

SECTION 09 30 00
CERAMIC TILE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies floor tile, ceramic marble thresholds, waterproofing membranes for thin-set applications, tile backer board.

1.2 RELATED WORK

- A. Sealing of joints where specified: Section 07 92 00 JOINT SEALANTS.
- B. Color, texture, and size of floor and base tile, size of field tile, trim shapes, and color of grout specified: Section 09 05 00 INTERIOR/EXTERIOR FINISHES, MATERIAL AND FINISH SCHEDULES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples:
 - 1. Floor and base tile, each type, each color, each size.
- C. Product Data:
 - 1. Ceramic tile, marked to show each type, size, and shape required.
 - 2. Chemical resistant mortar and grout (Epoxy and Furan).
 - 3. Cementitious backer unit.
 - 4. Divider strip.
 - 5. Waterproofing membrane and bond coat, ASTM D 5019, Type II, Grade I, chlorinated polyethylene sheet reinforced on both sides with a non-woven polyester fiber - to Nobleseal TS.
 - 6. Reinforcing tape.
 - 7. Skim coat under waterproof membrane - trowelable material similar to Ardex SD-P to create positive slope to drains.
 - 8. Latex-Portland cement mortar and grout.
 - 9. Commercial Portland cement grout.
 - 10. Organic adhesive.
 - 11. Slip resistant tile.
 - 12. Fasteners.
- D. Certification:
 - 1. Master grade, ANSI A137.1.
 - 2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
 - a. Chemical resistant mortar and grout (epoxy and furan).
 - b. Modified epoxy emulsion.
 - c. Commercial Portland cement grout.
 - d. Cementitious backer unit.

- e. Dry-set Portland cement mortar and grout.
- f. Elastomeric membrane and bond coat.
- g. Reinforcing tape.
- h. Latex-Portland cement mortar and grout.
- i. Leveling compound.
- j. Organic adhesive.
- k. Waterproof isolation membrane.
- l. Factory mounted tile suitability for application in wet area specified under 2.1, A, 3 with list of successful in-service performance locations.

1.4 DELIVERY AND STORAGE

- A. Deliver materials in containers with labels legible and intact and grade-seals unbroken.
- B. Store material to prevent damage or contamination.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
 - A10.20-1988.....Safety Requirements for Ceramic Tile, Terrazzo, and Marble Works
 - A108.1A-1999.....Installation of Ceramic Tile in the Wet-Set Method with Portland Cement Mortar
 - A108.1B-1999.....Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with dry-Set or latex-Portland Cement Mortar
 - A108.1C-1999.....Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
 - A108.4-1999.....Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesives
 - A108.5-1999.....Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
 - A108.6-1999.....Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy

- A108.8-1999.....Installation of Ceramic Tile with Chemical
Resistant Furan Resin Mortar and Grout
- A108.9-1999.....Installation of Ceramic Tile with Modified Epoxy
Emulsion Mortar/Grout
- A108.10-1999.....Installation of Grout in Tilework
- A108.11-1999.....Interior Installation of Cementitious Backer
Units
- A108.12-1999.....Installation of Ceramic Tile with EGP (Exterior
Glue Plywood) Latex-Portland Cement Mortar
- A108.13-1999.....Installation of Load Bearing, Bonded, Waterproof
Membranes for Thin-Set Ceramic Tile and
Dimension Stone
- A118.1-1999.....Dry-Set Portland Cement Mortar
- A118.3-1999.....Chemical Resistant, Water Cleanable Tile-Setting
Epoxy and Water Cleanable Tile-Setting and
Grouting Epoxy Adhesive
- A118.4-1999.....Latex-Portland Cement Mortar
- A118.5-1999.....Chemical Resistant Furan Mortars and Grouts for
Tile Installation
- A118.6-1999.....Standard Cement Grouts for Tile Installation
- A118.7-1999.....Polymer Modified Tile Gouts for Tile
Installation
- A118.8-1999.....Modified Epoxy Emulsion Mortar/Grout
- A118.9-1999.....Cementitious Backer Units
- A118.10-1999.....Load Bearing, Bonded, Waterproof Membranes for
Thin-Set Ceramic Tile and Dimension Stone
Installation
- A118.11-1999.....EGP (Exterior Glue Plywood) Latex-Portland
Cement Mortar
- A136.1-1999.....Organic Adhesives for Installation of Ceramic
Tile
- A137.1-1988.....Ceramic Tile
- C. American Society For Testing And Materials (ASTM):
 - A185-06.....Steel Welded Wire Fabric, Plain, for Concrete
Reinforcing
 - C241-90 (R2005).....Abrasion Resistance of Stone Subjected to Foot
Traffic
 - C627-93(R1999).....Evaluating Ceramic Floor Tile Installation
Systems Using the Robinson-Type Floor Tester

C954-00.....Steel Drill Screws for the Application of Gypsum
Board on Metal Plaster Base to Steel Studs from
0.033 in (0.84 mm) to 0.112 in (2.84 mm) in
thickness

C979-99.....Pigments for Integrally Colored Concrete

C1002-01.....Steel Self-Piercing Tapping Screws for the
Application of Panel Products

C1027-99.....Determining "Visible Abrasion Resistance on
Glazed Ceramic Tile"

C1028-96.....Determining the Static Coefficient of Friction
of Ceramic Tile and Other Like Surfaces by the
Horizontal Dynamometer Pull Meter Method

D. Marble Institute of America (MIA): Design Manual III-1999

E. Tile Council of America, Inc. (TCA):

2003 - 2004.....Handbook for Ceramic Tile Installation

PART 2 - PRODUCTS

2.1 TILE

A. Comply with ANSI A137.1, Standard Grade, except as modified:

1. Inspection procedures listed under the Appendix of ANSI A137.1.

2. Abrasion Resistance Classification:

a. Tested in accordance with values listed in Table 1, ASTM C 1027.

b. Class V, 12000 revolutions for floors in Corridors, Kitchens,
Storage including Refrigerated Rooms

c. Class IV, 6000 revolutions for remaining areas.

3. Slip Resistant Tile for Floors:

a. Coefficient of friction, when tested in accordance with ASTM
C1028, required for level of performance:

1) Not less than 0.7 (wet condition) for bathing areas.

2) Not less than 0.8 on ramps for wet and dry conditions.

3) Not less than 0.6, except 0.8 on ramps as stated above, for wet
and dry conditions for other areas.

b. Tile Having Abrasive Grains:

1. Unglazed Ceramic Mosaic Tile: Abrasive grains throughout body
of the tile.

4. Factory Blending: For tile with color variations, within the ranges
selected during sample submittals blend tile in the factory and
package so tile units taken from one package show the same range in
colors as those taken from other packages and match approved samples.

5. Factory-Applied Temporary Protective Coating:

- a. Protect exposed face surfaces (top surface) of tile against adherence of mortar and grout by pre-coating with a continuous film of petroleum paraffin wax, applied hot.
 - b. Do not coat unexposed tile surfaces.
 - c. Pre-wax tiles set or grouted with furan or epoxy or latex modified mortars.
- C. Trim Shapes:
1. Conform to applicable requirements of adjoining floor and wall tile.
 2. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.
 - b. External corners including edges: Use bullnose shapes.
 - c. Internal corners: Use cove shapes.
 - d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
 - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
 - f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
 - g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
 - h. Provide cove and bullnose shapes where required to complete tile work.

2.2 SETTING BED MATERIALS

- A. Acceptable Manufacturers:
1. Bostik Construction Products, Huntington Valley, PA.
 2. Laticrete International, Bethany, CT.
 3. Mapei Corporation, Elk Grove Village, IL.
 4. Summitville Tiles, Inc., Summitville, OH.
- B. Dry-Set and Polymer Modified Thin-Set Mortar: Two component system; factory prepared, high bond strength dryset mortar and liquid polymer additive; ANSI A118.4.
1. Polymer Additive: Acrylic latex or Styrene Butadiene latex additive.
 2. Acceptable Products:
 - a. Hydroment Tile Mate and Flex-A-Lastic 447 Flexible Mortar Admixture, Bostic Construction Products.
 - b. Laticrete 4237 Mortar Admix with Laticrete 211 Crete Filler, Laticrete International. Kerabond and Keralastic, Mapei Corporation.

2.4 GROUTING MATERIALS

A. Coloring Pigments:

1. Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
2. Add coloring pigments to grout by the manufacturer.
3. Job colored grout is not acceptable.
4. Use is required in Commercial Portland Cement Grout, Dry-Set Grout, and Latex-Portland Cement Grout.

B. Commercial Portland Cement Grout: ANSI A118.6 color as specified.

C. Dry-Set Grout: ANSI A118.6 color as specified.

D. Latex-Portland Cement Grout: ANSI A118.6 color as specified.

1. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.
2. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

E. Chemical-Resistant Grout:

1. Epoxy grout, ANSI A118.3.
2. Furan grout, ANSI A118.5.

2.5 PATCHING AND LEVELING COMPOUND

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

B. Shall have minimum following physical properties:

1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.
2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).

C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (four inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.

D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.

E. Ready for use in 48 hours after application.

2.6 MARBLE

A. Soundness Classification in accordance with MIA Design Manual III Groups.

B. Thresholds:

1. Group A, Minimum abrasive hardness (Ha) of 10.0 per ASTM C241.
2. Honed finish on exposed faces.
3. Thickness and contour as shown.
4. One piece full width of door opening. Notch thresholds to match profile of door jambs.

C. Window Stools:

1. Group A or B.

2. Polished finish on exposed faces.

3. Size and thickness as shown.

2.7 WATER

A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.8 CLEANING COMPOUNDS

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

B. Materials containing acid or caustic material not acceptable.

2.9 FLOOR MORTAR BED REINFORCING

A. ASTM A185 welded wire fabric without backing, MW3 x MW3 (2 x 2-W0.5 x W0.5).

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three days after installation.

B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.

C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).

D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).

E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after fourth day of completion of tile work.

3.2 ALLOWABLE TOLERANCE

A. Variation in plane of sub-floor, including concrete fills leveling compounds:

1. Not more than 1 in 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.

B. Variation in Plane of Wall Surfaces:

1. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar or organic adhesive setting materials is used.

3.3 SURFACE PREPARATION

- A. Cleaning New Concrete or Masonry:
 - 1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.
 - 2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
 - 3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.
- B. Patching and Leveling:
 - 1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
 - 2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
 - a. Thickness of compound as required to bring finish tile system to elevation shown.
 - b. Float finish except finish smooth for waterproofing.
 - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 - 3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- C. Additional preparation of concrete floors for tile set with epoxy, or furan-resin shall be in accordance with the manufacturer's printed instructions.

3.4 MARBLE

- A. Secure thresholds and stools in position with minimum of two stainless steel dowels.
- B. Set in dry-set Portland cement mortar or latex-Portland cement mortar bond coat.
- C. Set threshold to finish 12mm (1/2 inch) above ceramic tile floor unless shown otherwise, with bevel edge joint top flush with adjacent floor similar to TCA detail TR611-02.

3.5 METAL DIVIDER STRIPS

- A. Install metal divider strips in floor joints between ceramic and quarry tile floors and between tile floors and adjacent flooring of other materials where the finish floors are flush unless shown otherwise.

3.7 CERAMIC TILE - GENERAL

- A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.
- B. Comply with TCA Installation Guidelines
- C. Workmanship:
 - 1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
 - 2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.
 - 3. Form intersections and returns accurately.
 - 4. Cut and drill tile neatly without marring surface. All edges shall be wet saw cut.
 - 5. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.
 - 6. Remove and reset tiles that are out of plane or misaligned.
 - 7. Floors:
 - a. Extend floor tile beneath casework and equipment, except those units mounted in wall recesses.
 - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where shown.
 - c. In areas where floor drains occur, slope to drains where shown.
 - d. Shove and vibrate tiles over 200 mm (8 inches) square to achieve full support of bond coat.
 - 8. Joints:
 - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
 - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work.

3.8 THIN SET CERAMIC TILE INSTALLED WITH ORGANIC ADHESIVE

- A. Installation of Tile: ANSI A108.4.

3.9 THIN SET CERAMIC TILE INSTALLED WITH CHEMICAL-RESISTANT BOND COAT

- A. Epoxy Resin Type: Install tile in accordance with Installation of Tile with Epoxy Mortar; ANSI A108.6.
- B. Furan Resin Type: Proportion, mix and place in accordance with the manufacturer's printed instructions. Set tile in accordance with ANSI A108.8.

3.10 GROUTING

- A. Grout Type and Location:

1. Grout for glazed wall and base tile, paver tile and unglazed mosaic tile Portland cement grout, latex-Portland cement grout, dry-set grout, or commercial Portland cement grout.

B. Workmanship:

1. Install and cure grout in accordance with the applicable standard.
2. Portland Cement grout: ANSI A108.10.
3. Epoxy Grout: ANSI A108.6.
4. Furan and Commercial Portland Cement Grout: ANSI A108.8 and in accordance with the manufacturer's printed instructions.
5. Dry-set grout: ANSI A108.5.

3.11 MOVEMENT JOINTS

- A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
- B. TCA details EJ 171-02.
- C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.
- D. Rake out grout at joints between tile, at toe of base, and where shown not less than 6 mm (1/4 inch) deep.

3.12 CLEANING

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used shall not damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with epoxy, furan and commercial Portland cement grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

3.13 PROTECTION

- A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.
- B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

3.14 TESTING FINISH FLOOR

- A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.

- - - E N D - - -