

## SEAMLESS EPOXY QUARTZ AND MARBLE-CHIP FLOORING SPECIFICATION

### PART 1 GENERAL

#### 1.1 DESCRIPTION

- A. This section specifies a fluid applied epoxy quartz and marble-chip flooring with integral cove base.
- B. Glaze – Two component clear sealer topcoat.

#### 1.2 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
  - 1. Preparation instructions and recommendations.
  - 2. Storage and handling requirements and recommendations.
  - 3. Installation methods.
  - 4. Maintenance instructions: Manufacturer's written instructions for recommended maintenance practices.
- B. Selection Samples: For each finish product specified, submit two samples 4 by 4 inches (102 mm by 102 mm) in size illustrating color, chip size and variation, and matrix color.
- C. Verification Samples: For each finish product specified, submit two samples 4 by 4 inches (102 mm by 102 mm) in size in color, chip size and variation, and matrix color, representing actual product scheduled. This would require the chosen product(s) to be applied to a rigid backing by installer for this project.
  - 1. Finished flooring must match the approved samples in color and texture.
- D. Certifications and Approvals:
  - 1. Manufacturer's certification of material and substrate is in compliance with specification.
  - 2. Manufacturer's approval of installer.
  - 3. Contractor's certificate of compliance with Quality Assurance requirements.
- E. Sustainable Submittal:
  - 1. Product data for products having recycled content, submit documentation indicating percentages by weight of post-consumer and pre-consumer recycled content.
    - a. Include statements indicating costs for each product having recycled content, and low emitting materials.
  - 2. Product data for Environmental Quality Credit EQ 4.2 low emitting materials; include printed statement of VOC content indicating compliance with environmental requirements.

3. Product data for Material Resource Credit MR 4.1, 12%-35% post-consumer recycled glass content.

F. Warranty – See 1.6 for details

### 1.3 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Manufacture shall certify that a particular resinous flooring system has been in use for a minimum of (5) five years.
- B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this project for a minimum period of (5) five years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
  1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated. The Contractor shall furnish a certified installer certificate.
  2. Contractor shall have completed at least (5) five projects of similar size and complexity. Include list of at least (5) five projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
  3. Installer's Personnel: Contractor employs persons trained for application of specified product.
- C. Source Limitations:
  1. Obtain primary resinous flooring materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
  2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.
- D. Pre-Installation Conference:
  1. Convene a meeting not less than thirty days prior to starting work.
  2. Attendance:
    - a. Contractor
    - b. VA Resident Engineer
    - c. Manufacturer and Installer's Representative
  3. Review the following:
    - a. Environmental requirements
      1. Air and surface temperature
      2. Relative humidity
      3. Ventilation
      4. Dust and contaminants
    - b. Protection of surfaces not scheduled to be coated.
    - c. Inspect and discuss condition of substrate and other preparatory work performed.

- d. Review and verify availability of material, installer's personnel, and equipment needed.
  - e. Design and pattern(s) and edge conditions.
  - f. Performance of the coating with chemicals anticipated in the area receiving the resinous (epoxy resin composition) flooring system.
  - g. Application and repair.
  - h. Field quality control.
  - i. Cleaning.
  - j. Protection of coating systems.
  - k. One-year inspection and maintenance.
  - l. Coordination with other work as required.
- E. Mock-Up: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
- 1. Apply full-thickness mockups on 48 inch (1200 mm) square floor area selected by VA Resident Engineer.
    - a. Include 48 inch (1200 mm) length of integral cove base.
  - 2. Test mock-up with anticipated chemicals to be used in the designated area.
  - 3. Approved mockups not damaged during the testing may become part of the completed work if undisturbed at time of Substantial Completion.
  - 4. Sign off from VA Resident Engineer on texture for slip resistance and clean ability must be complete before installation of flooring system.
- F. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of resinous flooring systems.
- G. Contractor Job Site Log: Contractor shall document daily; the work accomplished environmental conditions and any other condition event significant to the long term performance of the resinous flooring systems installation. The Contractor shall maintain these records for one year after Substantial Completion.

#### 1.4 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.
- C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).
- D. Keep containers sealed until ready for use.
- E. Do not use materials beyond manufacturer's shelf life limits.
- F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages. No on-site weighing or volumetric measurements are allowed.

#### 1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous flooring application and for not less than 24 hours after application.
    - a. Maintain proper ventilation of the area during application and curing time period. Comply with the infection control measures of the VA Medical Center.
  2. Concrete substrate shall be properly cured per referenced section 03 30 00, CAST-IN-PLACE CONCRETE. Standard cure time a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade.
    - a. Resinous flooring applications where moisture testing resulting in readings exceeding limits as defined in this specification under part 3, section 3.1.A.2, shall employ an multiple component 15 mil thick system designed to suppress excess moisture in concrete.
    - b. Application at a minimum thickness of 15 mils, over properly prepared concrete substrate as defined in section 3.2.
    - c. Moisture suppression system must meet the design standards as follows:

| Property                                  | Test                                    | Value                                     |
|---|---|---|
| Tensile Strength                          | ASTM D638                               | 4,400 psi                                 |
| Volatile Organic Compound Limits (V.O.C.) | EPA & LEED                              | 25 grams per liter                        |
| Permeance                                 | ASTM E96 @ 16mils/<br>0.4mm on concrete | 0.1 perms                                 |
| Tensile Modulus                           | ASTM D638                               | 1.9X10 <sup>5</sup> psi                   |
| Percent Elongation                        | ASTM D638                               | 12%                                       |
| Cure Rate                                 | Per manufactures Data                   | 4 hours Tack free with 24hr recoat window |
| Bond Strength                             | ASTM D7234                              | 100% bond to concrete failure             |

- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

## 1.6 WARRANTY

- A. Work subject to the terms of the Article "Warranty of Construction" FAR clause 52.246-21.
- B. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly for both material and workmanship for an extended period of (10) full years from date of installation, or provide a joint and several warranty signed on a single document by manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (10) full years from date of installation. **A sample warranty letter must be included with bid package or bid may be disqualified.**

#### 1.7 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. ASTM Standard C722-04 (2012), "Standard Specification for Chemical-Resistant Monolithic Floor Surfaces," ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/C0722-04R12, [www.astm.org](http://www.astm.org).

- 1. Specification covers the requirements for aggregate-filled, resin-based, monolithic surfaces for use over concrete.

- C. American Society for Testing and Materials (ASTM):

C307 (2012) Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfaces

C531 (2012) Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfaces, and Polymer Concretes

C579 (2012) Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfaces, and Polymer Concretes

C580 (2012) Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfaces, and Polymer Concretes

D638 (2010) Tensile Properties of Plastics

D1308 (2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes

D2240 (2010) Rubber Property—Durometer Hardness

D2794 (2010) Resistance of Organic Coatings to the Effects of Rapid Deformation Impact

D4060(2010) Abrasion Resistance of Organic Coatings by the Taber Abraser

D4259 (2012) Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance

D7234 (2012) Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers

E96/E96M (2013) Water Vapor Transmission of Materials

F1679 Variable Incidence Tribometer for determining the slip resistance

F1869 (2011) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using

Anhydrous Calcium Chloride

F2170 (2011) Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

## 1.8 RELATED WORK

- A. Concrete and Moisture Vapor Barrier: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Substrate Preparation for Floor Finishes: Section 09 05 16.
- C. Color and location of each type of resinous (epoxy resin composition) flooring: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Floor Drains: Division 22, PLUMBING.

## PART 2 PRODUCTS

### 2.1 MANUFACTURERS

- A. Acceptable Manufacturer: See Recommended Sources

### 2.2 MATERIALS

- A. Floor: A 100 percent solids epoxy, marble-chip and quartz aggregate that are troweled in place, evenly textured, slip-resistant finish of between 1/8 inch (3 mm) and 3/16 inch (4.8 mm) thickness.
  - 1. System shall not require primer (unless needed due to the substrate), bond coat, grout or sealer components for application.
  - 2. System shall comply with the USDA guidelines for use in federally inspected facilities.
- B. Glaze: The finish of floor can range anywhere from glass smooth to a sandpaper-like finish. The texture can be adjusted during or long after by applying multiple coats of glaze (for a smoother finish) or by broadcasting anti-skid into the glaze (for a coarser finish).
- C. Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up

The specified finish is:

- Smooth finish. Floor with 1 coat of Glaze and no anti-skid.
- Standard finish – Floor with 1 coat of Glaze and no anti-skid. This finish is easy to clean with a mop or any other cleaning method and still has some slip-resistance, it is recommended for pet care facilities, public restrooms and any other area that needs to be consistently cleaned and is not always wet.
- Anti-Skid finish – Floor with 1 coat of Glaze with medium anti-skid broadcast into the surface during application. This finish is easy to clean with a deck brush and squeegee or power scrubber, but is not able to be mopped. It is slip-resistant even

when wet it is recommended for aquatic facilities, commercial kitchens and any other area that needs to be consistently cleaned and is always wet.

- Super Anti-Skid finish – Floor with 1 coat of Glaze with coarse anti-skid broadcast into the surface during application. This finish is easy to clean with a deck brush and squeegee or power scrubber, but is not able to be mopped. It is slip-resistant even when wet. It is recommended for commercial kitchens and any other area that needs to be consistently cleaned and is always wet and frequently has grease and/or oil on the floor. Note: This finish is extra abrasive and will need to have the glaze and anti-skid reapplied as the skid will wear off in high traffic – frequency depends on traffic.

Acceptable Manufacturer and Product:

Material shall include select silica quartz and marble-chip aggregate fillers.

1. Floor system shall be a 100 percent solid, unpigmented epoxy resin system.
2. Base: A three-component, integral troweled base and cove consisting of floor resin, hardener, marble-chip aggregates as used in the floor, and finely graded silica aggregate. Cove to be 4 inches (102 mm) height or as scheduled.
3. Glaze: a high performance, chemical resistant, two-component, clear sealer.
4. Color as selected by Architect from manufacturers standard color range.

D. System Characteristics:

1. Color and Pattern: As selected by VA Resident Engineer from manufacturer's standard colors. As indicated in Section 09 06 00, SCHEDULE OF FINISHES.
2. Integral cove base: 1 inch (25.4 mm) radius epoxy cove keyed into the substrate. Verify cove base installation with manufacturer's system.
3. Overall System Thickness: Verify thickness as systems vary by manufacturer.
4. Finish: Standard Textured anti-slip resistant to meet or exceed 0.06 dry; 0.08 wet.

E. Physical Properties:

1. Physical Properties of flooring system when tested as follows:

| Property                                  | Test                                | Value                                 |
|---|-------------------------------------|---------------------------------------|
| Compressive Strength                      | ASTM C579                           | 6,000 psi after 7 days                |
| Volatile Organic Compound Limits (V.O.C.) | EPA & LEED                          | Below 50 g/l                          |
| Tensile Strength                          | ASTM C307                           | 1,500 psi                             |
| Flexural Modulus of Elasticity            | ASTM C580                           | $5.0 \times 10^5$ psi                 |
| Water Absorption                          | ASTM C413                           | 0.1%                                  |
| Slip Resistance Index                     | ASTM F1679                          | 0.81 dry and 0.56 wet. Minimal levels |
| Impact Resistance                         | ASTM D2794                          | > 160 in. lbs.                        |
| Abrasion Resistance                       | ASTM D4060 Cs-17 wheel, 1000 cycles | 0.06 gm maximum weight loss           |
| Thermal Coefficient of Linear Expansion   | ASTM C531                           | $1.8 \times 10^{-5}$ mm/ °C mm        |
| Hardness Shore D                          | ASTM D2240                          | 85 to 90                              |
| Bond Strength                             | ASTM D7234                          | 100% Bond to concrete failure         |

- F. Chemical Resistance in accordance ASTM D1308 - 02(2007) "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes". ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/D1308-02R07, [www.astm.org](http://www.astm.org). No effect to the following exposures:

1. Acetic acid (5%)
2. Ammonium hydroxide (10%)
3. Citric Acid (50%)
4. Fatty Acid
5. Motor Oil, 20W
6. Hydrochloric acid (20%)
7. Sodium Chloride
8. Sodium Hypochlorite (10%)
9. Sodium Hydroxide (30%)
10. Sulfuric acid (25%)
11. Urine, Feces
12. Hydrogen peroxide (10%)

G. SUPPLEMENTAL MATERIALS

1. Textured Top Coat: Type recommended or produced by manufacturer of seamless resinous flooring system, slip resistance type and profile for desired final finish.
2. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditioned indicated.
3. Waterproof Membrane: Type recommended or produced by manufacturer of resinous floor coatings for type of service and conditions as indicated in Drawings and/or specified.

*NOTE: Positive side waterproofing membrane recommended for wet areas*



- above grade.*
4. Provide a chemical resistant top coat capable of resisting sustained temperatures up to 120 deg. C (250 deg. F).  
*NOTE: Provide highly chemically resistant Topcoat*
  5. Crack Isolation Membrane: Type recommended or produced by manufacturer of resinous flooring for conditions as indicated in Drawings and/or specified.  
*NOTE: Crack Isolation membrane recommended for new flooring in existing structures.*
  6. Patching and Fill Material: Resinous product of or approved by resinous coating manufacturer for application indicated. Resinous based materials only. Cement based or single component products are not acceptable.  
*NOTE: If sub-floor is not level is should be filled and leveled*

## PART 3 EXECUTION

### 3.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
  1. Verify that substrate is ready to receive work, and that sub-floor surface is clean, dry, and free of substances which could affect bond.
  2. Concrete hydrostatic, capillary or moisture pressure must be no greater than 3.0 lbs/1000 sf/24 hours. Substrates in contact with the ground must have a properly installed, functioning and effective vapor barrier to help prevent potential problems resulting from hydrostatic, capillary or moisture vapor emission. Concrete must contain less than 3% moisture when tested per ASTM D1864.
  3. Maintain minimum concrete surface temperature between 55° and 85° F, and relative humidity below 80% for a minimum of 48 hours before, during and after installation, or until cured. Surface temperature must be 5° F above dew point.
  4. Beginning work constitutes acceptance of substrate.
- B. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

### 3.2 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral PH substrate for resinous flooring application.
- B. Substrate Requirements:
  1. Contractor to provide positive drainage at floor drains.
  2. Floor drains shall be set no higher than 1/8 inch (4 mm) above slab.
  3. Floor sinks shall be set in accordance with local codes and regulations.
  4. Gaps between wall sheathing and substrate shall be filled prior to flooring commencement per flooring manufacturer's requirements.
  5. FRP and any other wall finish should terminate with a J-molding or other trim at least 6 inches (152 mm) above finish floor.
  6. The substrate shall be clean, dry and sound. Remove dust, laitance, grease, curing compounds, waxes, foreign particles and any previously applied potentially incompatible coatings by scarifying, chipping, wire brushing, acid

etching, or pressure washing. If pressure washing or any other liquid method is used for preparation, substrate should be fully rinsed, squeeze-dry mopped and allowed to completely dry.

7. Concrete: New concrete must cure for at least 28 days at 70°F (21°C), and have been free from water for at least 7 days. Older floors should be scarified and thoroughly cleaned. If badly cracked, crumbling, punky or deeply contaminated with oil or fat, a new concrete topping of proper thickness and strength should be installed. Swollen areas should be chipped out and any cracks, spalls, joints or other depressions filled with underlayment. The concrete should be at least 2500 psi. Concrete hydrostatic, capillary or moisture pressure must be no greater than 3.0 lbs. /1000 sf/24 hours.
8. Wood Floors: Plywood floors shall consist of 2 layers of at least 5/8 inch (16 mm) material with offsetting joints, and screwed (nailing not acceptable) into 16 inches (406 mm) on center joists. Alternatively, install 1/2 inch (12 mm) concrete backer board, using a quality sub-floor adhesive and deck screws. Seams in the plywood or concrete backer board shall be treated with fiber tape and a blend of Floor resin and cove base additive. All wood floors are to be treated with a blend of 90% Glaze and 10% Xylene, and allowed to cure for 12 hours prior to installing floor.
9. Vinyl Tile and Sheet Flooring: Thoroughly clean to eliminate wax buildup. Loose tiles and adhesive shall be removed and areas patched with flooring manufacturer's underlayment. Sheet flooring and adhesive shall be completely removed.
10. Quarry/Ceramic Tile: Tile and grout shall be thoroughly cleaned. Loose tile shall be removed and filled in with underlayment. Surface of the tile shall be scratched with a diamond grinder to remove the glaze.
11. Steel Decks: Clean free from oil, grease, rust and loose scale. The deck shall be wiped with denatured alcohol. Allow deck to dry before application of flooring.
12. Radiant Heating System: Floor can be installed over a radiant heating system if the following (3) conditions are met:
  - a) The wires are not exposed directly to the floor material. They must be covered by the substrate.
  - b) The radiant heat system is not more than 140 F at the source.
  - c) Moisture vapor transmission reading must be 3 lbs or less.Floor should not be used over hydronic (liquid) systems.

### 3.3 INSTALLATION - FLOORING

Apply flooring in accordance with manufacturer's instructions. Apply to a minimum thickness of 1/8 inch (3 mm). Finish to smooth level surface sloped to drains.

- A. Provide base and cove at vertical surfaces.
- B. Apply Glaze (and anti-skid, if required).
- C. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, etc.

### 3.4 TOLERANCES

- A. Maximum Variation from Flat Surface: 1/8 inch in 10 feet (3 mm in 3 m).

### 3.5 ENGINEERING DETAILS

- A. Chase edges to “lock” the flooring system into the concrete substrate along lines of termination.
- B. Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
- C. Trenches: Continue flooring system into trenches to maintain monolithic protection. Treat cold joints to assure bridging of potential cracks.
- D. Treat floor drains by chasing the flooring system to lock in place at point of termination.
- E. Treat control joints to bridge potential cracks and to maintain monolithic protection. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- F. Discontinue Resinous floor system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

### 3.6 CURING, PROTECTION AND CLEANING

- A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.
- B. Close area of application for a minimum of 24 hours.
- C. Touch-up, repair or replace damaged products before Substantial Completion.
- D. Protect resinous flooring materials from damage and wear during construction operation.
  - 1. Cover flooring with “Kraft” paper as required.
  - 2. Optional 1/4 inch (6 mm) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.
- E. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.
- F. Do not permit traffic over finished floor surfaces for 42 hours.