



# STYPOL®

## MST

### Structural Molding Resin

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#### Type

CCP's MST structural molding resins are terephthalics designed for use in producing bulk molding compound (BMC), sheet molding compound (SMC) or wet molding pastes that will be press molded into a wide variety of parts.

#### Usage

MST resins recommended for applications requiring excellent mechanical properties and good temperature resistance.

#### Distinguishing Characteristics

MST offers the following features:

- Excellent mechanical properties
- Good temperature resistance
- Excellent pigmentation

#### 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.

#### Values for Viscosity Classifications

Viscosity Grade	C	F	M
Nominal Viscosity, cps	600	1200	2300
Non-Volatile Matter	63%	65%	68%



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<b>Acid Value</b>	16	17	18
<b>Water Content</b>	0.2 max.	0.2 max.	0.2 max.

<sup>1</sup>Viscosity test method is FCTM 400. (Brookfield LVF, 77°F, spindle and rotation speed as appropriate for expected viscosity.)

<sup>2</sup>Non-volatile matter test method is FCTM 300.8.

<sup>3</sup>Acid value test method is FCTM 100.

**Values for Gel Time Classifications**

<b>Gel Time Grade</b>	<b>04</b>	<b>10</b>	<b>20</b>
<b>Gel Time</b>	4 min.	10 min.	20 min.
<b>Gel to Peak Exotherm</b>	1.3 min.	2.0 min.	2.5 min.
<b>Peak Exotherm</b>	440°F	430°F	425°F

<sup>1</sup>Gel properties per FCTM 500, SPI Gel Time, 1% BPO catalyst, 180°F Water Bath.

**Application Data:**

The following application data show use of MST series resins in BMC, and SMC. Example formulations are shown. Molded panel data, which may include mechanical properties, linear shrinkage and pigmentation uniformity, are included for each formulation. Typical thickening data are included for SMC formulas.

**Pigmented Low Shrink General Purpose BMC Formula**

<b>Component</b>	<b>Description</b>	<b>Parts</b>	<b>Weight %</b>
MST-M-0400	Molding resin	70	14.33
ACP-W-4000	Low shrink additive	30	6.14
Luperox® P <sup>1</sup>	t-Butyl Perbenzoate catalyst	1.2	0.25
Parabenzoquinone (pBQ)	Cure inhibitor	0.03	0.01
BYK®-W 996 <sup>2</sup>	Viscosity reducer	2.0	0.41
BYK®-W 972 <sup>2</sup>	Dispersing additive	1.0	0.20
Zinc Stearate	Internal mold release	5.0	1.02
Mogul L <sup>3</sup>	Carbon black pigment	1.5	0.31
Camel-Fil® <sup>4</sup>	Calcium carbonate filler	280	57.33
Vetrotex 919-A4 <sup>5</sup> (1/2 inch)	Chopped roving fiberglass	97.7	20.00



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- <sup>1</sup>Luperox® P is a product of ATOFINA.
- <sup>2</sup>BYK®-W 996 and BYK®-W 92 are products of BYK Chemie.
- <sup>3</sup>Mogul L is a product of Cabot Corporation.
- <sup>4</sup>Camel-Fil® is a product of IMERYS.
- <sup>5</sup>Vetrotex 919-A4 is a product of Vetrotex America

The following data represent typical values for the formula listed above. These values were obtained from panels molded at 300°F and 960 psi for three minutes. Panel thickness was approximately 0.125 inch. Actual customer results may vary.

**Molded Panel Data**

Data Type	Test Description	Value	Test Method
Physical Properties	Tensile Stress	5,000 psi	ASTM D638
	Tensile Modulus	680,000 psi	
	Elongation	0.52 %	
	Flexure Stress	12,600 psi	ASTM D790
	Flexure Modulus	1,900,000 psi	
		Glass Content	18.9 %
Shrinkage	Linear Shrinkage	0.4 mils/inch	FCTM 3010

**Injection Molding BMC Formula**

<u>Component</u>	<u>Description</u>	<u>Parts</u>	<u>Weight %</u>
MST-M-0400	Molding resin	80	22.28
ACP-W-4000 <sup>1</sup>	Low shrink additive	20	5.57
Luperox® P <sup>2</sup>	t-Butyl Perbenzoate catalyst	1.2	0.33
Zinc Stearate	Internal mold release	4.0	1.12
Clay	Filler	20	5.57
Calcium Carbonate	Filler	180	50.13
Vetrotex 919-A4 <sup>3</sup> (1/4 inch)	Chopped roving fiberglass	53.8	15.00

<sup>1</sup>MST structural resins work well with polystyrene for pigmentable finishes. It can also be used with STYPOL® 040-0188 polyvinyl acetate low profile additive. Microthene can also be used as part of the low shrink additive.

<sup>2</sup>Luperox® P is a product of ATOFINA.

<sup>3</sup>Vetrotex 919-A4 is a product of Vetrotex America.



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**Pigmented Low Shrink General Purpose SMC Formula**

Component	Description	Parts	Weight %
MST-M-0400	Molding resin	75	19.21
AIP-Y-4000	Low shrink additive	25	6.40
Luperox® P <sup>1</sup>	t-Butyl Perbenzoate catalyst	1.2	0.31
Luperox® 26 <sup>2</sup>	t-Butyl Peroxy-2-ethylhexanoate catalyst	0.05	0.01
Parabenzoquinone (pBQ)	Cure inhibitor	0.03	0.01
BYK® -W 972 <sup>3</sup>	Dispersing additive	1.0	0.26
BYK® -W 996 <sup>3</sup>	Viscosity reducer	2.0	0.51
Zinc Stearate	Internal mold release	4.5	1.15
Camel-Fil® <sup>4</sup>	Calcium carbonate filler	200	51.22
Mogul L <sup>5</sup>	Carbon black pigment	1.5	0.38
PG-9033 <sup>6</sup>	38% MgO dispersion	2.1	0.54
PPG 5509 <sup>7</sup> (1 inch)	Continuous roving fiberglass	78.1	20.00

<sup>1</sup>Luperox® P is a product of ATOFINA.

<sup>2</sup>Luperox® 26 is a product of ATOFINA.

<sup>3</sup>BYK® -W 972 and BYK® -W 996 are products of BYK Chemie.

<sup>4</sup>Camel-Fil® is a product of IMERYS.

<sup>5</sup>Mogul L is a product of Cabot Corporation.

<sup>6</sup>PG-9033 is a product of Plasticolors.

<sup>7</sup>PPG 5509 is a product of PPG Industries, Inc.

The following data represent typical values for the formula listed above. These values were obtained from panels molded at 300°F and 960 psi for three minutes. Panel thickness was approximately 0.125 inch. Actual customer results may vary.

**Molded Panel Data**

Data Type	Test Description	Value	Test Method
Physical Properties	Tensile Stress	9,600 psi	ASTM D638
	Tensile Modulus	2,200,000	
	Elongation	1.5%	



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	Flexure Stress	23,000	ASTM D790
	Flexure Modulus	1,400,000	
	Glass Content	22%	ASTM D2584
Shrinkage	Linear Shrink	1.3 mils/inch	FCTM 3010
Pigmentation	Daylight E value	9.47	PE 111
	E Standard Deviation	0.49	

**Pigmented High Glass SMC Formula**

Component	Description	Parts	Weight %
MST-M-0400	Molding resin	80	21.46
ACP-W-4000	Low shrink additive	20	5.37
Luperox <sup>®</sup> P <sup>1</sup>	t-Butyl Perbenzoate catalyst	1.2	0.32
Luperox <sup>®</sup> 26 <sup>2</sup>	t-Butyl Peroxy-2-ethylhexanoate catalyst	0.05	0.01
Parabenzquinone (pBQ)	Cure inhibitor	0.03	0.01
BYK <sup>®</sup> -W 972 <sup>3</sup>	Dispersing additive	1.0	0.27
BYK <sup>®</sup> -W 996 <sup>3</sup>	Viscosity reducer	2.0	0.54
Zinc Stearate	Internal mold release	4.5	1.21
Camel-Fil <sup>®</sup> 4	Calcium carbonate filler	130	34.88
Mogul L <sup>5</sup>	Carbon black pigment	1.5	0.40
PG-9033 <sup>6</sup>	38% MgO dispersion	1.98	0.53
PPG 5509 <sup>7</sup> (1 inch)	Continuous roving fiberglass	129.9	35.00

<sup>1</sup>Luperox<sup>®</sup> P is a product of ATOFINA.

<sup>2</sup>Luperox<sup>®</sup> 26 is a product of ATOFINA.

<sup>3</sup>BYK<sup>®</sup> -W 972 and BYK<sup>®</sup> -W 996 are products of BYK Chemie.

<sup>4</sup>Camel-Fil<sup>®</sup> is a product of IMERYS.

<sup>5</sup>Mogul L is a product of Cabot Corporation.

<sup>6</sup>PG-9033 is a product of Plasticolors.

<sup>7</sup>PPG 5509 is a product of PPG Industries, Inc.

The following data represent typical values for the formula listed above. These values were measured with a Brookfield HBDV 5x Viscometer at 90°F. Actual customer results may vary.



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**Thickening Data (FCTM 400)**

Elapsed Time	Spindle/Speed	Viscosity (cps)
Initial	T A @ 5.0 rpm	80,000
20 Minutes	T E @ 5.0 rpm	1,390,000
1 Hour	T E @ 5.0 rpm	6,860,000
1 Day	T F @ 1.0 rpm	28,400,000
2 Days	T F @ 1.0 rpm	30,400,000
1 Week	T F @ 1.0 rpm	38,800,000

The following data represent typical values for the formula listed above. These values were obtained from panels molded at 300°F and 960 psi for three minutes. Panel thickness was approximately 0.125 inch. Actual customer results may vary.

**Molded Panel Data**

Data Type	Test Description	Value	Test Method
Physical Properties	Tensile Stress	12,800 psi	ASTM D638
	Tensile Modulus	1,800,000 psi	
	Elongation	1.59 %	
	Flexure Stress	25,600 psi	ASTM D790
	Flexure Modulus	1,545,000 psi	
	Glass Content	32.3 %	
Shrinkage	Linear Shrink	0.8 mils/inch	FCTM 3010
Pigmentation	Daylight E value	12.53	PE 111
	E Standard Deviation	0.29	



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**Non-pigmented High Glass SMC Formula**

Component	Description	Parts	Weight %
MST-M-0400	Molding resin	80	21.33
ASP-B-5000	Low profile additive	20	5.33
Luperox® P <sup>1</sup>	t-Butyl Perbenzoate catalyst	1.2	0.32
<b>Luperox® 26<sup>2</sup></b>	t-Butyl Peroxy-2-ethylhexanoate catalyst	0.1	0.027
Parabenzoquinone (pBQ)	Cure inhibitor	0.03	0.0080
BYK®-W 996 <sup>3</sup>	Viscosity reducer	2.0	0.53
Zinc Stearate	Internal mold release	4.5	1.20
Sachtolith® HD-S <sup>4</sup>	Zinc sulfide pigment	4.0	1.07
Camel-Fil® <sup>5</sup>	Calcium carbonate filler	130	34.66
PG-9033 <sup>6</sup>	38% MgO dispersion	1.98	0.53
PPG 5530 <sup>7</sup> (1 inch)	Continuous roving fiberglass	131.28	35.00

<sup>1</sup>Luperox® P is a product of ATOFINA.

<sup>2</sup>Luperox® 26 is a product of ATOFINA.

<sup>3</sup>BYK®-W 996 is a product of BYK Chemie.

<sup>4</sup>Sachtolith® HD-S is a product of Sachtleben Chemie.

<sup>5</sup>Camel-Fil® is a product of IMERYS.

<sup>6</sup>PG-9033 is a product of Plasticolors.

<sup>7</sup>PPG 5530 is a product of PPG Industries, Inc.

**Thickening Data (FCTM 400)**

Elapsed Time	Spindle/Speed	Viscosity (cps)
Initial	T A @ 5.0 rpm	35,200
20 Minutes	T A @ 5.0 rpm	294,000
1 Hour	T E @ 5.0 rpm	2,440,000
1 Day	T F @ 1.0 rpm	28,800,000
2 Days	T F @ 1.0 rpm	32,000,000
1 Week	T F @ 1.0 rpm	39,600,000

The following data represent typical values for the formula listed above. These values were obtained from



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panels molded at 300°F and 960 psi for three minutes. Panel thickness was approximately 0.125 inch. Actual customer results may vary

**Molded Panel Data**

Data Type	Test Description	Value	Test Method
Physical Properties	Tensile Stress	12,200 psi	ASTM D638
	Tensile Modulus	1,720,000 psi	
	Elongation	1.37 %	
	Flexure Stress	28,200 psi	ASTM D790
	Flexure Modulus	1,470,000 psi	
	Glass Content	28.1 %	ASTM D2584
Shrinkage	Linear Shrink	0.9 mils/inch	FCTM 3010

**Storage**

MST resins have a minimum usage life of three months from the date of shipment when stored at 77°F or below in factory-sealed opaque containers out of direct sunlight.

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WARRANTIES, DISCLAIMERS AND LIMITATION OF LIABILITY (Rev. 10/11)**

Seller warrants that: (i) Buyer shall obtain good title to the product sold hereunder, (ii) at Shipment such product shall conform to Seller's specifications; and (iii) the sale or use of such product will not infringe the claims of any U.S. patent covering the product itself, but Seller does not warrant against infringement which might arise by the use of said product in any combination with other products or arising in the operation of any process. **SELLER MAKES NO OTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE, EVEN IF THAT PURPOSE IS KNOWN TO SELLER. ANY APPLICATION INFORMATION OR ASSISTANCE WHICH SELLER MAY FURNISH TO BUYER IS GRATUITOUS AND SHALL IN NO WAY BE DEEMED PART OF THE SALE OF PRODUCT HEREUNDER OR A WARRANTY OF THE RESULTS OBTAINED THROUGH THE USE OF SUCH PRODUCT.**

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.

**FOR INDUSTRIAL USE AND PROFESSIONAL APPLICATION ONLY. KEEP OUT OF REACH OF CHILDREN.**