DESCRIPTION:
CCP’s STYPOL® 040-8086 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® 040-8086 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
- Moderate production rates
- Various gel times with different catalysts

USES:
STYPOL® 040-8086 is formulated specifically for Light RTM (Laminate Shell Resin Transfer Molding). It is designed for moderate rate production cycles of 60 minutes to 2 hours without gel coat, or 2 to 4 hours with gel coat. These cycle times allow for optimal control of exotherm temperature, which results in optimum cosmetic quality. 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.

Light RTM is a very economical closed molding process that is ideally suited to replace open mold processes. For production runs of over 100 parts, Light RTM can be a lower cost manufacturing process than open molding. In addition, Light RTM offers zero emissions of Hazardous Air Pollutants (HAP) during the molding process.
STYPOL® 040-8086 Light RTM Resin for Cosmetic Quality Parts
Copyright 2000-2007

**RELATED PRODUCTS:**
STYPOL® 040-8085 is a faster curing version of STYPOL® 040-8086.

**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.

<table>
<thead>
<tr>
<th><strong>Test</strong></th>
<th><strong>Value</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Viscosity at 77°F, Brookfield LVF #3 Spindle @ 50 rpm</td>
<td>85 cps</td>
</tr>
<tr>
<td>Weight per Gallon</td>
<td>9.0 lbs.</td>
</tr>
<tr>
<td>Non-Volatile Material</td>
<td>61%</td>
</tr>
<tr>
<td>Flash Point</td>
<td>31°C (88°F)</td>
</tr>
<tr>
<td>Reactivity @ 77°F (25°C) with 1.25% Norox AZOX</td>
<td></td>
</tr>
<tr>
<td>Gel Time, Cup, 100g</td>
<td>20 minutes</td>
</tr>
<tr>
<td>Peak Exotherm, Cup, 100g</td>
<td>315°F</td>
</tr>
</tbody>
</table>

**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 be 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.

Cook Composites & Polymers
P.O. Box 419389 Kansas City, MO 64141-6389
Ph: (816) 391-6000 Fax: (816) 391-6125
www.ccponline.com
Page 2 of 7
CURE continued:

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 in the 120°F to 140°F range. 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 to 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% Norox AZOX (AAP) at 77°F.

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

The following table presents typical 100 gram cup gel time ranges for STYPOL® 040-8086 resin using various peroxide initiators:

<table>
<thead>
<tr>
<th>Peroxide Type</th>
<th>NORAC</th>
<th>ARKEMA</th>
<th>Min, %</th>
<th>Max, %</th>
<th>Gel Time@ 1.25%/77°F</th>
</tr>
</thead>
<tbody>
<tr>
<td>AAP</td>
<td>AZOX</td>
<td>224</td>
<td>0.8</td>
<td>2.3</td>
<td>18-22 minutes</td>
</tr>
<tr>
<td>AAP/CHP Blend</td>
<td>750</td>
<td></td>
<td>0.9</td>
<td>2.4</td>
<td>26-30 minutes</td>
</tr>
<tr>
<td>MEKP</td>
<td>MEKP-9</td>
<td></td>
<td>0.9</td>
<td>2.5</td>
<td>31-35 minutes</td>
</tr>
<tr>
<td>MEKP</td>
<td>DDM-9</td>
<td></td>
<td>0.9</td>
<td>2.5</td>
<td>40-44 minutes</td>
</tr>
<tr>
<td>MEKP/CHP Blend</td>
<td>MCP-75</td>
<td></td>
<td>1.2</td>
<td>2.6</td>
<td>50-54 minutes</td>
</tr>
</tbody>
</table>

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...
PHYSICAL PROPERTIES continued:
occasionally longer due to circumstances. Small, properly catalyzed, thin laminates that do not
exotherm and do not receive external heat may take months or years to achieve ultimate
physicals. Sufficient external heat can reduce the cure time to less than a day.

Typical physical properties for STYPOL® 040-8086 are presented in the following table. Specimens were initiated with 1.25% AAP (Norox 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.

<table>
<thead>
<tr>
<th>Test</th>
<th>Casting</th>
<th>Laminate</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barcol Hardness</td>
<td>40</td>
<td>45</td>
<td>ASTM D-2583</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>6800 psi</td>
<td>12,000 psi</td>
<td>ASTM D-638</td>
</tr>
<tr>
<td>Tensile Modulus</td>
<td>0.63 x 10^6 psi</td>
<td>1.30 x 10^6 psi</td>
<td>ASTM D-638</td>
</tr>
<tr>
<td>Tensile Elongation</td>
<td></td>
<td>1.40%</td>
<td>ASTM D-638</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>10,000 psi</td>
<td>22,200 psi</td>
<td>ASTM D-790</td>
</tr>
<tr>
<td>Flexural Modulus</td>
<td>0.60 x 10185°F</td>
<td>1.02 x 10^6 psi</td>
<td>ASTM D-790</td>
</tr>
<tr>
<td>Heat Distortion Temp @ 264 psi</td>
<td></td>
<td>N/A</td>
<td>ASTM D-648</td>
</tr>
</tbody>
</table>

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-pentanediione
peroxide; do not confuse 2,4-pentanediione peroxide with 2,4-pentanediione.

STORAGE LIMITATIONS:
Uncatalyzed, standard cure polyester products have a storage life of 90 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.cccponline.com.

Cook Composites & Polymers
P.O. Box 419389 Kansas City, MO 64141-6389
Ph: (816) 391-6000 Fax: (816) 391-6125
www.cccponline.com
COOK COMPOSITES AND POLYMERS CO.

WARRANTIES, DISCLAIMERS, AND LIMITATION OF LIABILITY (Rev. 03/09)

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 in 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.
COMPOSITES SAFETY INFORMATION
(January 2008)

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 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 workplace 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, 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.

Cook Composites & Polymers
P.O. Box 419389 Kansas City, MO 64141-6389
Ph: (816) 391-6000 Fax: (816) 391-6125
www.ccponline.com
Page 7 of 7