

POLYCOR®

945XJ142

Neutral Vinyl Ester Tooling Gel Coat

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Description

POLYCOR® 945XJ142 neutral, vinyl ester tooling gel coat is formulated for use in building molds for the composites industry. It is specifically formulated for use on molds where translucency is needed such as a counter mold for Light RTM or it can also be used as to provide a color contrast when using multiple layers of tooling gel coat.

POLYCOR® 945XJ142 is precision-formulated to ensure extended mold life. Unique benefits include

- High heat distortion temperature
- Abrasion resistance
- High gloss surface
- Excellent gloss retention with repeated moldings
- While offering these benefits, POLYCOR® 945XJ142 gel coat retains the important construction and application qualities expected from CCP gel coats, such as resistance to porosity, sag resistance, consistent liquid properties, and more. These all add up to higher quality, longer life composite molds made with CCP POLYCOR® 945XJ142.

Liquid Properties: (at 77°F)

Typical properties of POLYCOR® 945XJ142 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, testing equipment (type and procedure) can each have a significant effect on the test results. Gel coats with properties outside of these ranges can perform acceptably.

Test	Value
Viscosity, Brookfield RVF #5 Spindle @ 20 rpm	5,500 cps
Thixotropic Index (10/100)	6.0
Flash Point	88°F
Hazardous Air Pollutants	See MSDS for amounts
Volatile Organic Compound	45.3%



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Weight per Gallon	9.00 lbs
Gel Time with 2.0% Norox [®] MEKP 925	16 minutes
Lay-up Time	60 - 90 minutes
Sag Resistance	Good at 20 mils

Refer to the MSDS for handling precautions. MSDS's will be supplied automatically with the first order for material, and are available by product code upon request from CCP's Regulatory Department and at www.ccpcompositesus.com.

Physical Properties

The physical properties of POLYCOR[®] 945XJ142 are shown below. 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 gel coat. Gel coat at different stages of cure will have varying properties.

Test	Value
Barcol Hardness ¹	25 – 35
Heat Distortion Temperature	
• One week at room temperature	144°F
• One week after a 150°F, 16 hour post cure	189°F

¹**Barcol readings are very sensitive to catalyst/mass/temperature.** The Barcol hardness above was determined as follows.

- Adjusting the tooling gel coat to 77°F.
- Catalyzing at 2.0 % Norox[®] MEKP 925
- Weighing 50 grams in an aluminum weighing dish and on an insulated surface.
- Maintaining 77°F ambient temperature.

Final determination (numbers) should be achieved in 75 minutes using the Model #934 Barcol Impressor.

Barcol of a tooling gel coat (or any gel coat) cannot accurately be measured on a films of the recommended application thickness. The Barcol needle will penetrate through the film and read the hardness of the substrate underneath.

Application

Application information specifically for POLYCOR[®] 945XJ142 is given below. Please refer to CCP's Composites Application Guide, for additional information on gel coat application and mold building.

The prime reason for using tooling gel coats for the manufacturing of fiberglass molds is to produce a

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blemish-free, durable, high gloss surface. It is to the user's advantage to exercise strict quality control and application procedures when using tooling gel coats. Proper application is very important, since many of the defects that result from poor application do not appear until the part has been removed from the mold.

POLYCOR® 945XJ142 gel coat must be mixed prior to use. This includes prior to production spray application and when obtaining material for patching or any material that has been set aside for patching. Several suitable types of mixing equipment and styles of agitators are available for both pails and drums. Regardless of the specific type used, the equipment must have 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.

Do not over mix POLYCOR® 945XJ142 gel coat. Over mixing can break down the gel coat viscosity increasing the tendency to sag. Over mixing can also result in styrene loss which could contribute to porosity. Air bubbling should not be used for mixing. It is not effective and only serves as a potential source of water or oil contamination.

Always keep the container covered (except, of course, when transferring material). An open container is easily contaminated and allows for more styrene evaporation.

Before using tooling gel coat to fabricate a mold, a gel coat test panel should be prepared. Prepare the panel using the same equipment, mold release, gel coat batch, catalyst, catalyst level, and application techniques as will be used on the mold. Make adjustments as needed until a satisfactory test panel (no porosity, pits, pinholes, etc.) is fabricated. Then use the same equipment, materials and techniques to fabricate the mold.

CCP recommends that masters or plugs used to build molds be prepared using a good grade of paste wax. It is imperative that the master or plug be thoroughly waxed to avoid any sticking problems. To further ensure successful release, a film-forming material such as PVA, that creates a physical barrier can be used. These film-forming materials will impart some surface roughness to the molded article and some sanding/finishing may be required to meet cosmetic requirements. Do not apply tooling gel coat over wet Polyvinyl Alcohol (PVA) parting film.

For mold making, CCP recommends that two coats tooling gel coat be applied. Each coat should be at 18±2 mils wet. The first coat should be allowed to gel and cure before applying the second coat. The two coats of tooling gel provides optimal resistance to cosmetic flaws such as print-through (fiber pattern) and distortion. Thinner films will show more cosmetic flaws. Films thicker than 40 mils wet total may be susceptible to cracking. The two coats of tooling gel also provide thickness for finishing, maintenance and repair operations that occur during the life of the mold.

POLYCOR® 945XJ142 gel coats are formulated for spray application. Brushing or rolling is not recommended. Best results are obtained using pressure pot spray equipment and batch mixing. The following equipment is recommended.



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Binks Equipment		DeVilbiss Equipment	
Fluid Nozzle	66 or 67	Gun	P-JGA-502
Air Nozzle	63 PB or 67 PB	Nozzle Combination	704-E
Needle	65 or 67	More than 17 C.F.M. required	
More than 13 C.F.M. required			

Do not spray more than 2.5 pounds per minute of tooling gel coat. A minimum of 60 psi atomizing pressure (measured at the gun with fan full open) should be used to properly atomize the tooling gel coat. Install oil and moisture trap on compressed air line leading to spray gun--to remove lint, rust, oil and moisture. Use the catalyzed tooling gel coat within its working life--with a proper allowance of time for cleanup of equipment.

Apply each coat with a minimum of two passes; three passes are preferred. For best results, ensure that the tooling gel coat is allowed to "breathe" for two minutes between each pass. Do not allow over-spray and thin passes to go beyond 5 minutes without covering with a fresh pass. Do not apply over 20 mils per coat, as this can result in crazing and cracking of the gel coat film after use. Do not apply less than 12 mils per coat, as poor cure can result in dulling of the mold in use. Thinner films will also exhibit more print-through and distortion. It is essential that no more than 40 mils (wet) total be applied with any of the tooling gel coats.

Each coat must cure as a total film rather than several thin films which might cure independently of each other. It is essential to cover over-spray and thin passes as soon as possible (within 5 minutes). Thin, independently curing films can create a textured effect when the surface is sanded and buffed.

While the best and most consistent results are achieved by using pressure pot spray equipment, POLYCOR® 945XJ142 may also be applied using other types of spray equipment including internal air atomized, airless, air-atomized airless or catalyst injection equipment. Use of these type of equipment increase the risk of porosity and for defects related to catalyst incorporation. To minimize these risks, the spray equipment must be well maintained and calibrated daily. Application procedure recommendations should be followed carefully. Poorly maintained equipment or poor application will quickly negate the beneficial properties of these gel coats. Tooling gel coats will not be as tolerant of inaccuracies in a catalyst injection system as are production gel coats.

When establishing the fan pattern for the spray equipment, use the lowest pump pressure needed to achieve a good fan pattern (no fingers or tails, uniform particle size of about 1/16"). Use of higher pressures can lead to a porosity or overspray. Overspray can result in a leathery or chicken skin texture if it falls on the part surface). Ensure complete atomization and mixing of gel coat and catalyst. If air-assist is used, keep it as low as possible. Excess air-assist can result in trapping air in the film and sagging.

CCP does not recommend fluid lines longer than 50 feet, or pumps smaller than 20:1 ratio. CCP recommends a gel coat delivery rate of 1.5 to 2.5 pounds per minute. Recommended gel coat tip size is .021 inches.

Apply the POLYCOR® 945XJ142 in two coats. To minimize sagging, the first coat should be applied 18±2



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mils wet in three passes. The second coat should be applied no more than 18±2 mils wet in three passes. Allow the gel coat to attain lay-up time between each coat. In spray application of tooling gel coat, use slow, even strokes--triggering spray gun at the end of each stroke--to prevent excess buildup at overlaps. Do not let raw catalyst fall on the plug surface or on the sprayed gel coat. Spray gun distance should be no less than two feet and no more than three feet.

Equipment and application should be constantly monitored to maintain effective calibration, gel coat/catalyst mixing, and procedures. This would require an assistant to ensure effective monitoring. When applied with care, tooling gel coat will provide a durable and long-lasting mold. However, when compared to a hot pot, where catalyst is pre-mixed into the gel coat, airless catalyst injection equipment and methods of application can cause problems such as:

Problem	Cause
Spotty cure sticking	Due to improper concentration, atomizing or mixing of catalyst from incorrect calibration and malfunctioning injector slave pumps.
Porosity	Due to excessive air-assist; flow rates greater than 2.5 pounds per minute; more than 6 to 8 mils wet in one pass; no catalyst.
Low initial gloss	Incorrect catalyst calibration; under-cured gel coat film; raw catalyst sprayed on plug.
Gloss dulling	Due to under- or over-catalyzation, hence under-cured gel coat.
Uneven film thickness	Operator error; excessive surges during spray-out
Sag	Excessive air-assist; too thick of film; spraying too close to the mold.

Cure

It is recommended that gel time be checked in the customer's plant because age, temperature, humidity and catalyst will produce varied gel times. All data referencing gel or cure refers specifically to Syrgis NOROX[®] MEKP-925. Luperox[®] DHD-9, NOROX[®] MEKP-925H, and Chemtura HP-90 are expected to yield similar performance.

As the material ages, the gel time may lengthen. The longer gel time will extend the casting Barcol time, but the eventual Barcol should achieve the values listed under physical properties.

The recommended catalyst range is 1.5% to 2.5% with 2.0% at 77°F being ideal. Do not over-catalyze. Excess catalyst plasticizes tooling gel coats.

Normally, the gel coat film is ready for lamination in 60 to 90 minutes. This time element is dependent on material temperature, room temperature, humidity, air movement, and catalyst concentration. If lay-up time is checked by the finger method, slight pressure and rubbing should be used.

Disperse catalyst thoroughly in tooling gel coat. Poor distribution causes uneven cure, print-through, and premature release from the plug before lay-up.

These products should not be used when temperature conditions are below 70°F, as curing may be adversely

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affected.

When using conventional tooling resin, the gel coat should not be left overnight before being laminated, as the gel coat may pre-release and/or lose its tack and not provide a good bond between the gel coat and laminate. **If using a low shrink/filled laminate system (follow lay-up time recommendations for the system you're using. Application temperature and lay-up time recommendations will vary.**

Related Products

POLYCOR[®] 965XK118 is a MACT compliant version of POLYCOR[®] 945XJ142. See DS-65D for more information.

POLYCOR[®] 965CJ036 is a patching thinner developed specifically for patching and resurfacing POLYCOR[®] 945 and 965 series vinyl ester tooling gel coats. See DS-65C for more information.

Caution

POLYCOR[®] 945XJ142 is made with a vinyl ester base polymer. UV resistance will be limited. It is recommended that molds stored outside are protected from UV and moisture exposure. This may be accomplished by covering the mold or inverting the mold so that the surface is not exposed to UV and that moisture cannot collect on the mold.

POLYCOR[®] 945XJ142 gel coats are not compatible in the liquid state with isophthalic gel coats or resins. Spray and pumping equipment must be completely clean of these products before they can be used.

Do not use varnish as a sealer or finish coating when preparing a plug, as the styrene in the gel coat will soften the varnish even when well waxed and coated with a parting film.

Do not add any material, other than a recommended methyl ethyl ketone peroxide, to these products without the advice of a representative of CCP Composites US. Never reduce tooling gel coat with a conventional paint or lacquer thinner, or acetone.

Storage Limitations

Uncatalyzed, POLYCOR[®] 945XJ142 gel coats have a usage life of 60 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. The usage life is cut in half for every 20° over 73°F.

Data Sheets/MSDS

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

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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.

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