

SECTION 09 4000

TERRAZZO

PART 1 GENERAL

1.1 RELATED DOCUMENTS

- A. Section include's thin set Polyacrylate Modified and thin set Epoxy Terrazzo flooring as shown on the drawings.
- B. General provisions of Contract, including General and Supplementary Conditions apply to this Section.

1.2 SUBMITTALS

- A. General: Submit the following in accordance with Conditions of Contract and Division 1 Specification Sections.
- B. Product data for each type of terrazzo, accessory item, adhesive and component material specified.
 - 1. Shop Drawings: Submit manufacturers shop Drawings indicating layout of divider strips, control joints, control strips, and base and border strips. Final seaming diagram shall be submitted prior to flooring installation and shall reflect field condition and corrections required by the Architect on the preliminary layout diagrams.
- C. Samples: Submit two 6 inch square samples of each different pattern, color, and type of terrazzo required. Provide minimum 6 inch long samples of each type accessory item specified.
- D. Material Certification: Supplier's/Manufacturer's written certification that terrazzo material provided meet or exceed specified NTMA properties.
- E. Contract Closeout Submittals: Submit the following in accordance with Section 01700, Contract Closeout.
 - 1. Operating and Maintenance: Provide Owner with manufacturer's maintenance procedures for each type of terrazzo.

1.3 QUALITY ASSURANCE

- A. NTMA Standards: Comply with specified provisions and recommendations of National Terrazzo and Mosaic Association, Inc. (NTMA)
- B. Installer Qualifications: Engage an experienced Installer who has completed terrazzo installations similar in material and extent to that indicated for Project.
- C. Manufacturer's Instructions: In addition to specified requirements, comply with resin manufacturer's instructions and recommendations for substrate preparation, materials storage, mixing and application, finishing, and curing.
- D. Store materials in a clean, dry, heated location (minimum 50 degrees Fahrenheit) furnished by others.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Storage and Protection: Deliver materials to job site in manufacturer's original, unopened packaging and adequately protect against damage while stored in dry location at the site.

1.5 PROJECT/SITE CONDITIONS

- A. Environmental Requirements: Installation shall not begin until Work of other Trades is substantially completed and the area or rooms where flooring is to be installed has been maintained for at least 48 hours at a minimum temperature of 70 degrees F.
- B. Moisture content of concrete sub-floors shall not exceed 3 percent by weight as determined by an established field testing method.

1.6 WARRANTY

- A. Two (2) year from date of completion of terrazzo installation.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Except as otherwise specified herein, or specifically approved by the Architect, flooring shall be products of the following manufacturer, subjects to compliance with specification requirements.

2.2 POLYACRYLATE MODIFIED TERRAZO MATERIALS

- A. Primer: As recommended by polyacrylate resin supplier.
- B. Polyacrylate Binder: Formulated to meet physical properties of MIL-D-3134F.
- C. Polyacrylate Terrazzo:
 1. Odor, Fire and Toxicity Hazards: The Polyacrylate terrazzo, both before and after setting, shall not constitute an undue fire hazard, fumes from volatile substances contained in the material shall not be more toxic than those resulting from the use of ordinary service conditions.
 2. Weight: Polyacrylate terrazzo shall normally weigh 3.0 pounds per square foot in a thickness of 1/4 inch or 4.5 pounds for 3/8 inch thickness.
 3. Resistance to impact: The Polyacrylate terrazzo shall, when bonded securely to concrete, show no visible sign of chipping, cracking, or loss of bond when tested with 16 ft. lbs. (16 ft. lbs. is the dropping of a 2 pound steel ball from a height of eight feet.)
 4. Indentation: The Polyacrylate terrazzo shall, when bonded securely to concrete, show no signs of cracking or detachment. Initial indentation of the Polyacrylate terrazzo shall be less than 7% and more than 1% when tested in accordance with MIL-D-3134F, Section 4.7.4.
 5. Resistance to Elevated Temperature: The Polyacrylate terrazzo shall, when securely bonded to concrete, not flow or slip in any part more than 1/16 inch or soften when tested in accordance with MIL-D-3134F, Section 4.7.5.
 6. Moisture Absorption: The Polyacrylate terrazzo shall not absorb more than 5% moisture based on its weight at normal atmospheric conditions when tested in accordance with MIL-D-3134F, Section 4.7.8.

7. Resistance to Wear: The Polyacrylate terrazzo shall show wear not to exceed 0.150 inch when tested in accordance with MIL-D-3134F, Section 4.7.10.
8. Tensile Strength: Shall be at least 700 psi after aging 28 days when tested in accordance with ASTM-C-190.
9. Bond Strength: To damp, cured concrete, after aging 28 days, shall be at least 300 psi with failure in the concrete when tested in accordance with ACI Committee #403.
10. Flexural Strength: Shall have a minimum flexural strength of 2000 psi when tested according to ASTM-C-348.
11. Thermal Coefficient of Expansion: Matrix material shall develop a coefficient of thermal expansion no greater than 10×10^{-6} (Test Method ASTM C-157).
12. Flammability: Matrix material shall not support combustion (Test Method 15 minute suspension of sample at top of flame of Fisher Burner).

D. MANUFACTURERS THAT MEET OR EXCEED THESE REQUIREMENTS ARE POLYAMERICA, CROSSFIELD PRODUCTS (DEX-O-TEX) AND KEY RESIN CO.

E. Marble Chips:

1. Size to conform with NTMA graduation standards. The marble size shall be NTMA #1 and #2.
2. Hardness according to ASTM C-241 Ha-10 minimum.
3. 24 hour absorption rate not to exceed 0.75 percent.
4. Chips shall contain no deleterious or foreign matter.
5. Dust content less than 1% by weight.

2.3 EPOXY THIN SET TERRAZZO

A. Epoxy Resin Primer, as recommended by Epoxy Resin supplier.

B. Epoxy Resin: Mixed according to manufacturer's recommendation and tested without aggregate added. All specimens cured for 7 days at 75 degrees plus or minus to degrees Fahrenheit and 50% plus or minus 2% R.H. The products shall meet the following requirements:

<u>Property</u>	<u>Test Method</u>	<u>Requirement</u>
Hardness	ASTM D-22 using Shore D Durometer	60-85
Tensile Strength	ASTM D-638 run at .2 min. Specimen made using "C" die Listed in ASTM D-412	3,000 PSI min.
Compressive Strength	ASTM D-695, Specimen B Cylinder	10,000 PSI min.
Chemical Resistance	ASTM D-1308	

C. 7 days at room temp by immersion method have no deleterious effects.

The following contaminants used:

<u>Property</u>	<u>Test Method</u>	<u>Requirement</u>
Solution	Distilled Water	1% Soap
Hydroxide	Mineral Oil	10% Sodium
Hydrochloric Acid	Isopropanol	10%
Sulfuric Acid	Ethanol	30%
Acetic Acid	.025 Detergent Solution	5%

D. Epoxy Resin mixed according to manufacturers recommendations and blended with marble chips, ground and grouted with epoxy resin according to 3.02 C-2-Finishing to a

nominal 3/8" thickness. All specimens cured 7 days at 75 degrees plus or minus 2 degrees Fahrenheit and 50% plus or minus 2% R.H. The finished epoxy terrazzo shall meet the following requirements:

1. Flammability: When tested in accordance with ASTM D-635, the Epoxy terrazzo shall comply with the following value: Self-extinguishing, extent of burning 0.25 inches maximum.
 2. Thermal Coefficient of Linear Expansion: When tested in accordance with ASTM D-696, the Epoxy terrazzo will comply with the following value: 25×10^{-6} inches degrees Fahrenheit maximum. Temperature range – 12 degrees to 140 degrees Fahrenheit.
 3. Bond Strength: When tested in accordance with Field Test Method for surface soundness and adhesion as described in ACI Committee No. 403 Bulletin Title No. 59-43 (Pages 1139-1141) the Epoxy terrazzo shall comply with the following value: 100% concrete failure minimum, with 300 PSI minimum tensile strength.
 4. Color(s): Resin/aggregate color mix to match Architect's sample.
- E. Aggregate Chips: Size to confirm to NTMA graduation standards. The aggregate size shall be NTMA (#0, #1 and #2). Hardness according to ASTM C-241 Ha-10 minimum. Chips shall contain no deleterious or foreign matter. Dust content less than 1% by weight. Materials to be: (marble, recycled glass, or Mother of Pearl, etc.).

2.4 ACCESSORIES

- A. Divider Strips:
1. Stop and divider "L" strips; white alloy of zinc material with a depth of 3/8 inch and a topping of width of 16 gauge or 1/8 inch.
 2. Control joints double "I" strips 16 gauge, white alloy of zinc material, 3/8 inch depth, laid back to back 1/4" apart with flexible sealant insert.
- B. Colorants: Alkali-resistant, color-stable pigments.
- C. Terrazzo Cleaner:
1. pH factor between 7 and 10.
 2. Biodegradable and phosphate free.
 3. Flash Point: ASTM D-56, 80 degrees Fahrenheit minimum.
- D. Anti-Fracture Membrane: Elastomeric crack-bridging membrane, 12 inches wide, self adhering. Flex Guard or approved equal.
- E. Sealer:
1. 2 Coats - Johnson Diversey - Plaza Plus Sealer/ Finish
 2. 2 Coats - Johnson Diversey – High Mileage Floor Finish

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions: Examine surfaces to receive Work and report in writing, with a copy to Architect, detrimental conditions. Failure to observe this injunction constitutes a waiver to subsequent claims to the contrary and holds Contractor responsible for corrections Architect may require. Commencement of Work will be construed as acceptance of subsurfaces.

- B. Inspect the sub-floor to receive terrazzo flooring. Do not lay floor covering until sub-floors are in proper condition to receive same. Sub-floors shall be broom clean, free of foreign matter and thoroughly clean before installation.

3.2 PREPARATION

- A. Examine concrete substrate to ensure that surface levelness tolerances are within tolerance ranges required by NTMA for type of terrazzo application specified.
 - 1. Concrete sub-floor shall be level (maximum variation not to exceed 1/4" on 10'-0") and shall have a steel trowel finished surface. No curing agents or other additives, which could prevent bonding, should be used. Saw-cutting of control joints must be done between 12 and 24 hours after placement of structural concrete.
 - 2. Notify Contractor of unsatisfactory levelness tolerances. Do not begin installation until unsatisfactory tolerances have been corrected and are ready to receive terrazzo.
 - 3. General Contractor will modify or replace concrete not properly placed, resulting in excessive honeycombing, cracking, or other defects.
- B. Clean and prepare substrate to comply with NTMA specifications for type of terrazzo application indicated. Clean substrate to loose chips and foreign matter.
 - 1. Clean and prepare concrete substrate using a blastrac machine.
 - 2. After cleaning, rout cracks of 1/16" width or greater to create a "v" shape opening. Insert concrete pins to hold the cracks open. Pour self-leveling 100% solids epoxy into the cracks.
 - 3. After epoxy has cured, apply anti-fracture membrane as required.
 - 4. Fill holes in the floor with a polyacrylate filler as needed.
 - 5. All new concrete pours shall have a 3/8" by 16 gauge zinc strip applied to the pour line in order to eliminate cracking through the terrazzo.
 - 6. Terrazzo that terminates at vinyl tile/carpet shall taper to a 1/4" zinc strip.

3.3 INSTALLATION, GENERAL

- A. For Polyacrylate terrazzo, comply with resin manufacturer's recommendations for proportioning mixes, installing strips, and placing, curing, grinding, and finishing.
- B. Terrazzo Selection: Matrix color and aggregate (sprinkle) blend to be selected by Architect.
- C. Clean and prepare concrete subfloor by the use of a blastrac cleaning machine.
- D. Install divider strips with construction adhesive as shown on drawings or where necessary to prevent irregular cracking.
- E. Provide control joints where indicated by installing angle-type divider strips back-to-back with neoprene rubber filler cemented between strips, flush with finish floor.
- F. Provide for expansion joints where indicated by installing angle-type divider strips back-to-back with removable backer rod filler of the width indicated (but not less than 1/4 inch wide) between strips. Expansion void is to be filled with self-leveling traffic grade elastomeric joint sealant.

- G. Provide terrazzo bases and thresholds without interruptions of seams, except where divider strips, control joints, and expansion joints are indicated. Place and finish terrazzo around obstructions to achieve continuous color, pattern, and finish.
- H. Mixing, Terrazzo Topping: Charge and mix marble chips, filler and epoxy resin in accordance with terrazzo manufacturer's recommendation.
- I. Placing Terrazzo:
 - 1. Prime subfloor with bonding primer.
 - 2. Place terrazzo mixture in panels formed by divider strips. Trowel mixture to top of strips.
- J. Curing: Allow 24 hours before grinding terrazzo.
- K. Finishing:
 - 1. Rough Grinding:
 - a) Grind with 24-grit or finer stones or with comparable diamond plugs.
 - b) Follow initial grind with 80-grit or finer stones.
 - 2. Grouting:
 - a) Rinse floor with clean water.
 - b) Remove excess rinse water, dry and apply Polyacrylate grout to fill voids.
 - c) Cure grout.
 - 3. Fine Grinding:
 - a) Grind with 80-grit if finer stones until all grout is removed from surface.
 - b) [Polish floor to 400 grit.](#)
 - c) Upon completion, terrazzo shall show a minimum of 70% marble chips.
- L. Cleaning and Sealing:
 - 1. Wash all surfaces with a neutral cleaner.
 - 2. Rinse with clean water and allow surface to dry.
 - 3. Apply [two coats](#) of [Plaza Plus](#) to comply with the manufacturers instructions.
 - 4. Apply two (2) coats [High Mileage](#) to comply with manufacturers recommendations.
- M. Protection:
 - 1. Upon completion, the work shall be ready for final inspection and acceptance by the Owner.
 - 2. The General Contractor shall protect the finished floor from the time that the terrazzo installer completes the work.

3.4 CLEANING, SEALING, AND PROTECTING

- A. Clean terrazzo after installing and finishing operations are completed, complying with sealer manufacturer's instructions.
- B. Apply sealer to cleansed terrazzo surfaces to comply with sealer manufacturer's instructions.
- C. Protect terrazzo from damage and wear during construction operation.
- D. Entire installation shall be left clean and in a condition acceptable to the Architect.
- E. During the course of the Work and on completion of the Work, remove excess materials, equipment and debris and dispose of, away from premises. Leave Work in clean

condition in accordance with Section 01500, Construction Facilities and Temporary Controls.

3.5 FINAL CLEANING

- A. Clean terrazzo as recommended by manufacturer of sealer and machine buff terrazzo floor as required when building is ready for occupancy.

END OF SECTION