



**DS-45
945 SERIES
POLYCOR® TOOLING GEL COATS**

DESCRIPTION:

CCP tooling gel coats are formulated specifically for mold making. These precision-formulated gel coats utilize selected resins that exhibit high heat distortion to withstand the repeated moldings of FRP laminates. None of these products contain lead. They provide a high gloss and hard durable surface. These tooling gel coats are formulated ready-to-spray after the addition of the proper amount of an appropriate methyl ethyl ketone peroxide catalyst. They are formulated to be low in hide so that imperfections can be easily spotted. Read application instructions carefully; also read PB-5 (Polyester Tooling Bulletin), because even though manufacturing precautions are used to make tooling gel coat, a misapplication of these products can produce unacceptable results.

CCP offers these tooling gel coats:

		Availability
1. Conventional Spray		
Black	945-B-201	Stock
2. Airless or Conventional		
Green	945-GA-104	Stock
Orange	945-YA-058	Stock

Also see:

- DS-45C, data sheet for conductive tooling gel coat, 945B023.
- DS-45F, data sheet for tooling gel coat patching thinner, 945CJ007.
- DS-45G, data sheet for orange vinyl ester tooling gel coat, 945YJ071.
- PB-5, Polyester Tooling Bulletin.

TYPICAL PROPERTIES (at 77°F):

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.

<u>Test</u>	<u>Value</u>		
945	B-201	YA-058	GA-104
Color	Black	Orange	Green
Viscosity, Brookfield RVF #4 Spindle @ 4 rpm	15,000 - 20,000cps	15,000 - 20,000 cps	15,000 - 20,000 cps
Thixotropic Index	6.5 - 7.5	6.5 - 7.5	6.5 - 7.5
Weight per Gallon	9.08 lbs.	9.09 lbs.	9.03 lbs.
Flash Point	82°F	82°F	82°F
Gel Time*	18 - 23 minutes	18 - 23 minutes	18 - 23 minutes
Lay-up Time	60 - 90 minutes	60 - 90 minutes	60 - 90 minutes
Barcol Hardness**	35 - 45	35 - 45	35 - 45
Ultimate Barcol	35 - 45	35 - 45	35 - 45
Hide Complete (wet)	20 mils	28 mils	28 mils

Heat distortion temperature of tooling gel coats is 122°F with room temperature cure and 203°F to 212°F if cured at three hours at 150°F.

* 100 grams at 77°F catalyzed with 1.8% Lupersol DDM-9.

** Barcol readings are very sensitive to catalyst/mass/temperature. To help overcome this sensitivity, Barcol should be checked by:

- C Adjusting the tooling gel coat to 77°F.
- C Catalyzing at 1.8%.
- C Weighing 37 grams into a quart lid stacked on another lid and on an insulated surface.
- C Maintaining the lid casting at 77°F ambient temperature.

Final determination (numbers) should be made within 65 minutes using the Model #934 Barcol Impressor.

CCP has found it very erroneous to check Barcol on a *film* of tooling gel coat (any *film* of gel coat), because of the inaccuracies received by the Barcol needle penetrating inconsistent gel coat film thicknesses.

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

APPLICATION:

Tooling gel coats are applied to the part/plug to be duplicated. Care must be taken when preparing the plug with wax and parting film to permit positive release. Best results are obtained by applying two coats at 18 (± 2) mils wet each, and allowing the gel coat to gel and cure between coats. **See special film thickness precautions for 945-GA-104 and 945-YA-058.** 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 overspray and thin passes to go beyond 5 minutes without covering with a fresh pass. Do not apply more than 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.

See special application precautions.

CCP tooling gel coats are formulated for spray application. Brushing is not recommended.

APPLICATION (Conventional Air Atomized):

Best results are obtained using pressure pot spray equipment and batch mixing. The following equipment is recommended:

Binks Equipment

Fluid Nozzle	66 or 67
Air Nozzle	63 PB or 67 PB
Needle	65 or 67

More than 13 C.F.M. required

DeVilbiss Equipment

Gun	P-JGA-502
Nozzle Combination	704-E

More than 17 C.F.M. required

Do not spray more than 2.5 pounds per minute of tooling gel coat. A minimum of 60 psig atomizing pressure (measured at the gun with fan full open) should be used to properly atomize the gel coat.

APPLICATION (Airless 945-GA-104 and 945-YA-058 only):

Misapplication of these products can produce unacceptable results.

Airless tooling is a utility tooling, designed for good hardness and gloss retention with minimized porosity when applied through airless equipment. These products were developed as a customer accommodation, and the customer must assure suitability for themselves of the product and process. They can also be applied with conventional air atomized equipment.

Also, CCP does not typically recommend that pumps or catalyst injection systems be used for spraying tooling gel coats, but realizes they are necessary for airless spraying. Even with the equipment properly calibrated, potential problems can occur due to poorly atomized catalyst; surging problems (gel coat or catalyst); poor tip alignment (catalyst to gel coat mix); contamination; and poor application procedures, which will quickly negate all benefits of calibration. The equipment (and application procedures) must be monitored on a routine basis to ensure proper application and cure of the gel coat. Ask about and adhere to all equipment manufacturers' recommendations.

Airless tooling yields best results when applied in two coats. To minimize sagging (whether using conventional or airless equipment), the first coat should be applied 14 (± 2) 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.

Production requirements might dictate the “calculated risk” of airless catalyst injection equipment for the spraying of production units and therefore the risk of a ruined or sub-par unit. This risk is much greater when building costly plugs and molds.

In order to reduce the risk of a ruined mold, specific (but not inclusive) directions are:

1. Calibrate daily, or for each job:
 - a. Gel coat delivery of 1.5 to 2.5 pounds per minute.
 - b. Catalyst content--no less than 1.2% and no more than 2.4% (ideally 1.8% at 77 °F).
 - c. Recommended gel coat tip size is .021 inches.
2. 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.
 1. Do not let raw catalyst fall on the plug surface or on the sprayed gel coat.
 2. 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, 945 airless 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 Elf Atochem Lupersol DDM-9 catalyst. Norac NOROX MEKP-9 and NOROX MEKP-9H, Akzo Nobel CADOX L-50a and CADOX D-50 are expected to yield similar performance. NOROX MEKP-925 and NOROX MEKP-925H, and Witco HP-90 may yield slightly shorter gel and cure times.

As the material ages, it may encounter slightly longer gel times. The longer gel time will extend the casting Barcol time, but the eventual Barcol should achieve the numbers as listed under “Typical Properties.”

Do not use more than 2.4% catalyst in the tooling gel coat, as this can cause excessive shrinkage of the gel coat and pull it away from the plug. For adequate cure, do not use less than 1.2% catalyst.

Normally, tooling gel coats are ready to lay-up on (or spray with a second coat of gel coat) in 60-90 minutes--the time element being dependent on room temperature, air movement, humidity, catalyst type and concentration, and spray atomization.

For best results, it is recommended that the temperature be above 70°F.

When using conventional tooling resin, the gel coat should not be left overnight before being laminated onto, 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 (such as OPTIMOLD® II), follow lay-up time recommendations for the system being used. Application temperature and lay-up time recommendations will vary.

PRECAUTIONS:

The primary reason for using tooling gel coats for the manufacture of fiberglass molds is to produce a blemish-free, durable, high-gloss surface. It is advantageous 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. Many gel coat defects result from conditions that can easily be corrected.

A few of these are listed below:

1. Do not use varnish as a sealer or finish coat 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.
2. Proper spray technique is very important to eliminate porosity in the gel coat film. Internal air-atomization spray equipment, airless, or catalyst injection spray equipment can result in porosity in the gel coat film if improperly applied. Tooling gel coats will not be as tolerant of inaccuracies in a catalyst injection system as are production gel coats.
3. Tooling gel coats appear thick in the container. After mixing the gel coat, it becomes sprayable. Do not over-mix, however. Over-mixing breaks down viscosity, increasing tendencies to sag and causes styrene loss, which could contribute to porosity. Tooling gel coat needs mixing when opened (and daily thereafter). The gel coat should be mixing to the sides and bottom of the container with the least amount of turbulence possible. Air bubbling should not be used. It is not effective and only serves as a potential for water or oil contamination.
4. Always keep the container covered (except, of course, when transferring material). An open container is easily contaminated and allows for more styrene evaporation.
5. 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.
6. Never reduce tooling gel coat with a conventional paint or lacquer thinner, or acetone.
7. Disperse catalyst thoroughly in tooling gel coat. Poor distribution causes uneven cure, print-through, and premature release from plug before lay-up.
8. Do not over-catalyze. Excess catalyst plasticizes tooling gel coats.
9. Print-through (fiber pattern) and distortion are directly proportional to film thickness. Thicker films (not to exceed 40 mils wet total) resist print-through and distortion better than thinner films.

10. Atomize the tooling gel coat thoroughly when spraying. Low spray pressures will result in poor breakup, and will leave entrapped air in the gel coat. To check atomization for porosity, spray catalyzed tooling gel coat over glass to a film thickness to 18 (± 2) mils. Laminate, pull, sand, stain and examine for entrapped air. This procedure should be followed before a plug is sprayed with tooling gel coat; this is recommended each time tooling gel coat is sprayed. These spray-outs should be saved along with other mold records.
11. In spray application of tooling gel coats, use slow, even strokes, triggering the spray gun at the end of each stroke to prevent excess buildup at overlaps.
12. Do not apply tooling gel coat over wet Polyvinyl Alcohol (PVA) parting film.
13. Install an oil and moisture trap on the compressed air line leading to the spray gun to remove lint, rust, oil and moisture.
14. Use the catalyzed tooling gel coat within its working life, with a proper allowance of time for cleanup of equipment.
15. Tooling gel coats may leave a certain amount of “coloring” when sanded and/or buffed. This is a function of the pigment used and is not an indication of cure.
16. Do not add anything, other than the appropriate methyl ethyl ketone peroxide, to these products.

STORAGE:

Uncatalyzed tooling gel coats have a usage life of 90 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 usage life is cut in half for every 20°F over 73°F.

SHIPPING:

Shipment is normally in lined 5-gallon containers.

RDS 04/00

POLYESTER SAFETY INFORMATION
(Revised 06/92)

All sales of products manufactured by the Cook Composites and Polymers Co. and described herein are made solely on condition that our 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 breathe or ingest vapor, spray mists and dusts caused by applying, sanding, grinding and sawing polyester products. Wear an appropriate NIOSH/MSHA approved, 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 Cook representative or from: Cook Composites and Polymers Co., P.O. Box 419389, Kansas City, MO 64141-6389, (816) 391-6003.

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.

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DISCLAIMER AND LIMITATION of LIABILITY
(08/14/95)

The products sold hereunder shall meet Seller's applicable specifications at the time of shipment. Seller's specifications may be subject to change at any time without notice to Buyer. Buyer must give Seller notice in writing of any alleged defect covered by this warranty (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 or prior to the expiration of the shipment's quality life, whichever occurs first. **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.**

The Buyer's sole and exclusive remedy against Seller shall be for the replacement of the product or refund of the purchase price in the event that a defective condition of the product should be found to exist by Seller. **NO OTHER REMEDY (INCLUDING, BUT NOT LIMITED TO, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR LOST PROFITS, LOST SALES, INJURY TO PERSON OR PROPERTY, OR ANY OTHER INCIDENTAL OR CONSEQUENTIAL LOSS) SHALL BE AVAILABLE TO THE BUYER.**

The sole purpose of this exclusive remedy shall be to provide Buyer with replacement of the product or refund of the purchase price of the product if any defect in material or workmanship is found to exist. This exclusive remedy shall not be deemed to have failed its essential purpose so long as Seller is willing and able to replace the defective products or refund the purchase price.

To the best of our knowledge, the information contained herein is accurate.

Final determination of the suitability of the material for the use contemplated, the manner of use and whether the suggested use infringes any patents is the sole responsibility of the buyer.