

## Thin Set Epoxy Terrazzo - Section 096623

### **PART 1 – GENERAL**

#### **1.01 RELATED DOCUMENTS**

**A. Drawings and general provisions of the contract, including general and supplementary conditions and division 1 Specification Sections, apply to this section.**

#### **1.02 SUMMARY**

**A. Section Includes:**

1. Thin-set epoxy terrazzo flooring including preparation of substrates.
2. Thin-set precast epoxy terrazzo tread or tread & riser units.
3. Thin-set precast epoxy terrazzo wall base units.
4. Related accessories.

**B. Related Sections:**

1. Section 03300, Cast In Place Concrete.
2. Section 04200, Unit Masonry.
3. Section 05510, Metal Stairs.
4. Section 07260, Under-slab Vapor Retarder/Barrier.
5. Section 07900, Joint Sealants.
6. Section 09900, Painting.
7. Section [ ] Furnishing and Setting Floor Drains.
8. Section [ ] Setting of Metal Base Beads and Wood Grounds.
9. Section [ ] Temporary Heat, Water and Electricity.
10. Section [ ] Other Adjacent Floor Finish Trades (for Transition Details).
11. Section [ ] For Confirmation of LEED Requirements.

#### **1.03 SUBMITTALS**

**A. Manufacturer's product data for each type of terrazzo and accessory. System will be evaluated on the basis of standards. For tests not listed in published data, manufacturer shall supply missing data according to standard referenced.**

1. Physical properties.
2. Performance properties.
3. Specified tests.
4. Material Safety Data Sheet.
5. Manufacturer's standard warranty.

**B. LEED Submittals**

1. Product Data for Credit MR 4.1: For [aggregates], indicating percentages by weight of recycled content.
  - a. Include statement that indicates cost for each product having recycled content.
2. Product Data for Credit EQ 4.1: For adhesives, including printed statement of VOC content and chemical components. Compliance with CA 01350 requirements for testing of volatile organic Emissions from Various sources using small scale environmental chamber

**C. Shop Drawings. Include terrazzo installation requirements. Include plans, elevations, sections, component details and attachments to other work. Show layout of the following:**

1. Divider strips.
2. Control and expansion joint strips.
3. Base and border strips.
4. Abrasive strips.
5. Stair treads, risers and landings.
6. Pre-cast terrazzo jointing and edge configurations including anchorage details.
7. Terrazzo patterns.
8. <Insert requirements>

**D. Samples for initial selection from Terrazzo & Marble Supply color plates showing the full range of colors and patterns available for each terrazzo type indicated.****E. Samples for Verification: Match architect's samples for each type, material, color and pattern of terrazzo and accessory required showing the full range of color, texture and pattern variations expected. Label each terrazzo sample to identify Terroxy Resin System's matrix color and aggregate types, sizes and proportions. Prepare samples of same thickness and from same material to be used for the work in size indicated below:**

1. Epoxy terrazzo: minimum 6" x 6" (152.4 mm x 152.4 mm) sample of each color and type of terrazzo.
2. Precast epoxy terrazzo: minimum 6" x 6" (152.4 mm x 152.4 mm) sample of each color and type of terrazzo.
3. Accessories: 6" length (152.4 mm) of each kind of divider strip, stop strip and control joint strip required.
4. Stair Treads: 12" length (304.8 mm) wide sample combination tread/riser with cast-in nosing.

**F. Manufacturer Experience:**

1. Submit proof of associate membership to NTMA (TTMAC - Canada).
2. Furnish a list of at least five (5) epoxy terrazzo projects using material being submitted for this project installed during the last five (5) years of the same scope, complexity and at least 50 percent of the square footage.
3. Engage an epoxy manufacturer with at least ten (10) years experience.

**G. Qualification Data: For qualified installer.**

1. Submit proof of contractor membership in NTMA (TTMAC - Canada).
2. Furnish a list of at least five (5) epoxy terrazzo projects using material being submitted for this project installed during the last five (5) years of the same scope, complexity and at least 50 percent of the square footage.

**H. Material Test Reports: For moisture and/or relative humidity of substrate.****I. Maintenance Data: Submit [\_\_\_] copies of NTMA (TTMAC - Canada) maintenance recommendations and [\_\_\_\_\_] copies of manufacturer's instructions****1.04 QUALITY ASSURANCE****A. Installer Qualifications: A qualified installer who is acceptable to architect and epoxy terrazzo manufacturer to install manufacturer's products.**

1. Engage a terrazzo contractor with at least five (5) years of satisfactory experience in installation of epoxy terrazzo. Terrazzo contractor shall demonstrate experience during last five (5) years of at least five (5) projects of comparable scope and complexity of at least 50 percent of the total square footage of this project
2. Engage an installer who is a contractor member of NTMA (TTMAC - Canada).

**B. Source Limitations:**

1. Obtain primary Epoxy Terrazzo Flooring System materials including moisture treatment, membranes, primers, resins and hardening agents from a single manufacturer with proof of NTMA (TTMAC - Canada) associate membership.
2. Obtain aggregates, divider strips, sealers and cleaners from source recommended by primary materials manufacturer.
3. Engage an epoxy manufacturer with at least ten (10) years experience as a NTMA (TTMAC - Canada) associate member.

**C. Pre-installation Conference: Conduct conference at project site to comply with requirements in Section 01200 – Project Meetings. Review methods and procedures related to terrazzo including, but not limited to, the following:**

1. Inspect and discuss installation procedures, joint details, job site conditions, substrate specification, vapor barrier details and coordination with other trades.
2. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment and facilities needed to make progress and avoid delays.
3. Review special terrazzo designs and patterns.
4. Review plans for concrete curing and site drying to enable timely achievement of suitable slab moisture conditions.

**D. NTMA (TTMAC - Canada) Standards: Comply with NTMA's (TTMAC - Canada) "Terrazzo Specifications and Design Guide" and with written recommendations for terrazzo type indicated unless more stringent requirements are specified.**

**E. Mock-ups: Build mock-ups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.**

1. Build mock-ups for terrazzo including accessories.
  - a. Size: Minimum 100ft<sup>2</sup> (9.3m<sup>2</sup>) of typical poured-in-place flooring [and base] condition for each color and pattern [in locations directed by architect] <Insert location requirements>.
2. Approved mockups may become part of the completed work if undisturbed at time of substantial completion.

## **1.05 DELIVERY, STORAGE AND HANDLING**

**A. Deliver materials to project site in supplier's original wrappings and containers labeled with source's or manufacturer's name, material or product brand name and lot number if any.**

**B. Store materials in their original, undamaged packages and containers inside a well-ventilated area protected from weather, moisture, soiling, extreme temperatures and humidity.**

1. Storage temperatures should be between 50°F to 90°F (10.0°C to 32.2°C).

## **1.06 PROJECT CONDITIONS**

**A. Prior to surface preparation, terrazzo contractor shall:**

1. Evaluate slab condition, including slab moisture content and extent of repairs required, if any.
2. Maintain the ambient room and floor temperature at 60-90°F (15.5-32.2°C) or above for a period extending 72 hours before, during and after floor installation. Concrete to receive epoxy terrazzo shall have cured for at least 28 days and be free of all curing compounds. Test concrete substrate to determine acceptable moisture levels prior to installation. Testing should be conducted according to ASTM F2170 (determining relative humidity in concrete slabs using in situ probes). Proceed with installation only after substrates have a maximum relative humidity measurement reading less than 80%. If relative humidity measurement reading is greater than or equal to 80%, Terroxy Moisture Vapor Treatment or IC Moisture Guard is required. Apply to terrazzo substrates according to Terroxy Product Data Sheets. An effective in situ probe for relative humidity testing is the RH BluePeg available from T&M Supply.

**B. Prior to and during each day of installation, the terrazzo contractor shall verify that the dew point is at least 5°F (-15°C) less than the slab and air temperature.**

**C. Acceptable Substrates:**

1. Level tolerance: Concrete sub-floor shall be level with a maximum variation from level of 1/4" in 10 feet (6.4 mm in 3.1m). Any irregularity of the surface requiring patching and/or leveling shall be done using Terroxy Fill and selected aggregates as recommended by Terroxy Resin Systems.
2. Concrete floor shall be prepared mechanically by shot blasting in accordance with ICRI Guideline No. 03732. Specifically, surface preparation results should achieve a CSP3-CSP5 profile.
3. A light steel trowel is needed to provide an acceptable surface with minimum laitance.
4. Concrete shall be cured a minimum of 28 days. No curing agents are to be used in areas to receive terrazzo.
5. Concrete slab on grade shall have an efficient moisture vapor barrier (suggested minimum: 15 mils (.4 mm thickness)) directly under the concrete slab. Reference ASTM Methods E1745 Class A and installed in accordance with E1643. Moisture barrier shall NOT be punctured.
6. Saw cutting of control joints must be done between 12 and 24 hours after placement of the structural concrete and at a frequency compatible to ACI recommendations.

**D. Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during terrazzo installation.**

**E. Provide protection from other trades prior to final acceptance by owner.**

**PART 2 – PRODUCTS**

**2.01 EPOXY TERRAZZO**

**A. Products: Systems Overview: The basis of design is Terroxy Resin Systems Epoxy Matrix by Terrazzo & Marble Supply Companies, Wheeling, IL ([www.tmsupply.com](http://www.tmsupply.com)).**

**B. Materials:**

1. Primer: Terroxy Primer or Terroxy Moisture Vapor Treatment (for slabs on-grade, light weight concrete and green concrete).
  - a. Physical properties of moisture mitigating primer shall have a maximum of 0.3 perms with 100% RH.
2. Flexible Reinforcing Membrane: Terroxy Iso-Crack Epoxy Membrane, for substrate crack preparation and reflective crack reduction.
  - a. Reinforcement: Terroxy fiberglass scrim (optional).
3. Epoxy Matrix: Terroxy Epoxy Matrix and in color required for mix indicated.
  - a. Physical properties without aggregates. All specimens cured for 7 days at 73-77°F (22.8-25°C) and 50 percent plus or minus 2 percent RH. This product shall meet the following requirements:

Property	Test Method	NTMA (TTMAC - Canada) Requirements	Terroxy Thin-set Epoxy Terrazzo Typical Results
Hardness	ASTM D-2240 using Shore-D Durometer	60-85	75-85
Tensile Strength	ASTM D-638	3,000 psi min. (20.7 MPa)	4,800 psi min. (33.1 MPa)
Compressive Strength	ASTM D-695 Specimen B cylinde	10,000 psi min. (68.9 MPa)	12,000 psi min. (82.7 MPa)
Flexural Strength	ASTM D-790	Not specified	4,500 psi min. (31.7 MPa)
Chemical Resistance	ASTM D-1308 seven days at room temperature by immersion method	No deleterious effects: • Distilled Water • Mineral Oil • Isopropanol • Ethanol • 0.025 Detergent Solution • 1% Soap Solution • 10% Sodium Hydroxide • 10% Hydrochloric Acid • 30% Sulfuric Acid • 5% Acetic Acid	No deleterious effects: • Distilled Water • Mineral Oil • Isopropanol • Ethanol • 0.025 Detergent Solution • 1% Soap Solution • 10% Sodium Hydroxide • 10% Hydrochloric Acid • 30% Sulfuric Acid • 5% Acetic Acid

**b.** Physical properties with aggregates. For Epoxy Matrix blended with three volumes of Valdres marble blended 60% #1 chip and 40% #0 chip, ground and grouted with epoxy resin according to Installation Specifications, finishing to a nominal 3/8" (9.5 mm) thickness. All specimens cured for 7 days at 73-77°F (22.8-25°C) and 50 percent RH plus or minus 2 percent RH. This finished Epoxy Matrix shall meet the following requirements:

Property	Test Method	NTMA (TTMAC - Canada) Requirements	Terroxy Thin-set Epoxy Terrazzo Typical Results
Flammability	ASTM D-635	Self extinguishing, extent of burning 0.25" (6.4 mm) max.	Self extinguishing, extent of burning 0.25" (6.4 mm) max
Thermal Coefficient of Linear Expansion	ASTM D-696	25x10 <sup>-6</sup> inches per inch per degrees to 140°F (11.4x10 <sup>-7</sup> cm per cm per °C to 60°C Max)	25x10 <sup>-6</sup> inches per inch per degrees to 140°F (11.4x10 <sup>-7</sup> cm per cm per °C to 60°C Max)
Bond Strength	ACI COMM 403, Bulletin 59-43 (pages 1139-1141)	300 psi (2.1 MPa) -100% concrete failure	300 psi (2.1 MPa) -100% concrete failure
Flammability	ASTM D-635		Self extinguishing, extent of burning 0.25" (6.4 mm) max
Fire Rating - Test for Surface Burning Characteristics of Flooring	CAN/ULC S102.2-10 Tunnel Test		Smoke Developed Classification (SDC) - 175 Flame Spread Rating (FSR) - 5

4. Aggregates [OPTION: Marble, Glass, Mother of Pearl, Porcelain, Concrete] complying with NTMA (TTMAC - Canada) gradation standards for mix indicated and containing no deleterious or foreign matter.

- a.** Abrasion and Impact Resistance: Less than 40 percent loss per ASTM C 131.
- b.** 24-Hour Absorption Rate: Less than 0.74 percent.
- c.** Dust Content: Less than 1.0 percent by weight.
- d.** Pre-Consumer or Post-Consumer Recycled Content: <Insert Value> percent.

5. Finishing Grout: Terroxy Epoxy Matrix or Terroxy Clear Resin with a broadcast of filler as recommended by Terroxy Resin Systems.

**C. Mix: Comply with NTMA's (TTMAC - Canada) "Terrazzo Specifications and Design Guide" and manufacturer's written instructions for matrix and aggregate proportions and mixing.**

1. Color and pattern schedule: Where the following designations are indicated, provide specified terrazzo matrices matching architect's samples:

- a.** TZ1: <Insert Terroxy Resin System's sample number>
- b.** TZ\_\_: <Insert Terroxy Resin System's sample number>
- c.** TZ\_\_: (Precast Tread/Riser) <Insert sample number>
- d.** TZ\_\_: (Precast Base) <Insert sample number>

**2.02 STRIP MATERIALS**

A. Thin-set Divider Strips: L-type.

- 1. Material [White-zinc alloy] [Brass] selected from Domus Terrazzo full range.
- 2. Guide for commonly used L-type divider strips for Thin-set Epoxy Terrazzo Systems:

System Height	Strip Height	Strip Width	System Height	Strip Height	Strip Width
3/8" System	3/8"	16 gauge 1/8" 1/4"	9.5 mm System	9.5 mm	16 gauge 3.2 mm 6.4 mm

## **2.03 MISCELLANEOUS ACCESSORIES**

**A. Strip Adhesive: 100% solids epoxy resin adhesive recommended by Terroxy Resin Systems.**

1. Use adhesive that has a VOC content of 50g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).

**B. Construction joints, contraction joints (Saw Cuts), isolation joints and cracks shall be detailed in accordance with NTMA (TTMAC - Canada) technical bulletin T24**

**C. Patching and Fill Material: Terroxy Fill and selected aggregates as recommended by Terroxy Resin Systems.**

**D. Joint Compound: Terroxy Joint Filler Hardener to be used with Terroxy Resin Matrix Part A. Color to be selected by architect to match/compliment terrazzo flooring.**

**E. Cleaner: A neutral cleaner with pH factor between 7 & 10 specifically designed for terrazzo.**

**F. Surface Finish System: Level of polish to be specified by architect in accordance with desired appearance and level of reflectivity.**

**G. Sealer: Slip and stain-resistant sealer that is chemically neutral with a pH factor between 7 and 10, that meets a standard coefficient of friction of 0.5 or higher, as measured by the James Machine (ASTM D-2047 Test Method), does not affect physical properties of terrazzo and complies with NTMA's (TTMAC - Canada) "Terrazzo Specifications and Design Guide."**

1. [Option 1: Terroxy WB Urethane]
2. [Option 2: T-Rx, high performance, high gloss, chemical-resistant urethane sealer.]

## **2.04 PRECAST TERRAZZO**

**A. Precast Terrazzo Units: Precast epoxy terrazzo [base] [stair tread] [threshold] [bench] [and] [planter] <Insert requirements> units.**

1. All precast components to utilize Terroxy Resin products for fabrication to ensure color consistency with the poured in place flooring.
2. Manufacturers: Subject to compliance with requirements, provided products acceptable to architect.
  - a. <Insert manufacturer's name>.

**B. Precast Terrazzo Base Units: 1/4" (6.4 mm) thick, cast in maximum lengths possible, but not less than 36" (900 mm).**

1. Type: [As indicated].
2. Height: [As indicated].
3. Outside Corner Units: With finished returned edges at outside corner.
4. Color and Pattern: [Match architect's sample] [Match adjacent poured-in-place terrazzo flooring].

**C. Terrazzo Cove Base:**

1. [Option 1: Terroxy Resin Systems Epoxy Matrix poured-in-place cover base with 3/4" (19mm) radius, [\_\_\_\_]" high. (4" (101.2 mm), 6" (152.4 mm) or 8" (203.2 mm))]
2. [Option 2: Precast Epoxy Terrazzo Cove Base: Type \_\_\_\_\_, \_\_\_\_\_" high.]

**D. Precast Terrazzo Stair Treads: Thickness indicated with cast-in nosing.**

1. Tread/Riser: 1/2" (12.7 mm) thick epoxy, Type \_\_\_\_\_ with abrasive pattern \_\_\_\_\_.
2. Color and Pattern: [Match architect's approved Terroxy Resin Systems Sample]

## **PART 3 – EXECUTION**

### **3.01 EXAMINATION**

**A. Examine substrates and areas, with Terrazzo Contractor present, for compliance with requirements for installation tolerances and other conditions affecting performance.**

**B. Proceed with installation only after unsatisfactory conditions, including level tolerances, have been corrected.**

### **3.02 PREPARATION**

**A. Clean substrates of substances, including oil, grease and curing compounds, that might impair terrazzo bond. Provide clean, dry and neutral substrate for terrazzo application.**

#### **B. Concrete Slabs:**

1. Provide sound concrete surface free of laitance, glaze, efflorescence, curing compounds, form- release agents, dust, dirt, grease, oil and other contaminants incompatible with terrazzo.

**a.** Prepare concrete mechanically by shot blasting. Surface preparation results should achieve a CSP3-CSP5 profile according to International Concrete Repair Institute Guideline No. 03732.

**b.** Repair or level damaged and deteriorated concrete according to Terroxy Resin Systems Technical Bulletin 008 Substrate Leveling Requirements for Terroxy Thin-set epoxy terrazzo.

**c.** Repair cracks and non-expansion joints greater than 1/16" (1.6mm) wide according to NTMA (TTMAC - Canada) Technical Bulletin T26 Crack Detailing and Joint Treatments for Terroxy Resin Thin-set epoxy terrazzo.

2. Verify that concrete substrates are visibly dry and free of moisture.

3. Moisture Testing:

**d.** Test for moisture according to ASTM F2170 (determining relative humidity in concrete slabs using in situ probes). An effective in situ probe for relative humidity testing is the Blue Peg available from Terrazzo & Marble Supply.

**e.** Proceed with installation only after substrates have a maximum relative humidity measurement reading less than 80%. If relative humidity measurement reading is greater than or equal to 80%, Terroxy Moisture Vapor Treatment is required. Apply to terrazzo substrates according to Terroxy Resin Systems Moisture Vapor Treatment Product Data Sheet.

**C. Protect other work from dust generated by grinding operations. Control dust to prevent air pollution and comply with environmental protection regulations.**

1. Erect and maintain temporary enclosures and other suitable methods to limit dust migration and to ensure adequate ambient temperatures and ventilation conditions during installation.

### **3.03 EPOXY TERRAZZO INSTALLATION**

#### **A. General:**

1. Comply with NTMA's (TTMAC - Canada) written recommendations for terrazzo and accessory installation.
2. Place, rough grind, grout, cure grout, fine grind and finish terrazzo according to Terroxy Resin Systems Epoxy Matrix Product Data Sheet and NTMA's (TTMAC - Canada) "Terrazzo Specifications and Design Guide."
3. Ensure that matrix components and fluids from grinding operations do not stain terrazzo by reacting with divider and control-joint strips.
4. Delay fine grinding until heavy trade work is complete and construction traffic through area is restricted.

#### **B. Thickness: [3/8" (9.5 mm)]**

#### **C. Flexible Reinforcing Membrane**

1. [Option 1: Membrane application for isolated cracking. Route out all cracks and fill with 100% Terroxy Primer. Apply Terroxy Iso-Crack Epoxy Membrane (spread at 40 mils = 1.0 mm thickness) across the crack allowing 6" (152.4mm) on either side. Imbed fiberglass scrim at a minimum of 9" (22.8cm) into wet membrane and saturate with additional membrane.]
2. [Option 2: Membrane application for extensive cracking or crack prevention. Route out all cracks and fill with 100% Terroxy Primer. Apply Terroxy Iso-Crack Epoxy Membrane (spread at 40 mils = 1.0 mm thickness) over prepared substrate to produce full substrate coverage in areas to receive terrazzo. (fiberglass scrim optional)]



**D. Primer: Apply to terrazzo substrates according to Terroxy Resin Systems Primer Product Data Sheet.**

**E. Strip Materials:**

1. Divider and Accessory Strips:
  - a. Install strips in adhesive setting bed without voids below strips.
  - b. Construction joints, contraction joints (Saw Cuts), isolation joints and cracks shall be detailed in accordance with NTMA (TTMAC - Canada) technical bulletin T24.

**F. Placing Terrazzo:**

1. Mix epoxy matrix with chips and fillers in ratios directed by Terroxy Resin Systems.
2. Trowel apply terrazzo mixture over epoxy primer to provide a dense flat surface to top of divider strips. Allow to cure per Terroxy Resin Systems recommendations before rough grinding.

**G. Rough Grinding: Grind with 24 grit silicon carbide or 24 grit turbo diamonds until all terrazzo strips and marble chips are uniformly exposed.**

**H. Grouting:**

1. Cleanse floor with clean water and rinse.
2. Remove excess rinse water by wet vacuum, dry and fill voids with Terroxy Resin Systems Epoxy Matrix or Clear Resin with a broadcast of filler.
3. Allow grout to cure. Grout may be left on terrazzo until other trades work is completed.

**I. Polishing: Polish with 120 grit T&M Resin Pads or equivalent stones until all grout is removed from surface. Produce surface with a minimum of 70 percent aggregate exposure.** (Optional high finish polishes available. Please consult a terrazzo contractor for more information.)

### **3.04 PRECAST TERRAZZO INSTALLATION**

**A. Install precast units using method recommended by NTMA (TTMAC - Canada) and manufacturer unless otherwise indicated.**

**B. Seal joints between units with joint sealants.**

### **3.05 CLEANING AND PROTECTION**

**A. Cleaning: Remove grinding dust from installation and wash all surfaces with a neutral cleaner with a pH factor between 7-10. .**

**B. Sealing: Apply TRx sealer that is chemically neutral with a pH factor between 7 and 10, that meets a standard coefficient of friction of 0.5 or higher, as measured by the James Machine (ASTM D-2047 Test Method), does not affect physical properties of terrazzo and complies with NTMA's (TTMAC - Canada)**

**C. Protection: Upon completion, the work shall be ready for final inspection and acceptance by the owner or his agent. Provide final protection and maintain conditions, in a manner acceptable to terrazzo contractor, that ensure terrazzo is without damage or deterioration.**

END OF SECTION 096623



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