

SECTION 09320 – PORCELAIN CERAMIC MOSAIC TILE EXTERIOR CLADDING

PART 1 - GENERAL

1.01 SUMMARY

- A. Work Included: Provide porcelain ceramic mosaic tile exterior wall and roof cladding in accordance with the Contract Documents. The Contract Documents are as defined in the "AGREEMENT." The "GENERAL CONDITIONS GOVERNING ALL CONTRACTS" shall apply to all work under the Contract. The Work of this Section shall include but not be limited to the following:

1. Porcelain ceramic mosaic tile
2. Modified epoxy emulsion grout
3. Latex cement adhesive mortar
4. Direct-bond waterproof membrane
5. Latex cement plaster & mortar bed
6. Elastomeric expansion & control joints

- B. Related Sections:

1. Section 05120 – Structural Steel
2. Section 05400 – Cold-Rolled Metal Framing
3. Section 06100 – Rough Carpentry
4. Section 07210 – Building Insulation
5. Section 07553 – Single Ply Membrane Roofing
6. Section 07720 – Roof Accessories
7. Section 07901 – Joint Sealants

1.02 SYSTEM DESCRIPTION

- A. Porcelain ceramic mosaic tile exterior wall and roof cladding, adhered with latex cement adhesive mortar over a reinforced latex waterproof membrane, adhered to reinforced latex-modified Portland cement plaster / mortar bed, with modified epoxy emulsion grout joints.

1.03 PERFORMANCE REQUIREMENTS

- A. Contractor shall engage an independent test laboratory specializing in testing of exterior wall assemblies to conduct performance testing of a mock-up of the tile clad wall and roof assembly. Mock-up shall be constructed in compliance with 1.05 of this section and tested in accordance with the following standards:
1. ASTM E 283 Standard Test Method for Determining the Rate of Air Leakage through Exterior Windows, Curtain Walls and Doors Under Specified Pressure Differences Across the Specimen
 - a. Test criteria: 6.24 psf air pressure
 - b. Performance: 0.06 cfm per sq. ft.
 2. ASTM E 331 Standard Test Method for Water Penetration through Exterior Windows, Curtain Walls and Doors by Uniform Static Air Pressure Difference
 - a. Test criteria: 6.24 psf air pressure
 - b. Performance: no water leakage
 3. AAMA 501.1 Standard Test Method for Exterior Windows, Curtain Walls and Doors for Water Penetration Using Dynamic Pressure
 - a. Performance: no water leakage
 4. AAMA 501.5 Test Method for Thermal Cycling of Exterior Walls

- a. Test criteria: 180° F temperature range
 - b. Performance: no buckling or cracking of tile assembly, no failure of sealant joints, no visual stress or damage to structural elements
- B. Contractor shall engage an independent test laboratory specializing in testing of ceramic tile assemblies to conduct performance testing of 12 x 12 inch samples of the ceramic tile assembly. Samples shall be tested in accordance with the following standards:
1. ASTM C1026 (Modified) Standard Test for Measuring Frost Resistance of Ceramic tile to Freeze-Thaw Cycling (10 samples required)
 2. ASTM C484 (Modified) Standard Test for Thermal Shock Resistance of Glazed Ceramic Tile (10 samples required)

1.04 SUBMITTALS

- A. Submit shop drawings and manufacturers' product data under provisions of Section (01300) (01340). Shop drawings shall indicate ceramic mosaic tile sheet layout and expansion / control joint layout.
- B. Submit samples of ceramic mosaic tile under provisions of Section (01300) (01340)
- C. Submit manufacturers' product data and installation instructions under provisions of Section. (01300) (01340)
- D. Submit manufacturer's certification under provisions of Section (01405) that the materials supplied conform to ANSI 137.1 and ANSI A 118.1-11.
- E. Submit proof of guarantee under provisions of General Conditions and 1.10 of this section.
- F. Submit sample of installation system demonstrating compatibility/functional relationships between adhesives, mortars, grouts and other components under provision of Section (01300.) (01340.)
- G. Submit list from manufacturer of installation system/adhesive/mortar/grout identifying a minimum of three (3) similar projects, each with a minimum of ten (10) years service.
- H. For alternate materials, submit independent laboratory test results confirming compliance with specifications listed in Part 2 - Products at least thirty (30) days before bid date in accordance with General Conditions
- I. Maintenance Instructions: Submit manufacturer's recommended maintenance practices for porcelain mosaic tile exterior cladding

1.04 QUALITY ASSURANCE

- A. References: Applicable trade association names and titles of general standards are referred to by accepted abbreviations.
- B. Source Limitations for Porcelain Tile: Obtain tile from single source producer specializing in ceramic tile, mosaics, pavers, trim units, and thresholds with (three) (3) years minimum experience. Obtain tile from same production run and of consistent color, quality in appearance and physical

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properties.

- C. Source Limitations for Installation System Products: Obtain installation system products from single source producer specializing in installation systems/adhesives/mortars/grouts with ten (10) years minimum experience. Obtain products from same production run and of consistent quality in appearance and physical properties compatibility.
- D. Source Limitations for Other Products : Obtain accessory products from a single source producer for each product:
 - 1. Wire mesh reinforcing and wire mesh wall lath
 - 2. Elastomeric sealant
 - 3. Sealant back-up rod
 - 4. Waterstops
 - 5. Drainage Mat
- E. Contractor qualifications: company specializing in installation of ceramic tile with (5) years documented experience with ceramic tile clad exterior wall installations of similar scope, materials and design.
 - 1. The Contractor performing the Work of this Section may demonstrate compliance with the above qualification requirements by demonstrating that it is certified or authorized as an installer by a manufacturer designated as acceptable in these Specifications or by a manufacturer determined by the City to be an approved equal.
 - a. A copy of such manufacturer certification or authorizations must be submitted, or verified in writing by the manufacturer.

1.05 MOCK-UPS & SAMPLES

- A. Construct mock-up of porcelain mosaic tile clad wall and roof assembly in accordance with provisions of section 01450 and this section for the purpose of performance testing in accordance with paragraph 1.03 of this specification, proposed means/methods of construction, and judgement of aesthetics. Mock-up shall include construction of underlying structure, insulation, sheathing and structural attachments, along with porcelain mosaic tile installation system (metal lath & reinforcing, latex cement plaster and mortar bed, waterproof membrane, adhesive mortar and grout).
- B. Mock-up shall demonstrate monolithic construction of both the tile clad roof and wall assembly, including the window, gutter, roof drain, , expansion and control joints, and typical wall and roof penetrations. The size of the mock-up shall be approximately 6 x 9 x 6 feet, and replicate both the wall and roof assembly in accordance with mock-up drawings contained in the contract documents. Mock-up shall be constructed in accordance with requirements for performance testing specified in 1.03 of this section. Consult independent test laboratory for further design, size, and configuration requirements for performance testing.
- C. Construct the required number of 12 x 12 inch samples of the tile assembly for performance testing in accordance with test protocol specified in paragraph 1.03 of this specification.

1.06 PRE-INSTALLATION CONFERENCE

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- A. Convene one week prior to commencing work of this section, under provisions of Section (01220) and 3.10 Field Quality Control of this section

1.07 DELIVERY, STORAGE AND HANDLING

- A. Acceptance at Site: deliver and store packaged materials in original containers with seals unbroken and labels, including grade seal, intact until time of use, in accordance with manufacturer's instructions.
- B. Store ceramic tile and installation system materials in a dry location; handle in a manner to prevent chipping, breakage, and contamination.
- C. Protect latex additives and epoxy resins from freezing or overheating in accordance with manufacturer's instructions; store at room temperature when possible.
- D. Store Portland cement mortars and grouts in a dry location.

1.08 PROJECT/SITE CONDITIONS

- A. Maintain ambient temperatures not less than 50° F or more than 90° F during installation and for a minimum of seven (7) days after completion. Setting of Portland cement is retarded by low temperatures. Protect work for extended period of time and from damage by other trades. Freezing after installation will not damage Latex Portland cement mortars. Protect Portland cement based mortars from direct sunlight, radiant heat, forced ventilation (heat & cold), and drafts until cured to prevent premature evaporation of moisture. Modified epoxy grout requires surface temperatures between 50°F and 90°F at time of installation.

1.09 SEQUENCING AND SCHEDULING

- A. Coordinate construction of the tile clad roof and wall assemblies with related work.

1.10 GUARANTEE

- A. In accordance with Article on "GUARANTEES" of the "GENERAL CONDITIONS GOVERNING ALL CONTRACTS," the Contractor hereby guarantees that all work specified in this Section will be free from defects of materials and workmanship for a period of two (2) years. Furnish a guarantee form specified in Article on "GUARANTEES" of the "GENERAL CONDITIONS GOVERNING ALL CONTRACTS."
- B. The contractor shall provide a comprehensive non pro-rated written two (2) year guarantee against defective work which covers replacement materials and labor costs for demolition, tile, installation systems and accessories. Countersign warranty by contractor and tile / installation product manufacturer.
- C. The following types of failure will be adjudged as defective work:
 - 1. Abnormal deterioration, aging or weathering of tile, grout, or underlying assembly.
 - 2. Cohesive failure or deterioration of latex cement plaster / mortar bed or failure of structural attachment of metal lath and plaster.
 - 3. Adhesive failure of tile and/or waterproof membrane to substrate.
 - 4. Failure of the waterproof membrane or sealant joint assembly resulting in water infiltration.

1.11 MAINTENANCE

- A. Submit maintenance data under provisions of Section 01730. Include recommended cleaning methods, cleaning solutions, including stain and pollution removal methods/materials.

1.12 EXTRA MATERIALS STOCK

- A. Upon completion of the work of this Section, deliver to the Owner 2% minimum additional tile and trim shape of each type, color, pattern and size used in the Work, as well as extra stock of installation mortar, grouts, adhesives waterproof membrane and accessories for the Owner's use in replacement and maintenance of normal wear. Extra stock to be from same production run or batch as original tile and installation materials.

PART 2 – PRODUCTS

2.01 MANUFACTURERS

- A. Approved Manufacturers: Subject to compliance with requirements, provide porcelain ceramic mosaic tile exterior cladding products as manufactured by one of the following:
 - 1. PORCELAIN CERAMIC MOSAIC TILE:
 - a. Emaux de Briare
 - b. American Olean
 - c. Deutsche Steinzeug America
 - c. Or approved equal
 - 2. TILE ASSEMBLY INSTALLATION PRODUCTS (single source responsibility) for latex cement plaster and mortar bed, waterproof membrane for thin-set tile, latex cement adhesive mortar, and modified epoxy emulsion grout:
 - a. Laticrete International
 - b. Mapei Corporation
 - c. Custom Building Products
 - d. Or approved equal
 - 3. WELDED WIRE FABRIC LATH & REINFORCING
 - a. K-Lath
 - b. Or approved equal
 - 4. DRAINAGE MAT
 - a. Laticrete International
 - b. Schluter Systems
 - c. or approved equal
 - 5. WATERSTOP
 - a. Greenstreak, Inc.
 - b. Earthshield
 - c. or approved equal
 - 6. EXPANSION & CONTROL JOINT SEALANT
 - a. Laticrete International
 - b. Dow Corning Corporation
 - c. Pecora

d. or approved equal

2.02 MATERIALS

A. PORCELAIN CERAMIC MOSAIC TILE:

Provide porcelain ceramic mosaic tile in compliance with ANSI A 137.1 standards for mosaic tile

1. Design standard – Emaux de Briare glazed porcelain ceramic mosaic
2. Type: Gemmes
3. Module size: nominal 1 by 1 inch (2.52 mm) hexagonal
4. Thickness: nominal 1/4 inch (6 mm)
5. Face: Plain with cushion edge
6. Mounting: factory PVC back edge dot-mounted in custom sheet size/pattern as detailed on drawings (quality assurance requirement: dot mounting may not extend up the tile edge more than 1/3 the tile thickness in order to allow proper grout joint depth)
7. Color : custom color yellow # 3355 approved by architect

B. GROUT: GR-1 as indicated on the drawings

Epoxy grout with integrally pigmented aggregate (no applicable standard)

1. Design standard – Laticrete "Spectra-Lock" Epoxy Grout
2. Shear bond strength: 600 psi
3. Shrinkage: 0.04%
4. Pot life: 30 minutes @ 70°F
5. Tack free: 6-8 hours @ 70°F
6. Color: Custom yellow color match as approved by architect

C. LATEX CEMENT ADHESIVE MORTAR: TS-1 as indicated on the drawings

ANSI A118.4 Latex modified thinset adhesive mortar

1. Design standard – Laticrete "211 Crete Filler Powder" prepackaged dry mortar mix gauged with undiluted Laticrete "4237 Thin-Set Latex Additive"
2. Compressive strength: 5000psi
3. Tensile strength: 500 psi
4. Shear bond strength: 500 psi
5. Water absorption: 4% Max.

D. WATERPROOF MEMBRANE for Thin-Set Tile Installations: WPM-1 as indicated on the drawings

ANSI A118.10 fabric reinforced liquid latex waterproof membrane product for thin-set tile installations

1. Design standard – Laticrete "9235 Waterproof Membrane"
2. Thickness: 20 mils DFT
3. Elongation: 40% ASTM D 751
4. Tensile Strength: 2950 psi
5. Shear bond strength to concrete: 350 psi

E. LATEX CEMENT PLASTER AND MORTAR BED:

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Provide latex cement wall plaster and mortar bed complying with ANSI A118.4. Comply with manufacturer's recommended liquid to powder mix ratios for wall plaster and mortar bed

1. Design standard – Laticrete "226 Thick Mortar Bed Powder" prepackaged dry mortar mix gauged with undiluted Laticrete "3701 Latex Admixture"
2. Compressive strength: 5000psi
3. Tensile strength: 500 psi
4. Shear bond strength: 500 psi
5. Water absorption: 4% Max.

F. METAL LATH - WALL PLASTER:

Self-furring, zinc coated galvanized, 16 x 16 gauge, 2 x 2 inch heavy duty welded wire fabric lath with 11 gauge stiffener attachment wire 6 inches on center and slot-perforated, absorptive, separator paper between face and back wires complying with ASTM A42.3, C841, C933 and Federal Specifications QQ-W-461g and QQ-L-101c.

Backing to comply with Federal Specifications UU-B-790a Building Paper, Type 1, Grade D.

1. Design standard – K-Lath "Stucco Rite Double Wire Heavy Duty", 28 x 96 inch sheets

G. METAL REINFORCING – ROOF MORTAR BED:

Zinc coated galvanized, 16 x 16 gauge, 2 x 2 inch heavy duty welded wire fabric sheet, 28 x 96 inches

1. Design standard - K-Lath "Tile Mesh"

H. ROOF DRAINAGE MAT:

5/16 inch thick, load bearing polyethylene sub-surface drainage mat with perforated dimples, hydraulic transmissivity complying with ASTM D4716.

1. Design standard – Laticrete "Plaza and Deck Drainage Mat"

I. WATERSTOP:

PVC base seal type waterstop with expansion tear web

1. Design standard – Greenstreak style 698

J. ELASTOMERIC EXPANSION & CONTROL JOINT SEALANT: S-1 as indicated on the drawings

Provide chemically curing one-part silicone sealant complying with ASTM C920, Type S, Grade NS, Class 25, Use M,G for sealing non-porous exterior expansion and control joints in exterior ceramic tile wall assemblies. Comply with Fed. Spec. TT-S-001543A Class A. Provide non-solvent based primer compatible with tile assembly if recommended by manufacturer.

1. Design standard – Laticrete "Latisil Silicone Tile Sealant" and "Latisil 9116 Primer"
2. Color – Custom yellow color match as approved by architect

K. JOINT SEALANT BACK-UP ROD:

Provide closed-cell, non-gassing polyethylene foam rod. The diameter of the rod shall be approximately 25% in excess of the joint width as indicated on the drawings

PART 3 - EXECUTION

3.01 EXAMINATION

- A. Contractor shall convene pre-installation meetings with the owner, architect and independent inspection agency in accordance with 3.10 Field Quality Control of this section to examine wall and roof substrates where tile assemblies are to be constructed for compliance with specification requirements and to examine other conditions affecting performance of the tile assemblies. Separate meetings shall convene prior to construction of each critical phase of the work (installation of wall plaster and roof mortar bed, application of waterproof membrane, installation of tile, and grouting).

3.02 PREPARATION

- A. Comply with specific preparation requirements for each critical phase of the work (installation of wall plaster and roof mortar bed, application of waterproof membrane, installation of tile, and installation of grout) as specified in 3.03-3.09 of this section.

3.03 INSTALLATION - GENERAL

- A. ANSI Tile Installation Standards: comply with parts of ANSI A108 Series "Specification for Installation of Ceramic Tile" that apply to types of installation products and methods of installation.
- B. TCA Installation Guidelines: comply with Tile Council of America TCA "Handbook for Ceramic Tile Installation" that apply to methods of installation indicated on the drawings.
- C. Jointing Pattern: layout tile sheets in pattern as indicated on the drawings, using dimensioned control and expansion joint locations as reference points. Joints between tile sheets should be same width as joints within tile sheets, unless shown as a control or expansion joint in widths as indicated on the drawings.
- D. Expansion & Control Joints: locate and form expansion and control joints where indicated on the drawings during installation of wall plaster and roof mortar bed. Do not saw cut joints after installing wall plaster, roof mortar bed or tile.

3.04 INSTALLATION -LATEX CEMENT WALL PLASTER

- A. General – install latex cement wall plaster in compliance with ANSI A 108-AN 3.3 & A-4.1a for cement plastering and with product manufacturer's instructions.
- B. Install waterstops to form control and expansion joints locations and configurations as indicated on the drawings.
- C. Application of paper-backed metal lath : Install self-furring lath at stiffener wire with wood screw fasteners with a minimum 1/2 inch engagement to the plywood sheathing. Do not install metal lath across waterstops at control and expansion joints. Triangular configuration of plaster panels between joints will require careful attention to fastening metal lath at convergence of panel joints to

insure proper structural connection to the plywood substrate.

- D. Mix dry mortar mix and latex admixture to a proper plastic consistency in accordance manufacturer's instructions to insure good working characteristics and sag resistance for vertical application.
- E. Trowel apply scratch coat of latex cement plaster to a ½ inch thickness, insuring good compaction and full encapsulation of wire lath; allow to cure for 24 hours prior to application of leveling coat.
- F. Trowel apply leveling coat of latex cement plaster to an additional ½ inch thickness for a total plaster thickness of 1 inch. Provide a smooth, light steel trowel finish in preparation for installation of the waterproof membrane for thin-set tile installation.

3.05 INSTALLATION – LATEX CEMENT ROOF DECK MORTAR BED

- A. General – install latex cement mortar bed in compliance with ANSI A 108-AN 2.6.1 & A-4.1a for cement mortar beds and with product manufacturer's instructions.
- B. Verify that the primary single-ply roof membrane has been inspected and certified complete in writing by the roof contractor and roof product manufacturer in accordance with Section 07530 3.08
- C. Install drainage mat over primary single ply roof membrane in accordance with manufacturer instructions.
- D. Mix dry mortar mix and latex admixture to a proper semi-dry consistency in accordance manufacturer's instructions to insure proper working characteristics and compaction for horizontal application.
- E. Place mortar over the drainage mat to approximately ½ the specified finished thickness indicated on the drawings. Place wire reinforcing mesh over mortar, and immediately place remaining mortar over the reinforcing by tamping with a flat trowel ; the location of the reinforcing should be in the middle of the mortar bed; pulling wire mesh from the bottom of the mortar bed is not an acceptable method for installing the reinforcing. Screed the mortar bed to the thickness and profile as indicated on the drawings, and finish with a light steel trowel finish.

3.06 INSTALLATION – WATERPROOF MEMBRANE FOR THIN-SET TILE INSTALLATION

- A. General - install waterproof membrane in strict compliance with ANSI A108.13 and manufacturer's instructions.
- B. Preparation – wall plaster or mortar bed shall have a smooth, light steel trowel finish, free of loose material and free of any dirt or oil contamination, with flatness not to exceed a 1/8 inch deviation over 10 feet. Surface may be slightly damp (surface saturated dry SSD), with no standing or dripping water.
- C. Pre-cut reinforcing fabric to form crack reinforcement or flashings into expansion / control joints and other locations such as widow openings, gutters, etc. It is recommended to prefabricate strips of waterproof membrane in order to construct the continuous loop into expansion / control joints as indicated on the drawings. Consult manufacturer for recommended methods of prefabrication and flashing of prefabricated strips to field applied membrane. Consult manufacturer to insure compatibility of adhesion and connection with other flashings as required.

- D. Reinforce any shrinkage cracks in the plaster or mortar bed prior to application of the membrane.
- E. After proper preparation, flashing and crack reinforcement, install membrane in strict compliance with manufacturer's instructions. It is critical to insure proper initial application of a liberal amount of latex liquid and to insure the surface of the liquid remains wet prior to embedment of the reinforcing fabric especially during windy, dry or hot conditions; liquid should fully bleed through fabric before any additional liquid is applied. Do not apply more liquid to more area than can be fully embedded into the reinforcing fabric while the liquid latex and top coated
- F. A second and final application of liquid latex is required after the initial application is dry to the touch.
- G. Allow membrane to fully cure for 7 days at 70°F; colder temperatures may require longer cure time. Flood testing of membrane is not required

3.07 INSTALLATION – MOSAIC TILE

- A. General - install tile in strict compliance with ANSI A 108.5 and manufacturer's instructions.
- B. Preparation – Examine the waterproof membrane for defects of contamination prior to installation of tile. Clean surface of membrane with a clean damp sponge to remove any minor dirt or dust contamination.
- C. Mix prepackaged dry thinset mortar with undiluted latex additive to a plastic consistency in accordance with manufacturer's instructions.
- D. Trowel mortar with a ¼ x ¼ inch notched trowel; spread only as much mortar that can be covered while mortar remains wet and tacky to the touch (open time), approximately 20-30 minutes at 70°F open time may decrease with increased temperature or dry, windy conditions.
- E. Match tiles for color and pattern by using tile from cartons in same sequence as manufactured and packaged if so numbered. Cut tile neatly around all windows or roof penetrations. Broken, cracked, chipped, or deformed tiles are not acceptable.
- F. Set ceramic mosaic tile sheets in place, and beat each sheet with a beating block and rubber mallet to insure full contact with mortar and compliance with flatness tolerance of maximum 1/8 inch deviation in 10 feet ; periodically remove a sheet to insure a minimum of 95% mortar contact in accordance with ANSI A108.5 A-4.3.3.3.3 An alternate method for bedding tile is to use a mechanical vibrating orbital sander fitted with a non-scratching pad.
- G. Align sheets of mosaic tile to insure joints between tile sheets are the same width as joints within tile sheets, unless shown as a control or expansion joint in widths as indicated on the drawings.
- H. Clean excess mortar from tile surface and grout joints with a damp sponge while mortar remains fresh; insure minimum grout joint depth of 2/3 the thickness of the tile

3.08 INSTALLATION – GROUT

- A. General - Mix, install, and clean excess grout in strict compliance with manufacturer's proprietary product instructions and with ANSI A 108.9 A-4.6.3.
- B. Preparation – examine grout joints to insure proper depth requirements, and that joints are free of

contamination or water. Ambient and tile surface temperature must be between 50° F and 90° F, and surfaces to be grouted must be protected from direct sun exposure prior to and during grouting.

- C. Protect finished grout work from other trades and exposure to airborne contamination for a minimum of 24 hours at 70° F.

3.09 INSTALLATION – EXPANSION & CONTROL JOINTS

- A. Preparation – examine joints to receive joint sealant for compliance with required joint configuration and other conditions affecting performance of the joint sealant. Remove all foreign material or contamination that could affect adhesion or performance of the sealant. Remove loose material by blowing out joints with oil-free compressed air.
- B. Joint priming – prime joint substrates as required by sealant product manufacturer instructions; do not use solvent based primers
- C. Masking – use masking tape to prevent contact with tile and grout surfaces that could be damaged by such contact or by cleaning methods required to remove excess sealant; remove tape immediately after tooling of joint sealant.
- D. Sealant backings – install rounded closed cell polyethylene foam backer rod in diameter and depth to provide for sealant joint configuration with optimum movement capability; do not leave gaps between ends of sealant backings.
- E. Installation – comply with manufacturer’s written installation instructions and with ASTM C 1193 for specified materials and conditions. Place sealants to achieve full contact with joint substrates; completely fill recesses to produce uniform cross-sectional shapes and depths that allow optimum sealant movement capability.
- F. Tooling – immediately after sealant application and before skinning or curing begins, tool sealants to form smooth uniform beads, to eliminate air pockets, and to insure contact and adhesion of sealant with the sides of the joint. Provide concave joint configuration in accordance with ASTM C 1193 figure 5-A unless otherwise indicated.
- G. Field quality control – field test tile assembly sealant joints in accordance with Section 07901 3.04 of this specification.
- H. Clean and protect sealants in accordance with Section 07901 3.05 & 3.06 of this specification.

3.10 FIELD QUALITY CONTROL

- A. Contractor shall prepare and submit a formal quality control plan detailing means, methods and schedule for compliance with all quality control requirements specified in this section.
- B. Contractor shall engage an independent testing and inspection agency to perform field inspections and prepare field observation reports of the mock-up construction and testing, as well as the progress of full-scale tile clad wall and roof assembly construction and report to owner and architect within 24 hours of each inspection. Inspections shall include, but not be limited to the following procedures:
 - 1. Convene a pre-installation meeting with owner, architect, tile contractor and independent

inspection agency prior to each critical phase of the work (construction/testing of mock-up, application of wall plaster and roof mortar bed, application of waterproof membrane, installation of tile, and grouting) to discuss requirements of the contract documents and examine conditions affecting the proper performance of the tile assembly.

2. Observe and verify that latex cement wall plaster, latex cement roof mortar, waterproof membrane are mixed and placed as required by specification and recommended by manufacturer. Conduct observations on a random and frequent basis.

3. Observe tile setting and grouting procedures, including, but not limited to temperature conditions, mixing and installation of adhesives and grouts, use of proper notched trowels, beating of tile in place, cleaning excess mortar from grout joints.

4. Select at random three sheets of tile per inspection, not to exceed 1% of total area, for removal and observation of adhesive mortar contact and coverage to verify compliance with specification requirements. Remove tile while mortar is fresh.

5. Conduct periodic and random acoustic sounding of completed tile assembly after a minimum 7 day cure to judge quality of tile adhesion and identify any potential defects or delamination of underlying system components

6. Observe and verify that tile contractor maintains an appropriate number of installers in order to insure compliance with latex membrane, latex cement mortar and epoxy grout open time and pot life requirements. Verify proper protection of both work in progress and completed work during any unusual temperature or weather conditions.

7. Observe and verify that tile contractor maintains appropriate on-site supervisory personnel in order to maintain consistency in quality of work that could be affected by changes in available labor pool.

3.06 CLEANING

- A. Clean excess mortar from surface with water as work progresses. Perform cleaning while mortar is fresh and before it hardens on surfaces. Insure that a minimum of 2/3 depth of the grout joint is clear of adhesive mortar to allow proper depth for grout. Take care to not contaminate joints while cleaning prior to grouting. Sponge and wash tile diagonally across joints. Polish with clean dry cloth. Remove grout haze following recommendation of mortar additive and epoxy manufacturer. Do not use acids for cleaning.

3.07 PROTECTION

- A. Protect finished installation under provisions of Section (01500) (01535.) Close areas to other trades and traffic until tile being installed has set firmly. Keep traffic off horizontal Portland cement thick bed mortar installations for at least 72 hours at 70°F
- B. Cure tile clad façade assembly for 7-10 days at 70°F before removal of protection. Extend period of protection of tile facade at lower temperatures (below 60°F and at high relative humidity, >70% R.H.) due to retarded set times of mortar/adhesives. Replace or restore work of other trades damaged or soiled by work under this section.

END OF SECTION

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