



POLYCOR®

945B023

Conductive Black Tooling Gel Coat

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Description

POLYCOR® 945B023 is specifically formulated as a conductive tooling gel coat. Conductivity advantages are the draining off of nuisance (and sometimes dangerous) static electricity, and the capability of electrostatic spraying. This product is handled and sprayed as a regular tooling gel coat. The mold must be properly grounded during the waxing, spraying and de-molding processes (whether pulling the mold from the plug or parts from the mold) for the static charge to be dissipated. If not grounded properly, sparking or static discharge may cause fire. (See application instructions.)

POLYCOR® 945B023 utilizes selected resins exhibiting high heat distortion to withstand the repeated moldings of FRP laminates. This product does not contain lead. It has a high gloss and hard durable surface. 945B023 is formulated ready-to-spray after the addition of the proper amount of an appropriate methyl ethyl ketone peroxide catalyst. Read application instructions carefully and PB-5 (Polyester Tooling Bulletin), because even though manufacturing precautions are being used to make 945B023, a misapplication of this product can produce unacceptable results.

For electrostatic spraying, standard gel coats would be used (with special equipment) to spray on the conductive molds. These molds can be sprayed with standard application equipment (non- electrostatic), but no advantages will be seen except for the mold being grounded.

Follow all safety precautions listed by the equipment manufacturers and material suppliers when using electrostatic spray equipment.

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. Batches with properties outside of these readings can perform acceptably.

Test	Value
Viscosity, Brookfield RVF #4 Spindle @ 4 rpm	19,000 – 24,000 cps
Thixotropic Index (2/20)	5.5 – 7.5

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Flash Point	88°F
Hazardous Air Pollutants	See MSDS for amounts
Volatile Organic Compound	46 – 48%
Weight per Gallon	9.0 – 9.1 lbs.
Liquid Resistance	No more than .05 megohms
Gel Time ¹	18 – 23 minutes
Lay-up Time	60 - 90 minutes
Barcol Hardness ²	35 – 45
Ultimate Barcol	35 – 45
Hide Complete (wet)	1 – 3 mils

Heat Distortion Temperature of 945B023 is 122°F with room temperature cure and 203°F - 212°F if cured at three hours at 150°F.

¹100 grams at 77°F catalyzed with 1.8% Luperox DDM-9.

²Barcol readings are very sensitive to catalyst/mass/temperature. To help overcome this sensitivity, Barcol should be checked by:

1. Adjusting the tooling gel coat to 77°F.
2. Catalyzing at 1.8%.
3. Weighing 50 grams in an aluminum weighing dish on an insulated surface.
4. Maintaining 77°F ambient temperature.

Final determination (numbers) is achieved at 75 minutes using the Model #934 Barcol Impressor.

CCP has found it to be erroneous to check Barcol on a *film* of tooling gel coat (*any* film of gel coat), because of the inaccuracies which occur when the Barcol needle penetrates inconsistent gel coat film thicknesses

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 on CCP's website at www.ccpcompositesus.com.

Application

Tooling gel coat is 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. 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 porosity, crazing and cracking of the gel coat film after use. Do not apply less than 12 mils per coat, as poor cure can



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result in dulling of the mold in use. Thinner films will exhibit more print-through and distortion also. It is essential that no more than 40 mils (wet) total be applied with any of the tooling gel coats.

A grounding mechanism must be taken into consideration at the time of spraying 945B023. Wire(s) or a soft pliable mesh screen can be embedded into the mold flange prior to spraying this product. However, if desired, grounding straps can be applied after the mold has been built by drilling holes several feet apart in the flange and attaching brass bolts. The flange/brass bolts should be connected to the metal frame of the mold with copper wire. The metal frame must be properly grounded in accordance with local regulation. It is recommended that at least two ground sources (from mold to steel) be used rather than using one source. Resistivity of the surface should be spot-checked. **If not grounded properly, sparking or static discharge may cause fire.**

Ransburg reports conductivity of 945B023 is sufficient for spraying electrostatic and is as electrostatically sprayable as metal molds. Resistance of *liquid* 945B023 is no more than .05 megohms. **Do not** use an ohmmeter for checking conductivity (electrostatic sprayability) of **the molds** because resistance measurement varies significantly, and is confusing. Use the ITW-Ransburg #8333 Sprayability Meter; it is much easier to use and more relevant when determining if the mold is electrostatically sprayable.

POLYCOR® 945B023 is formulated for spray application. Brushing is not recommended. It can be sprayed with either conventional or airless equipment.

Application (Conventional Air Atomized)

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

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 psig atomizing pressure (measured at the gun with fan full open) should be used to properly atomize the gel coat.

Application (Airless)

Misapplication of this product can produce unacceptable results.

POLYCOR® 945B023 is a utility tooling gel coat, designed for good hardness and gloss retention with minimized porosity when applied through airless equipment. This product was developed as a customer accommodation, and the customer must assure suitability for themselves of the product and process.

Also, CCP does not typically recommend pumps or catalyst injection systems be used for spraying tooling gel



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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.

The first coat should be applied 18 ± 2 mils wet in three passes. 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 sag.
3. Do not let raw catalyst fall on the plug surface or on the sprayed gel coat.
4. 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. If applied with care, 945B023 should provide a durable and long-lasting mold. However, when compared to a hot pot, where catalyst is premixed into the gel coat, airless catalyst injection equipment and methods of application can cause potential 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.

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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 ATOFINA Luperox[®] 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. ATOFINA Luperox[®] DHD-9, NOROX MEKP-925 and NOROX MEKP-925H, and Crompton HP-90 may yield slightly shorter gel and cure times.

As the material ages, slightly longer gel times may occur. The longer gel time will extend the casting Barcol time but eventual Barcol should achieve the numbers shown 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 away from the plug. For adequate cure, do not use less than 1.2% catalyst.

Normally, 945B023 is ready to lay-up on (or spray with a second coat of gel coat) in 60 to 90 minutes. This time element is 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 lamination, as it may pre-release and/or lose its tack and not provide a good bond between gel coat and laminating material. If using a low shrink/filled laminate system (such as OPTIMOLD[®] or OptiPLUS[™]), 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 coat for the manufacture of fiberglass molds is to produce a 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. 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. Use of internal air atomization spray equipment, or 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 production gel coats.
3. Tooling gel coats appear thick in the container. After it is mixed, the gel coat 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 coats need mixing when

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- 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 the 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 leave entrapped air in the gel coat. To check atomization for porosity, spray catalyzed tooling gel coat over glass to a film thickness of 18 (± 2) mils. Laminate, pull, sand, and examine for entrapped air. This procedure should be followed before a plug is sprayed with tooling gel coat and 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 coat, use slow, even strokes--triggering 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 oil and moisture trap on compressed air line leading to 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 this product.

Storage

Uncatalyzed, 945B023 has a usage life of 90 days from date of shipment 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°.

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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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