

Understanding 100% Solids Clear Coatings

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Crown Tech Support: Series I

"The purpose of business is to find and keep customers. Therefore, marketing is at the heart of every business". Peter Drucker

Today, customers are wiser and competitors are aggressive. In this business environment, specifiers, contractors and installers are increasingly called upon to solve customer's problems by offering products and services that create real value, while allowing room for fair profit margins for themselves. Therefore, in today's economy, marketing and salesmanship alone will not generate the amount of business needed to maintain financial stability and growth.

If this is indeed the case, then the answer might seem obvious. It is - add a third component to marketing and salesmanship. Namely, add technical knowledge. The added advantage of technical knowledge will provide an understanding of each component, including the concrete that contributes to making the entire protective floor overlayment a sustainable "Green" system.

Of course, all you really may want to know is . . . "Will it do what you say it will? Will it work?" However, as a specifier or contractor, it is in your best interest to know more, so when you speak with customers you are able to provide clear and accurate information without making hopeful and possibly unrealistic promises. After all, mistakes made during application can create serious warranty issues that can be time consuming and extremely costly to correct resulting with the reduction of profitability or destroying profits entirely.

About the White Paper Series

In this series of White Papers, the objective is to provide a better understanding of the nature of polymer coatings and wear surfaces. With the information provided, specifiers, contractors and installers will be better equipped to explain to customers how they can achieve the fashion & style of decorative polymer overlays while meeting or exceeding expectations for beauty, durability and ease of maintenance. You will also come to know each product's limitations, thereby reducing costly application mistakes that can reduce or entirely eliminate profits. Understanding will allow you to make informed product selections based upon each product's capability. Knowledge, choice and technical support will become competitive advantages.

Practical Information

This white paper is not academic in nature. It is not about research or scientific data. It's basic and practical, at the level of the actual installation of floor overlay systems. You do not need to be a chemist or polymer scientist. However, it is advantageous to have a general understanding of how concrete and polymers function and the limitations of each. Become a student. Learn about concrete, as well as cementitious and polymer materials. Equally important is the need to know more than competitors. Understand what products to use on particular projects in order to satisfy each customers' unique need and objective.

The Manufacturer's Role

It's the polymer manufacturer's job to be the expert in the background providing training and technical support. The manufacturer's polymer scientists and technical experts can provide product knowledge and back up to support large scale commercial and industrial projects, as well as projects with mid-to-small sized organizations such as restaurants, schools, and retail stores, and so on.

The Green Initiative

In the past, at a time when the health issues regarding Volatile Organic Compounds (VOC's) and Hazard Air Pollutants (HAP's) were largely unknown, VOC's were present during the application process and HAP's were present after curing. Today, largely because of the "Green" initiative in the global construction industry with the support of responsible polymer manufacturers and leading specifiers and contractors, "Green" products are rapidly becoming the standard of the world. It remains a mystery, why many polymer manufacturers have not made the change to safer formulas, for the health of the application crew and benefit of the customer. Perhaps the lagging polymer formulator, or manufacturer, lacks the technical knowledge, or just wants to sell cheap formulas diluting with solvents or by using older chemistry technology. For whatever reasons, products made by these manufacturers are out-dated, potentially dangerous, and definitely not "Green".

Background

100% solids clear polymers, typically used for floor and deck wear surfaces, indoors and out, have been around for over two decades. They have proven themselves in all parts of the world, under normal and adverse conditions of application and performance.

Clear Coat Polymers

There are three basic polymers used as 100% solids clear coatings. They are: Epoxy, Polyurea and Methyl Methacrylate (MMA) based acrylic. Each system has advantages and limitations. There are no cure-alls. Therefore, the project conditions during application and the natural or artificial environmental exposure should determine the selection of the wear surface polymer. If your company sells only one or two types of floor overlays, under similar conditions of application and use, you probably can select one polymer for the wear surface and use it each time. However, in the present economy, most companies must sell a variety of floor projects to help build the sales and income to build growth and profit. Careful selection of the wear surface polymer will assist your sustainable floor overlayments and help sell future projects.

Performance Properties

Clear topcoats are commonly used in the construction industry, commercial stores, food industries, pharmaceutical and institutional structures, residential, as well as on any concrete surface that needs to be sealed or overlaid for its protection, ease of cleaning, or to improve the aesthetics of the floor and its surroundings.

100% solids clear coat polymers exhibit hardness for abrasion resistance, excellent gloss, chemical resistance and zero VOC's. They are easy to apply with standard squeegee and roller tools and are quick curing. Most formulas are self-leveling and create a dense surface that is sustainable for LEED® "Green" credits. Many formulations are nearly odorless, while others require respirators to be worn during application and cure. They exhibit high bond strength and great impact resistance. The coating never needs to be waxed; they do not stain, and resist fatty acid and oil penetration for easy cleanup and maintenance.

Clear coats are renewable without being removed. Most formulas can be cleaned, sanded, recoated to make the original surface like new. The clear coat, with its high gloss enhances the overlayment, gives the cementitious, or polymer surface a protecting added touch that highlights the floor's over-all appearance. Rapid Set formulations turn two and three day projects into one-day sessions. That's the power of rapid set formulas and the technical expertise to place them. Rapid Set systems are highly efficient and hold potential for high profit.

Comparison makes clear coat selection easier⁹

Property	Epoxy ^{1,2}	Polyurea ^{1,3}	methyl methacrylate ^{1,4}
2 Component technology	Yes	Yes	Yes
Component pre-conditioning required	Yes	Yes	Yes
Knowledgeable, skilled workman required	Yes	Yes	Yes
Special protective clothing required	No	No	On many projects
100% solids	Yes	Yes	Yes
VOC content, g/L	None	None	<100 g/L
Ventilation during mixing / application req.	No	No	Yes
OSHA exposure limits & monitoring	None	None	Max. 100 ppm - required
Odor control for applicators, customer and adjacent neighbors	None	None	Bad odor - All exhaust & intake areas must be properly sealed – direct air flow away from neighbors
Potential stagnant areas	Not an issue	Not an issue	Vapor on the surface prevents curing of MMA
Air flow during placement	Not an issue	Not an issue	Shorten working time
Airborne odor suppressant	Not required	Not required	Required with careful monitoring
Flash point, closed cup method	245°F (188°C)	201°F (94°C)	50°F (10°C) highly flammable
Low substrate temperature - application	36°F (2°C)	40°F (5°C)	Below freezing
High substrate temperature - application	120°F (49°C)	120°F (49°C)	90°F (30°C)
Storage Conditions – dry area, above freezing	Min.40°F (5°C) Max. 120°F (49°C)	Min.40°F (5°C) Max. 120°F (49°C)	Min. not listed Max. 85°F (30°C)
Shelf Life	2 years	1 years	6 months
Potlife – working time	12 – 25 mins	15 – 25 mins	10 – 15 mins
Tack-free time ⁵	2 – 8 hrs	4 – 8 hrs	1 hr
Cure time for pedestrians	2 – 8 hrs	2 – 8 hrs	1 hr
Cure time for vehicles without protection	24 hrs	24 hrs	1 hr
Tensile strength, ASTM D638	8,800 psi (63 N/mm ²)	3,100 psi (22 N/mm ²)	3,550 psi (25 N/mm ²)
Tensile Elongation, ASTM D638	>5%	>8%	Not listed
Water Absorption, ASTM D570	0.15%	0.18%	0.4%
Flammability, ASTM D635	Self-extinguishing	Self-extinguishing	Not listed
Compliance - USDA, FDA, OSHA, ADA	Complies	Complies	Complies
Top coat thickness, first coat	160 – 80 ft ² /gal (10-20 mils) ⁷	160 – 80 ft ² /gal (10-20 mils)	90 – 80 ft ² /gal (18-20 mils)
Top coat thickness, second coat ^{6,8}	160 – 80 ft ² /gal (10-20 mils) ⁷	160 – 80 ft ² /gal (10-20 mils) ⁸	110 – 90 ft ² /gal (14-18 mils)
UV light exposure sunlight or electric light lamps	Poor, turns yellow	Excellent resistance	Excellent resistance
Gloss retention, 45° South Florida, USA 12 month exposure	No data available, chalking will occur when exposed to UV	Excellent, 98.6% @ 60° 93% @ 20°	No data available, Not a gloss finish rather a matte or satin finish

If you have any questions about the above data please call Crown Polymers at 888.732.1270.

Ask to speak with an Account Manager responsible for your geographic area. They will be pleased to assist you.

Economic Perspective

From an economic perspective, Flooring Contractors are in a demanding, high-performance business. Owners must have the ability to navigate periods of uncertainty and challenges presented by unstable economic conditions. Most importantly, they must manage their businesses in such a way as to emerge strong, or stronger on the other side.

Crown Polymers manufactures only high quality products and is committed to providing the best technical support in the business. Crown provides customers with the know-how and back up to take on projects of any scope. Growth and profitability comes from technical product knowledge. That translates into becoming an expert. Becoming an expert requires a relationship with a leading polymer manufacturer. Crown has long ago proven its ability to train and support its customers. Now is a time when knowledge and cooperation are more important than ever. Talk with us to see how we can work together.

At Crown Polymers, we put creativity, imagination and vision to work for our clients. Let Crown share its know-how about how to design and install high-performance polymer walls and floors, in any season or climate. Register for one of the Polymer Overlay College classes. You will gain a deeper understanding of clear coatings and every other component involved in the marketing, selling, design and installation of polymer walls and floors.

In today's economy, knowledge is the competitive edge.

**Contact us for the next available training class dates: 888.732.1270 or register on-line:
www.crownpolymers.com/tech**

Floyd Dimmick, Sr. is co-founder and the Technical Director of Crown Polymers, a manufacturer of concrete repair products and decorative, institutional, educational, industrial and commercial floor and wall systems. He has designed and applied polymer products for over 45 years, and has received patents in the USA and Canada. He teaches 10 to 12 polymer classes for contractors annually and has numerous published papers and book chapters on concrete repair with polymers. He is a member and was past chairman of polymer overlay committees of ACI and ASTM and may be reached at info@crownpolymers.com

Notes:

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1. Each polymer can be formulated into numerous products for different uses.
The general floor formulas used for clear coat wear surfaces are being used as the comparison.
 2. Epoxy formulas are based on the standard bisphenol A resins and cyclo-aliphatic or modified polyamine curing agent technology.
 3. Polyurea formulas are based on aliphatic technology.
 4. Methyl methacrylate formulas are based on acrylic technology.
 5. Tack-free times vary with formula and substrate temperature.
 6. Second top coats are not always required. The thickness is dependent upon the project environmental requirements and manufacturer recommendations.
 7. Thinner epoxy top coats are more stable and help to reduce yellowing when UV exposure is an issue.
When the wear surface is exposed to fatty acids and petroleum based materials use two top coats.
 8. Second top coat is not always required. When exposed to fatty acids and petroleum based materials use two top coats.
 9. All data was taken from published literature by the polymer manufacturer.