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### 100% REACTIVE SOLIDS VINYL ESTER LINING/COATING SYSTEM

TECHNI-PLUS VE 41 is a 30 to 40 mil novolac vinyl ester resin based, flake glass filled, peroxide cured polymer system. It is designed for use as a tank lining, sub-surface pipeline coating or chemical containment membrane on metal or concrete, particularly where elevated temperatures are encountered.

TECHNI-PLUS VE 41 exhibits excellent resistance to aggressive concentrated acids, alkalines and organic solvents. In immersion service, TECHNI-PLUS VE 41 is used in combination with TECHNI-PLUS P 3 Primer and performs as a corrosion resistant lining up to 160°F in many severe corrosive environments. TECHNI-PLUS VE 41 provides superior performance in primary and secondary containment where excellent solvent and acid resistance is required.

TECHNI-PLUS VE 41 possesses excellent abrasion and impact resistance and may be used in flooring protection applications. TECHNI-PLUS VE 41 is fast curing and its outstanding high temperature chemical and abrasion resistance allows wide acceptance in the pipeline industry, where coating performance under severe sub-surface conditions and cathodic protection are often critical. The superior adhesion of TECHNI-PLUS 41 to the substrate maximizes performance and prevents delamination and undercutting. TECHNI-PLUS VE 41 may be applied to hot pipe (200°-300°F) while in service by spraying thin multiple coats.

Graphite filled version, VE 41 G, is available when required. TECHNI-PLUS VE 42 is a special higher temperature formulation using proprietary flake filler other than glass flake.

#### CHEMICAL RESISTANCE

In coating applications, TECHNI-PLUS VE 41 and VE 42 will generally withstand higher concentrations. Consult with KCC on temperature limitations. Examples of chemical resistance for immersion service are listed. Contact KCC Corrosion Control with complete operating service conditions for specific product recommendations.

ACIDS	ALKALINES	SOLVENTS, CHEMICALS
1% - Glacial Acetic	1-29% Ammonium Hydroxide	Acetone (24 hrs)
1-25% Acrylic	Black & White Pulp Liquor	Aniline
1-23% Adipic	1-100% Calcium Hydroxide <sup>2</sup>	Benzene
saturated Benzoic	Copper Plating Cyanide	Butyl Acrylate
saturated Boric	Diethanolamine	Carbon Tetrachloride
1-50% Chloroacetic	Dimethylamine	Chlorotoluene
1-10% Chromic	Gold Plating Cyanide	Cyclohexane
1-100% Citric	30% Hydrogen Peroxide	Cyclohexanone
1-50% Hydrobromic	Isopropylamine	Ethanol
1-30% Hydrochloric		Isopropanol
1-20% Hydrofluoric <sup>1, 2</sup>	Sodium Bisulfite (saturated)	Jet Fuel
Maleic	1-100% Sodium Chlorate	Kerosene
Nickel Plating	1-50% Sodium Chlorite	Methylene Chloride (24 hrs)
1-40% Nitric	1-100% Sodium Sulfite	Methyl Ethyl Ketone
Oleic	Sodium Peroxide	Naphtha, Aromatic
1-30% Perchloric	1-50% Potassium Hydroxide	ortho- & para-Xylene
100% Propionic	1-15% Sodium Cyanide	5-85% Phenol
1-100% Phosphoric	1-10% Sodium Hydroxide <sup>2</sup>	Salt Brine
Stearic	10-50% Sodium Hydroxide	Toluene
1-25% Sulfamic	1-18% Sodium Hypochlorite <sup>3</sup>	1,1,1 Trichloroethane
1-75% Sulfuric		Trichloroethylene

**MAXIMUM SERVICE TEMPERATURE** <sup>1</sup> 350°F Dry; 180°F for Splash/Spillage; 160°F for Immersion (VE 42:200°F Immersion) Solvents listed are for Secondary Containment @ ambient temperature up to 72 hours, unless fewer hours are stated above. Mixed solvents or repeated spills must be reviewed by KCC. Contact KCC for specific recommendations to meet your requirements.

<sup>1</sup> FOR SPECIFIC RECOMMENDATIONS CONTACT KCC CORROSION CONTROL CO., LTD.

<sup>2</sup> VE 41 G FOR LOW CONCENTRATIONS OR SPECIAL CLEAR COAT REQUIRED.

<sup>3</sup> CLEAR COAT REQUIRED GREATER THAN 15%.

<sup>4</sup> IF PROTECTED FROM DIRECT SUNLIGHT.

**TYPICAL PROPERTIES**

Solids Content:.....	100% Reactive
Volatile Organic Content:.....	0.45 lbs per gallon
Flash Point: (Pensky-Martens Closed Cup).....	VE 41, VE 42 Resins ..... > 99°F
	Hardener 2 C (MEKP) ..... > 135°F
Viscosity:.....	3000 to 3500 cps @ 75°F
Thinner:.....	<b>DO NOT THIN!</b>
Weights per Gallon:.....	9.8 lbs. mixed.
Coverage for Steel:.....	(Theoretical)... 70 sq. ft. per gallon @ 22.5 wet mils.
	(Practical)..... 60 sq. ft. per gallon per coat when applied at 20 to 25 wet mils yielding 15 to 20 dry mils. Normally applied in two coats to yield 30 to 40 dry mils.
Concrete:.....	Same as above if concrete is dense and primer is used. Porous or unprimed concrete may reduce coverage to 40 to 50 sq. ft. per gallon per coat at 20 to 25 wet mils.
Color:.....	Medium Grey , Beige . Minimum quantities apply for special orders VE 41 G is Black (Charcoal Gray) only.

**PHYSICAL PROPERTIES CURED SYSTEM**

Tensile Bond Strength:.....	Sandblasted Steel - 1800 psi. Concrete - exceeds 500 psi (tensile).
Tensile Strength (ASTM D638):.....	5,500 psi
Taber Abrasion (ASTM D 4060):.....	19 mg. loss / 1000 cycles with 1000 gms. CS - 17 Wheel.
Barcol Hardness:.....	40+
Moisture Permeability (ASTM E96-85):.....	0.0011 perm-inch

**POT LIFE AND RECOAT TIME**

Temp.	Pot Life	Recoat Time	
		Minimum	Maximum
@ 50°F	110 min.	12 hrs.	7 days <sup>4</sup>
@ 75°F	90 min.	4 hrs.	7 days <sup>4</sup>
@ 90°F	60 min.	3 hrs.	7 days <sup>4</sup>

Pot Life test on 200 gm. sample; working time in larger quantities will be shorter!

**PACKAGING**

TECHNI-PLUS VE 41 and VE 42 are packaged in premeasured units as follows:

1 Gal. Unit	5 Gal. Unit	30 Gal. Unit
Resin 9.8 lbs.	Resin 49.0 lbs.	Resin 294.0 lbs
Hard.2 C 2.0 fl.oz.	Hard.2 C 10.0 fl.oz.	Hard.2 C 60.0 fl.oz.

VE 41 G is packaged as follows:

1 Gal. Unit	5 Gal. Unit	30 Gal. Unit
Resin 9.0 lbs.	Resin 45.0 lbs.	Resin 270.0 lbs.
Hard.2 C 3.2 fl.oz.	Hard.2 C 16.0 fl.oz.	Hard.C 96.0 fl.oz.

**BID SPECIFICATION**

Concrete or steel shall be primed with a nominal 3 wet mils of KCC Corrosion Control's TECHNI-PLUS P 3 Primer. This primer shall be topcoated with a nominal 30 to 40 mil thickness of KCC Corrosion Control's TECHNI-PLUS VE

41, VE 42 or VE 41 G in two, 20 to 25 wet mil coats. The materials shall be applied to substrate prepared in accordance with the manufacturer's specifications. **DO NOT ATTEMPT LINING APPLICATION IF SUBSTRATE TEMP IS WITHIN 5°F OF DEW POINT OR IF RELATIVE HUMIDITY IS GREATER THAN 95% OR IF SUBSTRATE TEMPERATURES ARE BELOW 50°F OR EXPECTED TO GO BELOW 50°F DURING CURE.**

**STORAGE AND SHELF LIFE**

TECHNI-PLUS VE 41 components should be stored in cool dry area and out of direct sunlight. TECHNI-PLUS VE 41 should be used immediately. Storage is not recommended. The hardener is a **PEROXIDE (KCC Yellow Label)** and **SHOULD NOT BE STORED NEAR AMINES (KCC Red Label)**. **DO NOT STORE RESINS! USE IMMEDIATELY!**

**TYPICAL SHELF LIFE**

Temperature	Months
@ 50°F	2-3
@ 75°F	1-2
@ 80°-90°F	< 1

<sup>4</sup> IF PROTECTED FROM DIRECT SUNLIGHT.

## 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, etc. must have continuous welding (no skip welding) with weld rippling, undercutting and weld spatter ground smooth. Edges must be ground to a 1/8" radius. To facilitate the coating application, nozzles should have a large diameter (4" minimum) and short pipe nipple lengths. Nozzles smaller in diameter or with long pipe nipple lengths should be made of an alloy or utilize a Fiberglass Plastic nozzle insert. Threaded fittings must be avoided or be of an alloy suitable to resist the corrosive contents.

All surfaces to be coated require a white metal blast to SSPC-SP-5 or NACE 1 specification with a blast media that removes all visible mill scale and rust. Performance is directly related to the anchor pattern profile and cleanliness of the steel. For immersion service conditions, highly corrosive environments and thermal shock, the substrate should be clean, dry and have a minimum anchor profile of 3 mils. For less severe conditions, non-immersion service, splash, spillage and no thermal shock, a 2 mil anchor profile may be acceptable, contact KCC.

#### **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 be utilized to remove oil and grease or 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 filled with a scratch coat compatible with the coating system. It is the physical forcing, by troweling of a scratch coat onto and into an impervious finished coating. For specific scratch coat material recommendations and testing procedures for surface tensile strength and moisture content are contained in KCC Corrosion Control's Specification (SC-01).

**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 COATING 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 primer and basecoat 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 temperature changes will also reduce expulsion of air.

TECHNI-PLUS VE 41, VE 42 and VE 41 G are designed to be spray applied, (red tracer dye in hardener is recommended when spraying with plural component equipment). VE 41 G is also easily applied by roller and brush. Roller and brush application are only used for small areas and spot repair and touch-up for VE 42 and VE 41. When spraying batch-mix with conventional equipment, the pot and material lines should be flushed with solvent after every 3 - 4 batches when temperatures exceed 80°F. Proper ratio of resin to hardener is important to ultimate cure and film properties. **DO NOT THIN!**

**APPLICATION METHOD**

TECHNI-PLUS VE 41 & VE 42 are both designed for spray application only. **DO NOT ROLL APPLY!**

Spray: Refer to KCC Recommended Practice Bulletin: RP-01, Spray Application Methods and Equipment. Note short working time when using spray equipment!

A check for suitability of spray equipment can be made by first stirring the resin component of the product for two minutes with a jiffy mixer (no hardener), then spraying the product without the hardener. This procedure eliminates the risk of the product curing while adjusting or testing the spray unit.

- **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

**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 to higher temperature than ambient air. In winter, substrate may be colder than ambient air. The substrate temperature should be measured and dewpoint calculated prior to coating. Substrate temperatures below 50°F will retard curing.

	<b>Time To Complete Cure</b>
If substrate is maintained: @ 50°F.....	48 hrs.
@ 75°F.....	24 hrs.
@ 90°F.....	16 hrs.

**CAUTION:** Styrene fumes are offensive to personnel and heavier than air, therefore, it is necessary to maintain sufficient ventilation in closed areas to meet OSHA regulations, and to continuously ventilate closed areas such as tanks, pits and trenches to keep the working environment safe, and prevent styrene fumes from being trapped and building up, which will prevent the proper cure of the product.

**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.

Product that has been sprayed using plural component equipment with red tracer dye in the catalyst can be visually inspected by looking for variations in color. If under cured areas are found, they must be repaired.

not catalyze more material than can be used within the pot life. Above 90°F ambient temperature, best results are obtained when the catalyzed material is poured into smaller containers reducing the mass. When ambient temperature exceeds 80°F the pot life can be extended by cooling the materials. The materials should be stored between 65°F and 75°F for 24 hours prior to use for optimum handling properties. 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 solvent.

- **Clean-Up**  
All mixing equipment, spray equipment and brushes should be cleaned immediately after use. Solvents recommended for clean-up are KCC Corrosion Control's 622 Clean-up Solvent or methyl ethyl ketone. **DO NOT USE ACETONE!**

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 a coating is to be spark tested, a conductive primer must be used on the concrete in place of standard primer. Follow test procedure for completed coating outlined above.

**Reference Documents:** *Steel Structures Painting Council (SSPC) Volume 1, Chapter 14.2, "The Lining of Steel Tanks", Section VIII, Inspection.*

National Association of Corrosion Engineers (NACE) Standard RP0188-88, "Discontinuity (Holiday) Testing of Protective Coatings" and Standard RP0288-88, "Inspection of Linings on Steel and Concrete."

### **RECOAT AND TOPCOAT LIMITATIONS**

The maximum recoat time when exposed to direct sunlight (ultraviolet light) is 4 hours. This time period can be extended to 7 days by protecting the product from exposure to direct sunlight. The first coat should always be tested for suitability for topcoating by utilizing a styrene sensitivity test. This test is performed by wiping several small areas of the first coat with styrene, waiting until the styrene flashed off (just a minute or two) and then checking to insure that the first coat surface contacted by styrene is now "tacky" to the touch. If the surface does not become "tacky", the surface must then be roughened or abraded by light abrasive blasting to remove all shiny surfaces of the products, and then, after wiping all dust from the surface, the product is ready for topcoat application. After light roughening of the surface the surface must be topcoated within 3 hours.

### **SAFETY**

TECHNI-PLUS VE 41, VE 41 G, and VE 42 resins are flammable. Resins contain vinyl ester resins and styrene.

### **RETURN MATERIAL POLICY:**

**VE 41 & VE 42 are both short shelf life product, made to order. KCC does not accept returns on these or any short shelf life product.**

### **WARRANTY**

For product warranty see KCC Corrosion Control Co., Ltd. **STANDARD TERMS AND CONDITIONS (U. S. KCC-Sale), stated terms including limitation of liability constitute the total warranty.**

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.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 or intellectual property owned by a KCC company or any KCC affiliate company.

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## **NOTES:**

Hardener 2 C contains **PEROXIDE (KCC Yellow Label)** and **SHOULD NOT BE STORED NEAR AMINES (KCC Red Label)**. All components should 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 reworn. 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 area. When using these types of materials any sources of ignition should be eliminated within a 50 ft. range.

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