

SECTION 09 30 10

CERAMIC, QUARRY, AND GLASS TILING

PART 1 GENERAL

1.1 REFERENCES

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.

JAPANESE STANDARDS ASSOCIATION (JSA)

JIS A 1509-3	(2014) Test Method for Ceramic Tiles - Part 3: Determination of Water Absorption, Apparent Porosity and Bulk Density
JIS A 1509-4	(2008) Test Methods for Ceramic Tiles - Part 4: Determination of Modulus of Rupture and Breaking strength
JIS A 1509-8	(2014) Test Methods for Ceramic Tiles - Part 8: Determination for crazing resistance for glazed tiles
JIS A 1509-9	(2014) Test Methods for Ceramic Tiles - Part 9: Determination for frost resistance
JIS A 5005	(2009) Crushed Stone and Manufactured Sand for Concrete
JIS A 5209	(2010) Ceramic Tiles
JIS A 5403	(1989) Asbestos Cement Sheets
JIS A 5505	(2014) Metal Laths
JIS A 5548	(2015) Interior Organic Adhesives for Ceramic Tiles
JIS A 5557	(2010) Organic Adhesives for Exterior Tile Finishing
JIS A 6022	(2010) Stretchy Asphalt Roofing Felts (Synthetic Fiber Base)
JIS A 6902	(1995) Plastering Lime
JIS G 3551	(2005) Welded Wire Mesh and Rebar Grid
JIS R 5210	(2009) Portland Cement

MINISTRY OF LAND, INFRASTRUCTURE, TRANSPORT AND TOURISM (MLIT)

MLIT-SS Chapter 11	(2019) Public Building Construction
--------------------	-------------------------------------

Standard Specifications - Ch.11 Tile Work  
and Wood Work

1.2 SUBMITTALS

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.] Submittals with an "S" are for inclusion in the Sustainability eNotebook, in conformance to Section 01 33 29 SUSTAINABILITY REPORTING. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Detail Drawings; G

SD-10 Operation and Maintenance Data

Installation; G

1.3 CERTIFICATIONS

1.3.1 Indoor Air Quality Certifications

1.3.1.1 Adhesives and Sealants

Provide products certified to meet indoor air quality requirements by providing the certification or validation by other third-party program that products meet the requirements of this Section. When product does not have certification, provide validation that product meets the indoor air quality product requirements cited herein.

1.4 QUALITY ASSURANCE

Provide installers having a minimum of two years experience with a company specializing in performing the type of work described. Each type and color of tile to be provided from a single source. Each type and color of mortar, adhesive, and grout to be provided from the same source.

1.5 DELIVERY, STORAGE, AND HANDLING

Ship tiles in sealed packages and clearly marked with the grade, type of tile, producer identification, and country of origin. 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.

1.6 ENVIRONMENTAL REQUIREMENTS

Do not perform ceramic tile work unless the substrate and ambient temperature is at least 10 degrees C and rising. Maintain temperature above 10 degrees C 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.

## 1.7 WARRANTY

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

## 1.8 EXTRA MATERIALS

Supply an extra 2 percent of each type tile used in clean and marked cartons.

# PART 2 PRODUCTS

## 2.1 TILE

Provide tiles that comply with JIS A 5209 and are standard grade tiles. Provide a minimum breaking strength for floor tile in accordance with JIS A 1509-4. Provide exterior building tile for cold climate projects that is approved by the manufacturer for exterior use in accordance with JIS A 1509-9 and JIS A 5209. Provide floor tiles with a wet dynamic coefficient of friction value per JIS A 5209 requirements. Provide glazed floor tile with commercial rating by the manufacturer per JIS A 1509-8, for visible abrasion resistance as related to foot traffic. For materials like tile, accessories, and transition strips submit samples of sufficient size to show color range, pattern, type and joints. Submit manufacturer's catalog data. Tiles and tile works shall comply with MLIT-SS Chapter 11.

### 2.1.1 Porcelain Tile

Provide [[unglazed] [ or ] [glazed],] [ rectified] porcelain tile, [cove] [bullnose] base and trim pieces[ with color extending uniformly through the body of the tile]. [Provide tile with a [V0] [V1] [V2] [V3] [V4] aesthetic classification. Blend tiles in factory and in a packages to have same color range and continuous blend for installation.] Provide nominal tile size(s) of [150 by 150] [300 by 300] [450 by 450] [300 by 450] [\_\_\_\_\_] mm and [8] [10] [\_\_\_\_\_] mm thick. Provide a 0.50 percent maximum water absorption in accordance with JIS A 1509-3.

Provide Porcelain Tiling Materials that contain a minimum of 10 percent recycled content.

### 2.1.2 Quarry Tile

Furnish an unglazed quarry tile, [cove] [bullnose] base and trim pieces. Provide tile with [smooth] [abrasive] surface. Provide nominal tile size(s) of [150 by 150] [\_\_\_\_\_] mm and 13 mm thick. Provide maximum water absorption in accordance with JIS A 5209 or JIS A 1509-3.

Provide Quarry Tiling Materials that contain a minimum of 10 percent recycled content.

### 2.1.3 Mosaic Tile

Furnish [unglazed] [glazed], mosaic tile[, [cove] [bullnose] [base] and trim composed of [natural clay] [porcelain]. Blend tiles in factory and in a packages to have same color range and continuous blend for installation.] Provide [nominal tile size(s) of [25 by 25] [25 by 50] [50 by 50] [\_\_\_\_\_] mm][a mixture of standard sizes in a stock pattern]. [Provide porcelain mosaics with a water absorption up to 0.50 percent] [Provide natural clay mosaics with a water absorption up to [3.0] [\_\_\_\_\_] ]

percent] per JIS A 1509-3.

Provide Mosaic Tiling Materials that contain a minimum of 3 percent recycled content.

#### 2.1.4 Glass Tile

Furnish glass mosaic tile that requires thermal shock resistance and can withstand the range of temperatures outdoors. Provide nominal tile size(s) of [25 by 25] [\_\_\_\_\_] mm.

#### 2.1.5 Glazed Wall Tile

Furnish glazed wall tile that has cushioned edges and trim with lead-free [bright] [matte] finish. Provide nominal tile size(s) of [106 by 106] [106 by 150] [150 by 150] mm.

#### 2.1.6 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 long, two towel posts	[_____]	[_____]
Robe hooks	[_____]	[_____]
Roll paper holder	[_____]	[_____]
Recessed soap holder and hand hold combination	[_____]	[_____]

### 2.2 SETTING-BED

Submit manufacturer's catalog data. Compose the setting-bed of the following materials:

#### 2.2.1 Aggregate for Concrete Fill

Conform to JIS A 5005, 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 JIS R 5210, for cement, Type I, white for wall mortar and gray for other uses.

#### 2.2.3 Sand

Conform to JIS A 5005, for sand.

#### 2.2.4 Hydrated Lime

Conform to JIS A 6902, for hydrated lime.

#### 2.2.5 Metal Lath

Conform to JIS A 5505, for flat expanded type metal lath, and weighing a minimum 1.4 kg/square meter.

#### 2.2.6 Reinforcing Wire Fabric

Conform to JIS G 3551 for wire fabric. Provide [50 by 50 mm mesh, 16/16 wire] [or] [38 by 50 mm mesh, 16/13 wire].

### 2.3 WATER

Provide potable water.

### 2.4 MORTAR, GROUT, AND ADHESIVE

[Provide non-aerosol adhesive products used on the interior of the building (defined as inside of the weatherproofing system) meeting formaldehyde emission rate below 0.005 mg/m2h or meeting requirements of F 4-Star and 4VOC .]

#### 2.4.1 Dry-Set Portland Cement Mortar

MLIT-SS Chapter 11 Tile Work.

#### 2.4.2 Latex-Portland Cement Mortar

MLIT-SS Chapter 11 Tile Work.

#### 2.4.3 Ceramic Tile Grout

MLIT-SS Chapter 11 Tile Work; petroleum-free and plastic-free [sand portland cement grout] [dry-set grout] [latex-portland cement grout] [commercial portland cement grout].

#### 2.4.4 Organic Adhesive

MLIT-SS Chapter 11 Tile Work. Comply with JIS A 5557 for exterior tile and JIS A 5548 for interior tile.

#### 2.4.5 Sealants

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Grout sealant must not change the color or alter the appearance of the grout. Refer to Section 07 92 00 JOINT SEALANTS.

[Provide sealants used on the interior of the building (defined as inside of the weatherproofing system) meeting formaldehyde emissions rate below 0.005 mg/m2h or meet the requirements of F 4-Star and 4VOC

## 2.5 SUBSTRATES

### 2.5.1 Cementitious Backer Board

Provide cementitious backer units, for use as tile substrate over wood sub-floors, in accordance with MLIT-SS Chapter 11 Tile Work. Furnish [6.35] [12.7] mm thick cementitious backer units.

### 2.5.2 Glass Mat Gypsum Backer Panel

Provide glass mat water-resistant gypsum backer board, for use as tile substrate over wood subfloors, in accordance with JIS A 5403. Provide [6.35][12.7] mm thick glass mat gypsum backer board.

## 2.6 TRANSITION STRIPS

Provide [[clear] [\_\_\_\_\_] anodized aluminum transitions between tile and carpet or resilient flooring. Provide types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified] [marble transitions appropriate for conditions].

## 2.7 MEMBRANE MATERIALS

Conform to JIS A 6022, Type 1 for 33 kg waterproofing membrane, asphalt-saturated building felt.

## 2.8 COLOR, TEXTURE, AND PATTERN

Provide color, pattern and texture in accordance with [Section 09 06 00 SCHEDULES FOR FINISHES][as indicated][[\_\_\_\_\_]. Color listed is not intended to limit the selection of equal colors from other manufacturers]. [ Provide floor patterns as specified on the drawings.]

# PART 3 EXECUTION

## 3.1 PREPARATORY WORK AND WORKMANSHIP

Inspect surface to receive tile in conformance to the requirements of MLIT-SS Chapter 11 Tile Work 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 meter	3.0 mm in 3 meter
Organic Adhesives	3 mm in 2.4 meter	1.5 mm in 1 meter
Latex Portland Cement Mortar	3 mm in 2.4 meter	3.0 mm in 3 meter
Epoxy	3 mm in 2.4 meter	3.0 mm in 3 meter

## 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. Close space, in which tile

is being set, to traffic and other work. Keep closed until tile is firmly set. 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. 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. Dimension and draw detail drawings at a minimum scale of 6 mm = 300 mm. 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][ and ][floor plans]. Submit manufacturer's preprinted installation instructions.

Do not install building construction materials that show visual evidence of biological growth.

### 3.3 INSTALLATION OF WALL TILE

Install wall tile in accordance with the MLIT-SS Chapter 11 Tile Work, method [\_\_\_\_\_] and with grout joints [[as recommended by the manufacturer for the type of tile][of [\_\_\_\_\_] mm]. [Install thinner wall tile flush with thicker wall tile applied on same wall and provide installation materials as recommended by the tile and setting materials manufacturer's to achieve flush installation.]]

#### 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 polyethylene membrane, metal lath, and scratch coat.

#### 3.3.2 Dry-Set Mortar and Latex-Portland Cement Mortar

Use [Dry-set] [or] [Latex-Portland Cement] to install tile in accordance with MLIT-SS Chapter 11 Tile Work. Use Latex Portland Cement when installing porcelain ceramic tile.

#### 3.3.3 Organic Adhesive

Conform to JIS A 5557 for exterior tile and JIS A 5548 for interior tile for the organic adhesive installation of ceramic tile.

#### 3.3.4 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with MLIT-SS Chapter 11 Tile Work. [Provide and apply manufacturer's standard [\_\_\_\_\_] product for sealing grout joints in accordance with manufacturer's recommendations.]

### 3.4 INSTALLATION OF FLOOR TILE

Install floor tile in accordance with MLIT-SS Chapter 11 Tile Work method [\_\_\_\_\_] and with grout joints [as recommended by the manufacturer for the type of tile][of [\_\_\_\_\_] mm]. Install shower receptors in accordance with manufacturer recommendations.

#### 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. Install in accordance with MLIT-SS Chapter 11 Tile Work. Provide minimum 6.35 mm to maximum 9.53 mm.

#### 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 Install in accordance with MLIT-SS Chapter 11 Tile Work. Use Latex Portland cement when installing porcelain ceramic tile.

#### 3.4.3 Resinous Grout

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 MLIT-SS Chapter 11 Tile Work. 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 MLIT-SS Chapter 11 Tile Work. Provide and apply manufacturer's standard product for sealing grout joints in accordance with manufacturer's recommendations.

#### 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

Provide a 24.1 MPa 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. Tie laps together with 1.3 mm wire every 250 mm along the finished edges and every 150 mm 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 mm, and of the same thickness that the mortar setting-bed over the concrete fill with the thickness required.

### 3.5 INSTALLATION OF TRANSITION STRIPS

Install transition strips where indicated, in a manner similar to that of the ceramic tile floor and as recommended by the manufacturer. Provide thresholds full width of the opening. Install head joints at ends not exceeding 6 mm in width and grouted full.

### 3.6 EXPANSION JOINTS

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

#### 3.6.1 Walls

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

#### 3.6.2 Floors

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 to 11 m each way in large interior floor areas and 3 to 5 m each way in large exterior areas or areas exposed to direct sunlight or moisture. Extend expansion joints through setting-beds and fill.

### 3.7 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. Submit copy of manufacturer's printed maintenance instructions.

-- End of Section --