SECTION 093500 - CHEMICAL-RESISTANT TILING

Revise this Section by deleting and inserting text to meet Project-specific requirements.

Verify that Section titles referenced in this Section are correct for this Project's Specifications; Section titles may have changed.

1. GENERAL
   * + 1. RELATED DOCUMENTS
          1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
       2. SUMMARY
          1. Section Includes:

Chemical-resistant tile.

Tile backing panels.

* + - 1. DEFINITIONS
         1. General: Definitions in the ANSI A108 series of tile installation standards and in ANSI A137.1 apply to Work of this Section unless otherwise specified.
         2. ANSI A108 Series: ANSI A108.01, ANSI A108.02, ANSI A108.6, ANSI A108.8, ANSI A108.9, ANSI A108.10, ANSI A108.11, ANSI A108.13, and ANSI A108.17, which are contained in its "Specifications for Installation of Ceramic Tile."

Retain terms that remain after this Section has been edited for a project. Coordinate with tile sizes used in "Chemical-Resistant Tile Products" Article.

* + - * 1. Face Size: Actual tile size, excluding spacer lugs.
      1. PREINSTALLATION MEETINGS

Retain "Preinstallation Conference" paragraph below if Work of this Section is extensive or complex enough to justify a conference.

* + - * 1. Preinstallation Conference: Conduct conference at Project site.

Review requirements in ANSI A108.01 for substrates and for preparation by other trades.

* + - 1. SUBMITTALS
         1. General: Submittals for this section are subject to the re-evaluation fee identified in Article 4 of the General Conditions.
         2. Manufacturer’s installation instructions shall be provided along with product data.
         3. Submittals shall be provided in the order in which they are specified and tabbed (for combined submittals).
         4. Product Data: For each type of product.
         5. Sustainable Design Submittals:

Retain "Shop Drawings" paragraph below if tile installations are complex enough to justify Shop Drawings.

* + - * 1. Shop Drawings: Show locations of each type of tile and tile pattern. Show widths, details, and locations of expansion, contraction, control, and isolation joints in tile substrates and finished tile surfaces.
        2. Samples: For each type of tile.

Coordinate "Qualification Data" paragraph below with qualification requirements in "Quality Assurance" Article.

* + - * 1. Qualification Data: For Installer.

Name of each person who will be performing the work, trade certificates, and their employer’s name, business address, and telephone number.

Names and addresses of 3 similar projects that each person has worked on during the past 5 years.

Certificates in "Master Grade Certificates" paragraph below are issued by manufacturers, indicating type and grade of tile according to ANSI A137.1 and that tile complies with this standard. Delete if not required or unavailable, as may be the case with imported tile.

* + - * 1. Master Grade Certificates: For each shipment, type, and composition of tile, signed by tile manufacturer and Installer.

Retain "Product Certificates" paragraph below to require submittal of product certificates from manufacturers.

* + - * 1. Product Certificates: For each type of product.

Retain option if needed to establish compliance of products with characteristics specified.

* + - * 1. Product Test Reports: For tile-setting and -grouting products.
      1. QUALITY ASSURANCE
         1. Installer Qualifications:

Installer employs only Ceramic Tile Education Foundation Certified Installers or installers recognized by the U.S. Department of Labor as Journeyman Tile Layers for Project.

Installer employs at least one installer for Project that has completed the Advanced Certification for Tile Installers (ACT) certification for installation of [**mud floors**] [**mud walls**] [**membranes**] [**shower receptors**] [**gauged porcelain tile/gauged porcelain tile panels and slabs**] [**and**] [**large format tile**].

* + - 1. DELIVERY, STORAGE, AND HANDLING
         1. Deliver and store packaged materials in original containers with seals unbroken and labels intact until time of use. Comply with requirements in ANSI A137.1 for labeling tile packages.
         2. Store tile on elevated platforms, under cover, and in a dry location.
         3. Store liquid materials in unopened containers and protected from freezing.
         4. Handle tile that has temporary protective coating on exposed surfaces to prevent coated surfaces from contacting backs or edges of other units. If coating does contact bonding surfaces of tile, remove coating from bonding surfaces before setting tile.
      2. FIELD CONDITIONS
         1. Environmental Limitations: Do not install tile until construction in spaces is complete and ambient temperature and humidity conditions are maintained at the levels indicated in referenced standards and manufacturer's written instructions.

1. PRODUCTS

See Editing Instruction No. 1 in the Evaluations for cautions about named manufacturers and products.

* + - 1. MANUFACTURERS
         1. Source Limitations for Tile: Obtain tile of each type and color or finish from single source or producer and from same production run.
         2. Source Limitations for Setting and Grouting Materials: Obtain setting and grouting materials from single manufacturer.
      2. PRODUCTS, GENERAL

Revise or delete "ANSI Ceramic Tile Standard" paragraph below if another standard is used to specify tile products.

* + - * 1. ANSI Ceramic Tile Standard: Provide tile that complies with ANSI A137.1 for types, compositions, and other characteristics indicated.
        2. ANSI Standards for Tile Installation Materials: Provide materials complying with ANSI A108.02, ANSI standards referenced in other Part 2 articles, ANSI standards referenced by TCNA installation methods specified in tile installation schedules, and other requirements specified.
        3. Factory Blending: For tile exhibiting color variations within ranges, blend tile in factory and package so tile units taken from one package show same range in colors as those taken from other packages and match approved Samples.
        4. Factory-Applied Temporary Protective Coating: Where indicated under tile type, protect exposed surfaces of tile against adherence of mortar and grout by precoating with continuous film of petroleum paraffin wax, applied hot. Do not coat unexposed tile surfaces.
      1. CHEMICAL-RESISTANT TILE PRODUCTS
         1. Chemical-Resistant Tile Type[**CRT-**<**#**>]: Unglazed square-edged quarry tile.

[Manufacturers:](http://www.specagent.com/Lookup?ulid=9356) Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to the following:

[Daltile](http://www.specagent.com/Lookup?uid=123457129726).

[Metropolitan Ceramics](http://www.specagent.com/Lookup?uid=123457129730).

[Summitville Tiles, Inc](http://www.specagent.com/Lookup?uid=123457129734).

Approved equivalent.

Face Size: [**3 by 3 inches**] [**4 by 4 inches**] [**6 by 3 inches**] [**6 by 6 inches**] [**8 by 3-7/8 inches**] [**8 by 8 inches**].

Thickness: [**3/8 inch**] [**1/2 inch**] [**3/4 inch**].

If striated surface or raised pattern is required, insert description in "Wearing Surface" subparagraph below.

Wearing Surface: [**Nonabrasive, smooth**] [**Abrasive aggregate embedded in surface**].

Dynamic Coefficient of Friction: Not less than 0.42.

Tile Color and Pattern: [**As indicated by manufacturer's designations**] [**Match Director’s Representative's sample**] [**As selected by Director’s Representative from manufacturer's full range**].

Grout Color: [**As indicated by manufacturer's designations**] [**Match Director’s Representative's sample**] [**As selected by Director’s Representative from manufacturer's full range**].

Retain first subparagraph below if applicable. If retaining, coordinate with coating requirements specified elsewhere in this Section.

Precoat with temporary protective coating.

If trim units do not match adjoining flat tile, copy and re-edit "Trim Units" subparagraph separately for trim units, deleting option.

Trim Units: Coordinated with sizes and coursing of adjoining flat tile where applicable and matching characteristics of adjoining flat tile. Provide shapes as follows, selected from manufacturer's standard shapes:

Retain shape requirements from options in subparagraphs below that suit installation methods. Revise or supplement subparagraphs to suit Project.

Base: Coved[**with surface bullnose top edge**], face size [**6 by 6 inches**] [**8 by 3-7/8 inches**].

Wainscot Cap: Surface bullnose, face size [**6 by 6 inches**] [**8 by 3-7/8 inches**].

Wainscot Cap for Flush Conditions: Regular flat tile for conditions where tile wainscot is shown flush with wall surface above it, same size as adjoining flat tile.

Insert other shapes if required.

* + - 1. TILE BACKING PANELS
         1. Cementitious Backer Units: ANSI A118.9 or ASTM C1325, Type A, in maximum lengths available to minimize end-to-end butt joints.

[Products:](http://www.specagent.com/Lookup?ulid=277) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457129805); WonderBoard® Lite Backerboard.

[Georgia-Pacific Gypsum LLC](http://www.specagent.com/Lookup?uid=123457129807); DensShield® Tile Backer.

[USG Corporation](http://www.specagent.com/Lookup?uid=123457129809); DUROCK Cement Board.

Approved equivalent.

Coordinate thickness in "Thickness" subparagraph below with products selected.

Thickness: [**1/2 inch**] [**5/8 inch**] [**As indicated**].

* + - 1. WATERPROOF MEMBRANE

ANSI A118.10 specifies waterproof membranes for use under thinset tile installations.

* + - * 1. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.10 and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
        2. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and continuous fabric reinforcement.

[Products:](http://www.specagent.com/Lookup?ulid=9328) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Boiardi Products Corporation; a QEP company](http://www.specagent.com/Lookup?uid=123457138060); Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457138063); Custom® 9240 Waterproofing and Anti­Fracture Membrane.

[Laticrete International, Inc](http://www.specagent.com/Lookup?uid=123457138064).; Laticrete 9235 Waterproofing Membrane.

[MAPEI Corporation](http://www.specagent.com/Lookup?uid=123457138065); Mapelastic 315.

[Summitville Tiles, Inc](http://www.specagent.com/Lookup?uid=123457138068).; S-9000.

Approved equivalent.

* + - * 1. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

[Products:](http://www.specagent.com/Lookup?ulid=9329) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Boiardi Products Corporation; a QEP company](http://www.specagent.com/Lookup?uid=123457138073); Elastiment 644 Membrane Waterproofing System.

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457138077); RedGard® Waterproofing and Crack Prevention Membrane.

[Laticrete International, Inc](http://www.specagent.com/Lookup?uid=123457138079).; Laticrete Hydro Ban®.

[MAPEI Corporation](http://www.specagent.com/Lookup?uid=123457138080);Mapelastic AquaDefense.

Approved equivalent.

* + - 1. CRACK ISOLATION MEMBRANE

Before retaining products listed in this article, verify that they comply with ANSI A118.12 performance level retained in "General" paragraph below. Standard performance corresponds to a 1/16-inch gap; high performance to a 1/8-inch gap.

* + - * 1. General: Manufacturer's standard product, selected from the following, that complies with ANSI A118.12 for high performance and is recommended by the manufacturer for the application indicated. Include reinforcement and accessories recommended by manufacturer.
        2. Fabric-Reinforced, Fluid-Applied Membrane: System consisting of liquid-latex rubber or elastomeric polymer and fabric reinforcement.

[Products:](http://www.specagent.com/Lookup?ulid=9337) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Boiardi Products Corporation; a QEP company](http://www.specagent.com/Lookup?uid=123457138117); Elastiment 344 Reinforced Waterproofing and Anti-Fracture/Crack Suppression Membrane.

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457138120); Custom® 9240 Waterproofing and Anti­Fracture Membrane.

[Laticrete International, Inc](http://www.specagent.com/Lookup?uid=123457138121).; Laticrete Blue 92 Anti-Fracture Membrane.

[MAPEI Corporation](http://www.specagent.com/Lookup?uid=123457138122); Mapelastic 315.

[Summitville Tiles, Inc](http://www.specagent.com/Lookup?uid=123457138125).; S-9000.

Approved equivalent.

* + - * 1. Fluid-Applied Membrane: Liquid-latex rubber or elastomeric polymer.

[Products:](http://www.specagent.com/Lookup?ulid=9338) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457138131); RedGard® Waterproofing and Crack Prevention Membrane.

[Laticrete International, Inc](http://www.specagent.com/Lookup?uid=123457138133).; Laticrete Fracture Ban SC.

[MAPEI Corporation](http://www.specagent.com/Lookup?uid=123457138134); Mapeleastic CI.

Approved equivalent.

* + - 1. SETTING MATERIALS
         1. Portland Cement Mortar (Thickset) Installation Materials: ANSI A108.02.

Cleavage Membrane: Asphalt felt, ASTM D226, Type I (No. 15); or polyethylene sheeting, ASTM D4397, 4.0 mils thick.

Retain "Reinforcing Wire Fabric" subparagraph below for reinforced mortar bed.

Reinforcing Wire Fabric: Galvanized, welded-wire fabric, 2 by 2 inches by 0.062-inch diameter; comply with ASTM A185/A185M and ASTM A82, except for minimum wire size.

Retain "Expanded Metal Lath" subparagraph below for portland cement plaster scratch coat. Delete if scratch coat is specified in Section 092400 "Cement Plastering."

Expanded Metal Lath: Diamond-mesh lath complying with ASTM C847.

Base Metal and Finish for Interior Applications: Uncoated or zinc-coated (galvanized) steel sheet, with uncoated steel sheet painted after fabrication into lath.

Base Metal and Finish for Exterior Applications: Zinc-coated (galvanized) steel sheet.

Configuration over Studs and Furring: Flat.

Configuration over Solid Surfaces: Self furring.

Weight: [**2.5 lb/sq. yd.**] [**3.4 lb/sq. yd.**].

* + - * 1. Water-Cleanable, Tile-Setting Epoxy: ANSI A118.3.

[Products:](http://www.specagent.com/Lookup?ulid=9345) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457129784); EBM­Lite™ Premium Epoxy Bonding Mortar — 100% Solids.

[Laticrete International, Inc](http://www.specagent.com/Lookup?uid=123457129786).; Laticrete Latapoxy® 300 Adhesive.

[MAPEI Corporation](http://www.specagent.com/Lookup?uid=123457129787); Kerapoxy 410.

[Summitville Tiles, Inc](http://www.specagent.com/Lookup?uid=123457129790).; S-300 Epoxy Setting Adhesive.

Approved equivalent.

Subparagraph below is an example only. Delete if not required or revise to suit Project. Some products claim resistance of up to 350 deg F (176 deg C). See the Evaluations.

Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

Insert additional subparagraphs specifying chemical-resistance performance criteria if required. See ANSI A118.3 and ASTM C267.

Chemical-resistant furan mortar has better heat resistance than epoxies but cannot generally be used directly over concrete. Revise "Chemical-Resistant Furan Mortar" paragraph below if silica or other fillers are required.

* + - * 1. Chemical-Resistant Furan Mortar: ANSI A118.5, with [**carbon**][**silica**] filler.

[Products:](http://www.specagent.com/Lookup?ulid=9357) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Atlas Minerals & Chemicals, Inc](http://www.specagent.com/Lookup?uid=123457129793); [**Alkor Mortar**][**Corbo-Alkor Mortar**].

[Sauereisen](http://www.specagent.com/Lookup?uid=123457129794); Furan Resin Mortar/Grout No. 21C.

Summitville Tile Inc.; S-4000 Furan Chemical Resistant Mortar & Grout

Approved equivalent.

Insert additional subparagraphs specifying chemical-resistance performance criteria if required. See ANSI A118.3 and ASTM C267.

* + - 1. GROUT MATERIALS
         1. Water-Cleanable Epoxy Grout: ANSI A118.3.

[Products:](http://www.specagent.com/Lookup?ulid=9349) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Custom Building Products](http://www.specagent.com/Lookup?uid=123457129714);CEG-IG 100% Solids Industrial Grade Epoxy Grout.

[Laticrete International, Inc](http://www.specagent.com/Lookup?uid=123457129716).; Laticrete Spectralock® 2000 IG.

[MAPEI Corporation](http://www.specagent.com/Lookup?uid=123457129717); Kerapoxy® IEG CQ.

[Summitville Tiles, Inc](http://www.specagent.com/Lookup?uid=123457129720).; S-600 Setting & Grouting Epoxy.

Approved equivalent.

Subparagraph below is an example only. Some products claim resistance of up to 350 deg F (176 deg C). Revise to suit Project. See the Evaluations.

Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 140 and 212 deg F, respectively, and certified by manufacturer for intended use.

Insert additional subparagraphs specifying chemical-resistance performance criteria if required. See ANSI A118.3 and ASTM C267; the latter is test method for determining chemical resistance of mortars and grouts. See the Evaluations.

Chemical-resistant furan grout can withstand higher temperatures than epoxies but is available only in black color and requires special precautions, because smears can be impossible to remove.

* + - * 1. Chemical-Resistant Furan Grout: ANSI A118.5, with carbon filler.

[Products:](http://www.specagent.com/Lookup?ulid=9358) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Atlas Minerals & Chemicals, Inc](http://www.specagent.com/Lookup?uid=123457129796); Furathane Grout.

[Sauereisen](http://www.specagent.com/Lookup?uid=123457129797); Furan Resin Mortar/Grout No. 21C.

Summitville Tile Inc.; S-4000 Furan Chemical Resistant Mortar & Grout.

Approved equivalent.

Insert subparagraphs specifying chemical-resistance performance criteria if required. See ANSI A118.3 and ASTM C267; the latter is test method for determining chemical resistance of mortars and grouts. See the Evaluations.

* + - * 1. Chemical-Resistant Vinyl-Ester Resin Grout: ASTM C658.

[Products:](http://www.specagent.com/Lookup?ulid=9359) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

[Atlas Minerals & Chemicals, Inc](http://www.specagent.com/Lookup?uid=123457129799); Chemester Grout.

ChemMasters; PolyTops CR Grout.

Blome International; CP-104 Vinyl Ester Resin Tile Grout.

Approved equivalent.

* + - 1. ELASTOMERIC SEALANTS
         1. General: Provide sealants, primers, backer rods, and other sealant accessories that comply with the following requirements and with the applicable requirements in Section 079200 "Joint Sealants."

Use primers, backer rods, and sealant accessories recommended by sealant manufacturer.

Revise "Colors" paragraph below if color matching is not possible with sealant products selected, which may be the case with mildew-resistant sealants from some manufacturers.

* + - * 1. Colors: Provide colors of exposed sealants to match colors of grout in tile adjoining sealed joints unless otherwise indicated.
        2. Chemical-Resistant Sealants: Provide chemical-resistant elastomeric sealant of type recommended and produced by chemical-resistant mortar and grout manufacturer for type of application indicated, with proven service record and compatibility with tile and other setting materials, and with chemical resistance equivalent to mortar/grout.

[Products:](http://www.specagent.com/Lookup?ulid=9359) Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to the following:

Euclid Chemical Company; Eucolastic 1SL.

Master Builders, a Sika, Inc company; MasterSeal CR 640.

W.R. Meadows, Inc.; Pourthane SL.

Approved equivalent.

* + - 1. MISCELLANEOUS MATERIALS

Delete "Trowelable Underlayments and Patching Compounds" paragraph below if tile is not applied over concrete substrates.

* + - * 1. Trowelable Underlayments and Patching Compounds: Latex-modified, portland cement-based formulation provided or approved by manufacturer of tile-setting materials for installations indicated.
        2. Temporary Protective Coating: Petroleum paraffin wax, fully refined and odorless, containing at least 0.5 percent oil with a melting point of 120 to 140 deg F according to ASTM D87 and formulated to protect exposed surfaces of tile against adherence of mortar and grout; compatible with tile, mortar, and grout products; and easily removable after grouting is completed without damaging grout or tile.
        3. Tile Cleaner: A neutral cleaner capable of removing soil and residue without harming tile and grout surfaces, specifically approved for materials and installations indicated by tile and grout manufacturers.
      1. MIXING MORTARS AND GROUT
         1. Mix mortars and grouts to comply with referenced standards and mortar and grout manufacturers' written instructions.
         2. Add materials, water, and additives in accurate proportions.
         3. Obtain and use type of mixing equipment, mixer speeds, mixing containers, mixing time, and other procedures to produce mortars and grouts of uniform quality with optimum performance characteristics for installations indicated.

1. EXECUTION
   * + 1. EXAMINATION

Coordinate substrate tolerances, finishes, and curing methods specified in Section 033000 "Cast-in-Place Concrete" with requirements in the ANSI A108 series of tile installation standards.

* + - * 1. Examine substrates, areas, and conditions where tile will be installed, with Installer present, for compliance with requirements for installation tolerances and other conditions affecting performance of the Work.

Verify that substrates for setting tile are firm; dry; clean; free of coatings that are incompatible with tile-setting materials, including curing compounds and other substances that contain soap, wax, oil, or silicone; and comply with flatness tolerances required by ANSI A108.01 for installations indicated.

Verify that concrete substrates for tile floors comply with surface finish requirements in ANSI A108.01 for installations indicated.

Verify that surfaces that received a steel trowel finish have been mechanically scarified.

Verify that protrusions, bumps, and ridges have been removed by sanding or grinding.

Verify that installation of grounds, anchors, recessed frames, electrical and mechanical units of work, and similar items located in or behind tile has been completed.

Verify that joints and cracks in tile substrates are coordinated with tile joint locations; if not coordinated, adjust joint locations in consultation with Director’s Representative.

* + - * 1. Proceed with installation only after unsatisfactory conditions have been corrected.
      1. PREPARATION
         1. Fill cracks, holes, and depressions in concrete substrates for tile floors with trowelable leveling and patching compound specifically recommended by tile-setting material manufacturer.
         2. Blending: For tile exhibiting color variations, verify that tile has been factory blended and packaged so tile units taken from one package show same range of colors as those taken from other packages and match approved Samples. If not factory blended, either return to manufacturer or blend tiles at Project site before installing.

Delete "Field-Applied Temporary Protective Coating" paragraph below if not required. If required, retain "Temporary Protective Coating" paragraph in "Miscellaneous Materials" Article. See the Evaluations.

* + - * 1. Field-Applied Temporary Protective Coating: If indicated under tile type or needed to prevent grout from staining or adhering to exposed tile surfaces, precoat them with continuous film of temporary protective coating, taking care not to coat unexposed tile surfaces.
      1. INSTALLATION OF CHEMICAL-RESISTANT TILE
         1. Comply with TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" for TCNA installation methods specified in tile installation schedules. Comply with parts of the ANSI A108 series "Specifications for Installation of Ceramic Tile" that are referenced in TCNA installation methods, specified in tile installation schedules, and apply to types of setting and grouting materials used.
         2. Extend tile work into recesses and under or behind equipment and fixtures to form complete covering without interruptions unless otherwise indicated. Terminate work neatly at obstructions, edges, and corners without disrupting pattern or joint alignments.
         3. Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish, or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures, and other penetrations so plates, collars, or covers overlap tile.

Usually retain first paragraph below unless trim shapes are unavailable for specified tile.

* + - * 1. Provide manufacturer's standard trim shapes where necessary to eliminate exposed tile edges.
        2. Jointing Pattern: Lay tile in grid pattern unless otherwise indicated. Lay out tile work and center tile fields in both directions in each space or on each wall area. Lay out tile work to minimize the use of pieces that are less than half of a tile. Provide uniform joint widths unless otherwise indicated.

Where adjoining tiles on floor, base, walls, or trim are specified or indicated to be same size, align joints.

Where tiles are specified or indicated to be whole integer multiples of adjoining tiles on floor, base, walls, or trim, align joints unless otherwise indicated.

* + - * 1. Joint Widths: Unless otherwise indicated, install tile with [**1/4-inch**] [**3/8-inch**] joint width.

Retain first paragraph below for wainscots. Verify that instruction agrees with detailing.

* + - * 1. Lay out tile wainscots to dimensions indicated or to next full tile beyond dimensions indicated.

Refer to TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" and to the ANSI A108 series of tile installation standards for data on expansion joints. These standards require that joint locations be indicated on Drawings.

* + - * 1. Expansion Joints: Provide expansion joints and other sealant-filled joints, including control, contraction, and isolation joints, where indicated. Form joints during installation of setting materials, mortar beds, and tile. Do not saw-cut joints after installing tiles.

Where joints occur in concrete substrates, locate joints in tile surfaces directly above them.

Delete subparagraph below if joint sealants are specified in Section 079200 "Joint Sealants."

Prepare joints and apply sealants to comply with requirements in Section 079200 "Joint Sealants."

* + - 1. INSTALLATION OF TILE BACKING PANEL
         1. Install [**cementitious backer units**] [**and**] [**fiber-cement backer board**] and treat joints according to ANSI A108.11 and manufacturer's written instructions for type of application indicated.
      2. CLEANING AND PROTECTING
         1. Cleaning: On completion of placement and grouting, clean all ceramic tile surfaces so they are free of foreign matter.

Remove grout residue from tile as soon as possible.

Clean grout smears and haze from tile according to tile and grout manufacturer's written instructions but no sooner than 10 days after installation. Use only cleaners recommended by tile and grout manufacturers and only after determining that cleaners are safe to use by testing on samples of tile and other surfaces to be cleaned. Protect metal surfaces and plumbing fixtures from effects of cleaning. Flush surfaces with clean water before and after cleaning.

Remove temporary protective coating by method recommended by coating manufacturer and that is acceptable to tile and grout manufacturer. Trap and remove coating to prevent drain clogging.

* + - * 1. Protect installed tile work with kraft paper or other heavy covering during construction period to prevent staining, damage, and wear. If recommended by tile manufacturer, apply coat of neutral protective cleaner to completed tile walls and floors.
        2. Prohibit foot and wheel traffic from tiled floors for at least seven days after grouting is completed.
        3. Before final inspection, remove protective coverings and rinse neutral protective cleaner from tile surfaces.
      1. CHEMICAL-RESISTANT TILE INSTALLATION SCHEDULE

"Chemical-Resistant Tile Installation" subparagraphs in this article are based on TCNA installation methods. Have a copy of TCNA's "Handbook for Ceramic, Glass, and Stone Tile Installation" at hand while editing this schedule. Not all interior installation methods in the "TCNA Handbook" are included in this schedule; insert others if required.

Chemical-resistant tile installation designations in this article can be used on Drawings. If substrate descriptions are sufficient to indicate where each installation type is required, tile-type designations can be indicated on Drawings instead of tile installation designations, and tile types can be deleted from tile installation subparagraphs. If tile installation designations are used on Drawings and more than one tile type is required for a particular installation method, copy and re-edit an installation subparagraph for each tile type.

* + - * 1. Interior Floor Installations, Concrete:

ANSI A108.1A is wet-set method, ANSI A108.1B is cured-bed method, and ANSI A108.1C allows Contractor choice of using either method. Note that most furan grouts are incompatible with portland cement setting materials. If epoxy grout is used and floors are to be cleaned by hosing with extremely hot water, include requirements for heat resistance in "Water-Cleanable Epoxy Grout" paragraph in "Grout Materials" Article.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA F114 and [**ANSI A108.1A**] [**ANSI A108.1B**] [**ANSI A108.1C**]; cement mortar bed (thickset) with cleavage membrane.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Bond Coat for Cured-Bed Method: [**Dry-set**] [**Latex-**] [**Medium-bed, latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant furan**] [**Chemical-resistant vinyl-ester**].

Note that most furan grouts are incompatible with portland cement setting materials. If epoxy grout is used and floors are to be cleaned by hosing with extremely hot water, include requirements for heat resistance in "Water-Cleanable Epoxy Grout" paragraph in "Grout Materials" Article.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA F115; thinset mortar.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Thinset Mortar: [**Dry-set**] [**Latex-**] [**Medium-bed, latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant furan**] [**Chemical-resistant vinyl-ester**].

If floors are to be cleaned by hosing with extremely hot water, include requirements for heat resistance in "Water-Cleanable, Tile-Setting Epoxy" paragraph in "Setting Materials" Article.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA F131; water-cleanable, tile-setting epoxy.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

If floors are to be cleaned by hosing with extremely hot water, include requirements for heat resistance in "Water-Cleanable, Tile-Setting Epoxy" paragraph in "Setting Materials" Article.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA F132; Water-cleanable, tile-setting epoxy on cured cement mortar bed [**bonded to concrete subfloor**] [**installed over cleavage membrane**].

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

TCNA method in "Chemical-Resistant Tile Installation (Insert designation)" subparagraph below specifies installation in chemical-resistant furan mortar over concrete, which is generally inadvisable because most furan resins cannot be used in contact with concrete. Either retain option for epoxy rather than furan for setting material or revise requirements for chemical-resistant furan mortar in "Setting Materials" Article after verifying availability of products that are compatible with concrete. If epoxy setting material is used and floors are to be cleaned by hosing with extremely hot water, requirements for heat resistance should be included in "Water-Cleanable, Tile-Setting Epoxy" paragraph in "Setting Materials" Article.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA F133[**except use water-cleanable, tile-setting epoxy instead of furan mortar**]; furan grout.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Bond Coat: [**Chemical-resistant furan mortar**] [**Water-cleanable, tile-setting epoxy**].

Grout: Chemical-resistant furan grout.

* + - * 1. Interior Wall Installations, Masonry or Concrete:

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA W202; thinset mortar.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Thinset Mortar: [**Dry-set**] [**Latex-**] [**Medium-bed, latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

ANSI A108.1A is wet-set method, ANSI A108.1B is cured-bed method, and ANSI A108.1C allows Contractor choice of using either method.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA W211 and [**ANSI A108.1A**] [**ANSI A108.1B**] [**ANSI A108.1C**]; cement mortar bed (thickset) bonded to substrate.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

"Bond Coat for Wet-Set Method" subparagraph below is optional with ANSI A108.1A and ANSI A108.1C. If retaining either standard in last "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above, retain one mortar type from options below or delete subparagraph if unmodified portland cement is acceptable. Delete below if retaining ANSI A108.1B.

Bond Coat for Wet-Set Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Retain one thinset mortar from options in "Bond Coat for Cured-Bed Method" subparagraph below if retaining ANSI A108.1B or ANSI A108.1C in last "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above; delete subparagraph below if retaining ANSI A108.1A.

Bond Coat for Cured-Bed Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

ANSI A108.1A is wet-set method, ANSI A108.1B is cured-bed method, and ANSI A108.1C allows Contractor choice of using either method.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA W221 and [**ANSI A108.1A**] [**ANSI A108.1B**] [**ANSI A108.1C**]; cement mortar bed (thickset) on metal lath [**over cleavage membrane**] [**over waterproof membrane**].

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

"Bond Coat for Wet-Set Method" subparagraph below is optional with ANSI A108.1A and ANSI A108.1C. If retaining either standard in last "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above, retain one mortar type from options below or delete subparagraph if unmodified portland cement is acceptable. Delete below if retaining ANSI A108.1B.

Bond Coat for Wet-Set Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Retain one thinset mortar from options in "Bond Coat for Cured-Bed Method" subparagraph below if retaining ANSI A108.1B or ANSI A108.1C in last "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above; delete subparagraph below if retaining ANSI A108.1A.

Bond Coat for Cured-Bed Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

* + - * 1. Interior Wall Installations, Wood or Metal Studs or Furring:

ANSI A108.1A is wet-set method, ANSI A108.1B is cured-bed method, and ANSI A108.1C allows Contractor choice of using either method.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA W221 and [**ANSI A108.1A**] [**ANSI A108.1B**] [**ANSI A108.1C**]; cement mortar bed (thickset) [**over cleavage membrane**] [**over waterproof membrane**] on solid backing.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

"Bond Coat for Wet-Set Method" subparagraph below is optional with ANSI A108.1A and ANSI A108.1C. If retaining either standard in "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above, retain one mortar type from options below or delete subparagraph if unmodified portland cement is acceptable. Delete below if retaining ANSI A108.1B.

Bond Coat for Wet-Set Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Retain one thinset mortar from options in "Bond Coat for Cured-Bed Method" subparagraph below if retaining ANSI A108.1B or ANSI A108.1C in "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above; delete subparagraph below if retaining ANSI A108.1A.

Bond Coat for Cured-Bed Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

ANSI A108.1A is wet-set method, ANSI A108.1B is cured-bed method, and ANSI A108.1C allows Contractor choice of using either method.

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA W222 and [**ANSI A108.1A**] [**ANSI A108.1B**] [**ANSI A108.1C**]; one-coat cement mortar bed (thickset) [**over cleavage membrane**] [**over waterproof membrane**] on solid backing.

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

"Bond Coat for Wet-Set Method" subparagraph below is optional with ANSI A108.1A and ANSI A108.1C. If retaining either standard in last "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above, retain one mortar type from options below or delete subparagraph if unmodified portland cement is acceptable. Delete below if retaining ANSI A108.1B.

Bond Coat for Wet-Set Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Retain one thinset mortar from options in "Bond Coat for Cured-Bed Method" subparagraph below if retaining ANSI A108.1B or ANSI A108.1C in last "Chemical-Resistant Tile Installation (Insert designation)" subparagraph above; delete subparagraph below if retaining ANSI A108.1A.

Bond Coat for Cured-Bed Method: [**Dry-set**] [**Latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

Chemical-Resistant Tile Installation <**Insert designation**>: TCNA W244C or TCNA W244F; thinset mortar on cementitious backer units or fiber-cement backer board[**over vapor-retarder membrane**].

Chemical-Resistant Tile Type: <**Insert tile-type designation**>.

Thinset Mortar: [**Dry-set**] [**Latex-**] portland cement mortar.

Grout: [**Water-cleanable epoxy**] [**Chemical-resistant vinyl-ester**].

END OF SECTION 093500