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1/8 INCH WOVEN CLOTH REINFORCED EPOXY NOVOLAC LINING / FLOORING SYSTEM

TECHNI-PLUS EN 125CR is a corrosion resistant lining or floor topping with excellent chemical and wear resistance based on advanced epoxy novolac technology, amine cured and filled with blended silica aggregate. TECHNI-PLUS EN 125 CR is a 1/8 inch system reinforced with 10 oz. woven glass cloth saturated with epoxy novolac resin. Graphite "G" version (EN 125CR/G) is also available for fluoride and some caustic exposures. Abrasion resistant "AR" version (EN 125 CR/AR) is also available for highly abrasive environments TECHNI-

PLUS EN 125CR functions as a monolithic lining/flooring designed to withstand a broad range of chemicals including immersion and splash and spillage of strong acids, alkalis and solvents. Based on the KCC's widely known TECHNI-PLUS EN 25 epoxy novolac technology, TECHNI-PLUS EN 125CR functions as a lining designed to withstand a broad range of chemicals in immersion at elevated temperatures. The short cure time of EN 125CR results in minimum downtime and the reinforcement layer offers resistance to thermal cycling.

CHEMICAL RESISTANCE¹

The chemical resistance of KCC epoxy novolac systems surpass vinyl esters in most concentrated inorganic acid service. TECHNI-PLUS EN 125CR will resist severe chemical immersion exposures, examples are listed below. In flooring applications, the system will generally withstand higher concentrations. Contact KCC Corrosion Control with complete operating service conditions for specific product recommendations.

ACIDS	ALKALINES	SOLVENTS, CHEMICALS
1-50% Acetic	1-25% Ammonium Hydroxide ²	Acetaldehyde
Acid Plating Solutions	1%-saturated Barium Hydroxide	Acetone
1-25% Adipic	Black & Green Pulp Liquor	Cyclohexane
1-30% Chromic	Copper Cyanide Plating	Ethyl & Butyl Acetate
1-37% Hydrochloric	1-30% Hydrogen Peroxide	Formaldehyde
1-40% Hydrofluoric ²	1-50% Potassium Hydroxide ²	Methanol, Isopropanol
1-50% Nitric	1-50% Sodium Hydroxide ²	Methyl Ethyl Ketone
1-85% Phosphoric	1-9% Sodium Hypochlorite ²	Perchloroethylene
1-98% Sulfuric	Sodium Peroxide Bleach	1,1,1 Trichloroethane

MAXIMUM SERVICE TEMPERATURE¹ 220°F for Splash/Spillage, 180°F for Immersion.

TYPICAL PROPERTIES

Solids Content:.....	100%
Volatile Organic Content:	Zero
Liquids Mix Ratio by Volume:	4 parts Resin: 1 part Hardener
Mortar Mix Ratio by Weight:	2.4 parts Powder: 1 part mixed Resin & Hardener liquids
Flash Point: (Pensky-Martens Closed Cup)	Resin..... > 250°F
	Hardener..... > 200°F
Viscosity:	Mortar consistency with Lining Powder #4.
Thinner:	DO NOT THIN!
Weights per Gallon:	15.3 lbs. Resin, Hardener, Powder Mix; 9.5 lbs. Resin, Hardener
Color:	Gray is standard. Graphite "G" version is Black.
	Minimum quantity order applies to limited special colors.

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

² GRAPHITE "G" VERSION IS RECOMMENDED FOR THESE EXPOSURES.

³ IF PROTECTED FROM DIRECT SUNLIGHT.

PHYSICAL PROPERTIES OF CURED SYSTEM

Compressive Strength (ASTM C579A-82):	14,500 psi
Flexural Properties (ASTM C580-85):	
Strength:.....	3,800 psi
Modulus of Elasticity:.....	1.8 X 10 ⁶ psi
Tensile Strength (ASTM C307-83):	2,750 psi
Tensile Bond Strength:	Sandblasted Steel-exceeds 2500 psi. Concrete - exceeds 500 psi tensile.
Taber Abrasion (ASTM D 4060):.....	12 mg. loss/1000 cycles: 36 mg. loss/5000 cycles with 1000 grams and CS-17 Wheel.
Water Absorption (ASTM C413-83):.....	+ 0.02%

POT LIFE/RECOAT TIME

Temp.	Pot Life	Recoat Time	
		Minimum	Maximum
@ 50°F	70 min.	12 hrs.	2 days ³
@ 75°F	30 min.	6 hrs.	2 days ³
@ 90°F	20 min.	3 hrs.	2 days ³

ESTIMATING AND ORDERING

Priming with TECHNI-PLUS E 3
COVERAGE

Concrete	Steel
175 sq. ft. / 1 gal. unit	300 sq. ft. / 1 gal. unit
875 sq. ft. / 5 gal. unit	1500 sq. ft. / 5 gal. unit

EN 125 CR Basecoat/Saturant/Topcoat Resin and Hardener Unit
90 sq. ft. / 5 gal. unit @ 0.125 inches thick

Lining Powder #4 for Basecoat and Topcoat
35 sq. ft. / 35 lb. bag @ 0.125 inches thick

Lining Powder G - For Graphite (G) Version only.
40 sq. ft. / 35 lb. bag @ 0.125 inches thick

Lining Powder AR - For AR Version Topcoat Only
(Add 9 lbs. to each 24 lbs. of Lining Powder #4 in topcoat)
385 sq. ft./ 50 lb. bag mixed with Lining Powder #4

Cloth Reinforcement:
Order square feet needed plus 10%.

PACKAGING

TECHNI-PLUS E 3 Primer

1 Gal. Unit	5 Gal. Unit
Resin 6.3 lbs.	Resin 31.5 lbs.
Hardener 2.8 lbs.	Hardener 14.0 lbs.

PACKAGING (continued)

EN 125 CR Basecoat, Saturant & Topcoat Resin and Hardener

1 Gal. Unit	5 Gal. Unit
Resin 7.84 lbs.	Resin 39.2 lbs.
Hardener 1.70 lbs.	Hardener 8.5 lbs.

Basecoat & Topcoat Powder
Lining Powder #4 - 35 lb. bag

For "AR" version: (used in Topcoat only)
Lining Powder AR - 50 lb. bag

For "G" version: (used in Basecoat & Topcoat)
Lining Powder G - 35 lb. bag

BID SPECIFICATION

Substrate shall be primed with a nominal 3 wet mils of KCC Corrosion Control's TECHNI-PLUS E 3 Primer. The substrate shall be protected with a nominal 1/8 inch thickness of KCC Corrosion Control's TECHNI-PLUS EN 125 CR, consisting of a nominal 1/16 inch Basecoat reinforced with 10 oz. woven glass cloth saturated with TECHNI-PLUS EN 125 Resin/Hardener and a nominal 1/16 inch Topcoat. The materials shall be applied to substrate prepared in accordance with the manufacturer's specifications.

STORAGE AND SHELF LIFE

The shelf life of the powder is indefinite provided it is stored in a cool dry place. The hardeners are **AMINES** (KCC Red Label) and **SHOULD NOT BE STORED NEAR PEROXIDES** (KCC Yellow Label).

³ IF PROTECTED FROM DIRECT SUNLIGHT.

TYPICAL SHELF LIFE

	E 3 Primer	EN 125 CR
Temp.	Months	Months
@ 50°F	18	18
@ 75°F	12	18
@ 80°-90°F	6	12

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.

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

- **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 lining 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 lining 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 lined 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.

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, blasttracking 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 lining system. It is the physical forcing, by troweling of a scratch coat onto and into the concrete surface that makes it possible to obtain an impervious finished coating.

For specific scratch coat materials recommendations, contact KCC Corrosion Control. Specific 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

- **Priming the Substrate**

If lining 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 E 3 Primer is to be used for the TECHNI-PLUS EN 125 CR System. The primer should be applied to the concrete at a thickness of 3 wet mils. The hardener should be added to the mixed resin and for approximately 2 minutes. The primer can be applied by brush, roller or spraying. Specific instructions are contained in the TECHNI-PLUS E 3 Primer bulletin.

TECHNI-PLUS EN 125 CR Basecoat may be installed over very rough or porous concrete but should not exceed 1/4 inch thickness. A fill material would be recommended for any thicknesses over 1/4 inch. Contact KCC Corrosion Control for recommendations if there is any question about the roughness or texture of the concrete.

• **Mixing of Basecoat/Topcoat Materials**

The units of EN 125 CR should be mixed in a mortar mixer. First the Hardener should be added to the Resin in the pail and mixed approximately 3 to 5 minutes with a jiffy type mixer on a slow speed drill. For each 5 gallon pail of the combined mix of resin and hardener, 3 1/2 bags of powder (120 lbs.) are added while the mixer is running. The mixing should continue until the powder is completely wet out and no dry spots remain. Smaller mixes can be made by using a one gallon unit of EN 125 CR (Resin & Hardener) with 24 lbs. of Lining Powder #4. Bucket mixers are efficient for such small mixes. Quantity of Lining Powder #4 used in mix may vary according to site conditions.

For Graphite "G" version, four (4) bags of Lining Powder G are used with a 5 gallon unit of resin. For "AR" version, topcoat mixture is modified by adding 9 lbs. Lining Powder AR to each 24 lbs. of Lining Powder #4 used in the mix.

• **Working Time**

The 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. At ambient temperature above 90°F, best results are obtained when the catalyzed material is poured into smaller containers reducing the mass. When ambient temperatures exceed 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.

Working Time of Mixed Units (mortar)

@ 50°F.....	70 min.
@ 75°F.....	30 min.
@ 90°F.....	20 min.

NOTE: Working time of mixed resin and hardener without Lining Powder is reduced by half.

• **Application**

The mixed basecoat should be troweled onto the cured E 3 Primer at a thickness of 1/16 inch. The basecoat should be applied in sections wide enough to be covered with the cloth in one pass. Do not trowel more material than can be embedded with cloth and saturated prior to the basecoat hardening.

The 10 oz. woven glass cloth should be rolled into the wet basecoat and saturated with the mixed resin/hardener utilizing a short nap roller and a steel ribbed roller. The cloth should be saturated until no white or dry spots remain. The cloth should be overlapped a minimum of 1 inch. When ending for the day, the cloth should be embedded and saturated in all the basecoat applied. Starting the next day, trowel a 1/2"-2" wide overlap section of basecoat over the cured saturated cloth and then begin troweling basecoat on the cured E 3 Primer or Scratch Coat, if used. The cloth is rolled into the 1/2"-2" wide section and then applied as previously stated.

When the basecoat and saturated cloth is cured the surface should be checked for air pockets or other imperfections. These imperfections should be cut out and repaired; the seams should be ground down with a sander or grinder. The topcoat units are the same as the basecoat units and should be mixed in the same manner. The topcoat is troweled at a nominal 1/16 inch thick. For AR topcoat, 9 lbs. of Lining Powder AR is added for each 24 lbs Lining Powder #4 in the topcoat mix. Topcoat may be smoothed while wet by brush applying small amounts of KCC's Smoothing Liquid "E". **DO NOT FLOOD SURFACE!**

• **Clean-Up**

All mixing equipment, rollers 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.

RECOAT AND TOPCOAT LIMITATIONS

It is important that basecoat be fully cured prior to topcoat application and equally important that the basecoat is not exposed for a long period prior to topcoating. Minimum recoat time between basecoat and topcoat is 6 hours @ 75°F. Maximum allowable time between basecoat and topcoat application is 2 days @ 75°F.

CURE TIME OF COMPLETED SYSTEM

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

For minimum chemical service/foot traffic

If substrate is maintained:	@ 50°F.....	24 hrs.
	@ 75°F.....	16 hrs.
	@ 90°F.....	8 hrs.

For full chemical service/fork lift traffic

If substrate is maintained:	@ 50°F.....	72 hrs.
	@ 75°F.....	48 hrs.
	@ 90°F.....	24 hrs.

INSPECTION OF FILM INTEGRITY

During installation of the lining, care should be taken to provide for the correct specified uniform thickness of material by carefully checking at regular, pre-specified intervals, with guide bars or by using 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 temperatures. 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. Linings 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. Linings on concrete surfaces may be checked for continuity by spark testing if so desired. If a lining 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."

SAFETY

CAUTION: Exposure of this product to concentrated nitric acid, above 70% concentration, is not recommended, as a nitration reaction may result, with potential hazard of fire or explosion. This does not mean the product is recommended for concentrations of nitric acid up to 70%.

TECHNI-PLUS E 3 and EN 125 CR resins contain epoxy resin. The hardeners are **AMINES** (*KCC Red Label*) and **SHOULD NOT BE STORED NEAR PEROXIDES** (*KCC Yellow Labels*). All components should be stored in a cool dry place out of direct sunlight. Finishing Liquid "E" is a flammable solvent.

When working with any polymer, 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 areas. 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.***

WARRANTY

For product warranty see KCC Corrosion Control Co., Ltd. ***STANDARD TERMS AND CONDITIONS (U. S. 3/2006 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. Rev. 3/2006 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.

NOTES: