



POLYCOR®

945 Series Polyester Tooling Gel Coats

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Description

POLYCOR® 945 Series polyester tooling gel coats include the following products:

Product	Color	Description
945B023	Black	For mold making requiring conductive tooling gel coat
945B201	Black	For general mold making
945GA104	HG Retention Green	For general mold making
945XK184	Clear	For Light RTM "B-side" (upper) molds
945YA058	L/F Orange	For general mold making

POLYCOR® 945 Series polyester tooling gel coats provide durable surfaces to withstand the repeated moldings of FRP laminates. The pigmented products are formulated to be low in hide so that imperfections can be easily spotted.

POLYCOR® 945XK184, when used in a LRTM upper mold and backed by a translucent laminate, provides visibility of the mold filling process, aiding in troubleshooting and quality control.

POLYCOR® 945B023 is specifically formulated as a conductive tooling gel coat.

These products are formulated ready-to-spray after the addition of the proper amount of an appropriate organic peroxide catalyst.

Features and Benefits

- Flexibility – Excellent for reducing cracking and crazing
- Application – Easy to spray with minimal air entrapment and good air release
- Sag resistance – Sprayed films resist sagging and slumping
- Abrasion resistance – For long mold life
- Temperature resistance – Withstands repeated molding cycles
- Smoother sprayed film – For less orange peel
- High gloss surface

Typical Liquid Properties (at 77°F)

The liquid properties of POLYCOR® 945 Series polyester tooling gel coats are shown below. These values may or may not be manufacturing control criteria; they are listed as 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 results. Products with properties outside of these readings can perform acceptably. Final suitability of these products is in the end use performance.



Test	945B023	945B201	945GA104	945XK184	945YA058
Color	Black (conductive)	Black	Green	Clear	Orange
Flash Point	88°F	82°F	82°F	79°F	82°F
Weight per Gallon	9.04 lbs.	9.02 lbs.	9.06 lbs.	8.81 lbs.	9.1 lbs.
Viscosity	21,500 cps ⁽¹⁾	17,500 cps ⁽¹⁾	17,500 cps ⁽¹⁾	4,000 cps ⁽²⁾	17,500 cps ⁽¹⁾
Thixotropic Index (2/20)	6.5	7.0	7.0	6.5	7.0
Gel Time	21 minutes ⁽³⁾	21 minutes ⁽³⁾	21 minutes ⁽³⁾	11.5 minutes ⁽⁴⁾	21 minutes ⁽³⁾
Lay-up Time ⁽⁵⁾	60-90 min.	60-90 min.	60-90 min.	45-75 minutes	60-90 min.
Sag Resistance	No sag @ 20 mils wet	No sag @ 20 mils wet	No sag @ 20 mils wet	No sag @ 20 mils wet	No sag @ 20 mils wet
Electrical Resistance	> 0.05 MΩ	N/A	N/A	N/A	N/A
Hide Complete	2 mils wet	18 mils wet	26 mils wet	N/A	26 mils wet
Color Match, Maximum CMC ΔE	1.5 units	1.5 units	1.5 units	N/A	1.5 units
Barcol Hardness	40 ⁽⁶⁾	40 ⁽⁶⁾	40 ⁽⁶⁾	N/A	40 ⁽⁶⁾
Heat Distortion Temperature Cure @ 77°F Cure @ 150°F (3 hrs.) ⁽⁸⁾		181°F ⁽⁷⁾	181°F ⁽⁷⁾	N/A	181°F ⁽⁷⁾

⁽¹⁾ Brookfield RVF #4 Spindle @ 4 rpm

⁽²⁾ Brookfield RVF #4 Spindle @ 20 rpm

⁽³⁾ 100 g mass, 1.8% Arkema Luperox® DDM-9

⁽⁴⁾ 100 g mass, 1.5% Arkema Luperox® DDM-9

⁽⁵⁾ Depends on product, gel time and temperature

⁽⁶⁾ Barcol Hardness determined on a casting. Barcol readings are very sensitive to catalyst/mass/temperature. To help overcome this sensitivity, Barcol should be checked by:

- Adjusting the tooling gel coat to 77°F.
- Catalyzing 100 grams with 1.8% Arkema Luperox® DDM-9.
- Weighing 50 grams into a 160 ml aluminum weighing dish (4 in. diameter), placed on an insulated surface.
- Maintaining the casting at 77°F ambient temperature.
- Final determination (numbers) should be achieved in 75 minutes using the Model #934 Barcol impressor. Barcol cannot be checked on a gel coat film because the cured film is too thin. The Barcol impressor penetrates the film and reads the hardness of the substrate behind.

⁽⁷⁾ HDT was determined using an internal Polynt Composites test method that is similar to ASTM D648. The test was run on a gel coat casting (approximately 0.125" thick) made by catalyzing the gel coat with 1.8% Arkema Luperox® DDM-9. The gel coat casting was cured for 16 hours at room temperature and was post cured for 6 hours at 150°F.

⁽⁸⁾ HDT was determined using an internal Polynt Composites test method that is similar to ASTM D648. The test was run on a gel coat casting (approximately 0.125" thick) made by catalyzing the gel coat with 1.5% Arkema Luperox® DDM-9. The gel coat casting was cured for 16 hours at room temperature and was post cured for 3 hours at 150°F.



Application

The primary reason for using tooling gel coats for the manufacturing 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 mold has been removed from the plug.

POLYCOR® 945 Series polyester tooling gel coats are formulated for air atomized and airless air-assist spray application. Air atomized (pot gun) application is recommended for best results. Brushing and rolling are not recommended. Application procedures are given below. Refer to Polynt's Composites Applications Guide for additional information on all phases of mold fabrication.

POLYCOR® 945 Series polyester tooling gel coats should be mixed prior to use. Use mixing equipment with 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. Mixing once a day for 10 minutes is typically sufficient. Air bubbling should not be used for mixing. It is not effective and only serves as a potential source of water or oil contamination. Do not overmix POLYCOR® 945 Series polyester tooling gel coats. Overmixing can break down the viscosity, increasing the tendency to sag.

For best cosmetics and durability, Polynt Composites recommends that molds be fabricated using 18 ± 2 mils wet of tooling gel coat followed by 22 ± 2 mils wet of Polynt's ArmorGuard® 967 vinyl ester barrier coat. Allow the tooling gel coat to gel and cure prior to application of the ArmorGuard®. ArmorGuard® 967 improves cosmetics by reducing fiber print and distortion. ArmorGuard® 967 also provides excellent heat resistance and toughness.

If extensive sanding is expected, an alternative method is to apply two coats of tooling gel coat. The first coat should be 18 ± 2 mils wet. The second coat should be 20 ± 2 mils wet. Allow the gel coat to gel and cure between coats. This provides a thicker a gel coat layer for reworking the mold surface. Do not use barrier coat if applying two coats of tooling gel coat.

Apply each coat using three passes, with each pass having a thickness of 5-8 mils. More rapid film build could result in sagging and porosity. 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. Thin, independently curing films can create a textured effect when the surface is sanded and buffed.

Coats less than 12 mils total wet thickness may not cure properly, may be hard to patch, and have more print-through. Coats above 24 mils may pre-release, trap porosity, and be more subject to cracking.

Polynt Composites recommends that you include the fabrication of a quality control panel as part of your quality control program. Fabrication and testing of this panel prior to actual mold fabrication allows you to verify the suitability of the product and your process. Fabricate the quality control panel by spraying catalyzed tooling gel coat over a test mold to a film thickness to 18 ± 2 mils. Use the same equipment and settings that will be used for actual mold fabrication. Laminate behind the tooling gel. Once the laminate has cured, de-mold the panel. Sand and stain the gel coat and examine it for entrapped air. These spray-outs should be saved along with other mold records.



Air Atomized

Use the following advice when using air atomized equipment:

- Spray 1.5-2.5 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 gel coat.
- Spray gun distance should be 1.5-3 feet.

Airless Air-Assist

While the use of air atomized equipment typically gives the best results, production requirements may dictate the use of airless air-assist equipment. 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. Proper spray technique is very important to eliminate porosity in the gel coat film.

Use the following advice when using airless equipment:

- Calibrate daily or for each job
 - Gel coat delivery of 1.5-3.0 pounds per minute for intricate parts, small parts, and decks; recommended gel coat tip size of 0.018 inch.
 - Gel coat delivery of 1.5-4.0 pounds per minute for large parts, open molds, and flat panels; recommended gel coat tip size of 0.021 inch.
 - Catalyst content: 1.2-2.4% (ideally 1.8% at 77°F).
- 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.
- Do not let raw catalyst fall on the plug surface or on the sprayed gel coat.
- Spray gun distance should be 2-3 feet.

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. Equipment and application should be constantly monitored to maintain effective calibration, gel coat/catalyst mixing, and procedures. Ask about and adhere to all equipment manufacturers' recommendations.



The table below is a troubleshooting guide for airless application listing common problems and causes.

Problem	Cause
Spotty Cure Sticking	<ul style="list-style-type: none"> • Due to improper concentration, atomizing or mixing of catalyst from incorrect calibration and malfunctioning injector slave pumps
Porosity	<ul style="list-style-type: none"> • Due to excessive air-assist • Flow rates greater than 3-4 pounds per minute • More than 5 to 8 mils wet in one pass • No catalyst
Low Initial Gloss	<ul style="list-style-type: none"> • Incorrect catalyst calibration • Under-cured gel coat film • Raw catalyst sprayed on plug
Gloss Dulling	<ul style="list-style-type: none"> • Due to under- or over-catalyzation, hence under-cured gel coat
Uneven Film Thickness	<ul style="list-style-type: none"> • Operator error • Excessive surges during spray-out
Sag	<ul style="list-style-type: none"> • Excessive air-assist • Too thick of film • Spraying too close to the mold

Cure

The cure rate of POLYCOR® 945 Series polyester tooling gel coats depends on a number of factors including the product's age, temperature, catalyst type, catalyst level and ambient humidity. For these reasons, we recommend that you check the cure rate in your plant.

POLYCOR® 945 Series polyester tooling gel coats are quality control tested using Arkema Luperox® DDM-9, United Initiators Norox® MEKP-9, United Initiators Norox® MEKP-9H, and Akzo Nobel CADOX® L-50a and CADOX® D-50 are expected to yield similar performance. Arkema Luperox® DHD-9, United Initiators Norox® MEKP-925, United Initiators Norox® MEKP-925H, and Pergan Hi-Point® 90 may yield slightly shorter gel and cure times.

The catalyst level should not exceed 2.4% or fall below 1.2% for proper cure. A catalyst level of 1.8% at 77°F is considered ideal. Excess catalyst can cause excessive shrinkage of the gel coat and pull it away from the plug.

For best results, it is recommended that the temperature be above 75°F.

As the material ages, gel times may get longer. The longer gel time will extend the casting Barcol time, but the eventual Barcol should achieve the numbers as listed under "Typical Properties."

POLYCOR® 945B023, 945B201, 945GA104, and 945YA058 are ready to lay-up on (or spray with a second coat of gel coat) in 60-90 minutes. This time element is dependent on room temperature, air movement, humidity, catalyst type and concentration, and spray atomization.

POLYCOR® 945B023, 945B201, 945GA104, and 945YA058 should be laminated within a few hours of application to minimize pre-release and for best adhesion between the gel coat and laminate. The timing varies with temperature. Each customer should test under their specific shop conditions and specific materials.



POLYCOR® 945XK184 is ready for lamination in 45-75 minutes. This time element is dependent on material temperature, room temperature, humidity, air movement, and catalyst concentration.

Note: POLYCOR® 945XK184 has a tendency to air dry and so the lay-up times may be deceiving. If the lay-up time is checked by the finger method, slight pressure and rubbing should be used.

Caution

Molds stored outside should be protected from UV and moisture exposure for best mold life. This may be accomplished by covering the mold or inverting the mold so that the surface is not exposed to UV and moisture cannot collect on the mold.

POLYCOR® 945 Series polyester tooling gel coats may not be compatible with other gel coats or resins. Spray and pumping equipment must be completely clean of these products before they can be used.

Do not add any material, other than recommended organic peroxide, to these products without the advice of a representative of Polynt Composites.

Related Products

POLYCOR® 945CJ007 is a patching thinner developed specifically for patching and resurfacing any polyester tooling gel coats. Refer to the data sheet for more information.

Storage Limitations

Uncatalyzed POLYCOR® 945 Series polyester tooling gel coats, except POLYCOR® 945XK184, have a shelf life of 120 days from date of manufacture when stored at 73°F or below in a closed, factory-sealed opaque container and out of direct sunlight. POLYCOR® 945XK184 has a shelf 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 shelf life is cut in half for every 20°F over 73°F.

SDS / Data Sheets

SDS and data sheets can be obtained by contacting your Polynt representative or Polynt Customer Service at 800-322-8103.

POLYNT SAFETY INFORMATION

All sales of products manufactured by Polynt Composites USA Inc. and described herein, are made solely on condition that Polynt Composites USA 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 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 12th Report on Carcinogens issued by the National Toxicology Program lists styrene as a "reasonably anticipated" carcinogen, but the Report cautions that the NTP listing does not mean that styrene presents a risk to persons in their daily lives. The Styrene Information and Research Center does not agree with the classification as it did not include a review of all available data. SIRC states: "HHS included styrene in the 12th RoC despite the fact that European Union regulators have determined styrene does not represent a human cancer concern. E.U. scientists reviewed the full styrene database, weighing all of the available data in reaching their conclusion."

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 Safety Data Sheet for each product (identified by product number) before using. If unavailable, these can be obtained, free of charge, from your Polynt Composites USA representative or from: Polynt Composites USA Inc., 99 East Cottage Avenue, Carpentersville, IL 60110, 800-322-8103.

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.

LIMITED WARRANTY AND LIMITATION OF LIABILITY

LIMITED WARRANTY.

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 for the product; 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 ADDITIONAL REPRESENTATIONS OR SUGGESTIONS REGARDING THE PRODUCT OR ITS POSSIBLE USES ARE BASED UPON SELLER'S GOOD FAITH OPINION AND BELIEF, BUT ARE NOT TO BE CONSTRUED AS AFFIRMATIONS OF FACT, PROMISES, OR DESCRIPTIONS, AND SHALL IN NO WAY BE DEEMED PART OF THE SALE OF PRODUCT.** In particular, and without limiting the foregoing, because of environmental and use conditions beyond Seller's control, Seller offers no warranty and makes no promise concerning the results that may be obtained by the Buyer (or the Buyer's customer) with the product or the performance of the product. Each user should satisfy itself, by adequate testing, of the suitability of the product for its particular application.

LIMITATION OF LIABILITY.

- (a) Seller's total liability for any claim arising out of or in connection with this contract, including for breach of contract, warranty, statutory duty, or for other tort, including seller's negligence, shall not exceed the purchase price 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 LIMITATION LOSS OF PROFITS, CAPITAL OR BUSINESS OPPORTUNITY, DOWNTIME COSTS, OR CLAIMS OF CUSTOMERS OR EMPLOYEES OF BUYER, WHETHER IN AN ACTION UNDER CONTRACT, NEGLIGENCE OR ANY OTHER THEORY, ARISING OUT OF OR IN CONNECTION WITH THIS CONTRACT, OR THE USE, INABILITY TO USE, OR PERFORMANCE OF THE PRODUCT.**
- (b) If Seller furnishes technical or other advice to Buyer, whether or not at Buyer's request, with respect to processing, further manufacture, other use or resale of the products, Seller shall not be liable for, and Buyer assumes all risk of, such advice and the results thereof.

The information provided is believed to be accurate at the time of preparation, or prepared from sources believed to be reliable, but it is the responsibility of user to investigate and understand other pertinent sources of information, to comply with all laws and procedures applicable to the safe handling and use of the product and to determine the suitability of the product for its intended use.