Technical data sheet

STYPOL®

LLP Series
Low Profile Laminating Resins

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Description

LLP low profile lamination resin is ideal where excellent profile is desired and where a single resin system is needed. CCP's LLP low profile laminating resin series is designed for open mold processes where hand lay-up and spray up applications are used with neat resin. LLP resins demonstrate superior surface cosmetics, resistance to fiberglass pattern print-through, and high rigidity. Along with these qualities, LLP resins will provide high heat distortion temperature, minimal shrinkage and fast wet out.

Features and Benefits

- Superior surface cosmetics
- Resistance to fiberglass pattern print-through
- High heat distortion temperature equals reduced post-cure on finished parts
- Good reactivity

Application Characteristics

A) Regular viscosity & regular cure

B) Regular viscosity & thin cure

C) Regular viscosity & thick cure

D) Low viscosity & regular cure

E) Low viscosity & thin cure

F) Low viscosity & thick cure

G) High viscosity & regular cure

H) High viscosity & thin cure

I) High viscosity & thick cure

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Viscosity and Cure Properties

These values are 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 this product is in the end use performance.

Viscosity Classifications (77 °F)

Type	Viscosity	% Styrene	Thixotropic Index
Regular	500 cps	< 35	2.8
Low	400 cps	38	3.2
High	600 cps	< 35	3.5

(1) Brookfield RVT #2 Spindle @ 50 rpm

Properties Descriptions--Viscosity (77 °F)

Regular Viscosity 500 cps	Low Viscosity 400 cps	High Viscosity 600 cps
Meets Rule 1162	Superior wet out	Meets Rule 1162
Standard lamination with good wet out	Maximum fiber wetting with high glass content	For lamination of large vertical surfaces
		High ambient temperature application

Gel Times(1) for Cure Types

Cure Type		12	17	22	27	32	37	42	45
Regular Cure	Gel to Peak	9	9	9	10	10	12	12	13.5
	Peak Exotherm	345	345	345	340	340	300	325	319
Thin Cure	Gel to Peak	8	8	8	8.5	8.5	9	9.5	10
	Peak Exotherm	360	360	360	350	350	340	332	325
Thick Cure	Gel to Peak	10	10	10	11	11	13	14	15
	Peak Exotherm	330	330	330	325	325	320	315	305

(1) Brookfield RVT #2 Spindle @ 50 rpm

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Cure Properties Descriptions--Cure (77°F)

Regular Cure (125-180 mils)	Thin Cure (<125 mils)	Thick Cure (>180 mils)
• Moderate Cure Time	• Quickest Cure	• Slower Cure than Regular
• Single Stage or Multi-Pass	• Designed for Multi-Pass	• Single Stage Lamination
• Moderate Exotherm	• Quick Barcol Development	• Reduced Exotherm
	• Made for High Glass Content	

Gel Times[(1)]

12 minutes	27 minutes	42 minutes
17 minutes	32 minutes	45 minutes
22 minutes	37 minutes	

[(1)]100 g resin mass with 1.25% by weight MEKP catalyst

Physical Properties

The physical properties of Stypol® LLP series resins are shown below. Properties are shown for both a neat resin casting and for a glass fiber reinforced laminate. 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.

Test	Test Method	Casting	Laminate
Barcol Hardness	ASTM D-2583	40	45
Tensile Strength	ASTM D-638	6800 psi	12,000 psi
Tensile Modulus	“	0.63×10^6 psi	1.30×10^6 psi
Tensile Elongation	“		1.40%
Flexural Strength	ASTM D-790	10,000 psi	22,200 psi
Flexural Modulus	“	0.60×10^6 psi	1.02×10^6 psi
Heat Distortion @ 264 psi	ASTM D-648	85.0ºC (185°F)	N/A

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Application

Stypol® LLP series 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® LLP series 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 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.

It is recommended that gel time be checked in the customer's plant, as age, temperature, humidity and catalyst will produce varied gel times.

The catalyst level should not exceed 2.4% or fall below 0.9% for proper cure. Recommended range is 0.9% to 2.4% with 1.2% at 77°F being ideal.

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 Limitations

Un-catalyzed, standard cure polyester products have a shelf life of 3 months from date of shipment when stored at 73°F or below in a closed, factory-sealed, opaque container, and out of direct sunlight.

MSDS / Data Sheets

Available in printable format online at www.ccpcompositesus.com.

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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(Rev. 01/12)