

SECTION 09 66 23.16

EPOXY TERRAZZO

THIS GUIDE SPECIFICATION HAS BEEN PREPARED BY THE NATIONAL TERRAZZO AND MOSAIC ASSOCIATION, INC., AND IS DISTRIBUTED FOR USE BY ITS MEMBERS AND DESIGN PROFESSIONALS. IT CONTAINS REQUIREMENTS RELATED TO THE USGBC'S LEED® CERTIFICATION PROGRAMS.

SPECIFIER'S NOTE: REVISE THIS SECTION BY DELETING AND INSERTING TEXT TO MEET PROJECT SPECIFIC REQUIREMENTS.

SPECIFIER'S NOTE: EPOXY TERRAZZO FLOORING INSTALLATIONS HAVE A NOMINAL THICKNESS OF 3/8 INCH, BUT CAN BE APPLIED AS THIN AS 1/4 INCH. THICKNESS OF FLOOR APPLICATION WILL AFFECT AGGREGATE SIZE. THIS SPECIFICATION IS WRITTEN FOR 3/8-INCH THICKNESS. CONSULT WITH NTMA FOR THINNER APPLICATIONS.

SPECIFIER'S NOTE: THIS SPECIFICATION INCLUDES PRECAST TERRAZZO UNITS. EPOXY TERRAZZO FLOORING IS SOMETIMES REFERRED TO AS "THINSET EPOXY."

SPECIFIER'S NOTE: CONCRETE SUBFLOOR TO BE FLAT (MAXIMUM VARIATION NOT TO EXCEED 1/4" IN A 10 FOOT SPAN) AND TO HAVE A STEEL TROWEL FINISHED SURFACE. DO NOT OVER TROWEL TO DARK SHEEN. NO CURING AGENTS OR OTHER ADDITIVES SHOULD BE USED. THE SLAB SHOULD HAVE AN EFFICIENT MOISTURE BARRIER CONFORMING TO ASTM E-1745 CLASS "A" DIRECTLY BENEATH AND IN DIRECT CONTACT WITH THE CONCRETE SLAB WHEN PLACED DIRECTLY ON GRADE. SAW CUTTING OF CONTROL JOINTS MUST BE DONE BETWEEN 12 AND 24 HOURS AFTER PLACEMENT OF THE STRUCTURAL CONCRETE. THE CONCRETE TO RECEIVE EPOXY TERRAZZO SHALL BE OF FLATNESS MINIMUM 1/4" IN A 10 FOOT SPAN (**NOT CUMULATIVE**) PER NTMA RECOMMENDATIONS. IF THE DESIGN TEAM DETERMINES THAT A HIGHER DEGREE OF FLATNESS FOR THE TERRAZZO IS REQUIRED, THE CONCRETE SLAB SHALL BE OF THE SAME FLATNESS. IF LIGHTWEIGHT AGGREGATE CONCRETE IS SPECIFIED CONSULT EPOXY RESIN MANUFACTURER FOR PRECAUTIONS AND MOISTURE SENSITIVITY.

PART 1 - GENERAL

1.01 SUMMARY

A. Section includes:

1. Epoxy terrazzo with divider and accessory strips.

SPECIFIER'S NOTE: DELETE FOLLOWING IF PRECAST TERRAZZO UNITS ARE NOT INCLUDED.

2. Precast terrazzo units.

B. Related Requirements:

SPECIFIER'S NOTE: DELETE NON APPLICABLE ITEMS FROM THE FOLLOWING LIST.

1. Attach metal stairs including any welding and/or reinforcing, Section <Insert Section No. Here>.
2. Provide floor drains at epoxy terrazzo flooring, Section <Insert Section No. Here>.
3. Provide surface hardware at epoxy terrazzo flooring, Section <Insert Section No. Here>.
4. Set architectural reveals or metal base beads requiring installation prior to wall surface, Section <Insert Section No. Here>.
5. Concrete subfloor, Section <Insert Section No. Here>
6. Stair Nosing-Miscellaneous Metals, Section <Insert Section No. Here>.
7. Backing for poured in place epoxy terrazzo base shall be masonry or cement board at least 1/2 inch thick, Section <Insert Section No. Here>.
8. Backing for precast epoxy terrazzo base shall be 1/2 inch or greater thickness cement board, gypsum board or equivalent, Section <Insert Section No. Here>.

1.02 DEFINITIONS

- A. NTMA: National Terrazzo and Mosaic Association, Inc.

1.03 PREINSTALLATION MEETINGS

- A. Pre installation Conference: The General Contractor shall conduct a conference at project site before Terrazzo Contractor begins installation.
1. The General Contractor shall invite Terrazzo Contractor, the Architect and representatives of the Owner.
 2. Review methods and procedures related to terrazzo including, but not limited to, the following:
 - a. Inspect and discuss condition of substrate and other preparatory work performed by other trades.
 - b. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
 - c. Review terrazzo mixes and patterns.
 - d. Review custom terrazzo mixes, designs and patterns.
 - e. Coordination with the work of other installers.

1.04 ACTION SUBMITTALS

- A. Product Data: Terrazzo Contractor shall submit Product Data for each type of product required for installation including:

SPECIFIER'S NOTE: RETAIN ONLY THOSE ITEMS WHICH APPLY TO PROJECT IN THE FOLLOWING LISTING.

1. Strip materials.
2. Sealer.

B. LEED Submittals: Terrazzo Contractor shall submit the following:

SPECIFIER'S NOTE: RETAIN ONLY THOSE SUBMITTALS WHICH APPLY TO PROJECT IN THE FOLLOWING LISTING.

1. Product Data for Credit MR 4: For products having recycled content, submit documentation indicating percentages by weight of postconsumer and preconsumer recycled content.
 - a. Include statement indicating cost for each product having recycled content.
2. Product Certificates for Credit MR 5: For products and materials required to comply with requirements for regional materials, submit documentation indicating location and distance from Project of material manufacturer and point of extraction, harvest, or recovery for each raw material.
 - a. Include statement indicating cost for each regional material and the fraction by weight that is considered regional.

SPECIFIER'S NOTE: "PRODUCT DATA FOR CREDIT IEQ 4.1" SUBPARAGRAPH BELOW APPLIES TO LEED-NC, LEED-CI, AND LEED-CS; COORDINATE WITH REQUIREMENTS FOR ADHESIVES.

3. Product Data for Credit IEQ 4.1: For adhesives, submit documentation including printed statement of VOC content.

SPECIFIER'S NOTE: "PRODUCT DATA FOR CREDIT IEQ 4.3" SUBPARAGRAPH BELOW APPLIES TO LEED-NC, LEED-CI, AND LEED-CS; COORDINATE WITH REQUIREMENTS FOR SEALERS.

4. Product Data for Credit IEQ 4.3: For sealers, submit documentation including printed statement of VOC content.

SPECIFIER'S NOTE: "LABORATORY TEST REPORTS FOR CREDIT IEQ 4" SUBPARAGRAPH BELOW APPLIES TO LEED FOR SCHOOLS.

5. Laboratory Test Reports for Credit IEQ 4: For flooring system including adhesives and sealers, submit documentation indicating that products comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

SPECIFIER'S NOTE: SHOP DRAWINGS MAY NOT BE REQUIRED FOR SMALL AREAS OR SIMPLE DESIGNS. DELETE FOLLOWING PARAGRAPH IF SHOP DRAWINGS ARE NOT REQUIRED.

- C. Shop Drawings: Terrazzo Contractor shall prepare and submit Shop Drawings that include plans, elevations, sections, component details and attachments to other work. Include terrazzo installation requirements. Show layout of the following:

SPECIFIER'S NOTE: RETAIN ONLY THOSE ITEMS WHICH APPLY TO PROJECT IN THE FOLLOWING LISTING.

1. Divider strips.
2. Expansion joint strips.
3. Accessory strips.
4. Abrasive strips.
5. Stair treads, risers and landings.
6. Terrazzo patterns.
7. <Insert requirements>

SPECIFIER'S NOTE: KEEP PARAGRAPH BELOW FOR RELATIVELY SMALL AND SIMPLE PROJECTS WHERE TERRAZZO COLORS AND PATTERNS HAVE ALREADY BEEN SELECTED. DELETE PARAGRAPH IF KEEPING "SAMPLES FOR INITIAL SELECTION" OR "SAMPLES FOR VERIFICATION" PARAGRAPHS BELOW.

- D. Samples:

1. Terrazzo Contractor shall prepare and submit a maximum of three samples, sizes **[6 by 6 inches] [12 by 12 inches]** for each color and type of terrazzo specified.

SPECIFIER'S NOTE: DELETE FOLLOWING PARAGRAPH IF PRECAST TERRAZZO IS NOT USED.

2. Terrazzo Contractor shall submit three samples, sizes **[6 by 6 inches] [12 by 12 inches]** for each color and type of precast terrazzo specified.

SPECIFIER'S NOTE: KEEP PARAGRAPH BELOW FOR PROJECTS WHERE TERRAZZO COLORS WILL BE SELECTED DURING CONSTRUCTION FROM NTMA "COLOR PALETTE BROCHURE. DELETE PARAGRAPH WHERE TERRAZZO COLORS HAVE BEEN SELECTED AND ARE INDICATED ON THE DRAWINGS AND SPECIFICATIONS.

- E. Samples for Initial Selection: Terrazzo Contractor shall submit NTMA "Color Palette Brochure" showing full range of colors and patterns available for each terrazzo type.

SPECIFIER'S NOTE: KEEP PARAGRAPH BELOW FOR LARGER AND MORE COMPLEX PROJECT. DELETE PARAGRAPH WHERE TERRAZZO COLORS HAVE BEEN SELECTED AND ARE INDICATED ON THE DRAWINGS AND SPECIFICATIONS.

- F. Samples for Verification: Terrazzo Contractor shall prepare and submit samples for each type, material, color and pattern of terrazzo and accessory required showing the full range of color, texture and pattern variations expected.

1. Terrazzo: **[6 by 6 inch] [12 by 12 inch]** samples
2. Accessories: 6 inch long Samples of each type and kind of exposed strip item required

SPECIFIER'S NOTE: DELETE FOLLOWING PARAGRAPH IF PRECAST TERRAZZO IS NOT USED.

3. Precast Terrazzo Units: Samples, sizes [**6 by 6 inches**] [**12 by 12 inches**] for each color and type of precast terrazzo specified.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: Terrazzo Contractor shall submit two copies of qualification data.
 1. Include list of projects indicating name and location of project, name of Owner, name and contact information for General Contractor, and name and contact information for Architect.
 2. Include letter from NTMA with the name of the Project and name of member, stating current member status.
- B. Material Certificates:
 1. Epoxy Resin: For each type of resin required indicating that materials meet specification requirements, by manufacturer.
 2. Aggregate: For each type of aggregate required indicating compatibility with terrazzo mix, signed by aggregate supplier.

1.06 CLOSEOUT SUBMITTALS

- A. Maintenance Literature: Terrazzo Contractor shall submit two copies of maintenance recommendations from NTMA.

1.07 QUALITY ASSURANCE

- A. Acceptable Epoxy Resin Manufacturer: An Associate Member of the NTMA, experienced in manufacturing epoxy resin in accordance with NTMA standards and with a record of successful in-service performance, as well as sufficient production capacity to produce required materials.
- B. Acceptable Terrazzo Contractor: A Contractor Member of NTMA whose work has resulted in construction with a record of successful in-service performance.
 1. Installer shall have completed terrazzo installations within the past 5 years of scale and complexity similar to the proposed installation.
- C. Source Limitations for Aggregates: Terrazzo Contractor shall obtain each color, grade, type and variety of granular materials from sources with resources to provide materials of consistent quality in appearance and physical properties.

SPECIFIER'S NOTE: SIZE OF MOCKUP SHOULD BE DEPENDENT TO NUMBER OF COLORS AND PATTERNS. USUALLY A MOCKUP OF 50 TO 100 SQ. FT. SHOULD BE SUFFICIENT. DETAIL MOCKUP DESIRED ON DRAWINGS. KEEP REQUIREMENTS FOR MOCKUP FOR LARGER AND MORE COMPLEX PROJECTS.

- D. Mockups: Terrazzo Contractor shall construct mockup if required in bid or scope of work documents to verify selections made under Sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
1. Build mockup as indicated on Drawings.
 2. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Materials shall be delivered to Project site in supplier's original wrappings and containers, labeled with source or manufacturer's name, material or product brand name, and lot number if any.
- B. Materials shall be stored in their original, undamaged packages and containers, in a location where they will not be exposed to direct sunlight.
1. Epoxy components shall be stored in a space where the ambient temperature can be maintained 60 and 90 deg. F before use.

1.09 PROJECT CONDITIONS

- A. General Contractor shall provide sufficient water, temporary heat and light, and adequate electric power with suitable outlets connected and distributed for use within 100 feet of any working space.
- B. General Contractor shall provide temporary enclosures and other suitable methods to protect adjacent spaces from damage during installation.
1. Maintain ambient temperatures in the area to receive terrazzo at not less than 60 deg. F.
 2. Maintain adequate ventilation in the area to receive terrazzo.
- C. Terrazzo Contractor shall protect other adjacent work from water and dust generated by grinding operations.

1.10 GUARANTEE

- A. One year from date of substantial completion of terrazzo installation.

PART 2 - PRODUCTS

2.01 PERFORMANCE

- A. Recycled Content of Terrazzo Flooring Materials: Provide aggregates with a postconsumer recycled content plus one-half of preconsumer recycled content not less than **<Insert number>** percent.
- B. Regional Materials: Provide **[marble chips]** **[aggregate]** **[and]** **[sand]** that has been extracted, harvested, or recovered, as well as manufactured within 500 miles of Project site.

SPECIFIER'S NOTE: RETAIN "LOW-EMITTING MATERIALS" PARAGRAPH BELOW IF REQUIRED FOR LEED FOR SCHOOLS CREDIT IEQ 4.

- C. Low-Emitting Materials: Flooring system shall comply with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."

SPECIFIER'S NOTE: THE FOLLOWING DESCRIBES THE TYPE OF EPOXY RESIN FORMULATED SPECIFICALLY FOR EPOXY TERRAZZO INSTALLATIONS.

- D. Epoxy Resin:
1. Test Specimens: Mix resin materials according to manufacturer's recommendation without aggregate added and cure for 7 days at 75 degrees plus or minus 2 deg. F and 50 percent plus / minus 2 percent relative humidity.
 2. Cured test specimens shall meet or exceed the following requirements:
 - a. Hardness: 60 to 85 per ASTM D 2240, Shore D.
 - b. Minimum Tensile Strength: 3000 psi per ASTM D 638 for a 2-inch specimen made using a "C" die per ASTM D 412.
 - c. Minimum Compressive Strength: 10,000 psi per ASTM D 695, Specimen B cylinder.
 - d. Chemical Resistance: No deleterious effects by contaminants listed below after seven-day immersion at room temperature per ASTM D 1308.
 - 1) Distilled Water.
 - 2) Mineral Oil.
 - 3) Isopropanol.
 - 4) Ethanol.
 - 5) Soap solution at 1 percent.
 - 6) Sodium hydroxide at 10 percent solution.
 - 7) Hydrochloric acid at 10 percent solution.
 - 8) Hydrochloric acid at 30 percent solution.
 - 9) Detergent Solution at 0.025.
 - 10) Acetic Acid at 5 percent solution.
- E. Epoxy Resin with Aggregate:
1. Test Specimens:
 - a. Mix epoxy resin according to manufacturer's recommendations and blend one volume of epoxy resin with 3 volumes of marble aggregate, consisting of:
 - 1) 60 percent No. 1 chip.
 - 2) 40 percent No. 0 chip.
 - b. Grind and grout with epoxy resin finished to a nominal 1/4 inch thickness.
 - c. Cure specimens 7 days at 75 deg. F plus / minus 2 deg. and 50 percent plus / minus 2 percent relative humidity.
 2. Cured epoxy terrazzo specimens shall nominally meet the following requirements:

- a. Flammability: Self- extinguishing, extent of burning 1/4 inch maximum according to ASTM D 635.
- b. Coefficient of Linear Thermal Expansion: 0.000025 inch/inch per degree F per ASTM C531.

SPECIFIER'S NOTE: ASTM C531 IS CONDUCTED IN A TEMPERATURE RANGE FROM MINUS 30C TO 30C. THIS TEST RANGE IS TO OBTAIN A SPECIFIC RESULT AND DOES NOT REFLECT "IN USE" TEMPERATURE CONDITIONS.

- F. Bond Strength of Epoxy Terrazzo: 300 psi in concrete according to ASTM D7234 (modified to cut slightly into concrete).

2.02 MATERIALS

- A. Epoxy Resin Matrix: Two-component, high solids product complying with specified performance requirements.

1. Color: As required for mix indicated.

- B. Primer: As recommended, manufactured and supplied by epoxy resin manufacturer.

SPECIFIER'S NOTE: SELECT TYPES OF AGGREGATES TO BE INCLUDED IN EPOXY TERRAZZO MIX.

- C. Aggregates: **[Marble,] [glass,] [synthetic] [and] [metal]**.

1. Comply with NTMA gradation standards.
2. Abrasion and Impact Resistance: Loss of 40 percent or less when tested according to ASTM C 131 (LA Abrasion).
3. Aggregates shall contain no deleterious or foreign matter.

SPECIFIER'S NOTE: OTHER DECORATIVE MATERIALS THAT DO NOT COMPLY WITH REQUIREMENTS SPECIFIED ABOVE MAY BE USED AFTER CONSULTING WITH THE TERRAZZO CONTRACTOR FOR SPECIFIC USAGE GUIDELINES AND RECOMMENDATIONS.

- D. Divider Strips:

1. Material: **[White alloy of zinc] [Aluminum] [Brass]**.
2. Strip Thickness: 16 gauge.
3. Type: "L" strip: 3/8 inch by 1/2 inch.

SPECIFIER'S NOTE: DELETE FOLLOWING SUBPARAGRAPH IF HEAVY TOP DIVIDER STRIPS ARE NOT USED

4. Heavy Top Thickness: **[1/8 inch] [1/4 inch]**.

SPECIFIER'S NOTE: DELETE FOLLOWING IF ABRASIVE STRIPS ARE NOT INCLUDED.

- E. Abrasive Strips: [**Three-line**] [**Two-line**] [**One-line**] [**Abrasive nosing strip and two-line**] <Insert requirements> abrasive inserts at nosing. Silicon carbide or aluminum oxide, or combination of both, in epoxy resin binder and set in channel
1. Width: 1/2 inch
 2. Depth: As required by terrazzo thickness
 3. Length: [**4 inches less than stair width**] [**As indicated**] <Insert dimension>.
 4. Color: [**Black**] [**Darker than terrazzo, as selected by Architect**] <Insert requirements>

SPECIFIER'S NOTE: DELETE FOLLOWING PARAGRAPH IF PRECAST TERRAZZO UNITS ARE NOT REQUIRED.

2.03 PRECAST TERRAZZO

- A. Precast Terrazzo Base: Minimum 3/8-inch-thick, epoxy terrazzo units cast in maximum lengths possible, but not less than 36 inches. Comply with precast manufacturer's written recommendations for fabricating precast terrazzo base units in sizes and profiles indicated.
1. Type: [**As indicated**] [**Coved with minimum 3/4-inch radius**] [**Straight**] [**Splayed**] <Insert requirements>.

SPECIFIER'S NOTE: RETAIN FIRST OPTION IN "TOP EDGE" SUBPARAGRAPH BELOW IF TOP EDGE IS CONCEALED.

2. Top Edge: [**Straight, unfinished**] [**Beveled with polished top surface**] [**Radius edge with polished top surface**] <Insert requirements>.
3. Outside Corner Units: With finished returned edges or mitered at outside corner.
4. Color, Pattern, and Finish: [**As selected by Architect from full range of industry colors**] [**Match Architect's sample**] [**Match adjacent poured-in-place terrazzo flooring border**] [**Match adjacent poured-in-place terrazzo flooring field**] [**As indicated**] <Insert requirements>.

SPECIFIER'S NOTE: RETAIN "PRECAST TERRAZZO UNITS" PARAGRAPH BELOW FOR PRECAST TERRAZZO STAIR TREADS, RISERS, OR LANDINGS. FOLLOWING ASSUMES THAT PRECAST UNITS ARE FULLY SUPPORTED. DETAIL PROFILE, ANCHORAGE, AND OTHER REQUIREMENTS ON DRAWINGS OR INSERT BELOW. COPY AND RE-EDIT IF MORE THAN ONE TYPE IS REQUIRED; INSERT A UNIQUE DESIGNATION FOR EACH TYPE AND INDICATE LOCATIONS ON DRAWINGS. PRECAST TERRAZZO STAIR UNITS ARE RECOMMENDED FOR INSTALLATION OVER CONCRETE, STEEL PLATE, OR STEEL PAN STAIRS.

- B. Precast Terrazzo Stair Units: Minimum [**3/4-inch-**] <Insert dimension> thick terrazzo stair units. Comply with precast manufacturer's written recommendations for fabricating precast terrazzo units in sizes and profiles indicated. Reinforce units as required by unit sizes, profiles, and thicknesses and as recommended by manufacturer. Finish exposed-to-view edges and reveals to match face finish. Ease exposed edges to 1/8-inch radius.
1. Provide the following types of precast stair units:
 - a. Stair treads.

- b. Stair risers.
- c. Stair landings.
- d. <Insert item>.

SPECIFIER'S NOTE: COORDINATE "COLOR, PATTERN, AND FINISH" SUBPARAGRAPH BELOW WITH ANY PRECAST UNITS IN LIST ABOVE. RE-EDIT IF TREADS, RISERS, OR LANDING UNITS ARE DIFFERENT.

- 2. Color, Pattern, and Finish: [As selected by Architect from full range of industry colors] [Match Architect's sample] [Match adjacent poured-in-place terrazzo flooring border] [Match adjacent poured-in-place terrazzo flooring field] [As indicated]<Insert requirements>.

SPECIFIER'S NOTE: KEEP ONE OF THE FOLLOWING TYPES OF SETTING MATERIALS FOR INSTALLING PRECAST TERRAZZO OR KEEP BOTH IF SETTING MATERIAL IS TERRAZZO CONTRACTOR'S OPTION.

- C. Setting Materials for Precast Terrazzo: One of the following acceptable to the manufacturer of precast terrazzo units.

- 1. Latex-Portland Cement Mortar (Thin Set): ANSI A118.4.

SPECIFIER'S NOTE: EPOXY IS RECOMMENDED FOR INSTALLATION OVER STEEL SUBSTRATES BUT CAN BE USED WITH OTHER SUBSTRATES. THIN SET LATEX-PORTLAND CEMENT MORTAR IS NOT RECOMMENDED FOR METAL SUBSTRATES.

- 2. Epoxy Adhesive: Two component, compatible with terrazzo units and substrate[.][, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).][, that complies with the testing and product requirements of the California Department of Health Services' "Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers."]

2.04 MISCELLANEOUS ACCESSORIES

- A. Sealer: Terrazzo Contractor shall provide a non-ambering, clear sealer that is chemically neutral; does not impair terrazzo aesthetics or physical properties; is recommended by terrazzo matrix manufacturer. Sealers shall comply with the following:

- 1. Comply with requirements of authorities having jurisdiction.
- 2. Comply with ASTM D 2047.

SPECIFIER'S NOTE: RETAIN ONLY ONE OPTION IN THE FOLLOWING PARAGRAPH.

- 3. Water Based Sealer Properties: With pH factor between 7 and 10.

SPECIFIER'S NOTE: RETAIN ONLY PARAGRAPH ABOVE TO RESTRICT SEALERS TO THOSE THAT ARE WATER BASED. RETAIN PARAGRAPH BELOW IF SOLVENT BASED SEALERS ARE PERMITTED.

4. Solvent Based Sealer Properties: Flashpoint at 80 deg. F or above according to ASTM D 56.

SPECIFIER'S NOTE: RETAIN PARAGRAPH BELOW IF REQUIRED FOR LEED-NC, LEED-CI, OR LEED-CS CREDIT IEQ 4.3.

5. Sealers shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

SPECIFIER'S NOTE: BOTH OF THE FOLLOWING PRODUCTS WILL BE REQUIRED OVER CONCRETE SLABS WITH LIGHTWEIGHT AGGREGATES. EITHER OR BOTH MAY BE REQUIRED OVER CONCRETE SLABS WITH STANDARD AGGREGATES.

SPECIFIER'S NOTE: USE THE FOLLOWING IF INDICATED BY MOISTURE TEST RESULTS. MAY BE REQUIRED FOR CERTAIN EXISTING SLABS ON GRADE, AND MAY BE REQUIRED FOR NEW CONSTRUCTION WHERE SLABS CANNOT BE ADEQUATELY DRIED BEFORE TERRAZZO IS INSTALLED. CAN BE PROVIDED AT EXTRA COST TO OTHERS, BUT MUST BE RECOMMENDED, PRODUCED AND SUPPLIED BY APPROVED TERRAZZO RESIN MANUFACTURER. MAY BE SPECIFIED AS AN ALTERNATE.

SPECIFIER'S NOTE: RETAIN FOLLOWING IN BASE BID FOR INSTALLATIONS OVER CONCRETE SLABS WITH LIGHTWEIGHT AGGREGATES.

- B. Moisture Mitigation: Two-component, high solids, moisture tolerant, high density, low odor, epoxy-based product produced by epoxy terrazzo resin manufacturer specifically recommended to reduce alkalinity levels and moisture emission to not more than 3 lbs/ per 1000 sq. ft per 24 hours. **[If required, shall be an extra cost to others]**

SPECIFIER'S NOTE: KEEP THE FOLLOWING WHERE THERE IS EXCESSIVE CRACKING. MAY BE SPECIFIED AS AN ALTERNATE OR A UNIT PRICE ALLOWANCE.

SPECIFIER'S NOTE: RETAIN OPTION FOR INSTALLATIONS OVER CONCRETE SLABS WITH LIGHTWEIGHT AGGREGATES.

SPECIFIER'S NOTE: CRACK SUPPRESSION/ISOLATION MEMBRANES ARE INTENDED TO DEAL WITH HORIZONTAL MOVEMENT, NOT VERTICAL MOVEMENT AT CRACKS.

- C. Crack Suppression/Isolation Membrane: As recommended, produced and supplied by approved terrazzo resin formulator, having minimum 120 percent elongation potential per ASTM D 412. **[If required, shall be an extra cost to others]**.

2.05 MIXES

- A. Terrazzo Selection: Terrazzo Contractor shall provide standard terrazzo mix(es) according to the following:

SPECIFIER'S NOTE: USUALLY KEEP ONLY ONE OF THE FOLLOWING SUBPARAGRAPHS FOR SPECIFYING TERRAZZO MIX COLOR

SPECIFIER'S NOTE: RETAIN FOLLOWING IF SPECIFYING A COLOR FROM A NTMA PLATE NO. FOR EPOXY TERRAZZO.

1. NTMA Plate No. <Insert NTMA color plate no.>

SPECIFIER'S NOTE: RETAIN FOLLOWING IF COLOR WILL BE CHOSEN FROM A NTMA PLATE NO. AFTER CONTRACT IS AWARDED.

2. Mix Color: [As selected by Architect from NTMA color plates] <Insert NTMA color plate designation>

SPECIFIER'S NOTE: RETAIN FOLLOWING IF A CUSTOM COLOR HAS BEEN CHOSEN AND A MIX WILL BE SPECIFIED. MODIFY AS REQUIRED FOR DESIRED MIX. PERCENTAGES MUST ADD UP TO 100 PERCENT. COPY IF ADDITIONAL MIX REQUIREMENTS ARE NEEDED. DO NOT KEEP THE FOLLOWING IF CHOOSING FROM NTMA'S STANDARD TERRAZZO PLATES.

3. Custom Mix Color and Pattern:

- a. Color No. 1:

- 1) Epoxy Resin Color: <insert manufacturer's designation>
- 2) Chips: [No. 1][No. 2] <insert grade of chip><insert percentage> percent
- 3) Chips: [No. 1][No. 2] <insert grade of chip><insert percentage> percent
- 4) Chips: [No. 1][No. 2] <insert grade of chip><insert percentage> percent

- b. Color No. 2:

- 1) Epoxy Resin Color: <insert manufacturer's designation>
- 2) Chips: [No. 1][No. 2] <insert grade of chip><insert percentage> percent
- 3) Chips: [No. 1][No. 2] <insert grade of chip><insert percentage> percent
- 4) Chips: [No. 1][No. 2] <insert grade of chip><insert percentage> percent

- c. Color for Base:

- 1) Epoxy Resin Color: <insert manufacturer's designation>
- 2) Chips: [No. 1] <insert grade of chip> <insert percentage> percent
- 3) Chips: [No. 1] <insert grade of chip> <insert percentage> percent
- 4) Chips: [No. 1] <insert grade of chip> <insert percentage> percent

SPECIFIER'S NOTE: RETAIN FOLLOWING IF A CUSTOM COLOR HAS BEEN CHOSEN AND MATCHING AN APPROVED SAMPLE WILL BE REQUIRED OR IF TERRAZZO IS REQUIRED TO MATCH AN EXISTING INSTALLATION.

4. Custom Mix Color and Pattern: [Match Architect's sample] [Match existing]

B. Proportions for Epoxy Terrazzo Topping: Comply with resin supplier's recommendations.

C. Mixing of Terrazzo Topping: Mix epoxy components with aggregates in accordance with manufacturer's recommendations.

PART 3 - EXECUTION

3.01 EXAMINATION

- A. The General Contractor and Architect shall examine substrates and areas, with Terrazzo Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance of the work.

SPECIFIER'S NOTE: EPOXY TERRAZZO IS NOT INTENDED TO LEVEL SUBSTRATE AND WILL ONLY FOLLOW THE CONTOUR OF THE CONCRETE SLAB. SUBFLOOR SHALL NOT VARY MORE THAN 1/4 INCH FROM TRUE PLANE IN 10 FEET.

SPECIFIER'S NOTE: EPOXY TERRAZZO IS NOT INTENDED TO LEVEL SUBSTRATE AND WILL ONLY FOLLOW THE CONTOUR OF THE CONCRETE SLAB. SUBFLOOR SHALL NOT VARY MORE THAN 1/4 INCH FROM TRUE PLANE IN 10 FEET.

1. Slab Flatness Tolerance: Subfloor is not to vary more than 1/4 inch from true plane in a 10 foot span.
 2. Cracks: Locate cracks and joints in concrete substrates. Verify location of control joints and expansion joints in epoxy terrazzo flooring.
 - a. If required to prevent cracks in concrete substrates transmitting through epoxy terrazzo flooring, the Terrazzo Contractor shall make a written recommendation to install a crack suppression membrane and include specific recommendations on type and location.
- B. Verify that concrete substrates are dry and moisture-vapor emissions are within acceptable levels according to epoxy resin manufacturer's written instructions.
1. Perform relative humidity test using in situ probes, ASTM F 2170. Proceed with installation only after substrates have a maximum 75 percent relative humidity level measurement.
 2. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application of resinous flooring only after substrates have maximum moisture-vapor-emission rate of 3 lb of water/1000 sq. ft. of slab area in 24 hours.
 3. If required to prevent moisture vapor transmission in concrete substrates, the Terrazzo Contractor shall make a written recommendation to install moisture mitigation materials and include specific recommendations on type and location.
- C. The General Contractor shall be responsible for correcting non-conforming concrete substrates using materials compatible with epoxy terrazzo flooring system and as approved by the Terrazzo Contractor.
1. Materials used to correct nonconforming conditions must be compatible with the selected epoxy system and be approved by the manufacturer of epoxy resin materials and Terrazzo Contractor.
- D. Terrazzo Contractor shall proceed with installation only after unsatisfactory conditions, including levelness tolerances, cracking, and excessive moisture vapor transmission have been corrected.

3.02 PREPARATION

- A. General Contractor shall broom clean area to receive terrazzo to remove loose chips and all foreign matter.
- B. Terrazzo Contractor shall mechanically abrade concrete surface.

SPECIFIER'S NOTE: WHEN DETERMINED NECESSARY PER APPROVED MANUFACTURER'S RECOMMENDATION AT AN ADDITIONAL COST TO THE OWNER UNLESS CALLED FOR IN SPECIFICATION.

- C. Terrazzo Contractor shall provide moisture mitigation materials according to instructions and recommendations of moisture mitigation materials manufacturer. Cost for moisture mitigation materials and installation shall be **[included as an Alternate] [included as a Unit Cost] [an additional cost to the Owner under an approved Change Order]**.
- D. Terrazzo Contractor shall provide flexible epoxy crack isolation/suppression membrane: Cost for materials and installation for installation over not more than five percent of the floor area receiving epoxy terrazzo shall be included in the Base Bid. Cost for additional materials and installation for installation **[included as an Alternate] [included as a Unit Cost] [an additional cost to the Owner under an approved Change Order]**.

3.03 POURED-IN-PLACE TERRAZZO INSTALLATION

- A. Strip Materials: Terrazzo Contractor shall install strip materials as follows:

- 1. Divider and Control-Joint Strips:

- a. Locate divider strips in locations indicated.
- b. Install control joint strips back to back in locations indicated.
- c. Install strips in epoxy adhesive without voids below strips.

SPECIFIER'S NOTE: RETAIN "ACCESSORY STRIPS" SUBPARAGRAPH BELOW FOR ACCESSORY STRIPS.

- 2. Accessory Strips: Install as required to provide a complete installation.

- B. Placing Terrazzo:

- 1. Prime subfloor in accordance with manufacturer's recommendations.
- 2. Proportion and thoroughly blend the materials.
- 3. Place mixture to achieve specified thickness.

SPECIFIER'S NOTE: RETAIN "ABRASIVE STRIPS" SUBPARAGRAPH BELOW FOR ABRASIVE STRIPS. OPTION IS BASED ON NTMA RECOMMENDATIONS FOR PRECAST TERRAZZO STAIR TREADS.

- 4. Abrasive Strips: Install with surface of abrasive strip positioned 1/16 inch higher than terrazzo surface.

C. Poured in Place Terrazzo Base: Terrazzo Contractor shall provide mix color for terrazzo base to match [**approved sample**] [**approved mockup**].

1. Terrazzo Contractor shall place and finish terrazzo base at the same time the terrazzo floor is being installed.

SPECIFIER'S NOTE: DELETE THE FOLLOWING PARAGRAPH AND ASSOCIATED SUBPARAGRAPH IF TERRAZZO STAIRS ARE NOT USED. POURED IN PLACE TERRAZZO IS RECOMMENDED FOR INSTALLATION OVER CONCRETE STAIRS OR STEEL PAN STAIRS.

D. Poured in Place Terrazzo Stairs: Terrazzo Contractor shall provide mix color for treads and risers to match [**main terrazzo field**] [**terrazzo border**] [**as indicated on Drawings**].

1. Place and finish terrazzo stair treads and risers at the same time the terrazzo floor is being installed.

E. Finishing: Terrazzo Contractor shall finish the terrazzo topping as follows:

1. Rough Grinding:

- a. Grind with 24 or finer grit stones or with comparable diamond abrasives.
- b. Follow initial grind with 60/80 grit stones or with comparable diamond abrasives.

2. Grouting:

- a. Clean terrazzo with clean water and rinse. Allow to dry.
- b. Apply epoxy grout per manufacturer's instructions.
- c. Allow grout to cure.

3. Fine Grinding/Polishing: Grind with 120 grit or with comparable diamond abrasives until all grout is removed from surface.

SPECIFIER'S NOTE: UPON COMPLETION, TERRAZZO GENERALLY MATCHES APPROVED SAMPLES AND MOCKUPS.

F. Terrazzo Cleaning: Terrazzo Contractor shall clean finished terrazzo as follows:

1. Remove grinding residue from terrazzo surface.
2. Wash terrazzo surfaces immediately after final grinding of terrazzo flooring with water and allow surfaces to dry thoroughly.

G. Sealing: Terrazzo Contractor shall seal terrazzo according to sealer manufacturer's written instructions.

SPECIFIER'S NOTE: DELETE THE FOLLOWING ARTICLE IF PRECAST TERRAZZO UNITS ARE NOT USED.

3.04 PRECAST TERRAZZO INSTALLATION

A. Terrazzo Contractor shall install precast terrazzo units as follows:

SPECIFIER'S NOTE: DELETE THE FOLLOWING SUBPARAGRAPH IF PRECAST TERRAZZO BASE IS NOT USED. ANSI 108.05 IS THE STANDARD SPECIFICATION FOR SETTING TILE WITH LATEX-PORTLAND CEMENT THINSET MORTAR; ANSI 108.06 IS THE STANDARD SPECIFICATION FOR SETTING TILE WITH EPOXY ADHESIVE.

1. Precast Terrazzo Base: Use [**latex-portland cement mortar**] [**or**] [**water-cleanable, tile-setting epoxy**] to install precast terrazzo base over substrates indicated according to [**ANSI 108.5**] [**or**] [**ANSI 108.6**].

SPECIFIER'S NOTE: KEEP FOLLOWING SUBPARAGRAPH IF PRECAST STAIR UNITS ARE SET ON CONCRETE STAIRS AND LANDINGS OR CONCRETE FILLED TREADS AND LANDINGS. ANSI 108.05 IS THE STANDARD SPECIFICATION FOR SETTING TILE WITH LATEX-PORTLAND CEMENT THINSET MORTAR; ANSI 108.06 IS THE STANDARD SPECIFICATION FOR SETTING TILE WITH EPOXY ADHESIVE.

2. Precast Terrazzo Stair Units: Use [**latex-portland cement mortar**] [**or**] [**epoxy adhesive**] to install [**treads,**] [**risers,**] [**and**] [**landings**] over concrete substrates according to [**ANSI 108.5**] [**or**] [**ANSI 108.6**].

SPECIFIER'S NOTE: KEEP FOLLOWING SUBPARAGRAPH IF PRECAST STAIR UNITS ARE SET ON STEEL RISERS OR STEEL PLATE STAIRS AND LANDINGS.

3. Precast Terrazzo Stair Units: Use epoxy adhesive to install [**treads,**] [**risers,**] [**and**] [**landings**] over steel substrates according to ANSI 108.6.

3.05 REPAIR

- A. Terrazzo Contractor shall repair terrazzo areas that evidence lack of bond between topping and underbed according to NTMA's written recommendations.

3.06 PROTECTION

- A. After application of the sealer, the Work shall be ready for final inspection and acceptance by the Owner or his agent.
- B. The General Contractor shall protect the finished floor after the Terrazzo Contractor has completed final grinding and applied sealer to terrazzo surfaces.

END OF SECTION