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100% REACTIVE, LOW STYRENE, VINYL-ESTER LINING SYSTEM

KCC VE 62 and VE 62.2 are both 60 mil, highly modified novolac vinyl-ester, flake-filled, lining system that breaks new ground in resisting molecular permeation and abrasion. VE 62 series is the first of a new class of spray applied linings that exhibit superior resistance to molecular vapor permeation, (a primary determinant of longevity) even when compared to and tested against the traditional, heavier, 80-150 mil and thicker, glass flake trowel applied systems. VE 62 series outperforms these linings with industry leading permeation resistance, coupled with unequaled chemical, temperature and abrasion resistance and ease of application with low styrene content, 99% reactive – 1% loss of styrene. (1)

VE 62 series exhibits excellent resistance to aggressive concentrated acids, alkalines and organic solvents. In immersion service, VE 62 and VE 62.2 are always used with P 4, nanocomposite primer, and performs up to 210°F (wet) and 450°F (dry) in many severe corrosive environments (consult KCC on maximum temperature for your process conditions).

CHEMICAL RESISTANCE

Examples of chemical resistance for immersion service are listed. In coating applications, VE 62 series will generally withstand higher concentrations. Contact KCC with complete operating service conditions for specific product recommendations.

The VE 62 standard system is applied in two spray coats, each coat is applied at 30 to 35 wet mils, yielding 30 to 35 dry mils. Target minimum thickness for the entire system is 60 dry mils in two coats, with heavier thickness possible, in total or in single coat applications, consult KCC.

VE 62 was primarily developed for the Power Industry in FGD lining applications with tough chemical service conditions including abrasive limestone and gypsum slurries. VE 62 is used in tanks, clarifiers & ductwork, and VE 62 is spray applied, in fewer spray steps, lowering installation costs, while maintaining greater uniformity than is possible by trowel application. VE 62 and VE 62.2 are both also used in many other chemical / industrial applications, including tank trucks and international shipping containers.

In applications where high abrasion resistance is required, VE 62AR is recommended as a topcoat. See VE 62AR Technical Bulletin for dramatic advances in abrasion resistance.

(1) can vary slightly with higher application temperatures

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 ²	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
1-37% Hydrochloric ¹		Isopropanol
1-20% Hydrofluoric ^{1, 2}	Sodium Bisulfite (saturated)	Jet Fuel
Maleic	0-100% Sodium Chlorate	Kerosene
Nickel Plating	0-50% 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 ²	Salt Brine
Stearic	10-50% Sodium Hydroxide	Toluene
1-25% Sulfamic	1-18% Sodium Hypochlorite ³	1,1,1 Trichloroethane
1-75% Sulfuric		Trichloroethylene

MAXIMUM SERVICE TEMPERATURE ¹ 450°F Dry, 212°F Immersion – contact KCC for specific recommendations. 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.

¹ FOR SPECIFIC RECOMMENDATIONS CONTACT KCC CORROSION CONTROL CO., LTD.

² FOR LOW CONCENTRATIONS SPECIAL CLEAR COAT REQUIRED.

³ CLEAR COAT REQUIRED GREATER THAN 15%.

⁴ IF PROTECTED FROM DIRECT SUNLIGHT.

TYPICAL PROPERTIES

Solids Content:.....	100% Reactive
Volatile Organic Content:	0.45 lbs per gallon, (53.9 g/l)
Flash Point: (Pensky-Martens Closed Cup).....	Resins> 99°F Hardener 2 C> 135°F
Viscosity:	3000 to 3500 cps @ 73°F
Thinner:.....	DO NOT THIN!
Weight per Gallon:.....	9.8 lbs. mixed.
Coverage for Steel:	(Theoretical) ... 43 sq. ft. per gallon @ 37.5 wet mils avg. (Practical) 38 sq. ft. per gallon per coat when applied at 35 to 40. wet mils yielding 30 to 35 dry mils. Applied in two coats to obtain minimum target thickness of 60 dry mils in most applications.
Coverage for Concrete:	Same as above with required primer.
Color:	Medium Gray or Beige (Off-White). Minimum quantities and extra costs apply for special color orders.

PHYSICAL PROPERTIES OF CURED SYSTEM

Tensile Strength (ASTM D638):	5,800 psi
Tensile Bond Strength:	Sandblasted Steel – 1,800 psi Concrete - exceeds 500 psi (tensile)
Taber Abrasion (ASTM D 4060):.....	19 mg. loss / 1000 cycles with 1000 gms. CS - 17 Wheel for exceptional abrasion resistance use VE 62AR topcoat.
Moisture Permeability (ASTM E96-85):	0.000357 perm-inch. System is essentially a non-permeating lining.
Cathodic Disbondment (ASTM G8-96, 2003).....	4.2 mmr, temperature modified from 70°F - 77°F, to 77±5°F
Cathodic Disbondment (ASTM G42-96, 2003).....	17.1 mmr, temperature modified from 140±5° to 150±5°F
Barcol Hardness:.....	38+
Shore D Hardness.....	80 to 90

POT LIFE/RECOAT TIME

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

Pot Life test on 200 gm. sample; working time in larger quantities will be shorter! Recoat window is critical when working in direct sunlight with any vinyl ester. If recoat window stated above is exceeded or if lining is exposed to direct sunlight for up to 4 hrs max, the surface area must be abraded immediately prior to application of the next coat. Consult KCC for any questions on missing a recoat window.

PACKAGING

VE 62 is 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.

BID SPECIFICATION

Concrete or steel shall be primed with a nominal 4 to 6 wet mils of P 4.0 or P 3.3 Primer. This primer shall be topcoated with a minimum target of 60 mil dry film thickness of KCC VE 62 in two - 30 to 35 dry mil spray

applied coats. The materials shall be applied to the substrate, prepared in accordance with KCC manufacturer's specifications.

STORAGE AND SHELF LIFE

VE 62 components should be stored in cool dry area and out of direct sunlight. The hardener is a **PEROXIDE** (KCC Yellow Label Products) and is best stored in refrigerated conditions (not freezing) and **SHOULD NOT BE STORED NEAR AMINES** (KCC Red Label Products).

Any questions you may have on storage or shelf life, of KCC materials, please always consult KCC for recommendations.

TYPICAL SHELF LIFE VE 62 RESIN

Temperature	Months
@ 50°F	3-4
@ 75°F	2-3
@ 80°-90°F	1

Shelf life shown is typical for VE 62 Resin. Hardener shelf life is approximate 3 – 4 months if stored < 55°F.

⁴ 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 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 splatter 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 length. 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 to 4 mils for FGD and critical service. 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 Recommended Practice 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 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.

If coating concrete surfaces, concrete expels air during the day and intakes air during the night. The best time to apply primer and topcoat 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.

VE 62 is designed to be spray applied by Airless Spray and a further preference is a hopper on the airless gun to facilitate spraying with minimal clean-up. (red tracer dye in hardener is recommended). Roller and brush application may be used only for small touch up areas. Spraying batch-mix with conventional equipment is not recommended. Proper ratio of resin to hardener is critical to ultimate cure and film properties, and for that reason, we do not recommend plural component spray. **DO NOT THIN!**

During application and cure, it is critical that styrene fumes be evacuated from the work area in closed tanks, duct, trenches or pits. Styrene vapor is heavier than air, and it will fall and flow to the lowest level possible. If a lining or coating is in process of curing when styrene covers the surface, it will prevent the product from properly curing.

Styrene must be continually evacuated during the application process and throughout the time to cure.

APPLICATION METHODS

This product is designed for spray application. **DO NOT APPLY BY ROLLER !** Material thickness stated herein can not be obtained by roller application. Roller and brush may be used for small area touch up.

Spray: Refer to KCC Recommended Practice Bulletin: RP-01, Spray Application Methods and Equipment.

A check for suitability of spray equipment can be made by first stirring the resin component in 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 not catalyze more material than can be used within the pot

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 steel to higher temperature than ambient air. In winter, steel may be colder than ambient air. The substrate temperature should be measured and dewpoint calculated prior to coating. Substrate temperatures below 55°F will retard curing. It is strongly recommended that winter substrate temperatures be maintained above 60°F throughout application and cure time.

Time To Complete Cure

If substrate is maintained:	@ 55°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.

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 622 Clean-up Solvent or methyl ethyl ketone (MEK). ***KCC RECOMMENDS AGAINST THE USE OF ACETONE DUE TO THE FLAMMABILITY OF ACETONE, AND THE FLAMMABILITY HAZARD, ESPECIALLY IN A CLOSED ENVIRONMENT !***

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 crete 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 flashes 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 product, 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

Handle with care. Before and during use, observe all safety labels on packaging and coating containers, consult KCC Material Safety Data Sheets and follow all local, state or national safety regulations. Avoid inhalation, avoid contact with skin or eyes, and do not swallow. Take all precautions against possible risks of fire or explosions as well as protection of the environment. Apply only in well ventilated areas.

RETURN MATERIAL POLICY:

VE 62 is a short shelf life product, made to order. KCC does not accept returns on this or any short shelf life product.

WARRANTY

For product warranty and additional information see KCC Corrosion Control Co., Ltd, "**KCC STANDARD TERMS AND CONDITIONS**", (2/2010 Sale) with 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. 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 KCC Corrosion Control Co. Ltd. or any KCC affiliate company.

VE 62 resin is flammable. It contains vinyl-ester resins and styrene. Hardener 2 C contains **PEROXIDES** (KCC Yellow Label Product) and **SHOULD NOT BE STORED NEAR AMINES** (KCC Red Label Product). 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 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.**