

SECTION 09310 - CERAMIC TILE

PART 1 GENERAL

1.01 SUMMARY

- A. Section includes ceramic tile installations, including thresholds, window sills and other related work.
- B. Furnish all labor, materials, tools, equipment and services necessary for and reasonably incidental to complete the tile work as shown on the Drawings or specified in this Section.
- B. Related Sections:
 - 1. Section 07920 – Sealants and Caulking.
 - 2. Section 09100 – Metal Framing.
 - 3. Section 09250 – Gypsum Board Systems.
 - 4. Section 10810 – Toilet Accessories.

1.02 SUBMITTALS

- A. Product Data: Submit material specifications, printed installation and mixing instructions and maintenance recommendations for ceramic tile and accessories.
- B. Samples: Submit the following for Resident's approval:
 - 1. Panels: 12" square, of each type, color and pattern of tile required.
 - 2. Tile manufacturer's full color and pattern range for each type of tile required.
 - 3. Marble threshold sample.
 - 4. Grout manufacturer's full color range samples.
 - 5. Each type of trim shape and special shape required.
- C. Certificates:
 - 1. Master grade certificate: In accord with ANSI A137.1. Deliver to Resident before shipping tile to project.
 - 2. Grout materials: Manufacturer's certification that materials:
 - a. Are suitable for intended use.
 - b. Meet or exceed ANSI standards.
 - c. Are listed on the tested materials list published by the Ceramic Tile Institute.
 - 3. Friction test reports for floor tile: Submit test reports to Resident.

1.03 REFERENCE STANDARDS

A. Except as otherwise specified herein or shown on the Drawings, comply with the latest editions of all applicable codes and regulations including the applicable requirements of the following Reference Standards and Codes which are hereby made a part of this Section, as they relate to the ceramic tile.

1. American National Standards Institute (ANSI), latest editions:
 - a. ANSI A108.1-Installation of Glazed Wall Tile, Ceramic Mosaic Tile, Quarry and Paver Tile with Portland Cement Mortar.
 - b. ANSI A108.5 -Ceramic Tile Installed with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar.
 - c. ANSI A108.10- Installation of Grout in Tilework.
 - d. ANSI A118.1 - Dry-Set Portland Cement Mortar.
 - e. ANSI A118.6 - Ceramic Tile Grouts.
 - f. ANSI A137.1 - Specifications for Ceramic Tile.
2. American Society for Testing and Materials (ASTM).
3. Tile Council of America, Inc. (TCA), latest edition: Handbook for Ceramic Tile Installation.
4. MIA: Interior marble specifications.
5. Allowable tolerances: Level or plumb within 1/8 in. of true plane in 8 ft.
6. BOCA Building Code, latest Edition.
7. The Occupational Health and Safety Administration (OSHA) Code of Federal Regulations(CFR), Volume 29.

1.04 QUALITY ASSURANCE

- A. Tile shall conform to TCA 137.1, Standard Grade.
- B. Provide setting, grouting and related materials of each type, color and finish obtained from one source and as recommended by tile manufacturer.
- C. Installer Qualifications: Engage an installer with a minimum of five (5) commercial tile installations similar in material, design and scope to that indicated in the Drawings these Specifications.
- D. Comply with requirements of referenced standards and recommendations of material manufacturers for environmental conditions before, during and after installation.
- E. Maintain environmental conditions and protect work during and after installation to comply with referenced standards and manufacture's printed recommendations.
- F. Maintain minimum and maximum temperature limits as recommended by manufacturer.
- G. Illuminate the work area during installation providing the same level and angle of illumination as will be available for final inspection.

PART 2 PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

- A. Tile selections specified below with manufacturer's name and product identification data are intended as a guide without restricting provision of equivalent products of other manufacturers named above.
- B. Equivalent products of the following manufacturers are acceptable subject to requirements of this Section:
 - 1. American Olean Tile Company.
 - 2. Crossville Ceramics Company.
 - 3. Dal-Tile Corporation.
 - 4. United States Ceramic Tile Company.
- C. Equivalent products of other manufacturers which meet the requirements of the Drawings and this Section may be provided if approved by the Resident.

2.02 MATERIALS

- A. Tile:
 - 1. Ceramic Restrooms Floor Tile: Cross-Colors A-Series as manufactured by Crossville Ceramics.
 - a. Size: 8" x 8" x 5/16".
 - b. Type: Porcelain stone polished, all purpose edge, ANSI A137.1.
 - c. Finish: CP (Cross-Plus) ADA slip resistant.
 - d. Setting: Gray sanded ANSI A118.1, thin set mix.
 - e. Tile Color: A-825 Mercury.
 - f. Grout Color: Gray to match tile color.
 - g. Provide ceramic mosaic trimmers of manufacturer's standard trim shapes.
 - h. Coefficient of friction shall be not less than .6 on floors and .8 on ramps and stair trends in accord with ASTM C1028. Tests made in accord with ASTM F489 and F609. If tests have been made by tile manufacturer, submit test reports to Resident.
 - 2. Ceramic Restrooms Wall Tile: Cross-Colors A-Series as manufactured by Crossville Ceramics.
 - a. Size: 8" x 8" x 5/16".
 - b. Type: Porcelain stone polished, all purpose edge, ANSI A137.1.
 - c. Finish: PO (Polished).
 - d. Setting: Gray sanded ANSI A118.1, thin set mix.
 - e. Tile Color: A-825 Mercury.

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- f. Grout Color: Gray to match tile color.
 - g. Provide ceramic mosaic trimmers of manufacturer's standard trim shapes.
3. Ceramic Restrooms Wall Tile (Wainscot): Cross-Colors A-Series as manufactured by Crossville Ceramics.
- a. Size: 2" x 8" x 5/16".
 - b. Type: Porcelain stone polished, all purpose edge, ANSI A137.1.
 - c. Finish: PO (Polished).
 - d. Setting: Gray sanded ANSI A118.1, thin set mix.
 - e. Tile Color: A-825 Mercury.
 - f. Grout Color: Gray to match tile color.
 - g. Provide ceramic mosaic trimmers of manufacturer's standard trim shapes.
- B. Base:
- 1. Ceramic Tile Base: As manufactured by Crossville Ceramics.
 - a. Size: 4" x 8" x 5/16".
 - b. Type: Porcelain stone cove base.
 - c. Finish: CP (Cross-Plus)
 - d. Base Color: A-825 Mercury.
 - e. Grout Color: Gray.
 - f. Setting: Gray sanded ANSI A118.1, thin set mix.
- C. Marble Thresholds: 2-5/8 inch wide, 3/4 inch thick, gray Carrara to match tile color; with exposed edges beveled and honed finish on exposed surfaces.
- D. Dry-Set Portland Cement Mortar: Pre-sanded, premixed, prepackaged, manufactured product in accordance with ANSI A118.1 and by manufacturer licensed by the Tile Council of America. Materials shall be Laticrete 211 Crete Filler Powder mixed with Laticrete 4237 Latex Thinset Mortar Additive as manufactured by Laticrete International, Inc.
- E. Portland Cement: ASTM C150, Type I or Type II.
- F. Sand: ASTM C144.
- G. Hydrated Lime: ASTM C206 or ASTM C207, Type S.
- H. Water: Potable and fresh.
- I. Admixture (for use with wall grout only):
- 1. Sika Red label by Sika Chemical Corp.
 - 2. Anti-Hydro by Anti-Hydro Waterproofing Co.
- J. Welded wire fabric reinforcement: ASTM A185, 2 in. x 2 in. mesh 16/16 gauge wire or 3 in. x 3 in. mesh 13/13 gauge wire or 1-1/2in. x 2 in. mesh 16/13 gauge wire.

1. Provide reinforcement in flat sheets, or flatten before using.
- K. Cleavage membrane: ASTM D2103 Polyethylene sheet 0.010 in. thick.
- L. Mortar Additive: Laticrete 3701 latex additive or accepted equivalent.
- M. Grout: As manufactured by Laticrete International, Inc. or approved equal and certified by the tile manufacturer as suitable for type of tile and application. Conform to ANSI A108.6, A108.7 and A108.10.
1. Dry-Set Grout: A mixture of portland cement and additives furnished by a firm licensed to manufacture products, and tested and approved by the Tile Council of America.
 2. Commercial Latex-Portland Cement Grout: A mixture of portland cement and mortar additive conforming to ANSI A118.6. Use suitable grout to meet the requirements of the individual application from one of the following:
 - a. Laticrete 500 Series Sanded Grout mixed with Laticrete 1776 Gout Admix for joints 1/8" wide or greater.
 - b. Laticrete 1500 Series Polymer Modified Grout mixed with Laticrete 1776 Grout Admix for joints 1/8" wide or less.
 - c. Latapoxy SP-100, Latapoxy 2000 grout for use in public restrooms and areas requiring stain, chemical and erosion resistance.
 3. Colors: As selected by Resident.

N. Expansion/Control/Isolation Joints and Sealant Filler:

1. One-part silicone at joints between floor and walls, and at perimeter of metal door frames.
2. One-part silicone or self-leveling low modulus, two component polyurethane at joints in traffic areas.
3. Color as selected by Resident.
4. Joint backing material: Closed cell polyethylene foam weighing 2.7 pcf, and approximately 20% thicker than width of expansion joint. Use sealant complying to ASTM C920 according to type, grade, class and use required.
5. Provide marble threshold trim strips or other edging material where tile terminates at dissimilar finishes.

O. Floor joint grout sealer: "Penetrating Sealer" as manufactured by Aqua Mix, Inc., Cerritos, CA, and represented locally by Greg Webb, P.O. Box 393, Maitland, FL 32751, Tel: (407) 628 2265.

P. Edge strips: Type 302 stainless steel. Design as required by condition of use.

2.03 MORTAR BED MIX

- A. Walls - over scratch coat provided by plaster trade:
 - 1. 1-part Portland Cement.
 - 2. 1/2-part hydrated lime.
 - 3. 4-parts dry sand or 5-parts damp sand by volume.
 - 4. Dry-mix the ingredients, add water and blend to produce a stiff mix.

- B. Floors - over cleavage membrane over structural substrate:
 - 1. 1-part Portland Cement.
 - 2. 1/10-part hydrated lime by volume.
 - 3. 6-parts damp sand.
 - 4. Dry-mix the ingredients, add water and blend to produce a stiff mix.

2.04 TILE CLEANER

- A. Biscayne Chemical Laboratories, Inc., "Blue Boy" or accepted equivalent. Address: 1215 NW 7 Av., Miami, Florida.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine surfaces which will receive setting bed, tile, and accessories for compliance with requirements for installation tolerances and other conditions effecting performance of installed tile.
 - 1. Do not proceed with work until defects or conditions which would adversely affect quality, execution and permanence of finished tile work have been corrected. Commencement of work signifies acceptance of substrate and installation conditions.
 - 2. Maximum deviations of substrate surfaces:
 - a. Sub-floor surface: 1/8 to 1/4 in. in 10 ft.
 - b. Vertical surfaces: 1/8 to 1/4 in. in 8 ft.
 - c. Framing: 1/8 in. in 10 ft.

- B. Condition of surfaces to receive tile:
 - 1. Assure that surfaces to receive mortar setting bed and tile are firm, dry and clean. Make repairs if necessary so that substrate is in the proper condition to receive tile.
 - 2. Verify that grounds, anchors, plugs, hangers, recess frames, bucks, and electrical and mechanical work in or behind tile has been installed before proceeding with tile work.
 - 3. Verify that waterproofing at shower receptors will not affect tile installation

- adversely.
4. Verify that substrates for setting tile are well cured, structurally sound, dry, clean, and free from oil or waxy films, and curing compounds.

- C. Protection: Protect adjacent surfaces prior to beginning tile work and during the work in this Section.

3.02 INSTALLATION

- A. Proprietary materials: Mix and use in accord with manufacturer's printed instructions.
- B. Preparation: Prepare surfaces, set, fit, grout, and clean tile work in accord with referenced standards and manufacturer's instructions.

1. Remove protrusions, bumps and ridges by grinding or chipping.
2. Repair, fill, and level cracks, holes, depressions and rough or chipped areas in substrate using patching material recommended by setting materials manufacturer.
3. Concrete slab to have a steel trowel or light broom finish when tile is installed by the thin-set method.
4. Insure substrate is within the specified tolerances.
5. Blend tiles before installing in accordance with reference standards to produce an even range and distribution of color and finish.

- C. General Installation Standards: Install tile in accordance with ANSI A108 standards, appropriate TCA methods, and written instructions of the specified manufacturers.

1. Thin-set Floor Installations:

- a. General: TCA Method F-113-01.
- b. Requiring waterproofing: TCA Method F-122-01.
- c. Exterior: TCA Method F-102-01.

2. Thin-set Wall Installations:

- a. General: TCA Method W-243-01
- b. Wet areas: TCA Method W-244-01.
- c. Exterior over masonry or concrete: TCA Method W-202-01.

3. Thick-set Floor Installations:

- a. General: TCA Method F-112-01.
- b. Over structural floors subject to movement or deflection: TCA Method F-111-01.
- c. Requiring waterproofing: TCA Method F-121-01.
- d. Exterior: TCA Method F-101-01.

4. Thick-set Wall Installations:

- a. General: TCA Method W-241-01.
- b. Exterior over masonry or concrete: TCA Method W-211-01.

D. Tile Installation.

1. Install tile in pattern indicated. Align joints when adjoining tiles on floor, base, walls, and trim are same size. Adjust to minimize tile cutting and to avoid tile less than half size.
 - a. Where borders, lines, patterns, panels or other effects are a part of the work properly space tiles and accurately reproduce required designs.
2. Secure tile firmly in place with uniform width joints, smooth and even, well filled, without voids, cracks or excess mortar or grout, and with lines straight and true.
 - a. Finish surfaces to true and flat planes, plumb on walls.
 - b. Completed work shall be completely free of cracked or broken tiles.
3. Where acoustic tile ceilings occur, install ceramic wall tile to a line 2 to 4 inches above plane of exposed surface of ceiling.
4. When possible, smooth cut edges of tile and/or use appropriate cutter or wet saw to produce smooth cuts. Provide straight cuts which align with adjacent materials.
5. Install tile plumb and level to a tolerance of 1/8 inch in 10 ft. in all directions and 1/16 inch within any given running foot, except where floors are indicated on Drawings to be sloped.
 - a. At floor drains, slope floor tile from high points at walls around perimeter of rooms down to floor drains.
6. Center and balance tile within the areas to be tiled. Avoid excessive cutting. Do not make cuts smaller than half a tile. Form intersections and returns perfectly and perform cutting and drilling of tile neatly without marring tile face.
 - a. Grind/hone cut edges smooth and joint cut edges of tile against any trim, finish and built-in fixtures. Jagged or flaked edges will not be accepted.
 - b. Fit tile close around plumbing pipes, fixtures and fittings so that usual plates, collars or coverings will overlap tile.
7. Provide appropriate openings for toilet accessories and other items which occur in tiled walls and floors. Fit tile closely around pipe and conduit penetrations to allow full cover by trim and escutcheons. Extend tile into recesses and under equipment and fixtures to form a complete covering without interruptions.
 - a. Do not split tile to fit around piping - cut holes as required.
 - b. Seal around all penetrations through tile with sealant in accord with Section 07920.
 - c. Where tile abuts restraining surfaces, cut tile to match contour of that surface.

8. Mix mortar in strict accordance with manufacturer's recommendations.
9. Apply setting material in accordance with manufacturer's directions and install tile before mortar has started initial cure. For thin-set mortar application, use notch trowel that will achieve the recommended coverage of mortar after tiles have been installed. Reference standards coverage information and follow manufacturer's recommendations for trowel size when using mortars.
10. Do not spread more material than can be covered within 10 to 15 minutes. If "skinning" occurs, remove mortar and spread fresh material. Spread mortar with notches running in one direction, that shall be perpendicular to the pressing, pushing and pulling of the tile during placement.
11. Place tile in fresh mortar, press, push and pull the tile slightly to achieve 100% mortar coverage on back of all tile, regardless of location. Backbutter individual tiles as necessary to achieve 100% coverage. All exterior tiles shall be backbuttered. Make sure that all corners and edges are well supported with mortar. Leave no hollow corners or edges.
12. Ensure there is a minimum of 1/8" of mortar between tile and substrate after proper bedding. Installer must periodically remove sheets or individual tiles to assure proper bond coverage consistent with industry specifications. If coverage is found to be insufficient, use a larger size notch trowel.
13. Use a beating block and hammer or rubber mallet so that faces and edges of individual tiles are flush and level with faces and edges of adjacent tiles, and to reduce lippage.

E. Installation of Tile with Mortar Setting Bed.

1. Install wall tile on Portland Cement mortar setting bed over prepared scratch-coat base in accord with ANSI A108.1 using pure Portland Cement, or at Contractor's option, CTI tested dry-set mortar on a freshly cured Portland Cement mortar bed.
 - a. Allow mortar setting bed to cure 20 hours minimum at 70 degrees F. before commencing tile installation.
 - b. Soak absorbent tiles before they are installed.
2. Install floor tile on Portland Cement mortar setting bed over cleavage membrane over concrete substrate in accord with ANSI A108.1 using pure Portland Cement, or at Contractor's option, CTI tested dry-set mortar on a freshly cured bed, and the following:
 - a. Allow mortar setting bed to cure 20 hours minimum at 70 degrees F. before commencing tile installation.
 - b. If pure coat cement setting is used, soak absorbent tiles before they are installed.
 - c. Install cleavage membrane over all subfloors. Extend membrane up vertical surfaces at least 4" and fold at edges and ends to form a locked, waterproof joint.

- (1). Where a waterproof membrane is provided as part of the work of another Section, do not install the polyethylene cleavage membrane.
 - d. Install reinforcing wire fabric in center of setting bed, set on supports. Lap fabric one full mesh minimum. Hold wire fabric away from vertical surfaces 1/2 in.
 - e. Construct sloped mortar beds using mortar consisting of one part portland cement, four parts sand by volume, gauged with mortar additive in accordance with ANSI A108.5.
- F. Installation of Tile with Dry-Set Mortar.
1. Concrete Substrate:
 - a. Set ceramic tile in accordance with applicable requirements of ANSI A108.5.
 - b. Set tile with dry-set mortar, 1/8 to 1/4 inch thick.
 - c. Provide latex mortar additive in setting mortar per manufacturer's directions.

3.03 GROUTING

- A. Install grouting in accordance with with ANSI A108.10, A108.6, A108.8, A108.9-1999 correlating to grout type chosen and manufacturer's recommendations.
1. Ceramic mosaic floor tile: Use commercial latex-portland cement grout.
 2. Glazed ceramic wall tile: Use dry-set grout.
- B. Fill all joints solid between all tiles with the proper grout. Mix grout material in strict accordance with manufacturer's directions. Use unsanded grout for joints 1/8 in. and less in width and sanded grout for joints greater in width than 1/8 in. Allow 48 hours cure-time between setting and grouting.
1. Provide grout in color as selected by Resident.
 2. Clean joints of cushion edge tile to depth of cushion. Fill joints of square-edge tile flush with surface.
 3. Fill all gaps and skips. Do not permit mortar to show through grouted joints.
 4. Finish grout shall be uniform in color, smooth and without voids, pin holes or low spots.
 5. All tile shall be cleaned and left in a clean condition, without scum or surface residue.
 6. Remove and re-grout discolored joints.
- C. Before grouting entire area do a test to assure there will be no permanent staining or discoloration of the tile and to verify that the grout is easily removed from the surface. If

necessary, pre-coat exposed surfaces of tile with a grout release as recommended by the manufacturer, to facilitate grout removal.

- D. Cure all setting and grouting materials in accordance with manufacturer's recommendations.

3.04 SEALING OF FLOOR GROUT JOINTS

- A. Seal all floor joint grout with specified "Penetrating Sealer" in accord with manufacturer's recommendations.

- 1. Note: "Penetrating Sealer" must be removed from tile surfaces before it dries, otherwise it will discolor tiles.

- B. If there are questions regarding application or other procedures, telephone manufacturer direct at telephone number printed on material container.

3.05 THRESHOLDS AND EDGE STRIPS

- A. Edge strips: Install at openings without thresholds and where tile floors abut other flooring material at the same level.

- B. Marble thresholds: Install at locations indicated on Drawings or at dissimilar floor finishes using materials and methods specified for tile.

- 1. Where thresholds are detailed to be installed atop tile, install with full-bedding of epoxy adhesive as approved by Resident.

3.06 EXPANSION JOINTS

- A. Provide expansion joints where tile abuts to restraining surfaces such as curbs, columns, pipes, and to perimeter walls in rooms and spaces larger than 12 ft. on a side.

- 1. Interior installations shall have expansion joints spaced a maximum of 24' x 24'. Exterior areas shall have expansion joints spaced a maximum of 16' x 16'.

- 2. Comply with Tile Council of America Vertical and Horizontal Movement Joint Design Essentials EJ171-01.

- 3. Expansion joints are not required in small rooms less than 12 ft. on a side and along walls of corridors less than 12 ft. in width.

- B. Extend openings for expansion joints completely through tile, mortar, mortar bed, and reinforcing.

- C. Openings for expansion joints shall be the same width as tile joints. Keep joints open and free of mortar and grout until filled with sealant.

- D. As part of work of this Section, seal between tile and penetrations and restraining surfaces with sealant to match color of grout/joint filler. Perform sealant work in accord with Section 07920.

1. At floor traffic areas, use one-part silicone, or 2-part polyurethane as specified.
2. At joints between floor and walls and around metal door frames, use Silicone sealant. At walls, use Silicone sealant.

3.07 CLEANING AND PROTECTION

- A. Apply tile cleaner in strict accordance with cleaner manufacturer's printed instructions.
- B. Leave finished installation clean and free of cracked, chipped, broken and unbonded or otherwise defective tile.
- C. After completion of setting and grouting, thoroughly sponge and wash tile. Finally, polish glazed tile with clean dry cloths.
- D. Acid cleaning:
 1. Do not use acid or acid cleaners to clean glazed tile or tiles grouted with latex modified grout.
 2. Acid cleaning of unglazed tile, if required, may be done 10 days after setting in accord with ANSI A108.1.
 3. Protect all adjacent surfaces from damage.
- E. Protection: After cleaning, provide protective covering and maintain conditions to protect tile work from damage or deterioration. Where tiled surfaces will be subject to equipment or wheel traffic or heavy construction traffic, and during move-in of furniture and equipment, cover protective covering with 1/4 inch hardboard, plywood or similar material.

3.08 CURING

- A. Damp cure all tile installations, including Portland Cement grouts, for 72 hours minimum.

3.09 MAINTENANCE MATERIALS

- A. Provide 1 box of each color and type of tile installed.

END OF SECTION