

Revised, May 2005

3356 “GP SERIES[®]” HIGH PERFORMANCE COATING / LINING SYSTEM

GP Series is KCC’s new “Grafted Polymer” (patent pending) product series that carries forward KCC’s unique capabilities in creating new high performance corrosion control polymers through grafting and synthesis of thermoplastic polymers, changing thermoplastics to thermosets – together to obtain a new classes of materials unequalled in performance and physical attributes. The advantages are so significant in enhanced performance, that KCC has filed for patents on the technologies employed in this and other grafted polymers in this class of *GP Series[®]* materials.

The outstanding performance characteristics of 3356 GP include; very high adhesion to a wide variety of substrates, (over steel, concrete or old coatings), high temperature stability to 250°F, Low temperature flexibility, with high elongation of 40% with memory, thermal cycling stability, low embedment stress, very low molecular moisture permeability (3356 GP is hydrophobic, it rejects water) and high corrosion resistance to a wide variety of organic and inorganic acids, caustics including bleaches and some solvents at a wide range of operating temperatures.

3356 GP combines many advantages of rubbers & elastomers in a single high performance polymer material, that is resilient, ductile and not damaged from external forces placing the system in tension

Developed as a Railcar lining, 3356 GP is ideally suited as a coating for splash & spill or full time immersion in railcars, over the road tank trucks and storage / processing tanks. Many additional uses will include sump and trench lining and flooring systems where 3356 GP properties are desired. 3356 GP may also be reinforced with glass fiber, Kevlar[®] or other KCC recommended reinforcing material to build a “laminated structure” to provide a tough lining / floor system.

3356 is 96% solids and is easily installed by airless spray, plural component, or roll and brush, to piers, decks, offshore structures and waste treatment areas, crude oil and refined product storage and handling. Resists Skydrol and hydraulic fluids and a myriad of potent chemicals such as 100% Adipic Acid and Glacial Acid in full time immersion at 210°F (98.8°C).

Specifying 3356 GP High Performance Coating / Lining System provides very significant performance advantages:

- Unequalled chemical resistance to organic & inorganic acids, caustics, many solvents.
- Unique flexibility and ductility for a high performance polymer system, not easily damaged in tension from external forces on steel shells such as railcars.
- Excellent abrasion resistance.
- Resistant to high temperature spills of aqueous materials to 300°F (149°C) and Thermal Cycling.
- Recommended for corrosion protection on old and new concrete, steel and new or old cracked polymer linings.
- Performance unaffected by weathering and UV light.
- Low temperature capability to -70°F (-56.6°C) brittle point.
- High temperature capability to 250°F (121°C) stable in hot, humid environments.
- Constant elongation over a wide temperature range
- High resistance to molecular permeation with final cure rendering the system hydrophobic.
- Highly competitive installed "first cost" compared to far less capable materials.

Review the chemical resistance charts and physical properties for each product on the following pages. Consult with KCC for the optimum choice to of materials to fully meet your specific performance requirements.

KCC GP SERIES[™] – THE FUTURE IS NOW !
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1. Kevlar is a registered trademark of E. I. DuPont, DeNemours & Company

CHEMICAL RESISTANCE

3356 GP is recommended for aqueous environments for intermittent splash & spill as well as in full immersion conditions in lining sumps, trenches as well as in concrete & steel tanks up to 250°F, depending on chemical concentrations and temperatures. **Typical Chemical Condition examples are listed below. Do not assume 3356 GP is good for each chemical listed up to 250°F. Be sure to consult with KCC Corrosion Control for product recommendations to meet your specific service conditions, which may include mixtures of chemicals.**

ACIDS	ALKALINES	SOLVENTS, CHEMICALS
1-70% Acetic	All Plating Solutions	All Alcohols
1-80% Acrylic	All Pulp Liquors	Animal & Mineral Oils
1-100% Adipic	1-20% Ammonium Hydroxide	Fuels and Fuel Oils
1-20% Chromic	1-10% Ammonium Fluoride	Isopropyl & Methyl Alcohols
1-37% Hydrochloric	1-5% Calcium Hypochlorite	Lubricating Oils
1-10% Nitric	1-50% Hydrogen Peroxide	Sour Crude Oil
1-85% Phosphoric	1-50% Sodium Hydroxide	
1-40% Sulfuric	1-15% Sodium Hypochlorite	

TYPICAL PROPERTIES

Solid Content	96.12% ± .5%	MUST NOT BE THINNED !
Volatility Organic Content	0.36 lbs per gallon	
Volume Mix Ratio.....	3 parts Resin to 1 Part Hardener	
Viscosity: @ 75°F (mixed).....	2,600 cps.	
Weight / Gallon:.....	9.1 ± 0.2 lbs./gal. (mixed), Denisty 1.09 g/ml mixed	
Flash Point: (Pensky-Martens Closed Cup):.....	3356 GP Resin..... 125°F (51.7°C)	
.....	3356 GP Hardener	> 200°F (93.3°C)
Recommended Installation Thickness.....	40 – 60 mils DFT, consult KCC.	
Coverage for Steel – 100% Solids....(Theoretical)....	80 sq.ft. per gallon @ 20 wet/ 19 dry mils	
.....(Practical).....	74 sq.ft. per gallon @ 20 wet/ 19 dry mils	
Color:.....	Medium Grey is the only available color	

NOTE: 3356 GP MUST NOT BE THINNED UNLESS SPECIFICALLY RECOMMENDED BY KCC !

PHYSICAL PROPERTIES OF CURED SYSTEM (Cured 7 days @ 73°F (22.7°C) unless otherwise noted.)

Tensile Strength at break (ASTM D 412):.....	275 lb. force / in ²
Tensile Strength @ 50% Elongation.....	175 lbs. force / in ²
Elongation at break (ASTM D 412).....	40% - 60%
Tear Strength (ASTM D 624).....	120 lbs. force / in ²
Shore “A” Hardness.....	50
Bond Strength (Tensile):.....	Sandblasted Steel - 2000 psi
	Concrete - breaks 5000 psi concrete
Impact Strength.....	undamaged at highest test force possible

POT LIFE/RECOAT TIME

Temp.	Pot Life	Recoat Time	
		Minimum	Maximum
@ 25°F	Consult	KCC	-
@ 50°F	120 min.	8 hrs.	72 hrs
@ 75°F	50 min.	3 hrs.	72 hrs
@ 90°F	30min.	1 hrs.	24 hrs

Pot life test on 200 gram. sample; working time in larger quantities will be shorter! (See installation procedure sections.) For application of 3356 GP at temperatures below 50°F contact KCC Corrosion Control for recommendations.

PACKAGING

TECHNI-PLUS 3356 GP is packaged in pre-measured units as follows:

	1 Gal. Unit	5 Gal. Unit	30 Gal. Unit
Resin	7.1 lbs.	Resin 35.5 lbs.	Resin 213 lbs.
Hardener	2.0 lbs.	Hardener 10.0 lbs.	Hardener 60 lbs.

(30 gallon units include multiple containers for hardener).

INSTALLATION PROCEDURES - GENERAL

The installation procedures in this bulletin are as specific as possible. **Be certain to read and understand the mixing and application procedures prior to installation.**

Surface Preparation – Concrete All oil, grease, chemicals, and/or weak laitance should be removed by either mechanical or chemical methods. Mechanical methods such as abrasive blasting, blastracking or scarifying are the preferred methods.

Chemical methods such as acid etching and detergents should only be utilized to remove laitance, oil and grease when mechanical methods cannot be utilized. The concrete should have sufficient tensile strength (250 psi), and be clean and dry.

All pits and surface imperfections, sharp corners, undercut areas from forms, honeycombing and bug holes opened up as a result of surface preparation must be repaired by "scratch coating". Existing polymer materials may only require high pressure washing or light abrasive blasting, but must be well bonded to the concrete substrate. For specific surface repair material recommendations for your project, contact KCC Corrosion Control.

Specific recommendations and testing procedures for surface tensile strength and moisture content are contained in KCC Corrosion Control Specification SC-01 "Preparation of Concrete for Thermoset Polymer Systems".

• **Mixing and Application**

BEFORE MIXING COMPONENTS, MEASURE TEMPERATURE OF SURFACE TO BE COATED USING INFRARED or DIAL SURFACE THERMOMETERS. DO NOT ATTEMPT MATERIAL APPLICATION IF SURFACE TEMPERATURE IS BELOW 50°F, ABOVE 90°F, OR WITHIN 5°F OF DEW POINT. DO NOT USE AIR TEMPERATURE AS A DETERMINATION OF SURFACE TEMPERATURE!

When coating concrete surfaces, blowholes caused by air movement out of concrete may occur. Concrete generally expels air during the day and intakes air during the night. The best time to apply any coating to avoid blowholes in the coating film is early evening at which time concrete is cooling and temperature drop of surface has been confirmed by measurement. Other precautions such as shading work area from sunlight to minimize the heating of the substrate and elimination of cyclic temperature changes will also reduce expulsion of air. The use of KCC TECHNI-PLUS E 3.2 or E 8 Primers and Epoxy Scratch Coat may minimize air expulsion from concrete if applied during time when concrete is cooling.

TECHNI-PLUS 3356 GP is normally applied at a nominal 20 mil thickness in a single coat, in two coats

over E 3.2 or E 8 nanocomposite primer in immersion conditions or on concrete with high vapor pressure. 3356 GP will hang 20 wet mils on a vertical surface. Depending on temperature and size of area, 3356 GP will generally set up fast enough to allow for the application of a second coat in a continuous operation.

APPLICATION METHODS

Spray: Refer to KCC Recommended Practice Bulletin: Recommend 56:1 Airless, 533 twist cleanable tip RP-01, Spray Application Methods and Equipment.

Brush-Roller: Natural bristle brush, short nap wool or mohair roller.

TECHNI-PLUS 3356 GP may also be applied by plural component spray, brush and roller. When spraying with airless equipment the pots and lines should be flushed with KCC's 910 solvent. Use 910 solvent to clean up and every 3 to 4 batches to flush pump and lines when temperatures exceed 80°F.

• **Pot Life** (See values on Page 2)

The pot life or working time of the material is mass sensitive, the larger the volume the shorter the pot life. Do not catalyze more material than can be used within the pot life. Pot life @ 75°- 80°F for all applications is 50 minutes. For Airless, the pot life is 50 minutes at 75F - 80 F. Take care to make sure that lines full of material do not lay on hot concrete, or pot life will be dramatically reduced.

The materials should be stored between 65°F and 75°F for 24 hours prior to use for optimum handling properties. Never store material at jobsite in hot sun or direct sunlight. If plural component application equipment is used materials are not premixed and pot life is not a factor. Mixing chamber and spray tip must be kept clean and flushed with KCC 910 Solvent.

• **Clean-Up**

All mixing equipment, spray equipment and brushes should be cleaned immediately after use. Solvents recommended for clean up are KCC's 910 Clean-up Solvent or methyl ethyl ketone. **NEVER USE ACETONE UNDER ANY CIRCUMSTANCES !**

RECOAT AND TOPCOAT LIMITATIONS

The maximum recoat time for TECHNI-PLUS 3356 GP exposed to direct sunlight (ultraviolet light) is 72 hours. This time period cannot be extended. In the event that the 72 hour recoat time is expired, the surface must be first cleaned with MEK solvent, after wiping all dust from the surface, the product is ready for 3356 Tie Coat and after 30 minutes, a topcoat must be applied within 2 hours.

TYPICAL SHELF LIFE

Temperature	Months
@ 50°F	18
@ 75°F – 80°F	12
@ >90°F	8

INSTALLATION PROCEDURES

The installation procedures in this bulletin will be as specific as possible. If any questions arise after reading this bulletin, please contact KCC Corrosion Control for more specific information.

• **Equipment Design, Fabrication and Surface Preparation**

Whether the vessel is to be protected from the corrosive action of the contents or the contents are to be protected from contamination from the vessel surface, the coating must be continuous. The vessel design must consider the need to eliminate sharp corners, projections, crevices and acute angles and provide access to all surfaces. The design must also minimize movement when in operation.

Steel

External stiffeners and bracing should be used when acceptable. Internal bracing, dividers, nozzle projections and similar items must have continuous welds, (no skip welding) with weld rippling, undercutting and weld splatter ground smooth. Edges must be ground to a 1/8" radius. To facilitate the coating application, nozzles should have a larger diameter, (4" minimum) and short pipe nipple length. Nozzles smaller in diameter or with long pipe nipple lengths should be made of any alloy or utilize a fiberglass plastic nozzle insert. Threaded fittings must be avoided or made of alloy suitable to resist the corrosive contents.

All surfaces to be coated require a "White Metal" blast to SSPC-SP-5 or NACE 1, with an abrasive blast media that removes all visible mill scale, existing coating and rust. Performance is directly related to the anchor patten profile and cleanliness of the steel.

For immersion service conditions, highly corrosive environments and thermal shock, the steel substrate should be clean, dry and have a minimum anchor profile of 3 - 4 mils. For less severe conditions, non-immersion service, splash, spillage and no thermal shock, a 2 - 3 mil anchor profile with a "Near White Metal" blast to SSPC-SP-10 or NACE 2, is acceptable.

Concrete

All oil, grease, chemicals, polymeric materials and/or weak laitance should be removed by either mechanical or chemical methods. Mechanical methods such as sandblasting, blastracking or scarifying are the preferred

methods. Chemical methods such as acid etching and detergents should only be utilized to remove laitance, oil and grease when mechanical methods cannot be utilized. The concrete should have sufficient tensile strength (250 psi), and be clean and dry. All pits and surface imperfections, sharp corners, undercut areas from forms, honeycombing and bug holes opened up as a result of surface preparation must be repaired by "scratch coating." For specific scratch coat material recommendations, contact KCC Corrosion Control. Specific recommendations and testing procedures for surface ensile strength and moisture content are contained in KCC Corrosion Control's Specification SC-01 "Preparation of Concrete for Thermoset Polymer Systems."

Reference Documents: *National Association of Corrosion Engineers (NACE) Standard RP0178-89, "Fabrication Detail, surface Finish Requirements, and Proper Design Considerations for Tanks and Vessels to be Lined for Immersion Service."*

Steel Structures Painting Council (SSPC), Volume 1, Chapter 14.2, "The Lining of Steel Tanks."

• **Mixing and Application**

DO NOT ATTEMPT MATERIAL APPLICATION IF SUBSTRATE TEMPERATURE IS WITHIN 5°F OF DEW POINT OR IF RELATIVE HUMIDITY IS GREATER THAN 95%.

If coating concrete surfaces, concrete expels air during the day and intakes air during the night. The best time to apply coating is late afternoon or early evening at which time concrete is least likely to expel air. Other precautions such as shading the work area from sunlight to minimize the heating of the substrate and elimination of cyclic temperatures changes will also reduce expulsion of air. Use of primer is optional, although it may minimize air expulsion from concrete. Both components should be stirred thoroughly prior to mixing Hardener into Resin. Add Hardener to Resin portion and mix approximately 2 minutes. **DO NOT THIN!** If plural component spray equipment is used, both components must be thoroughly stirred. Hardener is not added to resin, but mixed in spray equipment at nozzle. Proper ratio is critical to ultimate cure and film properties.

CURE TIME

The cure time is dependent on temperature of the substrate. The ambient air temperature may not be the temperature of the substrate, i.e. direct sunlight will heat substrate or concrete to higher temperature than ambient air. In winter, substrate or concrete may be colder than ambient air. The substrate temperature should be measured and dew point calculated prior to coating.

	Time To Complete Cure
If substrate maintained:	
@ 50°F.....	96 hrs.
@ 75°F.....	84 hrs.
@ > 90°F.....	60 hrs.

INSPECTION OF FILM INTEGRITY

During installation of the coating, care should be taken to provide for the correct specified uniform thickness of material by carefully checking at regular, pre-specified intervals, with a wet film thickness gauge.

After allowing adequate cure time based on the actual substrate temperature, the surface should be inspected for runs, sags, foreign matter and under cured areas caused by insufficient hardener quantity, incomplete mixing or low temperature. If under cured areas are found, they must be repaired.

Film thickness on steel structures should be checked with a magnetic dry film thickness gauge. Coatings to be subjected to immersion service should be tested for minute discontinuities (pin holes) using a high voltage DC holiday detector, set at no more than 100 volts per mil of the film thickness being tested.

Coatings on concrete surfaces may be checked for continuity by spark testing if so desired. If coating is to be spark tested, a conductive primer must be used on the concrete (TECHNI-PLUS E 3 C) in place of the standard primer, TECHNI-PLUS E 3. Follow test procedures for completed coating outlined above.

- **Clean-Up**

Tools and mixing equipment can be washed off with warm water or KCC's 622 Clean-up Solvent or methyl ethyl ketone. **DO NOT THIN 3356 GP with 910 Solvent or methyl ethyl ketone. If 3356 GP is thinned with any materials other than that recommended specifically by KCC, the product will fail to perform to expectations.**

SAFETY

3356 GP Resin is a unique grafted resin system. 3356 GP Hardener (**KCC BLUE LABEL**) contains multiple cross linking agents and other components and **MUST NOT BE STORED WITH OTHER KCC RED LABEL (AMINES) OR KCC YELLOW LABEL (PEROXIDES)**. All components must be stored in a cool dry place out of direct sunlight.

When working with any polymers, hardeners and dry aggregate fillers always wear appropriate safety glasses, breathing protection, clothing, and gloves. Any contaminated clothing should be washed prior to being re-worn. The vapors given off during application and cure should not be allowed to build up. The ventilation should be sufficient to turn over the air with special consideration for enclosed areas. When using these types of materials any sources of ignition should be eliminated in the immediate work area.

Material Safety Data Sheets are provided with material shipment. KCC Corrosion Control recommends that personnel applying the materials thoroughly read and understand these MSD Sheets as well as all product labels, prior to mixing any material. If the resin or hardener are splashed in the eyes flush immediately with clean potable water for 15 minutes and **CONTACT A PHYSICIAN. IF INGESTED DO NOT INDUCE VOMITING AND IMMEDIATELY CONTACT A PHYSICIAN.**

All empty containers; bags, cans, bottles and excess material must be properly disposed of in accordance with applicable Federal, State and Local Codes.

IN EMERGENCY SITUATIONS CONTACT CHEMTREC AT 800/424-9300.

WARRANTY

For product warranty see KCC Corrosion Control Co., Ltd. **STANDARD TERMS AND CONDITIONS**, U. S. Rev. 04/04 KCC-Sale.

The information contained in this bulletin is believed to be accurate and reliable but does not represent each and every necessary step for proper installation. Material is to be sold only to Professional Coating / Lining Installers who have requisite knowledge and experience with such systems. If you lack such knowledge and experience, DO NOT INSTALL THIS PRODUCT, immediately contact KCC toll free - 800-395-5624.

The information contained herein is believed to be accurate and reliable but is not to be construed as implying any warranty or guarantee of performance. The suggestions or recommendations and data contained herein are based on laboratory tests and field data that are believed to be accurate and reliable. The suggestions or recommendations of data contained in this bulletin are made without guarantee or representations as to results. We suggest that the user evaluate these suggestions or recommendations in your facility or laboratory or in field testing prior to use. For specific Corrosion Control Co., Ltd. product Limited Warranty and Limitations of Liability see KCC Corrosion Control Co., Ltd. Terms and Conditions of Sale - U.S. Rev. 04/2004 KCC - Sale. No statement contained herein shall infer or be construed as granting the right or permission to use, in any manner whatsoever, any patent owned by any KCC company or any KCC affiliate company.