SPECIFICATION GUIDE TO SELECTION, PREPARATION, APPLICATION AND MAINTENANCE OF EPOXY COMPOSITION SURFACING SYSTEMS

1.0 SYSTEM SELECTION

1.01 GENERAL

1.01.1. Thousands of possible combinations of polymer resins, curing agents and aggregates are available for use in epoxy flooring systems. Each combination offers a different balance of performance properties, so it is essential that the designer prioritize performance requirements when selecting materials for a particular flooring application. This section contains sample performance profiles for three different types of epoxy coating and topping systems:

a. Flexible modified epoxy for crack bridging, impact absorption, and application over substrates with high deflection or vibration.
b. Semi-rigid Bisphenol A epoxy for general purpose floor topping and coating.
c. Novolac/Bisphenol F epoxy for applications under more severe chemical exposure or higher temperature.

1.01.2. It should be recognized that many factors must be weighed in selecting the particular materials for any specific application, and that many other types of epoxy systems are available to meet specialized needs. But the three basic types, above, provide the tools required for achieving most flooring objectives. In cases involving special requirements, the designer should consult with a technical specialist for additional options.

1.02 SELECTION FACTORS

The following is a partial list of factors to weigh in designing/selecting a polymer surfacing system:

a. Aesthetics (Check One)
   - Color granule pattern
   - Solid color coating in color(s) as selected by Owner's representative
   - Clear finish

b. Texture/Safety

Flooring system shall be designed for compliance with OSHA requirements:
   - 40-60 mesh fine quartz texture for light anti-slip finish in pedestrian traffic areas
   - 28 mesh color granule anti-slip surface where decorative anti-slip finish is required.
   - 12-20 mesh coarse finish for pneumatic tire vehicular traffic in wet areas
   - Surfaces subject to extreme heavy traffic and abrasion shall be textured with aluminum oxide.
   - Untextured (Dry areas)

c. Flexibility

High flexibility is required in some areas, especially around drains & at coved bases so movements, temperature changes & impacts won't crack or chip the surface. Flexibility is also required to reduce tendency for subsurface cracks to transmit to the surface, causing it to crack. In addition, some structures undergo high vibration or deflection and require a more flexible system to prevent cracking. If the floor develops surface cracks or chips, contamination can be drawn into the matrix or into the subsurface causing further deterioration and an unsanitary environment.

Rigid systems are required for higher chemical resistance, higher scratch resistance, and to efficiently transmit loads to the rest of the structure in situations where the system has a structural role, such as in repair of columns, structural slabs and piers.

d. Chemical resistance is the ability of the floor system to withstand exposure to cleaning compounds, water, or other materials being handled in the particular subject environment. Knowledge of the particular chemicals to which the floor system will potentially be exposed, as well as their concentrations and temperatures is a critical factor in proper floor system design.

e. Pitch, or the need to slope the floor toward drains so that cleaning and rinsing water doesn't stand and allow bacteria to breed, will help determine whether a trowel-grade mortar must be installed as part of the flooring system. Sloping with concrete is less expensive than sloping with epoxy mortar, and is preferred when under new construction, but in restoration work the time delay for concrete curing (28 days) may not be possible.

f. Coved bases at wall/floor joints are required in sanitary areas such as food processing plants or laboratory animal rooms so that contamination doesn't stand in corners or at edges of floor.

g. Structural: Maximum expected service load must be calculated, and flooring system design capacity should be at least three times this anticipated maximum or as otherwise required by State and local building codes. This includes evaluation of not only the type of traffic (heavy vs. light) expected, but also subfloor strength, its structural supports, all static and dynamic loads, as well as the strength of the epoxy composition floor system itself. In renovation or restoration projects, the condition of the substrate and the need for any structural repairs must be considered.

h. Heat: Most standard Bisphenol A epoxies soften at 110-160F. Service exposures in excess of this range require the use of harder, higher temperature resistant epoxies, such as epoxy novolacs.

i. Thermal Shock: Rapid temperature change creates stresses which must be considered in a number of applications, including:

-Coolers & freezers
-Floors which will be hot water washed or steam cleaned regularly
-Floors near heat-releasing equipment which operates intermittently, such as batch dryers and ovens
-Exterior applications subject to wide temperature swings

j. Sanitation/Permeability
While surface texture also impacts on ease of cleaning, permeability is the single most important factor affecting both sanitation and rates of deterioration of surfacing systems and concrete subsurfaces. The ratio of the polymer to aggregate/filler is the most important factor in achieving a non-porous, impenetrable surfacing system.

k. Environmental Requirements
Volatile Organic Compounds content (V.O.C.) is regulated in many areas by law, and industrial maintenance coatings must comply with the maximum allowable solvent content where so regulated. Odors pose other potentially serious problems in both new construction and renovation work, as personnel detecting typical solvent and some polymer odors are likely to protest a perceived hazardous material exposure, even if exposure levels are below the permissable OSHA limits. Odorless or low odor systems should be specified wherever exposure of non-installer personnel is likely.

l. Aggregates:
Aggregates/Fillers are initially important for reducing stress caused by the resin/hardener polymerization reaction and the heat released by that reaction. After the reaction, aggregates/fillers contribute to thickness, texture, appearance and abrasion resistance. The following aggregates are commonly used:

Quartz: High purity silica sand in various particle size ranges.

Colored Quartz: Silica particles with colored coating, usually in 12 or 28 mesh sizes, used for their decorative appearance in combination with clear resin while providing non-slip texture.

Aluminum oxide/ carborundum: Harder than quartz, used for non-slip texture and high abrasion resistance in heavy abrasive environments.

Glass beads, walnut shells, metallics: Special purpose aggregates for increasing light reflectance or other special purpose applications.

m. Thickness/Film Build
The number and types of coatings used will determine overall system build or thickness. Some common types include:
Sealer (Primer): 5-10 mils thickness, used for penetration into concrete

to bond subsequent layer, to prevent dusting, or to prevent vapor transmission

Coating - with optional anti-slip aggregate: 10-50 mils thickness, for use as a thin layer of protective surfacing or as a topcoat in a composition system (topping).

Topping: 50-250 mils thickness, used for the following applications:

- -High traffic with turning
- -High impact resistance
- -Thermal shock resistance
- -Maximum chemical resistance
- -Color pattern & texture variations
- -Maximum durability

1.03 DEFINITIONS

Polymer - Resinous synthetic material used as the binder in a protective coating or the matrix of a composition surfacing system, e.g., epoxy, polyurethane, MMA, polyester, etc.

Polymer/Aggregate Ratio - Ratio of the amount of polymer (resin plus curing agent; liquid components) to the amount of aggregate/filler by volume (coarse aggregates, fine fillers and extenders). This is the most useful factor in designing non-porous, impermeable surfacing systems.
Note: Another way to specify the polymer/aggregate ratio: No more than 25 lbs. aggregate to no less than one gallon epoxy (liquid components) covering no more than 25 sq. ft. area at 1/8" thick (or 17 sq. ft. area at 3/16" thick).

Polymer Composition Surfacing (Topping) - System consisting of a primer/sealer, possible underlayment, matrix of polymer & aggregate/filler, and a coating (topcoat).

Coverage Rate - Relates amount of a particular component or composition used for a unit area, e.g. sq.ft./gal. It is important to distinguish between coverage rates for liquid components only and the coverage rate for a mixture composed of the coating, aggregates and fillers.

Aggregate/Filler - Organic & inorganic particles and/or fibers added to polymer liquid components to produce a matrix composition.

Liquid Components - Polymer resin and curing agent, which must be mixed together at a prescribed Mix Ratio. Ratios of resin to hardener are usually expressed by volume, to facilitate field measurement.
Sealer (Primer) - Generally solvent thinned polymer applied 5-10 mils thick

Coating - Generally 90-100% solids polymer with some fillers & pigments applied at 10-50 mils thickness.

Topping - Composition surfacing consisting of coating material and additional aggregate/filler, applied at 50-250 mils thickness, i.e., mortar, slurry, broadcast.

Resin Rich - High polymer/aggregate ratio method of installing composition flooring systems that achieve maximum impermeability and performance characteristics.

1.04 PRODUCTS

A distinction is to be made between individual components or materials used in the flooring system and the composite system assembled to meet a project's aesthetic and functional requirements. The polymer composition special surfacing system is composed of several materials or components, utilized for specific functions within the system.

1.04.1. SPECIFICATION FOR EPOXY QUARTZ COMPOSITION FLOORING SYSTEM

a. Epoxy composition flooring system shall be a resin rich composite consisting of:

Low viscosity clear epoxy primer, for maximum bond potential.

100% solids epoxy mortar underlayment for cracked, spalled or depressed area patching; for sloping & pitching to drains; for forming cove bases; for sealing around drains

100% solids resin rich epoxy mortar matrix layer with high polymer to aggregate ratio for thickness & texture

Two 100% solids topcoats for final seal and texture

b. Primer (Subsurface conditions dictate the selection of an appropriate primer. Check one of the following.)

Highly polished, dense concrete shall be primed using a water or solvent thinned 30% solids epoxy with chemical coupling agent additive designed to promote chemical bond to bare concrete.

Worn, spalled, very porous concrete shall be primed using 100% solids epoxy primer.

Bonding to oil saturated concrete, after chemically removing as much contamination as possible and mechanically abrading, shall be enhanced by utilizing a special oil tolerant, 100% solids modified epoxy primer

Damp subsurfaces shall be primed for adequate adhesion, when time won't permit thorough drying, with waterborne or moisture insensitive epoxy primer. This technique must be limited to applications which will not result in encapsulation of moisture in concrete or the creation of negative side hydrostatic force behind the epoxy composition flooring system.

Very smooth, non-porous subsurfacing, such as glazed tile, shall be prepared for excellent adhesion by first treating with a ceramic etch compound and then priming with epoxies that contain additional wetting agents and chemical coupling agents.

c. Special Polymer Underlayments

The following special purpose polymer underlayments shall be used as applicable. (Check all that apply.)

100% solids elastomeric epoxy membrane and underlayment with long term flexibility shall be used to provide waterproofing of small working cracks, and to act as a stress relieving / stress absorbing base coat between substrate and flooring, and to enhance bond potential.

100% solids elastomeric epoxy mortar shall be used for patching, joint nosing repair, for forming wall/floor intersecting coved base radius and for filler around drain housings (see accompanying detail sketches). Polymer to aggregate ratio shall be 1:2 by weight.

Expansion joint treatment: See accompanying detail sketches.

Pitching and sloping shall be performed using semi-rigid, 100% solids epoxy combined with graded, high density quartz aggregate with polymer to aggregate ratio of 1 to 4 by weight. At perimeter of the room where thicker section of mortar is required, the polymer to aggregate can be lowered to 1 to 6 and the matrix can be extended with larger, pea gravel aggregate. Thin section pitching mortar - from 2" to "feather" edge - shall be prepared using higher polymer to aggregate ratios with smaller aggregates. See accompanying detail sketches.

NOTE: If the floor surfacing system requires pitching or sloping, first prime the subsurface, do all patching, crack repair, & drain detail work, then install pitching & sloping mortar, then install 100% solids elastomeric epoxy layer, then proceed with the matrix (body) layer

d. Matrix Layer

Matrix layer shall be prepared using semi-rigid, 100% solids, cycloaliphatic amine cured epoxy with standard grade 28 mesh quartz (or colored quartz for multi-color pattern floors). Polymer/aggregate ratio to be 1:2 by volume, which will produce the required impermeable, non-porous surface.

For forming vertical surfaces use semi-rigid, 100% solids cycloaliphatic amine cured epoxy and aggregate composition with polymer/aggregate ratio of 1 to 4, or polymer/aggregate ratio of 1 to 3 with thixotropic agent such as fumed silica added to the matrix composition.

e. Topcoats

Use semi-rigid, 100% solids cycloaliphatic amine cured epoxy without aggregates or fillers. Use clear epoxy for multi-colored quartz patterns and use pigmented epoxy in color selected by Owner for solid-colored floors. Note: For rough textures, apply single topcoat 15 mils thick; for smoother textures, apply second topcoat at 10-15 mils thick

For areas subjected to constant temperatures greater than 1600F, use 100% solids Novolac epoxy for the topcoat and in the matrix layer.

In areas that may require greater chemical resistance, please consult with flooring system installer and manufacturer for assistance in selection of appropriate material for the specific chemical exposure.

1.04.2. PERFORMANCE CRITERIA - COMPOSITE SYSTEM

The typical performance properties listed in Tables 1-4 shall represent the minimum standards for each type of component as listed. Materials which fail to meet all of these criteria will not be acceptable for use.

1.04.3. ACCEPTABLE MANUFACTURER

The following shall be acceptable products and manufacturers, and shall be deemed to conform to the requirements of these specifications:

a. Semi-rigid 100% solids epoxy shall be FLEXI-GARD 500-S as manufactured by Edison Coatings, Inc., Waterbury, CT 06704 Phone (203)597-9727.
b. 100% solids Novolac epoxy shall be FLEXI-GARD 500-N as manufactured by Edison Coatings, Inc.
c. 100% solids Flexible modified epoxy shall be FLEXI-DECK 500-E as manufactured by Edison Coatings, Inc.
d. Low temperature 100% solids flexible epoxy shall be FLEXI-DECK 500-U-LT as manufactured by Edison Coatings, Inc.
e. Oil-tolerant, low viscosity epoxy primer shall be FLEXI-DECK 500-L as manufactured by Edison Coatings, Inc.

Table 1. Typical 100% Solids, Semi-Rigid Bisphenol A Epoxy Flooring Composite Performance

Compressive Strength, ASTM D-695 11,000 psi filled 8,000 psi unfilled

Compressive Modulus 300 Kpsi

Flexural Strength, ASTM D-790 4,400 psi filled 9,400 psi unfilled

Flexural Modulus, ASTM D-790 1,200 Kpsi filled

Tensile Strength, ASTM D-638 6000 psi unfilled ASTM C-307 2400 psi filled

Tensile Modulus, ASTM D-638 190 kpsi unfilled ASTM C-307 102 kpsi filled

Tensile Elongation, ASTM D-638 3 - 15%

Linear Shrinkage (77F), ASTM D-2566 2×10^{-4} in./in. 6×10^{-4} in./in.

Surface Hardness, Shore D, ASTM D-2240 85

Adhesion (to concrete), MIL-D-3134, Para. 4.7.14 335 psi, failure in concrete

Mar Resistance, ASTM D-5178 1.15 kg

Heat Distortion Temperature 120 to 160F

Indentation Characteristics
MIL-D-3134, Para. 4.7.3 0.012 in., No cracking

Slip Resistance (coefficient of sliding friction)
Dry Leather 0.49 Wet Leather 0.57 Dry Rubber 0.72 Wet Rubber 0.71

Density, ASTM D-792 127 lb./ ft3 filled 67.5 lb./ft3 unfilled

Abrasion Resistance, ASTM C-501 28.5 mg filled
(H-22 wheel, 1000g, 1000 cycles)

150.5 mg unfilled

Table 2. Typical Characteristics of 100% Solids, Semi- Rigid Bisphenol A Epoxy - Liquid Components

Flammability, ASTM E-84-75 Average 3 runs
Fuel contribution: Negligible
Flame Spread: <25
Smoke generated: <400

Water Absorption, MIL-D-31 34, Para. 4.7.8 .04%

Pot Life, Techne GT-4 Gelation Timer 20-25 minutes at 77F 60-70 minutes at 50F

Thin Film Working Time
Approx. 1/2 hour at 75F, when mixed with aggregate and troweled onto subfloor

Thin Film Dry Time, BK Drying Recorder
Light Traffic: 8 hrs. at 75F
11 hrs. at 50F
Normal Traffic: 24 hrs. at 75F
33 hrs. at 50F

Toxicity
Non-toxic, USDA accepted

Table 3. Typical Properties, 100% Solids Flexible Epoxy

Tensile Strength, ASTM D-638 1243 PSI

Tensile Elongation 109%

2.0 CONCRETE SUBSURFACE PREPARATI0N

2.01 GENERAL

2.01.1 The objective of subsurface preparation is to provide maximum chemical and mechanical bond potential between the cured concrete subsurface and an epoxy overlayment.

2.01.2. The concrete must be made clean, dry, free of any oil, grease or other bond breaking contamination.

2.01.3. New concrete subsurfaces must be cured for at least 28 days, or longer, if required to reach full design strength and low enough moisture content to permit overlayment (<3%).

2.01.4. The prepared concrete subsurface must be treated to provide an etched, porous, "toothy" profile (subsurface profile to be equal to #40-#60 mesh graded sand or sandpaper); yet be structurally and integrally sound.

2.02 PROCEDURES

2.02.1. Chemical Preparation

a. Thoroughly scrub with heavy-duty detergent or cleaners appropriate to emulsify the particular contamination present.

b. Thoroughly rinse with clean water. Repeat this procedure as required to remove contamination. Remove rinse water by forcing to appropriate drains or by power vacuum. Perform all chemical cleaning in strict accordance with federal, state and local regulations, which prohibit introduction of certain chemicals and contaminants into sewers, open bodies of water and into the ground.

c. Spread acid solution by sprinkle can and scrub into concrete with stiff broom or power scrubber. Use 25% aqueous solution of HCl (muriatic acid) cut 4 or 5 to 1 with water. (Alternatively, to minimize potential damage to metal equipment adjacent to area being prepared, or to steel reinforcement, use 40% phosphoric acid).

d. Thoroughly rinse with clean water. Repeat this procedure as required to remove contamination & acid residue. Remove rinse water by forcing to appropriate drains or by power vacuum. Allow to dry.

e. For oil, fat and grease saturated concrete (whether saturated by petroleum based or other organic fatty esters) both mechanical and chemical preparation procedures may be required, as well as mechanical keying.

2.02.2. Mechanical Preparation

a. Shotblasting using steel shot and self-contained abrasive blasting equipment, such as

Blastrac, is the preferred method of mechanical preparation. Blasting should be performed so as to leave clean, "white" concrete with a uniform stipple finish. This method is generally limited to horizontal surfaces not within 4-6 inches of walls, columns or other fixed obstructions. Additional mechanical methods must be used to supplement preparation for areas not within reach of the shotblasting equipment. Any contaminants which remain after shotblasting may require chemical removal, as described above.

b. Sandblasting, or use of other pneumatically impelled abrasive media, is another acceptable method of preparing both vertical and horizontal surfaces. Care must be taken to provide a uniformly textured surface. All spent abrasive media and loosened concrete particles must be carefully removed following blasting using vacuums and brushes.

c. Scarifying, using motorized scarification equipment, generally incorporating rotating banks of hardened, star-shaped steel teeth, is particularly useful when high builds of soft materials must be removed. These may include asphalt adhesives or mastics, elastomeric coatings which do not respond to shotblasting, or unsound thin cementitious overlayments. Scarifying generally leaves a more deeply scarred subsurface, which must then be leveled in the course of overlayment if a uniform finish is to be achieved. Scarifying may result in incomplete removal of penetrated materials, and must then be supplemented by other chemical or mechanical processes.

d. Sanding, or surface abrasion with heavy grit media is often used to reach corners and edges in conjunction with shotblasting. It is also useful when recoating sound epoxy surfaces to improve intercoat bonding when removal down to subsurface is not required or desired.

2.02.3. Mechanical Keying is sometimes used in conjunction with other methods to increase contact area between substrate and topping, thereby increasing adhesion. One method of keying is by providing criss-crossing sawcuts (1/4" deep) to create maximum bond potential. Another method is by chiseling parallel grooves in the subsurface. This procedure should be used when substrate surface strength is marginal or when trying to overcome some residual surface contamination.

2.02.4. Edge Detailing: All leading edges, around drains, joints and cracks should be sawcut and chiseled to key epoxy overlayment into concrete subsurface.

2.02.5. Do Not Rely on the inherent porosity of poorly finished, broom finished, or bull float finished concrete. These conditions will not provide adequate, structurally integrated bond potential.

3.0 INSTALLATION OF EPOXY COMPOSITION FLOORING

3.01 GENERAL

3.01.1. Provide all labor, equipment, supervision and technical support services as required to provide complete, finished epoxy composition flooring installation in accordance with the project documents and professional workmanship standards.

3.02 INSPECTION OF SUBSURFACE & PROJECT SITE

3.02.1. Prior to authorizing the epoxy flooring system contractor to start work, it shall be the responsibility of the Owner or Owner's authorized representative to confirm/provide the following:

a. New concrete has been adequately cured for a minimum of 28 days, to a minimum of 3,500 psi compressive strength, and dried to maximum moisture content of 3%.

b. New slabs on grade have been poured over properly drained and grades fill, with an effective polyethylene vapor barrier. Puncturing of the vapor barrier not have been permitted. Existing slabs on grade shall be tested by 72 hour vapor emission test and shall be determined to be transmitting less than 3 lbs. Per 1000 sq. Ft. per 24 hours of moisture vapor.

c. The use of concrete curing agents, if any, have been only as directed by the epoxy flooring system manufacturer. Use of curing compounds have been permitted only with written approval from epoxy flooring manufacturer

d. The area to be surfaced has adequate protection from roof leaks, and shall be protected from traffic, construction dust & debris from other trades, or any other conditions which may result in damage to epoxy flooring work in progress.

e. Remove all moveable equipment & provide adequate heat, light, water source, & container for refuse removal.

3.02.2. Flooring system contractor shall perform inspection of actual site conditions prior to start of work to verify that the work done under other sections meets all epoxy flooring system requirements. Contractor shall examine the areas and conditions where the epoxy flooring is to be installed and notify the Owner or Owner's representative of conditions detrimental to the proper and timely completion of the work. Contractor shall not proceed with the work until unsatisfactory conditions have been corrected in a manner acceptable to the Contractor, Owner and system manufacturer.

3.03 SUBSURFACE PREPARATION

Refer to Section 2.0, Concrete Subsurface Preparation. Shot-blast, acid etch or power scarify as required to obtain maximum bond of flooring to concrete. Remove sufficient material to provide a sound surface free of laitance, glaze, efflorescence, and any bond-inhibiting curing compounds or form release agents. Remove grease, oil, and other penetrating contaminants. Repair damaged and deteriorated concrete to restore sound condition.

3.04 INSTALLATION

3.04.1. General: Apply each component of epoxy flooring system in compliance with manufacturer's directions to produce a uniform monolithic wearing surface of thickness specified, uninterrupted except at types of joints indicated or recommended by flooring system manufacturer.

3.04.2. Primer: Mix and apply primer over properly prepared substrate in strict conformance with manufacturer's installation procedures and coverage rates. Coordinate timing of primer application with application of subsequent layers to ensure optimum adhesion between resinous flooring materials and substrate.

3.04.3. Underlayments: Refer to accompanying detail sketches.

a. Fill all stress cracks, control joints, gouges, and spalled areas with 100% solids elastomeric epoxy mortar. Apply by trowel & strike off even with edge of concrete. Apply flexible fiberglas mat saturated with 100% solids elastomeric epoxy to all joints or cracks wider than 1/8".

Coverage Rate - as required to fill
Thickness - as required to fill

Polymer to Aggregate/Filler Ratio

Cracks & Joints - 1 to 2 by volume
Gouges & Spalled Areas - 1 to 3 by volume

3.04.4. Chisel all transition edges to a depth of at least 1/4" & a width of at least 2" (from transition edge). Chisel & remove concrete from around drains or along drain troughs approximately 1/2" deep by 1" wide. Fill with 100% solids elastomeric epoxy mortar

Coverage Rate - as required to fill

Thickness - as required to fill

Polymer to Aggregate Ratio - 1:2

3.04.5. Install pitching (sloping) 100% solids epoxy mortar to achieve 1/8" per lineal foot slope to drain or drain trough as required- uniformly spread mortar over primed substrate by hand trowel and/or screeds - key the pitching mortar into the substrate 6" back from edge of drain housing

Coverage Rate - as required
Thickness - from 0 (6" back from edge of drain) to required height at wall to achieve required

slope

Polymer to Aggregate Ratio - approximately 1 to 4

3.04.6. Form coved base radius with 100% solids elastomeric epoxy mortar, then form coved base as required (4" to 8" high) with 100% solids epoxy mortar with hand held cove tool

Coverage Rates -
Liquid components: 40 sq. ft./gal.
Epoxy/Aggregate Mortar: 12-13 sq.ft./gal.

Thickness - 125 mils

Polymer to Aggregate Ratio - 1 to 4

3.04.7. Apply layer of 100% solids elastomeric epoxy by notched trowel (then back roll to level if required) then broadcast grade 28 quartz aggregate into uncured polymer to saturation.

Coverage Rates

Liquid components - 80 sq. ft./gal.

Quartz aggregate - 1 lb./sq. ft.

Thickness - 50-60 mils

Polymer to Aggregate Ratio - 1 to 2 by volume

3.04.8. Body Matrix Layer: Apply 20 mil layer of 100% solids epoxy (liquid components only) using notched trowel over entire area. Allow initially covered area to self level and allowing for a 1 to 2 ft. wet edge without any aggregate to provide a smooth transition to next pass of neat epoxy, broadcast grade 28 quartz aggregate into the applied epoxy to saturation allow to cure. Sweep off excess aggregate, and repeat the above procedure until body matrix layer reaches a total thickness of a minimum of 125 mils. After curing, lightly hand stone any imperfections until even surface texture is achieved.

Coverage Rates

Liquid components - 80 sq. ft./gal. for each layer

Aggregate - 1/2 lb./sq. ft. for each layer

Thickness - 125 mils (1/8")

Polymer to Aggregate Ratio - 1 to 2

Note: Total thickness of system at this point to be minimum of 185 mils or approximately 3/16" including the elastomeric epoxy layer, but not including the pitched epoxy mortar bed (if utilized).

Alternate Method: Apply single slurry/broadcast by hand trowelling a mixture of 100% solids epoxy and quartz aggregate at a ratio of 1 to 1 by volume to a thickness of about 65 mils, then broadcasting more quartz aggregate to saturation - this method should be employed only when project timing is critical - this method might save one day in total application time, but might leave an uneven appearance.

3.04.9. Topcoat(s): Apply 100% solids epoxy (liquid components only) by squeegee, then back roll with short napped roller to insure a uniform surface texture. Repeat as required to achieve desired texture. One topcoat will provide an anti-skid surface - two topcoats will provide a smoother, more easily cleaned subsurface.

Coverage Rates -

First topcoat - 100-125 sq. ft./gal.

Second topcoat - 150-175 sq. ft./gal.

Thickness - 15-20 mils

Polymer to Aggregate Ratio - does not apply; only liquid components are used.

3.04.10. Vertical Surfaces, Coved Base & Wainscoat:

a. Fill all cracks, gouges and spalled areas with 100% solids elastomeric epoxy mortar. Apply by trowel and strike off even with edge of concrete

Coverage Rate - as required to fill

Thickness - as required to fill

Polymer to Aggregate/Filler Ratio - approximately 1 to 3 by volume

b. Apply layer of 100% solids elastomeric epoxy (primer/membrane) by roller, then lightly scatter grade 28 or grade 40 quartz aggregate into the uncured epoxy at a rate of 1/4 to 1/2 lb. per sq. ft.

Coverage Rate - 150-175 sq. ft./gal.

Thickness - approximately 12 mils

Polymer to Aggregate Ratio - 1 to 1 by volume

c. Before above layer of 100% solids elastomeric epoxy cures, apply 4" to 6" wide flexible fiber tape to inside corners of wall/floor intersection and across any cracks or joints wider than 1/8". Embed flexible fiber tape into uncured epoxy and apply additional layer of 100% solids elastomeric epoxy into and over tape with brush or roller.

Coverage Rate - 80 sq. ft/gal.

Thickness - 50-60 mils

Polymer to Aggregate Ratio - does not apply; only liquid components are used.

d. Apply mortar consisting of 100% solids epoxy and quartz aggregate by trowel. Form radius at base of walls and equipment pads with coved base trowel

Coverage Rate - 40 sq. ft./gal. - liquid components

12-13 sq. ft./gal. of epoxy aggregate mortar

Thickness - 125 mils

Polymer to Aggregate/Filler Ratio - 1 to 4 by volume

e. After the above matrix has cured, apply two coats of 100% solids epoxy by roller (an anti sag additive may be added to prevent running)

Coverage Rate -

1st coat - 100-125 sq. ft./gal.

2nd coat - 150-200 sq. ft./gal.

Thickness - average 25 mils

Polymer to Aggregate Ratio - does not apply; only liquid components are used

3.05 CURING & PROTECTION

Allow flooring system to cure undisturbed for at least 24 hours after application of final coat. Semi-rigid epoxy coatings require 7 days at room temperature to reach nominal design strength, and flexible epoxies may require longer periods to reach nominal full cure. Lower temperature extends curing times, and a useful rule of thumb is that cure time requirements double for every 15-20 degrees F drop below room temp.

If surfaces will be exposed to other construction trades, cover with plastic (polyethylene) sheeting & fiberboard during all other construction until ready for use. Place polyethylene in direct contact with epoxy flooring before covering with protection board.

3.06 MAINTENANCE

Refer to the accompanying Maintenance Guide - Section 4.0.

Yearly inspections are recommended so that damage from abuse can be repaired promptly. Contamination can permeate the concrete subsurface via open gouges or other unrepaired damages, causing deterioration and undermining of the surfacing system.

3.07 DETAILS

Please refer to the accompanying detail sketches

4.0 MAINTENANCE OF EPOXY COMPOSITION FLOORING

4.01 GENERAL

4.01.1. Since Epoxy Composition Flooring is stronger, tougher, more resilient and chemical resistant than conventional flooring systems, it will stand up to traffic for longer periods than the concrete or wooden subsurface.

4.01.2. The cleaner the floor is kept, the longer the floor will last. If not removed regularly, fine particles of dust, dirt, debris, act as abrasives with traffic. For the pharmaceutical, cosmetic and food industries it is particularly important to keep clean, sanitary surfaces. Proper cleaning techniques are essential.

4.01.3. Proper cleaning is a function of utilizing both a cleaning solution that will dissolve or emulsify the type of soil or contamination present and thorough application and rinsing techniques. For general purposes, a floor subjected to normal pedestrian traffic can be cleaned using any high quality detergent and water solution. It is important that clean water is then used to rinse.

4.01.4. Epoxy Composition Flooring will not be affected by most special purpose cleaning compounds, when used properly and rinsed thoroughly. Always perform a small spot cleaning test in an inconspicuous area prior to general use of any cleaning product, however, as some cleaners contain chemicals which may be aggressive to some particular epoxy products.

4.01.5. The best cleaning technique is achieved by utilizing soft bristle scrub brushes, (either hand types or mechanical types) to positively attack the soil with the appropriate cleaning solution. Selection of the correct cleaning compound is important, but the cleaning technique is an equally important factor in effective cleaning. After the surface has been subjected to the cleaning solution and properly scrubbed, particular attention must be given to removing the resultant emulsion of cleaning solution and soil. This is best achieved by rinsing with clean water and vacuuming, or using a squeege to remove to floor drains. A second rinsing with clean water is recommended to minimize the possibility of leaving any residue. If rinsing is not complete a film may develop.

4.01.6. An important feature of Epoxy Composition Flooring is that it is non-porous. This makes cleaning relatively easy to achieve, because contamination can not penetrate into the surface; it stays on top. This enables the surface to be positively cleaned, but it does not mean that proper cleaning techniques can be compromised.

4.02 TYPICAL CLEANING METHODS

4.02.1. Hand or Mechanical Scrubbing Unit

a. Broom sweep area for debris and heavy build-up.

b. Utilize proper cleaning agent - detergent (liquid or powder), sanitizing agent, deodorizing agent degreaser, fatty ester emulsifier, etc., or combination of agents:

c. Spread cleaning agent (or combination of agents) and allow it to react on surface.

d. Agitate with mechanical scrubbing device or by hand.

e. Flood with clean water and agitate.

f. Pick up solution with wet vacuum or squeegee to floor drains. Observe all federal, state and local regulations, which prohibit introducing introducing certain chemical cleaners, solvents and wastes into municipal sewer systems, open bodies of water or into the soil.

g. Rinse again and remove.

4.02.2. High-Pressure Water or Steam Equipment

a. Broom sweep area for debris and heavy build-up.

b. Utilize proper cleaning agent - detergent (liquid or powder) sanitizing agent, deodorizing agent, degreaser fatty ester emulsifier, etc., or combination of agents.

c. Spread cleaning agent (or combination of agents) and allow it to react on surface.

d. Utilizing high pressure water or steam equipment work over entire surface. This phase will agitate and loosen tough-to-remove contamination.

e. Flood with clean water or switch to clean water mode on equipment and work over surface again.

f. Pick up solution with wet vacuum or squeegee to floor drains. Observe all federal, state and local regulations, which prohibit introducing introducing certain chemical cleaners, solvents and wastes into municipal sewer systems, open bodies of water or into the soil.

g. Rinse again and remove.

4.02.3. Mopping

a. Mopping may be employed if sufficient amounts of clean rinsing water are used. Unless meticulous attention is paid to clean water rinsing, conventional mopping will not be effective.

b. Broom sweep area for debris and heavy build-up.

c. Utilize proper cleaning agent - detergent (liquid or powder) sanitizing agent, deodorizing agent, degreaser, fatty ester emulsifier, etc., or combination of agents.

d. Spread cleaning agent with mop.

e. Agitate with mop by wiping and swirling, applying pressure to excessive build-ups.

f. Flood with clean water - spread with mop.

g. Use mop to soak up solution and wring out into empty bucket. Keep clean rinsing water in separate bucket and keep clean rinsing water clean, replacing with fresh water when required. Continue process until floor is totally rinsed.

h. Rinse again with more clean water.

4.03 ADDITIONAL COMMENTS AND SUGGESTIONS

4.03.1. It is suggested to employ an acrylic type coating or finish at six (6) month intervals, (in lieu of waxing periodically). Epoxy Quartz Composition Flooring does not require this, but it will even further extend service life of the floor.

4.03.2. Depending on degree of traffic, a new finish coating may be required every three to five years.

4.03.4. It is important to promptly repair any damages or irregularities that may develop, such as cracking due to building movement at expansion joints, gouges or indentations that may occur from extreme abuse or impact, or blisters or swelling that may occur as a result of certain solvent or other chemical attacks. These damages or irregularities can occur in industria1 situations. They must be addressed promptly in order to properly and economically mitigate and correct them.

4.04.5. Recommended cleaning agents can be furnished upon request and determination of type of soil or contamination.