Division 09 67 26 - Quartz Flooring

PART 1 - GENERAL

1.01 Work Included

A. Work described in this section includes surface preparation and installation of Silikal reactive resin industrial floor system with low flame spread characteristics, a system that will not produce excessive levels of smoke or toxic products of combustion.

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. The Silikal 62 FR system is a 4-6mm (3/16”-1/4”) thick troweled surfacing composite of Silikal 100% reactive binder resin, fire resistant filler and Silikal colored quartz aggregate with specified Silikal primer and topcoat.

B. The Silikal flooring system shall cure completely and be available to normal operations in no more than 90 minutes at temperatures as low as 0 ° C. after application of the final coat.

C. The finished Silikal floor coating system shall be uniform in color combinations, texture, 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 installer 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 and 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.

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.

D. IMO FTP Code Part 5 of Annex 1 and Part 2 of Annex 1

1.06 Submittals

A. Acceptance Sample: As required by owner, one foot square (1m by 1 m) sample of the specified Silikal 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 -4 and 27° C. 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 0° to 27° C 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 22° C. 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 "rubbed" finish; float or darby finish the concrete (a hard steel trowel is neither necessary nor desirable)

4. Drains should be set to the concrete grade rather than raised to the finished grade of the topping.

D. Concrete shall have a moisture emission rate of no more than 2,25 kg. per 100 sq. m. per 24 hour period as determined by proper Calcium Chloride Testing. Concrete R/H must be 85% or less as measured by protimeter.

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

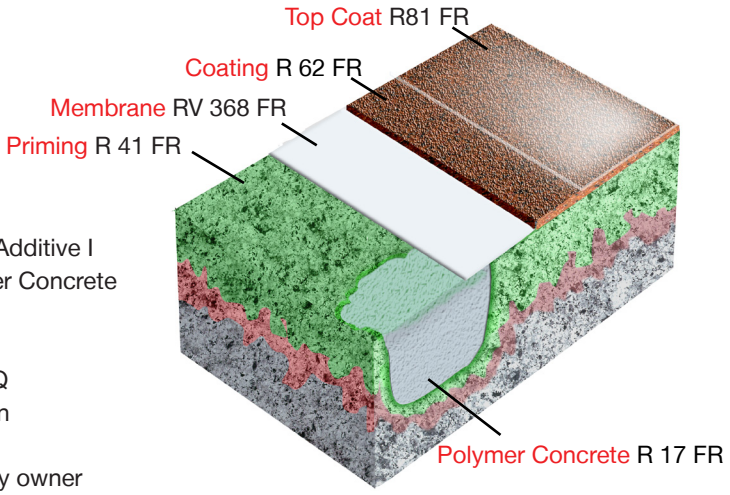
2.01 Acceptable Manufacturers

A. Silikal GmbH, Germany

2.02 Materials

A. Silikal 62 FR Decorative Quartz Flooring with Flexible Membrane

1. Moisture Vapor Treatment (if required)
2. Saturating Primer/Silikal Coat: Silikal R41 FR with Additive I
3. Patching/Sloping (if required) Silikal R17 FR Polymer Concrete
4. Silikal RV368 FR Flexible Membrane, consisting of SIlikal RV 368 and Silikal FR Filler
5. Coving (if required): Silikal HK20 with Silikal filler CQ
6. Topping: Silikal 62 FR, consisting of Silikal R62 resin and Silikal FR Filler
7. Silikal CQ for broadcasting: Color/s to be chosen by owner
8. Topcoat(s): Silikal R81 FR Colorless Silikal Topcoat Resin
9. Aluminum Oxide (if required)



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

2.02.01 Product Performance Criteria

A. Silikal R41 FR with Additive

1. Percentage Reactive Resin 100%
   Percentage Solids 100%
2. Water Absorption, 4 days (DIN 53 495): .....125 mg (50 x 50 x 4 mm)
3. Ultimate Elongation (DIN 53 455).....1.3%
4. Water Vapor Permeability (DIN 53 122).....1.05 x 10^{-11} g/cm x h x Pa
5. Coefficient of Thermal Expansion, in. /in. /deg. F: 0.000035
6. Electrical Resistivity:

Volume Resistance, ohm-cm: ..... 10^{15}

Surface Resistance, ohm: .....10^{12}

B. Silikal R17 Polymer Concrete
1. Percentage Reactive Resin: 100%
2. Water Absorption, 4 days (DIN 53 495): .....90 mg (50 x 50 x 4mm)
3. Tensile Strength, (DIN 1164).....27.5 N/mm^2
4. Modulus of elasticity (DIN 53 457) .....7000 N/mm^2
5. Coefficient of Thermal Expansion, in./in./deg. F 0.000018
6. Compressive Strength (DIN1164)..... 75 N/mm^2

C. Silikal RV368 FR Flexible Membrane
1. Percentage of reactive resin: 100%
Percentage of solids: 100%
2. Tensile Strength (DIN 1164): .....15.0 N/mm^2
3. Compressive Strength (DIN 1164): .....25.0 N/mm^2

D. Silikal R62 FR Topping
1. Percentage of reactive resin: 100%
Percentage of solids: 100%
2. Compressive Strength, (DIN1164): .....45.0 N/mm^2
3. Tensile Strength, psi (DIN 1164): .....25.0N/mm^2
4. Coefficient of Thermal Expansion, in./in./deg. F: 0.000019
5. Electrical Resistivity, (ASTM D257) Volume Resistance, ohm-cim: .....10^{14}
6. 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

E. Silikal R81 FR Colorless Topcoat Resin
1. Percentage Reactive Resin: 100%
Percentage of solids: 100%
2. Water Absorption, Wt, 4 days (DIN53 495): .....125 mg (50 x 50 x 4 mm)
3. Coefficient of ThermalExpansion in./in./deg. F: 0.000035
4. Electrical Resistivity (ASTM D257):
Volume Resistance, ohm-cm: .....10^{15}
Surface Resistance, ohm: .....10^{12}
7. Water Vapor Transmission (DIN 53122) .....1.05 x 10^{-11} g/cm x h x Pa
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 2,25 kg. per 100 sq. m. 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 250 ml 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 palm sized patties 4 to 6 mm 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 62 FR flooring system consists of:
1. Applying moisture vapor treatment (if required).
2. Applying the primer,
3. Applying coving (if required),
4. Performing patching and sloping with polymer concrete (if required),
5. Re-priming polymer concrete areas,
6. Applying the flexible membrane,
7. Applying the topping, broadcasting the quartz,
8. Applying the topcoat(s),
Time for curing (45 - 60 minutes) shall be allowed between each coat
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 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. **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 Prime Coat

A. Mix primer components according to manufacturer's instructions.

B. Pour the mixture batches onto the floor surface and use a 25 cm to 60 cm wide, 12 mm thick-napped, solvent resistant paint roller to roll out the material at a rate of 100 square feet per gallon or 400 grams per square meter to form a uniform, continuous film, ensuring that all crevices, cracks and other surface discontinuities have been saturated and coated. Use a paint brush to reach areas inaccessible to the roller. Work quickly and deliberately; the pot life is short (10 -15 minutes). Do not leave any "puddles"; roll out any such accumulations.

C. Allow the primer coat to cure.

D. If any of the concrete has absorbed all of the primer or if the concrete still has a dry look, reprime these areas before applying the next layer.

3.04.03 Coving (if required)

A. Surface Preparation

1. If concrete walls are to be painted prior to installation of cove base, the bottom portion of the walls shall remain uncoated to the height of the cove base to insure a proper bond to the concrete wall.
2. If walls are constructed of a non-compatible material or if a coating exists, a backer board of 12 mm cement board cut to the desired height of the cove base needs to be installed. The top of the backer board should be cut at a 45° angle to create a "beveled" edge.
3. If a backer board needs to be installed it shall be fastened using a high grade construction adhesive as well as counter sunk screws or concrete masonry anchors.

B. Cove base shall be installed according to manufacturer's recommendations and shall be:

1. Application area requires prime coat according to 3.04.02
2. Trowel-On cove base consisting of a trowel applied radius/base mix with a termination strip installed at the top of the base.
3. Cove base will receive a top coat consistent with flooring system.

3.04.04 Patching/Sloping (if required)

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

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

C. Once cured, material must be re-primed before next layer is applied.

3.04.05 Flexible Membrane

A. Size the batches, and mix according to Manufacturer's instructions. The entire batch should be poured and spread at once; do not let material set in pail.

B. Spread the topping material with a gauge rake set to a depth of 1.5 mm. Lightly trowel to a uniform thickness of 1 mm as necessary.

E. Lightly scatter quartz into wet material before it begins to cure. Allow the topping to cure.

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.

3.04.06 Topping

A. Size the batches, and mix according to Manufacturer's instructions. The entire batch should be poured and spread at once; do not let material set in pail.

B. Spread topping material with a gauge rake set to a depth of 3 mm. Lightly trowel to a uniform thickness of 2 mm.

C. If necessary, roll with a porcupine roller to release trapped air.

D. Broadcast colored quartz into the fresh material before it begins to cure. Broadcast by hand, or use a backpack type blower or sand blast pot to achieve an even broadcast. The quartz must 'rain' down and not be thrown into the wet base coat.

E. Allow the topping to cure.

F. Remove excess quartz by sweeping, "blown-down", and vacuuming.

3.04.07 Top Coat

A. Apply with clean rollers at a rate of 90 – 120 square feet per gallon or 300- 450 grams per square meter in the same way as the R81 FR seal coat was applied as described in Paragraph 3.04.07. Finish rolling uniformly in one direction.

B. Allow topcoat to cure.

3.04.08 Second Top Coat

A. Apply with clean rollers at a rate of 100 - 125 square feet per gallon in the same way as the R81 FR seal coat was applied as described in Paragraph 3.04.07. Finish rolling uniformly in one direction.

B. Allow topcoat to cure.

3.05 Field Quality Control/Inspection

A. Applicator shall request acceptance of surface preparation from the Engineer before application of the primer coat. Please refer to the data sheets for the relevant Silikal resins for the guideline recipes, material consumption and hardener quantities.

B. Applicator shall request acceptance of the prime coat from the Engineer before application of subsequent specified materials.

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. Primer shall be Silikal R41 FR with Additive I Application rate shall be approx. 100 square feet per gallon or 400 grams per square meter (approximately 16 mils or 0.4 mm).

B. Patching/Sloping material shall be R17 FR

C. Flexible membrane shall be Silikal RV368 FR applied with a gauge rake set at 1,5 mm for a rate of 40 sq. ft. per batch or 1.6 kg per square meter approximately 1 mm thickness.

D. Coving shall be Silikal HK 20 FR per manufacturer's recommendations.

E. Body coat shall be Silikal R62 FR, applied with a gauge rake set at 3 mm for a rate of 40 sq. ft. per batch or 3.2 kg per square meter approximately 2mm thickness.

Colored quartz is to be broadcast into the uncured topping. Broadcast the quartz at the rate of 0.5 – 0.75 pounds per square foot or 2.4 – 3.6 kg per square meter.

F. Clear topcoat shall be Silikal R81 FR; apply at the rate of 80 - 90 sq. ft. per gallon or 450 to 500 grams per square meter for the first coat and 90 – 120 sq. ft. per gallon or 300-450 grams per square meter for the second application

*Please refer to the data sheets for the relevant Silikal resins for the quidelines recipes, material consumption and hardener quantities. Note that FR resins are required and that FR filler is used in place of SV filler for this application.