

SECTION 6610

TILES

1. SCOPE

The work under this section of the Specifications consists of furnishing all plant, labour, equipment, appliances, and materials and in performing all operations in any floor and at any height connection with providing and installation of Ceramic tiles for interior floor , wall finishes and exterior wall cladding, Porcelain floor tiles complete in strict accordance with this section of the Specifications and the applicable drawings and subject to the terms and conditions of the Contract.

2. APPLICABLE STANDARDS

2.1 ANSI - American National Standards Institute:

A108.1	Installation of Glazed Wall Tiles
A108.4	Ceramic Tiles Installed with Water-Resistant Organic Adhesives
A118.1	Dry-Set Portland Cement Mortar
A118.2	Conductive Dry-Set Portland Cement Mortar
A118.3	Chemical-Resistant, Water Cleanable Tile-Setting and Grouting Epoxy
A118.6	Ceramic Tile Grouts
E136.1	Organic Adhesive for Installation of Ceramic Tiles
A137.1	Standard Specification for Ceramic Tiles

2.2 ASTM - American Society for Testing and Materials:

ASTM C 150	Specification for Portland Cement
ASTM C 206	Specification for Finishing Hydrated Lime
ASTM C 373	Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware
ASTM C 648	Breaking Strength of Ceramic Tile
ASTM C 1027	Abrasion Resistance of Glazed Ceramic Tile

2.3 TCA - Tile Council of America:

TCA 137.1	Standard Specification for Ceramic Tile
TCA Handbook for Ceramic Tile Installation	

3. SUBMITTALS

3.1 Complete set of samples of manufacturer's standard products for color selection.

3.2 Certification from manufacturer of tile certifying the following:

- Materials provided are suitable for intended use.
- Materials meet or exceed appropriate ANSI Standard .

3.3 Tile manufacturer's complete installation instructions.

3.4 Shop drawing layout showing the tile arrangements.

4. TRANSPORTATION, HANDLING AND STORAGE

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

5. QUALITY ASSURANCE

5.1 Source Limitations for Tile: Obtain all tiles of same type and color or finish from one source or producer.

5.2 Source Limitations for Setting and Grouting Materials: Obtain ingredients of a uniform quality for each adhesive, and grout component from a single manufacturer.

5.3 Mockups: Build mockups for the approval of the Engineer to verify qualities of materials and execution. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.

5.4 Variation in plane of sub-floor, including concrete fills: Not more than 6 mm in 3 meters from required elevation where Portland cement mortar setting bed is used and not more than 3 mm in 3 meters where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical resistant bond coats are used.

5.5 Variation in plane of wall surfaces and surface of scratch coat: Not more than 6 mm in 2.40 meters from required plane where Portland cement mortar setting bed is used and not more than 3 mm in 2.40 meters where dry-set or latex-Portland cement mortar or organic adhesive setting materials are used.

6. MATERIAL

6.1 CERAMIC TILES

6.1.1 General:

- a. Ceramic tiles shall have a standard grade quality in accordance with the Grade Specifications of ANSI A137.1 or DIN 18166 or BS 1286. Tiles shall be stain resistant, impact resistant and slip resistant (floor).
- b. Unless otherwise indicated, minimum requirements for ceramic wall and floor tiles shall be Grade-1, best quality glazed tiles, 6 mm thick for walls and 8 mm thick for floors.
- c. Accessories: Provide manufacturer's standard trim including bullnose, cove base and related corners, and half pieces required for the complete installation.
- d. Selection and Size: Type, color and pattern shall be as indicated on Drawings unless otherwise approved by the Engineer.

6.1.2 Physical Properties:

- a. Breaking strength: Minimum 250 kg for floor 100 kg for wall tiles to ASTM C 648.

- b. Water absorption: Maximum 0.5 % for floor and 11% for wall tiles to ASTM C 373.
- c. Coefficient of Friction (COF): Minimum 0.5 (wet & dry) to ASTM C 1028.
- d. MOH's: Minimum 7.

6.2 PORCELAIN TILES

- 6.2.1 Fine porcelain stoneware tiles shall be manufactured by using top quality fine porcelain stoneware, obtained by raw materials wet grinding, followed by partial drying by spraying, silo storage to allow homogenization of properties, and pressing by hydraulic pressure exceeding 500 kg/cm², and heat treatment in excess of 1200°C.
- 6.2.2 Porcelain tiles shall be of sizes, pattern and color as shown on drawings. Physical properties of porcelain tiles shall be as follows:

Properties	Applicable Standard	Value
Dimensions and appearance	EN 98	Compliant
Water absorption	EN 99	0.1%
	IIIIISO PROJECT 10545/3	
Flexural strength	EN 100	50 N/mm ²
Scratch resistance	EN 101	6 MOHS
Deep abrasion resistance	EN 102	140 mm ³
Linear thermal expansion coefficient	EN 103	6 x 10 ⁻⁶ deg C ⁻¹
Resistance to sudden temperature changes	EN 104	Compliant
Resistance to chemical etching by acids and bases	EN 106	Compliant
Color stability to light	DIN 51094	Compliant
Specific weight	DIN 51057	2.52 g/cm ³
Weight of unit of volume	DIN 5165	2.40/cm ³

6.3 MISCELLANEOUS MATERIALS

6.3.1 Adhesive and Grout:

Tile Adhesive: Shall be white cement-based polymer modified ready-mixed powder adhesive conforming to BS 5980:1980, Type 1, Class AA, or equivalent standards. Use 3-6 mm bed thickness mixed with admixture as per manufacturers written recommendations.

- 6.3.2 Grouting Material: Shall be cement-based polymer modified ready-mixed powder conforming to BS 5750:Part 2 or equivalent standards. Use grout with admixture as per manufacturers written recommendations. Color of grout shall be as approved by Engineer.

6.3.3 Sealants: Elastomeric type, in conformance with the requirements specified.

7. EXECUTION

7.1 GENERAL

7.1.1 Installation of floor and wall tiles shall comply with the requirement of ANSI A108.1 through A108.6 and the TCA Handbook for Ceramic Tile Installation, unless otherwise indicated.

7.1.2 Protection and Curing:

Spaces in which tile is being set shall be closed to traffic and other work. Keep closed until tile is firmly set. Protect tile from damage.

Damp cure for at least 3 days; add dampness as needed to achieve a hard cure.

7.1.3 Jointing Pattern:

Unless otherwise shown, lay tile in grid pattern. Align joints when adjoining tiles on floor, base, walls and trim are the same size. layout tile work and center tile fields both directions in each space or on each wall area. Adjust as necessary to avoid use of widths less than 1/2 tile at edge of walls. Provide uniform joints, not less than 5 mm and not more than 7 mm unless otherwise shown.

7.2 INSTALLATION OF WALL TILES

7.2.1 Ceramic tiles on concrete and CMU walls shall be installed with tile adhesive on cured cement plaster. Tiles shall not be soaked prior to installation.

7.2.2 Tiles shall be pressed firmly into freshly notched 3 to 6 mm thick tile adhesive and shall be tapped and beaten to a true surface.

7.2.3 Joint width shall be determined by spacers on tile or by strings or pegs if tile without spacers are used.

7.2.4 Tiles shall be pressed and beaten into place to obtain full coverage by adhesive on back.

7.2.5 Tiles shall be adjusted before initial set of adhesive takes place.

7.2.6 Grouting Wall Tiles: Grouting shall be in strict accordance with the manufacturer's recommendations and shall be cured as required to produce a hard grout.

7.3 INSTALLATION OF FLOOR TILES

7.3.1 Install tiles with adhesive 3 - 6 mm thick tile adhesive as per manufacturer's written recommendations over Portland cement screed sloped to drains, not less than 20 mm thick and not more than 30 mm thick.

7.3.2 Press tiles firmly into the adhesive to obtain full contact with adhesive with no voids.

7.3.3 Grouting Floor Tiles: Grouting shall be in strict accordance with the

manufacturer's recommendations and shall be cured as required to produce a hard grout.

7.4 CLEANING AND PROTECTION

- 7.4.1 Upon completion of placement and grouting, all ceramic and quarry tiles surfaces shall be cleaned free of foreign matter.
- 7.4.2 Glazed tiles surfaces shall be sponged and washed thoroughly diagonally across joints and finally polished with clean, dry clothes.
- 7.4.3 Unglazed tiles may be cleaned with cleaners and/or solvents recommended by tile manufacturer after completion of installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of cleaning materials. Flush and surface with clean water before and after cleaning.
- 7.4.4 Finished installation shall be left clean and free of cracked, chipped, broken, un-bonded or otherwise defective tile work.
- 7.4.5 Apply a protective clear sealer coat(s) for unglazed tiles. Number of coats shall be as recommended by manufacturer. Protect installed tile work with Kraft paper or other heavy covering during the construction period to prevent damage.
- 7.4.6 Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.
- 7.4.7 Seal plumbing and electrical penetrations through wall tile with sealants.

8. MEASUREMENT AND PAYMENT

8.1 General

Except otherwise specified herein or elsewhere in the Contract Documents, no measurement and payment will be made for the under mentioned specified works related to the relevant items of the Bill of Quantities. The cost thereof shall be deemed to have been included in the quoted unit rate of the respective item of the Bill of Quantities.

The rates quoted by the Contractor in the Bill of Quantities shall include work to be executed under these specification in any floor and at any height except where otherwise specifically stated in the relevant item of Bill of Quantities and the Contractor shall not be entitled to any claim or claim any compensation on this account.

- 8.1.1 Submittals
- 8.1.2 Transportation, Handling and Storage
- 8.1.3 Quality Assurance
- 8.1.4 Adhesive and Grout
- 8.1.5 Cleaning and protection
- 8.1.6 Cement sand mortar

8.1.7 Protection and curing

8.2 Ceramic tiles

8.2.1 Measurement

Measurement of acceptably completed works of Ceramic tiles will be made on the basis of actual area in square foot / meter of Ceramic tiles provided and fixed in position as shown on the Drawings and as directed by the Engineer.

8.2.2 Payment

Payment will be made for acceptable measured quantity of Ceramic tiles on the basis of unit rate per square foot / meter quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

8.3 Porcelain tiles

8.3.1 Measurement

Measurement of acceptably completed works of Porcelain tiles will be made on the basis of actual area in square foot / meter of Porcelain tiles provided and fixed in position as shown on the Drawings and as directed by the Engineer.

8.3.2 Payment

Payment will be made for acceptable measured quantity of Porcelain tiles on the basis of unit rate per square foot / meter quoted in the Bill of Quantities and shall constitute full compensation for all the works related to the item.

*** End of Section 6610 ***