
USACE / NAVFAC / AFCEA / NASA UFGS-09 30 00 (August 2010)

Preparing Activity: USACE Superseding
UFGS-09 30 00 (January 2007)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2013

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08/10

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SECTION 09 30 00

CERAMIC TILE, QUARRY TILE, AND PAVER TILE 08/10

NOTE: This guide specification covers the requirements for ceramic tile for walls and floors, porcelain tile, quarry tile, paver tile, and marble thresholds.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).

PART 1 GENERAL

NOTE: Tile grouted with epoxy or furan resin is included in this specification, but quarry tile subject to severe chemical exposures is specified in Section 09 35 16 CHEMICAL-RESISTANT QUARRY TILE.

For Army facilities, buildings not excluded by UFC 3-301-01 or TI 800-01 Design Criteria will be accessible in accordance with 36 CFR, Part 1191, Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities.

Drawings will indicate location, dimensions, elevations, schedules, content, details and such other information as required to indicate the extent

of the work.

Product selections must be based on esthetic values, function, type of facility, and cost as related to project needs.

1.1 REFERENCES

NOTE: This paragraph is used to list the publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the text by the basic designation only.

ASTM INTERNATIONAL (ASTM)

ASTM A185/A185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM C1026	(2010) Standard Test Method for Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling
ASTM C1027	(2009) Standard Test Method for Determining Visible Abrasion Resistance of Glazed Ceramic Tile
ASTM C1028	(2007; E 2010) Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
ASTM C1178/C1178M	(2011) Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel
ASTM C144	(2011) Standard Specification for Aggregate for Masonry Mortar

ASTM C150/C150M	(2012) Standard Specification for Portland Cement
ASTM C206	(2003; R 2009) Standard Specification for Finishing Hydrated Lime
ASTM C207	(2006; R 2011) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C241/C241M	(2009) Standard Specification for Abrasion Resistance of Stone Subjected to Foot Traffic
ASTM C33/C33M	(2013) Standard Specification for Concrete Aggregates
ASTM C373	(1988; R 2006) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
ASTM C482	(2002; R 2009) Bond Strength of Ceramic Tile to Portland Cement
ASTM C501	(1984; R 2009) Relative Resistance to Wear of Unglazed Ceramic Tile by the Taber Abraser
ASTM C648	(2004; R 2009) Breaking Strength of Ceramic Tile
ASTM C847	(2012) Standard Specification for Metal Lath
ASTM D2103	(2010) Standard Specification for Polyethylene Film and Sheeting
ASTM D226/D226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D4068	(2009) Chlorinated Polyethylene Sheeting for Concealed Water-Containment Membrane
ASTM E2129	(2010) Standard Practice for Data Collection for Sustainability Assessment of Building Products
ASTM F446	(1985; R 2009) Grab Bars and Accessories Installed in the Bathing Area

BAY AREA AIR QUALITY MANAGEMENT DISTRICT (Bay Area AQMD)

Bay Area AQMD Rule 8-51	(1992; R 2001) Adhesive and Sealant Products
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GREEN SEAL (GS)

GS-36 (2000) Commercial Adhesives

MARBLE INSTITUTE OF AMERICA (MIA)

MIA Design Manual (2003) Dimension Stone Design Manual

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 99 (2012; TIA 11-1; TIA 11-2; Errata 12-1)
Health Care Facilities Code

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168 (1989; R 2005) Adhesive and Sealant
Applications

TILE COUNCIL OF NORTH AMERICA (TCNA)

TCA Hdbk (2010) Handbook for Ceramic Tile
Installation

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED GBDC (2009) LEED Reference Guide for Green
Building Design and Construction

LEED NC (2009) Leadership in Energy and
Environmental Design(tm) New Construction
Rating System

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191 Americans with Disabilities Act (ADA)
Accessibility Guidelines for Buildings and
Facilities; Architectural Barriers Act
(ABA) Accessibility Guidelines

1.2 SYSTEM DESCRIPTION

1.2.1 General Requirements

Close space, in which tile is being set, to traffic and other work. Keep closed until tile is firmly set. Do not walk or work on newly tiled floors without using kneeling boards or equivalent protection of the tiled surface. Keep traffic off horizontal portland cement mortar installations for at least 72 hours. Keep all traffic off epoxy installed floors for at least 40 hours after grouting, and heavy traffic off for at least 7 days, unless otherwise specifically authorized by manufacturer. For materials like Tile, Accessories, and marble Thresholds submit Samples of sufficient size to show color range, pattern, type and joints.

1.2.2 Local/Regional Materials

Submit documentation indicating distance between manufacturing facility and the project site and also the distance of raw material origin from the project site. For Tile and Reinforcing Wire Fabric indicate percentage of post-industrial and post-consumer recycled content per unit of product.

Indicate relative dollar value of recycled content products to total dollar value of products included in project.

1.2.3 Environmental Data

NOTE: ASTM E2129 provides for detailed documentation of the sustainability aspects of products used in the project. This level of detail may be useful to the Contractor, Government, building occupants, or the public in assessing the sustainability of these products.

[Submit Table 1 of ASTM E2129 for the following products: [____].]

1.3 SUSTAINABILITY REQUIREMENTS

NOTE: The bracketed items are representative of LEED material documentation and requirements that may apply to this project. These items should be edited to reflect the project requirements.

Materials in this technical specification may contribute towards contract compliance with sustainability requirements. See Section 01 33 29 LEED DOCUMENTATION for project LEED NC [local/regional materials,] [low-emitting materials,] [recycled content,] [____] [and] [rapidly renewable materials] requirements.

1.4 SUBMITTALS

NOTE: Review submittal description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy,

Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force
and NASA projects, or choose the second bracketed
item for Army projects.

Government approval is required for submittals with a "G" designation;
submittals not having a "G" designation are for [Contractor Quality Control
approval.] [information only. When used, a designation following the "G"
designation identifies the office that will review the submittal for the
Government.] Submit the following in accordance with Section 01 33 00
SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings[; G][; G, [_____]]

SD-03 Product Data

[Local/Regional Materials; (LEED NC)]
[Environmental Data]
Tile[; G][; G, [_____]]
Setting-Bed[; G][; G, [_____]]
Mortar, Grout, and Adhesive; (LEED)[; G][; G, [_____]]
Tile; (LEED NC)
Reinforcing Wire Fabric; (LEED NC)

SD-04 Samples

Tile[; G][; G, [_____]]
Accessories[; G][; G, [_____]]
Marble Thresholds[; G][; G, [_____]]
Grout[; G][; G, [_____]]

SD-06 Test Reports

Testing[; G][; G, [_____]]

SD-07 Certificates

Tile[; G][; G, [_____]]
Mortar, Grout, and Adhesive[; G][; G, [_____]]

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)
LEED Documentation
Tile; (LEED)
Adhesives; (LEED)

1.5 QUALITY ASSURANCE

Dimension and draw detail drawings at a minimum scale of 6 mm = 300 mm 1/4
inch = 1 foot. Include drawings of pattern at inside corners, outside
corners, termination points and location of all equipment items such as
thermostats, switch plates, mirrors and toilet accessories mounted on
surface. Submit drawings showing ceramic tile pattern [elevations] [floor
plans].

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather, and store them under cover in accordance with manufacturer's printed instructions.

1.7 ENVIRONMENTAL REQUIREMENTS

Do not perform ceramic tile work unless the substrate and ambient temperature is at least 10 degrees C 50 degrees F and rising. Maintain temperature above 10 degrees C 50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used, ventilate the area to the outside to avoid carbon dioxide damage to new tilework.

1.8 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1-year period.

1.9 EXTRA MATERIALS

Supply an extra two percent of each type tile used in clean and marked cartons.

PART 2 PRODUCTS

NOTE: Color and pattern must be indicated. When manufacturer's names, colors, and patterns are shown, add the following sentence: Colors listed are for color identification purpose only; the listing is not intended to limit selection of similar colors from other manufacturers.

The surface datum will be established for the top of the tile floors to indicate to other trades the required elevation for the top of subfloor.

2.1 TILE

NOTE: Unglazed ceramic tile with low absorption rates are easier to maintain because they are more resistant to staining. They do not readily absorb grease, food or beverage spills, or other staining agents.

A minimum coefficient of friction of 0.50 (wet and dry) is the recognized industry standard for a slip-resistant flooring surface. The Americans with Disabilities Act (ADA) recommends a minimum coefficient of friction of 0.60 (wet and dry) for accessible routes and 0.80 (wet and dry) for ramps.

The basic durability classifications for floors are

as follows:

Class 0 - Generally not recommended for use on floors.

Class I - Light Traffic, residential bathroom floors.

Class II - Medium-Light Traffic, residential interiors except kitchens, stairs, landings, and areas near exterior entries.

Class III - Medium-Heavy Traffic, all residential applications and similar commercial applications except areas of prevalent circulation or turning points.

Class IV - Heavy Traffic, all residential and most commercial applications such as public areas of exhibition halls, shops, and schools.

Class IV Plus - Extra Heavy Traffic; walkways, food service, etc., or where extra wear is required.

Consider ceramic-free recycled glass tile with a minimum of 85 percent post-consumer recycled glass. Preference will be given to ceramic-free recycled glass tile with a minimum of 85 percent post-consumer recycled glass.

Conform to TCA Hdbk for standard grade tile. Provide grade sealed containers. Mark seals with the marks on the signed master grade certificate. Provide an impact resistant tile with a minimum floor breaking strength for wall tile of 41 kg 90 pound and for floor tile of 113 kg 250 pound in accordance with ASTM C648. The manufacturer will provide a frost resistant rating for tile used in cold climate projects as determined by ASTM C1026. Provide a [0.50] [_____] maximum percent water absorption in accordance with ASTM C373. Provide a minimum coefficient of friction of [0.50] [0.60] [_____] wet and dry in accordance with ASTM C1028. Identify floor tile as Class [III-Medium Heavy] [IV Plus-Extra Heavy] [_____] Traffic, durability classification as rated by the manufacturer when tested in accordance with ASTM C1027 for abrasion resistance as related to foot traffic. Coordinate the color [with Section 09 06 90 COLOR SCHEDULE] [_____] [Indicate VOC content.]

2.1.1 Mosaic Tile

NOTE: Glass tile will meet accepted industry standards at a minimum. This guide specification does not include technical requirements or referenced standards for glass tile. Determine appropriate product technical requirements and/or referenced standards for reliable products and include in this paragraph.

Furnish [glass mosaic tile][glass-bonded ceramic mosaic tile][ceramic mosaic tile]. Trim shall be unglazed [[natural clay][conductive] with

cushion edges] [porcelain] [unpolished] [polished] with sharply formed face. Provide tile size [25 by 25 mm 1 by 1 inch] [25 by 50 mm 1 by 2 inch] [50 by 50 mm 2 by 2 inch] [a mixture of standard sizes in a stock pattern] [_____].

2.1.2 Quarry Tile

NOTE: Abrasive surface quarry tile will be specified for vestibules, kitchens, walk-in refrigerators, and work spaces behind serving lanes. Abrasive surface quarry tile should be considered for other areas which may become slippery due to grease or soapy water spillage or for other reasons. Red quarry tile is the most economical color. If other colors are desired, they should be limited to the darker shades.

Furnish an unglazed quarry tile and trim with [smooth surface] [abrasive surface]. Use [150 by 150] [[_____] by 13] mm [6 by 6] [[_____] by 1/2] inch.

2.1.3 Paver Tile

NOTE: Low-fire clay tiles have low embodied energy. Embodied energy is defined as "the total energy required to produce a product from the raw materials stage through delivery."

Furnish [100 by 100 by 10 mm 4 by 4 by 3/8 inch] [150 by 150 by 10 mm 6 by 6 by 3/8 inch] [100 by 200 by 10 mm 4 by 8 by 3/8 inch] size paver tile [made of low-fire clay,] [glazed with lead-free glaze] [unglazed].

2.1.4 Detectable Warning Tile

Furnish an unglazed detectable warning tile with raised truncated domes with a diameter of nominal 23 mm 0.9 inch at a height of nominal 5 mm 0.2 inch and a center-to-center spacing of nominal 60 mm 2.35 inch that contrast visually with adjoining surfaces. Provide [150 by 150] [[_____] by 13] mm [6 by 6] [[_____] by 1/2] inch tile.

2.1.5 Porcelain Tile

Furnish an unglazed porcelain tile and trim with the color extending uniformly through the body of the tile. Provide a nominal size of [305 by 305] [_____] by 8 mm [12 by 12] [_____] by 5/16 inch thick. Criteria for tile to meet or exceed is as follows: Abrasive wear in accordance with ASTM C501 and bonding strength in accordance with ASTM C482. Comply with 36 CFR 1191 for coefficient of friction for interior tiled floors.

2.1.6 Glazed Wall Tile

NOTE: One type of finish will be retained. Generally, matte glaze will be used; however, bright glaze may be selected where a glossy finish would

not be objectionable.

Provide glazed wall tile with cushioned edges and trim edged with lead-free [bright] [matte] finish. Provide tile [106 by 106] [106 by 150] [150 by 150] mm [4-1/4 by 4-1/4] [4-1/4 by 6] [6 by 6] inch.

2.1.7 [Stone Tile] [Stone Chip Tile]

NOTE: Stone tile is made of post-industrial waste.
Stone chip tiles are stone fragments bound in a
portland cement matrix.

Tile shall be [_____] by [_____] mm inches.

2.1.8 Accessories

NOTE: Where glazed accessories are required, the
color, style, and number will be inserted and
locations indicated on the drawings. This paragraph
will be coordinated with Section 10 28 13 TOILET
ACCESSORIES.

Provide built-in type accessories of the same materials and finish as the wall tile. Provide accessories as follows:

	Quantity	Location
Recessed soap holders	[_____]	[_____]
Tumbler holders	[_____]	[_____]
Combination tumbler and toothbrush holders	[_____]	[_____]
Towel bars, [stainless steel] [ceramic] [600] [750] mm [24] [30] inch long, two towel posts	[_____]	[_____]
Robe hooks	[_____]	[_____]
Roll paper holder	[_____]	[_____]
Recessed soap holder and hand hold combination: support static load in compliance with ASTM F446	[_____]	[_____]

2.2 SETTING-BED

Compose the setting-bed of the following materials:

2.2.1 Aggregate for Concrete Fill

Conform to [ASTM C33/C33M](#) for aggregate fill. Do not exceed one-half the thickness of concrete fill for maximum size of coarse aggregate.

2.2.2 Portland Cement

Conform to [ASTM C150/C150M](#) for cement, Type I, white for wall mortar and gray for other uses.

2.2.3 Sand

Conform to [ASTM C144](#) for sand.

2.2.4 Hydrated Lime

Conform to [ASTM C206](#) for hydrated lime, Type S or [ASTM C207](#), Type S.

2.2.5 Metal Lath

Conform to [ASTM C847](#) for flat expanded type metal lath, and weighing a minimum [1.4 kg/square meter](#) [2.5 pound/square yard](#).

2.2.6 Reinforcing Wire Fabric

Conform to [ASTM A185/A185M](#) for wire fabric. Provide [[50 by 50 mm 2 by 2 inch](#) mesh], [[16/16 wire](#)] [or] [[38 by 50 mm 1-1/2 by 2 inch](#) mesh, [16/13 wire](#)]..

2.3 WATER

Provide potable water.

2.4 MORTAR, GROUT, AND ADHESIVE

Submit certificates indicating conformance with specified requirements. Submit LEED documentation relative to low-emitting materials credit in accordance with [LEED GBDC](#). Include in LEED Documentation Notebook. [Interior [adhesives](#), sealants, primers and sealants used as filler must meet the requirements of LEED low emitting materials credit.] Conform to [[SCAQMD Rule 1168](#) and [Bay Area AQMD Rule 8-51](#)], and to the following for mortar, [grout](#), adhesive, and sealant:

2.4.1 Dry-Set Portland Cement Mortar

[TCA Hdbk.](#)

2.4.2 Conductive Dry-Set Mortar

[TCA Hdbk.](#)

2.4.3 Latex-Portland Cement Mortar

[TCA Hdbk.](#)

2.4.4 Ceramic Tile Grout

[TCA Hdbk](#); petroleum-free and plastic-free [sand portland cement grout]

[dry-set grout] [latex-portland cement grout] [commercial portland cement grout].

2.4.5 Organic Adhesive

TCA Hdbk, Type I. Water-resistant. Comply with applicable regulations regarding toxic and hazardous materials[, **GS-36**,] and as specified.

2.4.6 Epoxy Resin Grout

NOTE: Resin grout will be used only where chemical
resistance is required.

TCA Hdbk. Prohibited unless specifically indicated otherwise.

2.4.7 Furan Resin Grout

TCA Hdbk and consist of an intimate mixture of furfuryl-alcohol resin with carbon filler and catalyst. Prohibited unless specifically indicated otherwise.

2.4.8 Sealants

Comply with applicable regulations regarding toxic and hazardous materials and as specified.

2.4.9 Cementitious Backer Board

Provide cementitious backer units, for use as tile substrate over wood sub-floors, in accordance with **TCA Hdbk**. Furnish **[6.35] [12.7] mm [1/4] [1/2] inch** thick cementitious backer units.

2.4.10 Glass Mat Gypsum Backer Panel

NOTE: Additives used to produce water-resistant
gypsum board ("green board") may include VOCs.
Water-resistant types may be difficult to recycle.
Glass-fiber reinforced types may be difficult to
recycle.

Provide glass mat water-resistant gypsum backer board, for use as tile substrate over wood subfloors, in accordance with **ASTM C1178/C1178M**. Provide **[6.35] [12.7] mm [1/4] [1/2] inch** thick glass mat gypsum backer board.

2.5 MARBLE THRESHOLDS

NOTE: Where the top of tile floors will occur at a
different elevation from the top of finished floors
in adjoining spaces, provision for marble thresholds
or saddles will be edited appropriately.

Provide marble thresholds of size required by drawings or conditions.

Categorize marble Group A as classified by MIA Design Manual. Provide a fine sand-rubbed finish marble with [white] [pink] [or] [gray] in color as approved by the Contracting Officer. Provide minimum 12.0 marble abrasion when tested in accordance with ASTM C241/C241M.

2.6 MEMBRANE MATERIALS

Conform to ASTM D226/D226M, Type 1 for 33 kg 15 pound waterproofing membrane, asphalt-saturated building felt. Conform to [ASTM D2103] [ASTM D4068] 0.0102 4 mil for polyethylene film.

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

NOTE: When using the dry-set method to install tile on concrete or masonry surfaces, Section 03 30 00.00 10 CAST-IN-PLACE CONCRETE and Section 04 20 00 MASONRY, as applicable, will be coordinated to require (1) steel trowel and fine broom-finished concrete floors free of curing compounds and waxes, (2) masonry surfaces that are level and plumb with struck joints and square openings.

Inspect surface to receive tile in conformance to the requirements of TCA Hdbk for surface conditions for the type setting bed specified and for workmanship. Provide variations of tiled surfaces that fall within maximum values shown below:

TYPE	WALLS	FLOORS
Dry-Set Mortar	3 mm in 2.4 meter1/8 inch in 8 ft.	3.0 mm in 3 meter1/8 inch in 10 ft.
Organic Adhesives	3 mm in 2.4 meter1/8 inch in 8 ft.	1.5 mm in 1 meter1/16 inch in 3 ft.
Latex Portland Cement Mortar	3 mm in 2.4 meter1/8 inch in 8 ft.	3.0 mm in 3 meter1/8 inch in 10 ft.
Epoxy	3 mm in 2.4 meter1/8 inch in 8 ft.	3.0 mm in 3 meter1/8 inch in 10 ft.

3.2 GENERAL INSTALLATION REQUIREMENTS

Do not start tile work until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Do not start floor tile installation in spaces requiring wall tile until after wall tile has been installed. Apply tile in colors and patterns indicated in the area shown on the drawings. Install tile with the respective surfaces in true even planes to the elevations and grades shown. Provide special shapes as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Solidly back tile bases and coves with mortar.

3.3 INSTALLATION OF WALL TILE

NOTE: This paragraph covers three different methods of installing tile on walls: the mortar bed method W211, W221, W222, W231, and W241; direct to masonry with dry-set mortar W202; and the organic adhesive method W223, and W242, 243 or 244. See TCA Hdbk for detailed guidance.

General guidance is as follows:

The mortar bed method or cementitious backer board method will be used for all prolonged wet areas such as showers. Ceramic tile over gypsum board will be used only in dry areas.

Dry-set mortar applied direct to masonry is suitable for all but prolonged wet areas such as showers.

The organic adhesive method will be limited to dry areas and will generally be used over gypsum wallboard.

Where more than one method is used for the same project, care must be taken to ensure that the drawings clearly indicate the various substrates and where each method is used. Where only one method is used on a project, clearly specify that method only.

Install wall tile in accordance with the TCA Hdbk, method [____].

3.3.1 Workable or Cured Mortar Bed

Install tile over workable mortar bed or a cured mortar bed at the option of the Contractor. Install a 0.102 mm 4 mil polyethylene membrane, metal lath, and scratch coat. Conform to TCA Hdbk for workable mortar bed, materials, and installation of tile. Conform to TCA Hdbk for cured mortar bed and materials.

3.3.2 Dry-Set Mortar and Latex-Portland Cement Mortar

Use [Dry-set] [or] [Latex-Portland Cement] to install tile in accordance with TCA Hdbk. Use Latex Portland Cement when installing porcelain ceramic tile.

3.3.3 Organic Adhesive

Conform to TCA Hdbk for the organic adhesive installation of ceramic tile.

3.3.4 Furan Mortar and Grout

Conform to TCA Hdbk for furan mortar and grout installation.

3.4 INSTALLATION OF FLOOR TILE

NOTE: This paragraph covers two different methods of installing tile on floors. The mortar bed method F111, F112, F114, and F121 and direct to concrete with dry-set mortar method F113 and F115. See TCA

Hdbk for detailed guidance.

General guidance is as follows:

The mortar bed method will be used for areas having a floor drain.

Dry-set mortar direct to concrete is suitable for areas without a floor drain or when it is not practical to recess the slab.

Where more than one method is used for the same project, care must be taken to ensure that the drawings clearly indicate the various substrates and where each method is used. Where only one method is used on a project, clearly specify that method only.

Install floor tile in accordance with TCA Hdbk method [____]. Install shower receptors in accordance with TCA Hdbk method [B414] [B415].

3.4.1 Workable or Cured Mortar Bed

Install floor tile over a workable mortar bed or a cured mortar bed at the option of the Contractor. Conform to TCA Hdbk for workable mortar bed materials and installation. Conform to TCA Hdbk for cured mortar bed materials and installation. Provide minimum 6.35 mm 1/4 inch to maximum 9.53 mm 3/8 inch joints in uniformed width.

3.4.2 Dry-Set and Latex-Portland Cement

Use [dry-set] [or] [Latex-Portland cement] mortar to install tile directly over properly cured, plane, clean concrete slabs in accordance with TCA Hdbk. Use Latex Portland cement when installing porcelain ceramic tile.

3.4.3 Resinous Grout

NOTE: Resin grout will be used where chemical resistance is required. For quarry tile subject to severe chemical exposure conditions, use Section 09 35 16 CHEMICAL-RESISTANT QUARRY TILE.

The areas to receive resin grout must be clearly indicated on the drawings or defined in the specifications. Due to the higher cost of this grout, its use will generally be limited to areas such as:

- a. Within the areas bounded by a line 600 mm (2 feet) outside of the trough areas for ranges, kettles, and ovens.
- b. Within the areas of pot washing and dish washing. In small kitchens where it may be impracticable to subdivide areas for grouting, resin grout method F114 or F133 may be used throughout.

For severe chemical exposure such as meat packing

plants and photo labs, resin grout method F134 will be used throughout and a resin setting-bed will be required. Wherever resin setting-bed is used, the concrete slab will be steel-troweled finished to the final slope of the finished floor. The tile shall be set in a 3 mm (1/8 inch) thick layer of epoxy-or furan-resin mortar. When using furan resins, the concrete slab will be neutralized or painted in accordance with the resin manufacturer's directions.

When resinous grout is indicated, grout quarry tile with either furan or epoxy resin grout. Rake and clean joints to the full depth of the tile and neutralize when recommended by the resin manufacturer. Install epoxy resin grout in conformance with TCA Hdbk. Install resin grout in accordance with manufacturer's printed installation instructions. Provide a coating of wax applied from the manufacturer on all tile installed and furan resin. Follow manufacturer's printed installation instructions of installed resin grout for proportioning, mixing, installing, and curing. Maintain the recommended temperature in the area and on the surface to be grouted. Protect finished grout of grout stain.

3.4.4 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with TCA Hdbk.

3.4.5 Waterproofing

Shower pans are specified in Section 22 00 00 PLUMBING, GENERAL PURPOSE. Conform to the requirements of Section 07 12 00 BUILT-UP BITUMINOUS WATERPROOFING for waterproofing under concrete fill.

3.4.6 Concrete Fill

NOTE: In areas to receive conductive ceramic tile,
the first sentence will be chosen.

Provide a 24.1 MPa 3500 psi concrete fill mix to dry as consistency as practicable. [Compose concrete fill by volume of 1 part Portland cement to 3 parts fine aggregate to 4 parts coarse aggregate, and mix with water to as dry a consistency as practicable.] Spread, tamp, and screed concrete fill to a true plane, and pitch to drains or levels as shown. Thoroughly damp concrete fill before applying setting-bed material. Reinforce concrete fill with one layer of reinforcement, with the uncut edges lapped the width of one mesh and the cut ends and edges lapped a minimum 50 mm 2 inch. Tie laps together with 1.3 mm 18 gauge wire every 250 mm 10 inch along the finished edges and every 150 mm 6 inch along the cut ends and edges. Provide reinforcement with support and secure in the centers of concrete fills. Provide a continuous mesh; except where expansion joints occur, cut mesh and discontinue across such joints. Provide reinforced concrete fill under the setting-bed where the distance between the under-floor surface and the finished tiles floor surface is a minimum of 50 mm2 inches, and of the same thickness that the mortar setting-bed over the concrete fill with the thickness required in the specified TCA Hdbk method.

3.5 INSTALLATION OF CONDUCTIVE FLOORING

Install conductive ceramic mosaic tile floors in accordance with TCA Hdbk.

3.6 INSTALLATION OF MARBLE THRESHOLDS

NOTE: Where the top of tile floors will occur at a
different elevation from the top of finished floors
in adjoining spaces, provision for marble thresholds
or saddles will be edited appropriately.

Install thresholds where indicated, in a manner similar to that of the ceramic tile floor. Provide thresholds full width of the opening. Install head joints at ends not exceeding 6 mm 1/4 inch in width and grouted full.

3.7 TESTING

Perform electrical resistance tests on conductive flooring, in the presence of the Contracting Officer, by a technician experienced in such work. Furnish a copy of the test results. Provide test procedures, testing apparatus, and test results in accordance with the provisions for Conductive Flooring in NFPA 99.

3.8 EXPANSION JOINTS

Note: Expansion-joint details will be indicated on
the drawings. Location of expansion joints should,
insofar as practical, be located outside the areas
of tile finishes.

Form and seal joints as specified in Section 07 92 00 JOINT SEALANTS.

3.8.1 Walls

Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials.

3.8.2 Floors

NOTE: Second sentence will be deleted for projects
where the use of tile is limited to small areas or
long narrow corridors or where chemical resistant
grouts are used.

Provide expansion joints over construction joints, control joints, and expansion joints in concrete slabs. Provide expansion joints where tile abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 7.2 to 10.8 m 24 to 36 feet each way in large interior floor areas and 3.6 to 4.8 m 12 to 16 feet each way in large exterior areas or areas exposed to direct sunlight or moisture. Extend expansion joints through setting-beds and fill.

3.9 CLEANING AND PROTECTING

Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. Do not use acid for cleaning glazed tile. Clean floor tile with resinous grout or with factory mixed grout in accordance with printed instructions of the grout manufacturer. After the grout has set, provide a protective coat of a noncorrosive soap or other approved method of protection for tile wall surfaces. Cover tiled floor areas with building paper before foot traffic is permitted over the finished tile floors. Provide board walkways on tiled floors that are to be continuously used as passageways by workmen. Replace damaged or defective tiles.

-- End of Section --