CCP POLYCOR® STYPOL®

# STYPOL® 040-8085
# RESIN TRANSFER MOLDING

## DESCRIPTION:

CCP's STYPOL® 040-8085 is an unsaturated polyester resin containing styrene monomer. This resin is a low-shrink polymer that yields high quality cosmetic parts without the use of a low profile additive. STYPOL® 040-8085 is designed to cure with different peroxide catalysts for different gel and cure scenarios. This flexibility allows optimum cycle times to be established for different classes of parts.

## FEATURES AND BENEFITS:

- Superior surface cosmetics with gel coat
- Resistance to fiberglass pattern print-through
- Minimal mold build-up due to polystyrene/release agent residue
- High heat distortion temperature
- Low exotherm temperature for moderate thicknesses
- Rapid production rates
- Various gel times with different catalysts

## USES:

STYPOL® 040-8085 is formulated specifically for RTM (Resin Transfer Molding). It is designed for moderately rapid production cycles of 10 minutes to 40 minutes without gel coat, or 1 to 2 hours with gel coat. The resin exhibits excellent mold release characteristics with minimal mold buildup due to polystyrene and/or mold release residue. It may be used as is or with filler and/or pigment. Fillers such as calcium carbonate, calcium sulfate or alumina trihydrate may be used from 20 to 50% by weight. Proper and allowable filler ranges are dependent upon part and mold design.

RTM is an economical closed molding process that is ideally suited to replace open mold processes for many parts. For production runs of over 1000 parts, RTM can be a lower cost manufacturing process than open molding. In addition, RTM offers zero emissions of Hazardous Air Pollutants (HAP) during the molding process.

## RELATED PRODUCTS:

STYPOL® 040-8086 is a slower curing version of STYPOL® 040-8085. STYPOL® 040-8086 is designed specifically for Light RTM (laminate shell resin transfer molding) and provides enhanced cosmetic quality.

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**TYPICAL LIQUID PROPERTIES:**

These values are nominal properties that are listed for reference only. Particular batches will vary within normal manufacturing tolerances because storage conditions, temperature changes, age, and testing equipment (type and procedure) can each have a significant effect on the results. Resin properties that vary from these nominal values can perform in an acceptable manner. Final suitability of this product is in the end use performance.

| Test | Value |
|---|---|
| Viscosity at 77°F, | |
| Brookfield LVF #3 Spindle @ 50 rpm | 125 cps |
| Weight per Gallon | 9.0 lbs. |
| Non-Volatile Material | 64% |
| Flash Point | 31°C (88°F) |
| Reactivity @ 77°F (25°C) with 1.25% DDM-9 | |
| Gel Time, Cup, 100g | 8.5 minutes |
| Peak Exotherm, Cup, 100g | 345°F |

## CURE:

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

This resin is designed to cure with various catalyst systems. For the quickest cure, Acetyl Acetone Peroxide (AAP, also known as 2,4-Pentanedione Peroxide) should be used. For thicker parts and /or hot weather conditions, an AAP/CHP (cumene hydroperoxide) blend should be used. For a slightly longer gel and cure time, a standard MEK peroxide should be used. Under hot weather conditions, a CHP blended MEKP should bee used. Use of CHP blended catalysts for thin sections or during cool weather conditions can result in an inadequate cure at low catalyzation levels. Use of straight CHP catalyst is not recommended.

To maximize mold life, part exotherm temperatures must be kept within the limits of the tooling materials. For a typical polyester gel coat and resin mold, exotherm temperatures should be kept below the HDT of the materials used in the mold. To achieve this, any given part design should have a reasonable thickness consistency. For thin parts, the thickness should range between 0.060 inch and 0.14 inch. For moderate parts, thickness should range within 0.12 inch to 0.18 inch. For thick parts, thickness should range within 0.16 inch and 0.25 inch. This is necessary to ensure sufficient cure in thin areas of the part without building excessive heat in thicker sections. These thicknesses do not include the thicknesses of embedded (but non-reactive) cores such as balsa, plywood or PVC foam.

Refer to the following chart for catalyst recommendations. The catalyst level should not exceed the maximum nor fall below the minimum recommendations for most instances. This will help to ensure proper cure. However, part thickness influences cure, so the following is only a guide. Quality control and nominal reactivity is established with 1.25% DDM-9 at 77°F.

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

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The following table presents typical 100 gram cup gel time ranges for STYPOL® 040-8085 resin using various peroxide initiators:

| Peroxide Type | NORAC | ARKEMA | Min,% | Max,% | Gel Time@ 1.25%/77°F |
|---|---|---|---|---|---|
| AAP | AZOX | 224 | 0.8 | 2.3 | 4-8 minutes |
| AAP/CHP Blend | 750 | | 0.9 | 2.4 | 6-10 minutes |
| MEKP | | DDM-9 | 0.9 | 2.5 | 8-12 minutes |
| MEKP/CHP Blend | MCP-75 | | 1.2 | 2.6 | 10-14 minutes |

## PHYSICAL PROPERTIES:

Polyesters do not develop ultimate physicals properties right away. Time and/or heat are needed to reach full cure. Heat may come from internal exotherm or external sources. The amount of catalyst will influence the extent of cure. With time and/or heat, a "moderate cure" will develop into "ultimate" physical properties.

When the part reaches ultimate cure depends upon time, temperature and satisfactory catalyzation. Too much or too little catalyst can result in permanent under-cure, which cannot be overcome. Practically speaking, serviceable cure time will range from overnight to a week and occasionally longer due to various circumstances. Small, properly catalyzed, thin laminates that do not exotherm and do not receive external heat may take months or more to achieve ultimate physicals. Sufficient external heat can reduce the cure time to less than a day.

Typical physical properties for STYPOL® 040-8085 are presented in the following table. Specimens were initiated with 1.25% AAP (Norac AZOX) at 77°F, cured overnight at room temperature (77°F), post-cured for 1 hour at 187°F (86°C), and 2 hours at 248°F (120°C). The laminates were produced with chopped strand mat at 30 wt% glass.

| Test | Casting | Laminate | Test Method |
|---|---|---|---|
| Barcol Hardness | 40 | 45 | ASTM D-2583 |
| Tensile Strength | 6800 psi | 12.,000 psi | ASTM D-638 |
| Tensile Modulus | $0.63 \times 10^6$ psi | $1.30 \times 10^6$ psi | ASTM D-638 |
| Tensile Elongation | | 1.40% | ASTM D-638 |
| Flexural Strength | 10,000 psi | 22, 200 psi | ASTM D-790 |
| Flexural Modulus | $0.60 \times 10^6$ psi | $1.02 \times 10^6$ psi | ASTM D-790 |
| Heat Distortion Temp @ 264 psi | 185ºF | N/A | ASTM D-648 |

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## CAUTION:

Do not add any material, other than the recommended fillers, pigments and methyl ethyl ketone peroxide (MEKP), acetyl acetone peroxide (AAP), or mixtures of cumene hydroperoxide (CHP) and either MEKP or AAP. Acetyl acetone peroxide is another name for 2,4-pentanedione peroxide; *do not confuse 2,4-pentanedione peroxide with 2,4-pentanedione.*

## STORAGE LIMITATIONS:

Uncatalyzed, standard cure polyester products have a storage life of 120 days 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.

## SHIPPING:

Shipment is made in 5-gallon pails, standard 55-gallon, closed head steel drums or tank wagons.

## DATA SHEETS/MSDS:

CCP data sheets and MSDS's are available in printable format at www.ccponline.com.

DCL 04/07

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**POLYESTER SAFETY INFORMATION**
**(Revised 09/00, supersedes 06/92)**

All sales of products manufactured by Cook Composites and Polymers Co. (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 polyester 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 polyester 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) has reclassified styrene as Group 2B, "possibly carcinogenic to humans." This new classification is 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 has 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 polyester 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.

If the label or Material Safety Data Sheet indicates lead or lead chromate is present, do not use on toys, furniture or surfaces that might be chewed by children. Wash hands thoroughly after using and before smoking or eating. Long-term overexposure by inhalation or ingestion of mists and dusts from products containing lead compounds and lead chromate can cause harmful effects to the urinary, blood, reproductive and nervous systems and may create risk of cancer. Use a respirator as explained in Paragraph 4 of this Information Sheet.

Some polyester 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, 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.

Polyester 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 polyester 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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**WARRANTY, DISCLAIMER, AND LIMITATION OF LIABILITY**

**(Rev. 12/02, supersedes 06/01)**

Seller warrants to Buyer that, at the time of shipment, the products sold hereunder shall meet Seller's then-applicable specifications for such product. Seller's specifications may be changed at any time without notice to Buyer. To assert a warranty claim, Buyer must give Seller notice in writing of the alleged failure of the product to conform to the applicable specifications (together with all identifying details, including the product code(s), description and date of purchase) within thirty (30) days of the date of shipment of the product to Buyer and, upon Seller's request, shall return the alleged nonconforming product. The failure of Buyer to assert a claim within such period shall be an admission by Buyer and conclusive proof that such product is in every respect as warranted and shall release Seller from all claims for damage or loss in respect of such product. **THE WARRANTY DESCRIBED HEREIN SHALL BE IN LIEU OF ANY OTHER WARRANTY, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE DESCRIPTION ON THE FACE HEREOF.** Without limiting the generality of the foregoing, the warranty provided above does not extend to damage, loss, or injuries caused by or in any way related to misuse, misapplication, abuse, improper handling or storage of the product; normal weathering (including but not limited to cracking and blistering); or any cause beyond the control of Seller. Seller further disclaims any and all liability for Buyer's decision to modify, amend or reject any recommendation set forth herein. Seller does not warranty or guarantee that implementation of any of the recommendations set forth herein constitute compliance with any federal, state or local laws or regulations. Final determination of the suitability of the product for the use contemplated, the manner of use, and whether the use infringes any patents is the sole responsibility of Buyer.

Buyer's sole and exclusive remedy against Seller shall be, at Seller's option, the replacement of the nonconforming product or refund of the purchase price. NO OTHER REMEDY SHALL BE AVAILABLE TO BUYER. In no event shall Seller be liable for lost profits, lost sales or business opportunity, downtime, claims of Buyer's customers, injury to person or property, or any incidental, consequential, punitive, or special damages, or for labor or other costs in connection with testing, replacing, or returning product, whether such claim is made in contract, tort, strict liability, negligence or any other legal theory.