STYPOL®

LTP Series
Toughened Product Laminating Resins

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Description

Polynt's STYPOL® LTP Series toughened product laminating resins are pre-promoted, thixotropic resins containing styrene monomer. This series is designed for open mold processes where hand lay-up and spray-up applications are used with neat resin.

All STYPOL® LTP Series resins meet the EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) for Reinforced Plastic Composites Production. The following STYPOL® LTP Series resins also meet the EPA NESHAP for Boat Manufacturing and California's SCAQMD Rule 1162: A-C and G-I.

Features and Benefits

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

STYPOL® LTP Series resins are low profile systems that demonstrate superior tensile elongation and tensile strength. Along with these qualities, these resins also provide superior surface cosmetics and faster wet out characteristics. The STYPOL® LTP toughened product laminating resin series provides superior strength and toughness as well as excellent resistance to mechanical fatigue.

Application Characteristics

Type	Viscosity	Cure
A	Regular	Regular
B	Regular	Thin
C	Regular	Thick
D	Low	Regular
E	Low	Thin
F	Low	Thick
G	High	Regular
H	High	Thin
I	High	Thick

Typical Liquid Properties (at 77°F)

The viscosity and cure properties of STYPOL® LTP 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, and testing equipment (type and procedure) can each have a significant effect on the results. Products with properties outside of these readings can perform acceptably. Final suitability of these products is in the end use performance.

A. Viscosity Properties

STYPOL® LTP Series resins are available in three viscosity grades: regular, low and high.

Regular Viscosity	Low Viscosity	High Viscosity
• Standard lamination with good wet-out	• Superior wet-out • Maximum fiber wetting with high glass content	• 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

B. Cure Properties

STYPOL® LTP Series resins are available with three cure profiles depending on laminate thickness and trimming requirements.

Cure Profile	Characteristics
Regular Cure (125-180 mils) (A, D, G)	• Moderate cure time • Single stage or multi-pass lamination • Moderate exotherm
Thin Cure (< 125 mils) (B, E, H)	• Quickest cure • Designed for multi-pass applications • Quick Barcol development • Made for high glass content applications
Thick Cure (> 180 mils) (C, F, I)	• Slower cure than regular • Single stage lamination • Reduced exotherm

Choose the desired gel time for your specific product. Gel times are available for products A-I. Mid-range values are shown.

Standard Gel Times [1] (minutes)							
12	17	22	27	32	37	42	45

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

Physical Properties

The physical properties of STYPOL® LTP Series resins 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**.**

Test	Test Method [1]	Neat Resin Casting [2]	Laminate [3]	Neat Resin Casting [4]
Tensile Strength	ASTM D638	7,100 psi	13,200 psi	8,440 psi
Tensile Modulus		600,000 psi	1,310,000 psi	452,000 psi
Tensile Elongation		N/A	1.6%	2.2%
Flexural Strength	ASTM D790	13,200 psi	25,800 psi	14,800 psi
Flexural Modulus		580,000 psi	1,200,000 psi	519,000 psi
Heat Distortion Point at 264 psi	ASTM D648	158°F (70°C)	N/A	179°F (82°C)

[1] All tests run per internal Polynt test methods. These methods are similar to the ASTM method listed above.

[2] Neat 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.

[3] Laminate - Resin catalyzed with 1.25% Arkema Luperox® DDM-9. The laminate schedule was two plies of 1.5 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.

[4] Neat resin casting catalyzed with 1.25% Arkema Luperox® DDM-9. The casting cured for 16 hours at room temperature and was post cured for 5 hours at 212°F (100°C).

Application

STYPOL® LTP 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 overmix STYPOL® LTP Series resins. Overmixing 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 customers check the cure rate in their plant.

STYPOL® LTP 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® LTP Series resins are quality control tested using Arkema Luperox® DDM-9 MEKP catalyst. United Initiators Norox® MEKP-9 is expected to yield similar performance. Other MEKP peroxides such as Arkema Luperox® DHD-9, United Initiators Norox® MEKP-925 and Pergan HP®-90 may also be used but gel time will vary.

An AAP catalyst (also known as 2,4-Pentanedione Peroxide) such as United Initiators Norox® Azox or Arkema Luperox® 224 should be considered if your fabrication process requires building thin laminates using regular or thick cure STYPOL® LTP resins. AAP type catalyst should not be used with thin or trim cure STYPOL® LTP resins.

A MEKP/CHP blended catalyst such as United Initiators Norox® MCP-75 can be used to control exotherm if your fabrication process requires building thick laminates with thin or regular cure STYPOL® LTP Series resins. The use of a MEKP/CHP blended catalyst is not recommended for thin sections, during cool weather conditions, or with thick cure STYPOL® LTP Series resins. The use of a MEKP/CHP catalyst under these conditions can result in an inadequate cure. The use of straight CHP catalyst is not recommended.

Refer to MB-334 for recommended catalysts or contact a representative of Polynt Composites.

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 Polynt representative for acceptable catalyst ranges for AAP or MEKP/CHP blends.

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

Adhesion

It is recommended that all laminates that have been heat cured, exposed to direct sunlight, or allowed to cure for more than 72 hours at room temperature be sanded before the next laminate is applied.

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 Polynt Composites.

Related Documents

MB-334 Recommended Initiators for Polynt STYPOL® L-Series and ArmorStar® Series Laminating Resins

Storage Limitations

STYPOL® LTP Series resins have a shelf life of 120 days from date of manufacture when stored at 73°F or below in a closed, factory sealed, opaque container, and out of direct sunlight. The shelf life is cut in half for every 20°F over 73°F.

SDS / Data Sheets

SDS and data sheets can be obtained by contacting your Polynt representative or Polynt Customer Service at 800-322-8103.