# Division 09 67 26 - Mottled Color Floor Coating

PART 1 - GENERAL

## 1.01 Work Included

A. Work described in this section includes surface preparation and installation of Silikal reactive resin concrete stain system.
B. See drawings for locations and quantities.

## 1.02 Related Work - Specified elsewhere

A. Cast-in-place concrete (Section 03300)
1. See Paragraph 1.08 - Requirements for New Concrete.
B. Painting (Section 09900)

## 1.03 System Description

A. Silikal Transparencies is a 0.5-1.0 mm (25-40 mils) thick coating system of Silikal 100% reactive binder resin and colorant with specified Silikal seal coat.
B. The Silikal stain system shall cure completely and be available to normal operations in no more than 60 minutes at temperatures as low as 0 °C. after application of the final coat.
C. The finished Silikal floor coating system shall be a mottled color combination, and appearance. All edges that terminate at walls, floor discontinuities, and other embedded items shall be sharp, uniform, and cosmetically acceptable with no thick or ragged edges. The Contractor shall work out an acceptable masking technique to ensure the acceptable finish of all edges.
D. See Paragraph 3.04 and/or 3.07 for number and thicknesses of each coat/layer in each system.
E. All resins must be manufactured and tested under an ISO 9001 registered quality system and ISO 14001 ecology management system.

## 1.04 Quality Assurance

A. Manufacturer Qualifications:
1. Acceptable manufacturer: Silikal GmbH, Germany.
B. Applicator Qualifications:
1. Pre-qualification requirements: Only approved applicators, licensed by Silikal shall be considered for qualification. In no case will Silikal permit the application of any of its materials by untrained, non-approved Contractor or personnel.
2. Each approved applicator shall have been qualified by the Manufacturer as knowledgeable in all phases of surface preparation.
3. Each approved applicator must have three (3) years experience of installing resinous flooring systems and submit a list of five projects/references as a prequalification requirement. At least one of the five projects / references must be of equal size, quantity, and magnitude to this project as a prequalification requirement. Owner has the option to personally inspect the projects/references to accept or reject any of the Contractors prior to bid time as a prequalification requirement.
C. Subcontractor Qualifications:
1. The only approved and specified subcontractors for this resurfacing work shall be for shot-blast cleaning of the concrete substrate.
D. Acceptance Sample:
1. Representative sample of the specified flooring system shall be submitted to the Owner prior to the

bidding phase of the project. All bidders shall inspect the “acceptance sample” before submitting their bids.

2. The installed flooring system shall be similar to the acceptance sample in thicknesses of respective film layers, color, texture, overall appearance and finish. Because the stain allows the substrate to show through the finished appearance will reflect substrate color and substance.

E. Bond Testing:

1. Surface preparation efforts shall be evaluated by conducting Bond Tests at the site prior to application of the flooring system.

2. See paragraph 3.03 - B or consult with Material Manufacturer for specific procedure.

F. Pre-Job Meeting

1. Owner requires a Pre-Job Meeting with representatives of Owner, Contractor/Applicator, and material manufacturer in attendance. The agenda shall include a review and clarification of this specification, application procedures, quality control, inspection and acceptance criteria, and production schedules. Applicator is not authorized to proceed until this meeting is held or waived by Owner.

## 1.05 Reference Standards

A. ACI 308 - Standard Practice for Curing Concrete

B. ACI 302.1R-80 - Guide for Concrete Floor and Slab Construction

C. United States Department of Agriculture (USDA) and (Food and Drug Administration (FDA) authorization) for incidental contact with foodstuffs.

## 1.06 Submittals

A. Acceptance Sample: As required by owner, one foot square (1 ft. by 1 ft.) sample of the specified acrylic flooring system applied to hardboard or similar backing for rigidity and ease of handling.

B. Manufacturer’s Literature: Descriptive data and specific recommendations for surface preparation, mixing, and application of materials.

C. Manufacturer’s Material Safety Data Sheets (MSDS) for each respective product to be used.

D. Cleaning and Maintenance

## 1.07 Delivery, Storage, And Handling

A. All material shall be delivered in original Manufacturer’s sealed containers with all pertinent labels intact and legible.

B. Store materials in dry protected area between 25° and 80° Fahrenheit. Keep out of direct sunlight. Protect from open flame; keep all containers grounded.

C. Follow all Manufacturer’s specific label instructions and prudent safety practices for storage and handling.

## 1.08 Project/Site Conditions

A. Material, air, and surface temperatures shall be in the range of 32° to 85° Fahrenheit during application and cure, unless a special formulation is being used and Manufacturer has been consulted.

B. Relative humidity in the specific location of the application shall be less than 85 percent and the surface temperature shall be at least 5 degrees above the dew point.

C. Conditions required of new concrete to be coated.

1.Concrete shall be moisture cured for a minimum of 7 days at 70° F. The concrete must be fully cured for a minimum of 28 days prior to application of the coating system pending moisture testing.

2. Surface contaminants such as curing agents, membranes, or other bond breakers should not be used.

3. Concrete shall have a light steel troweled finish.

4. Drains should be set to the finished grade of the topping.

D. Concrete shall have a moisture emission rate of no more than 5 lbs. per 1000 sq. ft. per 24 hour period as determined by proper Calcium Chloride Testing. Concrete R/H must be 85% or less as measured by protimeter. Readings greater than 5 by the Calcium Chloride method or 85% by protimeter, may require a preliminary treatment with Silikal RE40. If treatment is required, consult technical department for alternative staining techniques.

E. Foodstuffs are the responsibility of the owner and shall have been removed from the area of application by the owner or his representatives.

F. Vapor barriers and/or suitable means shall have been installed beneath grade slabs to prevent vapor transmission. Consult technical department.

## 1.09 Warranty

A. Silikal warrants that materials shipped to buyers are at the time of shipment substantially free from material defects and will perform substantially according to Silikal published literature if used strictly in accordance with Silikal's prescribed procedures and prior to expiration date.

B. Silikal's liability with respect to this warranty is strictly limited to the value of the material purchased.

C. Silikal has no responsibility for the application and processing of products and is under no circumstances liable to any third party whatsoever.

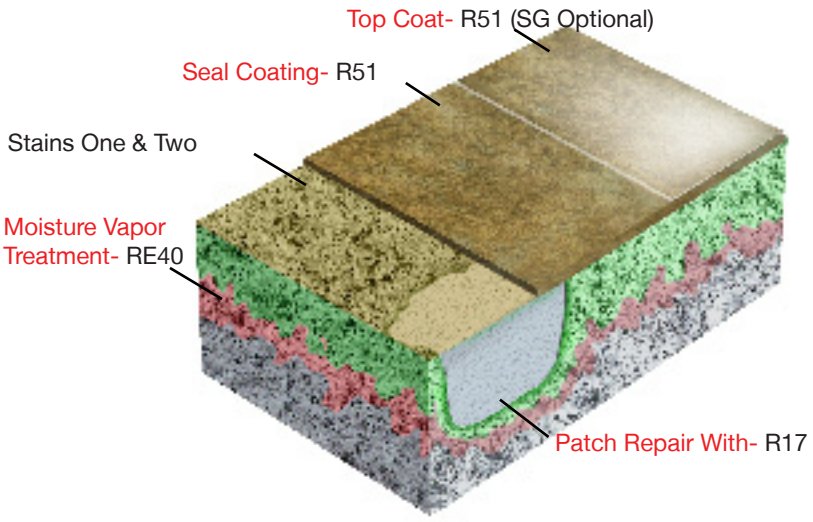
PART 2 - PRODUCTS

## 2.01 Acceptable Manufacturers

A. Silikal GmbH, Germany

## 2.02 Materials

A. Silikal Transparencies Coating System
1. Moisture Vapor Treatment (if required)
Silikal RE40
2. Patching/Sloping (if required)
Silikal R17 Polymer Concrete must be reprimed
3. Silikal Stain One
4. Silikal Stain Two
5. Seal Coats:
Silikal R51 Colorless Silikal Seal Coat Resin or with SG for texture (if required)




*This diagram should be used only as a visual aid.

## 2.02.01 Product Performance Criteria

A. Silikal RE40

1. Percentage Reactive Resin ..... 100%
Percentage Solids ..... 100%
2. Water Pressure Resistance (3 days at 72 psi) ..... Passed
3. Resistance to Diffusion Against $H_20$ ..... 0.3g/$m^2$ • day
4. Tensile Bond Strength..... 475 psi

B. Silikal R17 Polymer Concrete

1. Percentage Reactive Resin ..... 100%
2. Water Absorption, Wt. % (ASTM D570): ..... less than 0.02
3. Tensile Strength, psi (ASTM D638) ..... 4,000 psi.

4. Tensile Modulus, psi X $10^5$ (ASTM D638): .....1.2
5. Coefficient of Thermal Expansion, in. / in./deg. F (ASTM D696) psi x$10^{-6}$: .....18
6.Compressive Strength, psi (ASTM C39): .....9,200 psi.
(ASTM C109): .....11,000 psi.

C. Silikal R51

1. Percentage Reactive Resin: .....100%
Percentage Solids: .....100%
2. Water Absorption, Wt. % (ASTM D570): .....less than 0.06
3. Tensile Strength, psi (ASTM D638): .....3,550 psi
4. Tensile Modulus, psi X $10^5$ (ASTM D638): .....2.1
5. Coefficient of Thermal Expansion, in. / in. / deg. F (ASTM D696): .....0.000035
6. Electrical Resistivity (ASTM D257):
Volume Resistance, ohm-cm: .....1015
Surface Resistance, ohm: .....1.012
7. Water Vapor Transmission (DIN 53122), g/cm-hr-mm Hg X $10^{-11}$: .....1.05
8. Chemical Resistance (ASTM D543):
Effect of weak acids: .....none
Effect of strong acids: .....slight
Effect of alkalis: .....none
Effect of salt solutions: .....none
Effect of oil, grease: .....none
Effect of sunlight (UV radiation): .....none

## 2.02.02 Product Installation & Application Criteria

A. All Silikal Material Systems Excepting Moisture Vapor Treatment:

1. Pot Life at 68° F.:.....10-15 minutes
2. Cure Time at 68° F.: .....45 minutes
3. Recoat Time at 68° F.:.....45-90 minutes

## 2.03 Mixes

A. Follow manufacturer's prescribed procedures and recommendations.

PART 3 - EXECUTION

## 3.01 Prework Inspection

A. Examine all surfaces to be coated with Silikal material systems and report to the Owner and/or Engineer any conditions that will adversely affect the appearance or performance of these coating systems and that cannot be put into acceptable condition by the preparatory work specified in Paragraph 3.03.

B. Do not proceed with application until the surface is acceptable or authorization to proceed is given by the Engineer.

C. In the event that Applicator has employed all acceptable methods of surface preparation and cannot remedy adverse conditions that would lead to failure of the installation, Applicator shall withdraw from the contract and Owner will be financially responsible only for preparation efforts.

## 3.02 General

A. Material storage area must be selected and approved by Applicator and Owner or his representative.

B. Owner will furnish ____ V ____ Phase electricity and water for use by Applicator.

C. If existing ventilation is inadequate, Applicator will provide sufficient ventilation to allow complete air exchange every five (5) minutes.

D. Owner shall provide means for disposal of construction waste.

E. Applicator will protect adjacent surfaces not to be coated with masking and/or covers. Owner's equipment shall be protected from dust, cleaning solutions, and flooring materials.

## 3.03 Preparation

A. Surface Preparation - General

1. Concrete substrate must be clean and dry. Dislodge dirt, mortar spatter, paint overspray, and other dry surface accumulations and contamination by scraping, brushing, sweeping, vacuuming, and/or compressed air blowdown.
2. New concrete: See 1.08 - C for requirements.
3. Surfaces that are heavily contaminated shall be cleaned with the appropriate degreaser, detergent, or other appropriate cleaner/surfactant followed by thoroughly rinsing with fresh water to remove the accumulation prior to mechanical cleaning efforts. Mechanical cleaning will not remove such deposits, but only drive them deeper.
4. Concrete shall have a moisture emission rate of no more than 5 lbs. per 1000 sq. ft. per 24 hour period as determined by proper Calcium Chloride Testing and no more than 85% R/H as measured by Protimeter

B. Bond Testing

1. The applicator shall evaluate all surface preparation by conducting bond tests at strategic locations.
2. Mix six (6) ounces of the primer to be used in the application with 5% by volume Silikal Powder Hardener. Add #10-#12 mesh, dry quartz sand until an easily trowelable mixture is obtained. Apply palmsized patties 1/8" to 1/4" thick.
3. After one (1) hour at (68° F.), patties must be cured tack-free and cooled to ambient temperature of concrete. Remove patties with hammer and chisel and examine fracture/delamination plane. Concrete with fractured aggregate must be attached to the entire underside of the patty.
4. If only laitance or a small amount of concrete is attached or if interface between patty and substrate is tacky, further substrate preparation is required.
5. If further surface preparation is required, bond tests shall be conducted again when this has been completed.
6. If no amount or kind of surface preparation produces satisfactory bond tests, the applicator shall report that to the Owner, Engineer, and Manufacturer.

C. Mechanical Surface Preparation and Cleaning

1. All accessible concrete floor surfaces shall be acid etched, rinsed and dried, or mechanically blast cleaned using a mobile steel shot, dust recycling machine such as BLASTRAC®, or approved equivalent. All surface and embedded accumulations of paint, toppings, hardened concrete layers, laitance, power trowel finishes, and other similar surface characteristics shall be completely removed leaving a bare concrete surface having a profile similar to 60 grit sandpaper and exposing the upper fascia of concrete aggregate.
2. After blast cleaning, floors shall be mechanically abraded using 20 to 24 grit metal bonded diamond grinders.
3. After blasting and grinding, traces or accumulations of spent abrasive, laitance, removed toppings, and other debris shall be removed with brush and vacuum.
4. Conduct Bond Tests to check adequacy of surface preparation. See Paragraph 3.03 – B.
5. Application of the respective specified material system must be completed before any water or other contamination of the surface occurs.

## 3.04 Installation

A. Application of Silikal Transparencies concrete stain system consists of:

1. Applying moisture vapor treatment (if required).

**Consult technical department before treating for application sequence.**

2. Patching and sloping with polymer concrete (if required),
3. Applying stain color coats
4. Applying the seal coats

Time for curing (45 - 90 minutes) shall be allowed between seal coats.

Thicknesses are specified below and/or in Paragraph 3.07.

B. Open only the containers of component materials to be use in each specific application as needed. Refer to Manufacturer's data sheets for pot-life/temperature relationship to determine size of batches to mix and mix ratios for each respective coat of the system.

C. Measure, add and mix the Silikal BP-Powder Hardener into the respective resin components in the proportions recommended by the Material Manufacturer. Pot life is short, so mix only as much material at a time as can be easily and efficiently applied.

## 3.04.01 Moisture Vapor Treatment (if required)

A. **Stain colors need to be applied prior to RE-40 if moisture treatment is required.** Consult technical department for details. Mix moisture vapor treatment products as recommended by manufacturer. .

B. Pour out all resin onto the concrete surface and spread it with a squeegee. After a short operating time (approximately 10 minutes) the excess must be removed with the squeegee. The remaining resin can be rolled out with a lint free resin proof roller. Resin films as well as puddles must be avoided!

The waiting time between the coats depends on the absorbency of the substrate and is normally between one and three hours. Before applying the second coat if required, the impregnation of the first coat into the substrate should be evident.

C. If required, repeat the above process. During application of the treatment take care that there is no film building at the surface. The surface texture has to be maintained after every step.

## 3.04.02 Patching/Sloping (If Required)

A. Mix polymer concrete components as recommended by the Material Manufacturer,

**incorporate stain colorant if necessary.**

B. Use mixture to repair any damaged concrete, or to slope any areas as needed.

## 3.04.03 Color Coat

A. Apply color coat with a Hudson sprayer or equivalent to achieve a stain pattern. Coverage will be 300 to 500 square feet per gallon, depending on desired depth of color. Restain if needed.

B. Apply subsequent color using the same method, after the first color has dried.

## 3.04.04 Seal Coat

A. Apply with clean rollers at a rate of 80 - 125 sq. ft. / gal. Finish roll, uniformly in one direction.

B. Allow topcoat to cure. Floors may be lightly sanded if required. Vacuum all dust, paying particular attention to edges and corners.

C. Second coat can be applied in the same manner as the first seal coat.

## 3.05 Field Quality Control/Inspection

A. Applicator shall request acceptance of surface preparation from the Engineer before application of the stain coat.

B. Applicator shall request acceptance of the stain coat from the Engineer before application of seal coats.

## 3.06 Cleaning

A. Applicator shall remove any material spatters and other material that is not where it should be. Remove masking and covers taking care not to contaminate surrounding area.

B. Applicator shall repair any damage that should arise from either the application or clean-up effort.

## 3.07 Coating Schedule

A. Moisture vapor treatment shall be Silikal RE40 application rate shall be approximately 220 sq. ft. per gallon (approx. 7 mils) Stain should be applied prior to RE-40; consult technical department.

B. Patching/Sloping material shall be R17.

C. Stain colorant application rate shall be approximately 300-500 sq.ft. per gallon per coat. Two coats are generally required, one coat per each of two colors.

D. Clear seal coat shall be Silikal R51; apply at the rate of 80 - 125 sq. ft. per gallon. Two coats are required. The second coat may incorporate SG filler for texture if specified.

Please refer to the data sheets for the relevant Silikal resins for the guideline recipes, material consumption, hardener quantities

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