elongation		1.40%
Flexural Strength	10,000 psi	24,000 psi
Flexural Modulus Heat Distortion	0.58 x 10 ⁶ psi 70°C (158°F)	1.2 x 10 ⁶ psiN/A

Test	Test Method ¹	Neat Resin Casting ²	Laminate ³
Tensile Strength	ASTM D638	7,000 psi	16,000 psi
Tensile Modulus		600,000 psi	1,300,000 psi
Tensile Elongation		1.2%	1.9%
Flexural Strength	ASTM D790	10,000 psi	33,700 psi
Flexural Modulus		540,000 psi	1,160,000 psi
Barcol Hardness, Model #934	ASTM D2583	42	45
Heat Distortion Point at 264 psi	ASTM D648	176°F (80°C)	--

¹All tests run per internal CCP test methods. These methods are similar to the ASTM Method listed above.

²Neat resin casting catalyzed with 1.25% Arkema Luperox[®] DDM-9. The casting cured for 16 hours at room temperature and was post cured for 6 hours at 150°F.

³Laminate - Resin initiated with 1.25% Arkema Luperox[®] DDM-9. The laminate schedule was two plies of 2.0 ounce mat, 33% glass content. The panel was post cured for 16 hours at room temperature and post cured for 4 hours at 150°F.

Application

STYPOL[®] LSP resins should be mixed prior to use. Use mixing equipment with sufficient horsepower (relative to container size) to achieve thorough circulation from top to bottom and out to the sides of the container. The agitator must be properly sized for the container and must allow for uniform mixing regardless of the liquid level in the container. Mixing once a day for 10 minutes is typically sufficient. Air bubbling should not be used for mixing. It is not effective and only serves as a potential source of water or oil contamination. Do not over mix **STYPOL[®] LSP** resins. Over mixing can break down the resin viscosity increasing the tendency to sag.

The cure rate of polyester resins depends on a number of factors including the product's age, temperature, catalyst type, catalyst level and ambient humidity. When used in a laminating application the laminate cure

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rate also depends on reinforcement content and laminate thickness as well as other factors. For these reasons, we recommend that customer's check the cure rate in your plant.

Stypol[®] LSP series resins can be used with a wide range of room temperature activated organic peroxide catalyst including MEKP (methyl ethyl ketone) peroxides, AAP (acetyl acetone) peroxides and MEKP/CHP (cumene hydroperoxide) blends.

Standard **STYPOL[®] LSP** resins are quality control tested using Arkema Luperox[®] DDM-9 MEKP catalyst. Syrgis NOROX[®] MEKP-9 and Akzo Nobel CADOX D-50a are expected to yield similar performance. Other MEKP peroxides such as Arkema Luperox[®] DHD-9, NOROX[®] MEKP-925 and NOROX[®] MEKP-925H, Akzo Nobel CADOX L-50a and Chemtura HP-90 may also be used but gel time will vary.

An AAP catalyst (also known as 2,4-Pentanedione Peroxide) such as Syrgis Norox[®] Azox or Arkema Luperox[®] 224 should be considered if your fabrication process requires building thin laminates using regular or thick cure **Stypol[®] LSP** resins. AAP type catalyst should not be used with thin or trim cure **Stypol[®] LSP's**.

A MEKP/CHP blended catalyst such as Syrgis Norox[®] MCP-75 can be used to control exotherm if your fabrication process requires building thick laminates with thin or regular cure **Stypol[®] LSP** resins. Use of a MEKP/CHP blended catalyst is not recommended for thin sections, during cool weather conditions or with thick cure **Stypol[®] LSP** resins. Use of a MEKP/CHP catalyst under these conditions can result in an inadequate cure. Use of straight CHP catalyst is not recommended.

For MEKP peroxide catalysts, the catalyst level should not exceed 2.4% or fall below 0.9% for proper cure. A catalyst level of 1.25% at 77°F is considered ideal. Contact your catalyst supplier or your CCP representative for acceptable catalyst ranges for AAP or MEKP/CHP blends.

This product should not be used when temperature conditions are below 60°F, as curing may be adversely affected.

Caution

Do not add any material, other than the recommended fillers and methyl ethyl ketone peroxide, to this product without the advice of a representative of CCP Composites US.

Storage

STYPOL[®] LSP resins have a shelf life of three months from date of shipment from CCP when stored at 73°F or below in a closed, factory-sealed, opaque container, and out of direct sunlight. The usage life is cut in half for every 20°F over 73°F.

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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.

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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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