Technical data sheet
23V series tooling gelcoat

DESCRIPTION:

23V series of gelcoats are formulated specifically for composite mold making. It is formulated with a special base resin that permits an excellent resistance to heat distortion even after repeated use. 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 appropriate methyl ethyl ketone peroxide or cumene hydro peroxide catalyst. The « low opacity» formulation help to detect default during spraying process. See section: «application» in PB-5 (Polyester tooling) because even though manufacturing precautions are used to make tooling gelcoat, a misapplication of these products can produce unacceptable results.

Gelcoat available	conventional application	airless application	100% opacity
23V black	yes	yes	15-21 mills
23V green	yes	yes	22-29 mills
23V orange	yes	yes	28-29 mills

TYPICAL PROPERTIES (at 25° C):

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	Values
Viscosity	
Brookfield RVF #4 @ 20 rpm	4 500 – 5 500
Thixotropic Index 2/20	5,0 - 7,0
Specific gravity	1,07 – 1,13 Kg / litre
Gel Time 1,8% NOROX CHM50*	14 - 20 minutes
Lay up time	30 - 50 minutes
Barcol hardness**	40 – 55
(24 after addition of CHM50)	
Glass transistion (T_g) before post cure***	T_g = 144 °C residual heat: 48 J/g
after a post cure 4 hours @ (65°C) ***	T_g = 151 °C residual heat: 23 J/g

* Gel time tested with 100 grams mass @ 25°C catalysed at 1,8%.
** Barcol Hardness tested with 40 grams mass @ 25°C catalysed at 1,8%.
*** Catalysed with 1,8% NOROX CHM50

Important !
We recommend the use of NOROX CHM50 catalyst to achieve best results.
Other catalyst may work but surface quality (porosity) may be affected.

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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 25°C.
- Catalyzing at 1.8%.
- Weighing 50,0 gram (ex: aluminium container) and on an insulated surface.
- Maintaining the lid casting at 25°C ambient temperature.

Final determination (numbers) using the Model #934 Barcol Impressor.

We consider that 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.

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. 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 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.

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

Most polyester and vinyl esters 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. If unavailable, these can be obtained, free of charge, from your Progress representative.

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<u>APPLICATION</u> (Conventional Air Atomized):

Binks Equipment

Fluid Nozzle	66 or 67
Air Nozzle	63 PB or 67PB
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.

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:

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Calibrate daily, or for each job:

Gel coat delivery of 1.5 to 2.5 pounds per minute.
Catalyst content--no less than 1.5% and no more than 2.4%
Recommended gel coat tip size is .021 inches.
Ambient temperature is 25°C

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 no less than two feet and no more than three feet.

Equipment and application should be constantly monitored to maintain effective calibration, gelcoat/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 gelcoat, 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; undercured gel coat film; raw catalyst sprayed on plug.
Gloss dulling	Due to under- or over-catalyzation, hence undercured 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.

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.

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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:

- 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.

- 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.

- Tooling gel coats appear thick in the container. After mixing the gel coat, it becomes sprayable. Do not overmix, however. Overmixing breaks down viscosity, increasing tendencies to sag and causes styrene loss, which could contribute to porosity. Tooling gelcoat 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

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

- 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 overspray 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

- Never reduce tooling gel coat with a conventional paint or lacquer thinner, or acetone.

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

- Do not over-catalyze. Excess catalyst plasticizes tooling gel coats.

- 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.

- 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 sprayouts should be saved along with other mold records.

- 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.
- Do not apply tooling gel coat over wet Polyvinyl Alcohol (PVA) parting film.
- Install an oil and moisture trap on the compressed air line leading to the 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.
- 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.
- 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 60 days from date of manufacture when stored at 22°C or below in a closed, factory-sealed opaque container and out of direct sunlight. The usage life is 45 days if stored at 33°C and 22 days at 45°C.

SHIPPING:

Shipment is normally in 20 litres containers.

All sales of products manufactured by Progress, 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 vapours, 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 vapours, mists and dusts are below applicable exposure limits. Follow respirator manufacturer's directions for respirator use.

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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 vapours 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 vapours well below the lower explosion limit and all air contaminants (vapours, mists and dusts) below the current permissible exposure limits in the mixing, application, curing and repair areas.

Progress Plastiques Cie 2400, Canadien
Drummondville Québec J2C 7W3
tel : 819 477-4516
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To the best of our knowledge, the information contained herein is accurate.

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