

DIVISION 9

FINISHES

BUILDING WORK

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FINISHES

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SECTION 09220

PORTLAND CEMENT PLASTER

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required for Portland cement plaster system, including Metal furring and lathing, as shown on the drawings and specified herein

1.02 RELATED WORK

- A. Section 04200 - Masonry.
- B. Section 03300 - Concrete.

1.03 REFERENCES

- A. ASTM C91 - Standard Specification for Masonry Cement.
- B. ASTM C150 - Standard Specification for Portland Cement.
- C. ASTM C206 - Standard Specification for Finishing Hydrated Lime.
- D. ASTM C207 - Standard Specification for Hydrated Lime for Masonry Purposes.
- E. ASTM C631 - Standard Specification for Bonding Compounds for Interior Plastering.
- F. ASTM C897 - Standard Specification for Aggregate for Job-Mixed Portland Cement-Based Plasters.
- H. ASTM C926 - Standard Specification for Application of Portland Cement-Based Plaster.

1.04 SUBMITTALS FOR REVIEW

- A. Product Data: Provide data on plaster materials, characteristics and limitations of products specified.

1.05 QUALITY ASSURANCE

- A. Perform Work in accordance with ASTM C926.

1.06 MOCK-UP

- A. Provide mock-up of exterior and interior wall and ceiling system.

- B. Construct mock-up, 2 m long by 1.5 m wide, illustrating surface finish.

1.07 ENVIRONMENTAL REQUIREMENTS

- A. Section 01601 - Control of Material: Environmental conditions affecting products on site.
- B. Do not apply plaster when substrate or ambient air temperature is less than 10 degrees C nor more than 35 degrees C.
- C. Maintain minimum ambient temperature of 10 degrees C during installation of plaster and until cured.

PART 2: PRODUCTS

2.01 PLASTER BASE MATERIALS

- A. Cement: to ASTM C150, Type I Portland.
- B. Lime: to ASTM C206, Type S and C207, Type S.
- C. Aggregate: In accordance with ASTM C897.
- D. Water: Clean, fresh, potable and free of mineral or organic matter which can affect plaster.
- E. Bonding Agent: in accordance with ASTM C631; type recommended for bonding plaster to concrete and concrete masonry surfaces.
- F. Admixtures: use plasticiser to ASTM - C 494 or BS 4887 and water-retaining Agents with prior approval.

Man: FEP - MASTER BUILDERS

Ref: RHEOMIX - 720

Man: FOSROC

Ref: CEBEX 112
Or other approved and equal

- G. Waterproofing Admixtures: shall be use for planter, water tank and external plaster

Man: FEP-MASTER BUILDERS

Ref: RHEOMIX - 141

Man: FOSROC

Ref: CONPLAST PROLAPIN 031
Or other approved and equal

2.02 PLASTER FINISH MATERIALS

- A. Cement: As specified for plaster base coat, gray color.
- B. Lime: As specified for plaster base coat.
- C. Water: Clean, fresh, potable, and free of matter which can affect plaster.

2.03 FURRING AND LATHING

- A. Metal Lath: to ASTM C847; flat diamond self furring mesh, of weight to suit application, backed with treated paper; galvanized.
- B. Wire Mesh Reinforcement: 38 x 38 mm galvanized steel 24 gage 0.6 mm wire, woven mesh.
- C. Casing Bead: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges, with square edges; galvanized.
- D. Corner Bead: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges with radiused edge; galvanized.
- E. Base Screed: Formed sheet steel, depth governed by plaster thickness, maximum possible lengths, expanded metal flanges, with beveled edge; galvanized.
- F. Corner Mesh: Formed sheet steel, minimum 0.5 mm thick, expanded flanges shaped to permit complete embedding in plaster, minimum 50 mm size; galvanized.
- G. Strip Mesh: Expanded metal lath, minimum 0.5 mm thick, 100 mm wide galvanized.
- H. Control and Expansion Joint Accessories: Formed sheet steel accordion profile, 50 mm expanded metal flanges each side, galvanized.
- I. Anchorage: Tie wire, nails, and other metal supports, of type and size to suit application; to rigidly secure materials in place, galvanized.
- J. Fasteners: ASTM C1002, self drilling, self tapping screws.

2.05 CEMENT PLASTER MIXES

- A. Mix and proportion cement plaster in accordance with ASTM C926, and as indicated.

- B. Base Coat and Brown Coat: One part cement, minimum 3-1/2 and maximum 4 parts aggregate, and minimum 15 percent and maximum 25 percent hydrated lime.
- C. Finish Coat: One part cement, minimum 4 and maximum 5 parts aggregate, and minimum 25 percent and maximum 50 percent lime.
- D. Mix only as much plaster as can be used prior to initial set.
- E. Add color pigments to finish coat in accordance with manufacturer's instructions.
- F. Mix materials dry, to uniform color and consistency, before adding water.
- G. Add admixtures to all coats as manufacturer's instructions.
- H. Protect mixtures from freezing, frost, contamination, and excessive evaporation.
- I. Do not retemper mixes after initial set has occurred.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Verification of existing conditions before starting work.
- B. Masonry: Verify joints are cut flush and surface is ready to receive work of this section. Verify no bituminous or water repellent coatings exist on masonry surface.
- C. Concrete: Verify surfaces are flat, honeycomb are filled flush, and surfaces are ready to receive work of this section. Verify no bituminous, water repellent, or form release agents exist on concrete surface that are detrimental to plaster bond.
- D. Metal Lath and Accessories: Verify lath is flat, secured to substrate, and joint and surface perimeter accessories are in place.
- E. Mechanical and Electrical: Verify services within walls have been tested and approved.

3.02 PREPARATION

- A. Dampen masonry surfaces to reduce excessive suction.
- B. Clean concrete surfaces of foreign matter. Clean surfaces using acid solutions, solvents, or detergents. Wash surfaces with clean water.
- C. Roughen smooth concrete surfaces and apply bonding agent in accordance with manufacturer's instructions.

3.03 INSTALLATION - LATHING MATERIALS

- A. Apply metal lath taut, with long dimension perpendicular to supports.
- B. Lap ends minimum 25 mm. Secure end laps with tie wire where they occur between supports.
- C. Lap sides of diamond mesh lath minimum 38 mm.
- D. Attach metal lath to concrete and masonry using wire hair pins, or loops. Ensure that anchors are securely attached to concrete and spaced at maximum 600 mm on center.

3.04 INSTALLATION - ACCESSORIES

- A. Continuously reinforce internal angles with corner mesh, return metal 75mm from corner to form the angle reinforcement; fasten at perimeter edges only.
- B. Place corner bead at external wall corners; fasten at outer edges of lath only.
- C. Place strip mesh diagonally at corners of lathed openings. Secure rigidly in place.
- D. Place 100 mm wide strips of metal lath centered over junctions of dissimilar backing materials. Secure rigidly in place.
- E. Place casing beads at terminations of plaster finish. Butt and align ends. Secure rigidly in place.
- F. Install door and glazed frames plumb and level in opening. Secure rigidly in place.
- G. Install metal access panels and rigidly secure in place.
- H. Position to provide convenient access to concealed work requiring access.

3.05 CONTROL AND EXPANSION JOINTS

- A. Locate interior control and expansion joints every 6 m. or as indicated.
- B. After initial set, scribe contraction joints in exterior work every 1 m in each direction by cutting through 2/3 of the cement plaster depth, neatly, in straight lines.
- C. Locate exterior control and expansion joints every 4m in each direction.
- D. Establish control and expansion joints with double casing beads butted tight. Set both beads over 150 mm wide strip of polyethylene sheet for air seal continuity.
- E. Coordinate joint placement with other related work.

3.06 PLASTERING

- A. Apply plaster in accordance with ASTM C926.
- B. Apply brown coat to a nominal thickness of 10 mm and a finish coat to a nominal thickness of 3 mm over masonry, concrete and clay tile surfaces.
- C. Apply base coat to a nominal thickness of 8 mm, brown coat to a nominal thickness of 9 mm, and a finish coat to a nominal thickness of 3mm over metal lath.
- D. Moist cure base and brown coats. Apply brown coat immediately following initial set of scratch coat.
- E. After curing, dampen previous coat prior to applying finish coat.
- F. Apply finish coat and wood float or steel trowel as indicated to a consistent and smooth finish.
- G. Avoid excessive working of surface. Delay troweling as long as possible to avoid drawing excess fines to surface.
- H. Hand or Machine apply aggregate surfacing to full surface coverage.
- I. Moist cure finish coat for minimum period of 48 hours.

3.07 ERECTION TOLERANCES

- A. Maximum Variation from True Flatness: 3 mm in 3 m.

3.08 SCHEDULES

- A. Interior Area: Two coat cement plaster, smooth wood float finish, excluding scratch coat.
- B. Exterior Area: Three coat cement plaster, course float finish, excluding scratch coat.
- C. Walls to receive ceramic tiles one coat cement plaster, rake float finish, excluding scratch coat.
- D. Water tight and planters surfaces: Two coat cement plaster, smooth steel trowel finish, excluding scratch coat.

End of Section

SECTION 09300

CERAMIC TILE

PART 1: GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install ceramic tile on floors, base and walls using thinset applications method, including bath fitting as shown on the drawings and specified herein.
- B. Tile and expansion joint pattern shall be as shown and as accepted.

1.02 RELATED WORK

- A. Other sections directly related to work covered in this section include the following:
 - 1. Section 03350 - Concrete Finishes.
 - 2. Section 07005 - Waterproofing and Dampproofing.
 - 3. Section 07900 - Caulking.
 - 4. Plumbing Work Sections.

1.03 REFERENCES

- A. ANSI A108.1 - Installation of Ceramic Tile with Portland Cement Mortar.
- B. ANSI A108.4 - Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive.
- C. ANSI A108.5 - Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex Portland Cement Mortar.
- D. ANSI A108.10 - Installation of Grout in Tilework.
- E. ANSI A118.1 - Dry-Set Portland Cement Mortar.
- F. ANSI A118.6 - Ceramic Tile Grouts.
- G. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.
- H. ANSI A137.1 - Standard Specifications for Ceramic Tile.
- I. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

J. ASTM C847 - Metal Lath.

1.04 SUBMITTALS

- A. Shop Drawings: Indicate tile layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.
- B. Product Data: Provide instructions for using adhesives and grouts.
- C. Samples: Mount tile & apply grout on two plywood panels, (800x600mm) in size illustrating pattern, color variations, and grout joint size variations.
- D. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

1.05 MAINTENANCE DATA

- A. Submit Maintenance Data Include recommended cleaning methods, cleaning materials, stain removal methods, and polishes and waxes.

1.06 QUALITY ASSURANCE

- A. Perform Work in accordance with ANSI A137.1.
- B. Conform to TCA Handbook, and ANSI A108.4.
- C. Maintain one copy of each document on site.

1.07 QUALIFICATIONS

- A. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.
- B. Installer: Company specializing in performing the work of this section with minimum three years experience and approved by manufacturer.

1.08 DELIVERY, STORAGE, AND HANDLING

- A. Protect adhesives from freezing or overheating in accordance with manufacturer's instructions.

1.09 ENVIRONMENTAL REQUIREMENTS

- A. Do not install adhesives in an unventilated environment.

1.10 EXTRA MATERIALS

- A. Provide (3 sq m) of each size, color, and surface finish of tile specified, and representative trim, all properly packed in cartons, and clearly marked on the outside.

PART 2: PRODUCTS

2.01 CERAMIC MANUFACTURERS

- A All ceramic tile shall be local made.
- B For swimming pool ceramic and fihings and for pool surrounding area:

Man: Gail
germany

2.02 CERAMIC TILE MATERIALS

- A. Ceramic Floor Tile: to BS 1286, conforming to the following:

- | | |
|------------------------|----------------------|
| 1. Moisture Absorption | (5) percent. |
| 2. Size | as shown on Drawing. |
| 3. Edge | Square. |
| 4. Surface Finish | Slip resistant. |
| 5. Color | As selected. |

- B. Ceramic Wall Tile: to B 1281, conforming to the following:

- | | |
|------------------------|--------------------------------|
| 1. Moisture Absorption | (10) percent. |
| 2. Size | as shown on Drawings. |
| 3. Edge | Square. |
| 4. Surface Finish | Matte glazed and as indicated. |
| 5. Color | As selected. |

2.03 BASE MATERIALS

- A. Base: Match floor tile for moisture absorption, surface finish, and color:

- | | |
|--------------------|--|
| 1. Length | Tile length. |
| 2. Height | (100 mm) and as stated on the drawing. |
| 3. Top Edge | Bull nosed . |
| 4. Internal Corner | Coved . |
| 5. External Corner | Bullnosed . |

2.04 ADHESIVE MATERIALS

- A. Type recommended by adhesive and tiling manufacturer's as suitable for type of tile and location in the works and to be approved.

2.05 GROUT MATERIALS

- A. Grout: shall be waterproof, cement-based material, suitable for grouting ceramic wall and floor tile joints in interior and exterior installation, conform to BS5750: Part 2; colours as selected.

2.06 GROUT MIX

- A. Mix and proportion pre-mix grout materials in accordance with manufacturer's instructions.

PART 3: EXECUTION

3.01 EXAMINATION

- A. Verify that surfaces are ready to receive work.

3.02 PREPARATION

- A. Protect surrounding work from damage or disfiguration.
- B. Vacuum clean surfaces.
- C. Seal substrate surface cracks with filler.
- D. Apply sealer to substrate surfaces in accordance with adhesive manufacturer's instructions.

3.03 INSTALLATION - THINSET METHOD

- A. Install adhesive tile, thresholds, stair treads, and grout in accordance with manufacturer's instructions.
- B. Lay tile to pattern indicated.
- C. Place edge strips at exposed tile edges.
- D. Cut and fit tile tight to penetrations through tile. Form corners and bases neatly. Align floor, base and wall joints.
- E. Place tile joints uniform in width, subject to variance in tolerance allowed in tile size. Make joints watertight, without voids, cracks, excess mortar, or excess grout.
- F. Sound tile after setting. Replace hollow sounding units.

- G. Keep expansion joints free of adhesive or grout.
- H. Allow tile to set for a minimum of 48 hours prior to grouting.
- I. Grout tile joints.
- J. Apply sealant to junction of tile and dissimilar materials and junction of dissimilar planes.
- K. Form internal angles coved and external angles bullnosed.
- L. Install ceramic accessories rigidly in prepared openings.

3.04 CLEANING

- A. Clean tile and grout surfaces.

3.05 PROTECTION OF FINISHED WORK

- A. Do not permit traffic over finished floor surface for 4 days after installation.

End of Section

SECTION 09410**TERRAZZO TILE****PART 1: GENERAL****1.01 SCOPE OF WORK**

- A Furnish all labor, materials, equipment and incidentals required to install terrazzo floor and base tiles including stairs and landings tile as shown and as specified herein.
- B Tile and control (expansion) joint pattern shall be as shown and as accepted.

1.02 RELATED WORK

- A Other sections directly related to work covered in this section include the following:
 - 1. Section 03350 - Concrete Finishes.
 - 2. Section 07005 - Waterproofing and Dampproofing.
 - 3. Section 07900 - Caulking.

1.03 REFERENCES

- A ASTM A185-Welded Steel Wire Fabric for Concrete Reinforcement.
- B ASTM C33 - Concrete Aggregates.
- C ASTM C150 - Portland Cement.
- D ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.
- E ASTM D2103 - Polyethylene Film and Sheeting.
- F NTMA (National Terrazzo and Mosaic Association, Inc.) - Terrazzo Ideas and Design Guide.

1.04 SUBMITTALS

- A Submit two copies of manufacturer's specifications and installation instructions for all materials required. Include certifications and other data as may be required to show compliance with these Specifications.
- B Submit one sample panel of each tile type mounted on not less than 600 mm square plywood or hardboard backing and grouted as required. Engineer's review will be for color, pattern, and texture only. Resubmit as required until acceptance is obtained.

1.05 QUALITY ASSURANCE

- A Installation Specifications shall conform to NTMA except as provided otherwise herein.
- B Maintain one copy of document on site.

1.06 SAMPLE FLOOR AREA

- A The Engineer will select one room or area which is scheduled to receive floor tile and designate it as the sample floor area. This area shall be finished and approved before authorization to proceed with work in other areas.
- B The sample floor area shall, upon approval, be part of the finish work and shall become the standard of acceptance for floor finish on the remainder of the project.

1.07 ENVIRONMENTAL REQUIREMENTS

- A Do not install terrazzo when temperature is below (10 degrees C) or above (40 degrees C).
- B Maintain this temperature range 24 hours before, during, and 72 hours after installation of terrazzo.

1.08 COORDINATION

- A. Coordinate the work with mechanical and electrical access cover placement in relation to terrazzo divider strips.

1.09 PRODUCT DELIVERY, STORAGE AND HANDLING

- A Deliver materials and store on the site in original containers with seals unbroken and labels intact until time of use and handle all in accordance with manufacturer's directions. No tile shall be dropped during unloading or handling.

PART 2: PRODUCTS

2.01 MATERIALS

- A Terrazzo tiles and fittings (normal type): shall be 250 x 250 x 25 mm for floor tiles, 30 mm thick for treads with non slip nosing, 20 mm thick for risers, 15 mm thick for skirtings, and shall be precast pressed tiles, with the wearing surfaces made of white Portland cement and local marble chippings of an approved quality and color. Tiles shall be Grade A, sound, square edged, and of even and uniform texture and color. Terrazzo tiles shall meet the prescribed laboratory tests.
- B Terazzo tiles with Morble pieces: shall as item A above but wearing surfaces made of white cement and local large marble pieces
- C Cement shall conform to ASTM C150, Type I.

- D Colour Pigments for Topping: Non-fading mineral type.
- E Terrazzo Sand shall conform to ASTM C33.
- F Underbed: One part Portland cement to 4 parts sand by volume. Add water to produce low slump mix.
- G Grout shall be Hydroment tile grout factory mixed with all required aggregate and pigment. The color shall be selected by the Engineer.
- H Water shall be fresh, clean and potable, free from organic matter, acids and alkalis.

PART 3: EXECUTION

3.01 GENERAL

- A Coordinate work with the work of other trades affected by tile work. Grounds, door bucks, electrical boxes, connections for plumbing and heating fixtures, and all fittings shall be in place and pipe chases and other openings shall be properly closed before any tile is installed.
- B Inspect all surfaces to receive tile be assured that they are in proper condition for the work to be performed under this Section. Concrete to receive tile shall cured 28 days, minimum, before receiving tile. Notify the Engineer in writing of any condition requiring correction before any tile work is installed. Failure to make such a report shall be construed as acceptance of the conditions.
- C Coordinate the work of this Section and that of the Section 07005 to insure that the required joints are caulked before grouting is performed.

3.02 CONTROL JOINTS

- A Install control joints (tile expansion joints) in tile work at locations noted, at the intersection with walls and vertical obstructions, at other places where construction joints occur in concrete subfloor.

3.03 INSTALLATION - FLOOR TILE

- A Set all tile in neat cement paste applied to a plastic setting bed. Thoroughly beat-in all tile while the mortar bed is still plastic. The beating shall fill the entire space between ribs of rib-backed tile with mortar. Provide control joints free of mortar where detailed and required.
- B Tile shall be laid out in grid pattern as shown on Drawings and shop drawings. Unless shown otherwise, floor tile pattern shall be centered in room with generally no tile cut smaller than half size and all cuts on the outer edge of the field. Floor tile shall be set with 2mm joints to receive grout.

- C Extend tile work into recesses and under or behind equipment and fixtures, to form a complete covering without interruptions, except as otherwise specified or shown. Terminate work neatly at obstructions, edges and corners without disrupting pattern or joint alignments.
- D Accurately form intersections and returns. Perform cutting and drilling of tile without marring visible surfaces. Carefully grind cut edges of tile abutting trim, finish or built-in items for straight aligned joints. Fit tile closely to electrical outlets, piping, fixtures and other penetrations so that plates, collars, or covers overlap tile.
- E Provide openings for control joints where and as indicated and as specified above. If not indicate and detailed, comply with recommendations in TCA "Handbook for Ceramic Tile Installation" leaving joints ready for sealant specified.
- F Grout tile joints using the approved prepared grout. Force a maximum amount of grout into the joints. Follow the grout manufacturer's directions explicitly. Tool joints flush for floor tile and to bottom of cushion edge for wall tile, all as accepted by the Engineer. Mortar shall not show through grouted joints. The finished grout shall be uniform in color, smooth and without voids, pinholes or low spots.

3.04 INSTALLATION - BASE

- A Vertical Base Projecting From Wall: 9 mm minimum topping on underbed bonded to wall substrate, projecting 5 mm from finish wall surface, as detailed and shown on drawings.

3.05 APPLICATION - STAIRS

- A Terrazzo Stairs and Landings: Minimum 16 mm topping on underbed bonded to treads and minimum 9 mm topping on underbed bonded to risers.

3.06 CURING

- A Use curing method in accordance with NTMA instructions.
- B Close area to allow undisturbed curing.

3.07 SURFACE FINISHING

- A Brush apply terrazzo toping mix slurry to topping surface.
- B Finish terrazzo in accordance with NTMA instructions.
- C Produce terrazzo finish surface to match approved sample, with minimum 70 percent chip exposed.
- D Grind terrazzo surface with power disc machine; successively sequence using coarse to fine grit abrasive, using a wet method.
- E Apply grout mix to match matrix over ground surfaces to fill honeycomb exposed during grinding.

- F After grout has sufficiently cured, grind, using a fine grit abrasive.

3.08 TOLERANCES

- A Maximum Variation from Flat Surface: 2 mm in one m.
- B Maximum variation from Level (Except Surfaces Sloping to Drain): 2mm

3.9 CLEANING AND PROTECTION

- A Upon completion of placement and grouting, clean all tile surfaces so they are free of foreign matter.
- B Seal and polish surfaces in accordance with NTMA.
- C Tile may be cleaned with acid solutions only when permitted by tile and grout manufacturer's printed instructions, but not sooner than 14 days after installation. Protect metal surfaces, cast iron and vitreous plumbing fixtures from effects of acid cleaning. Flush surface with clean water before and after cleaning.
- D Leave finished installation clean and free of cracked, chipped, broken, unbonded, or otherwise defective tile work.
- E Prohibit foot and wheel traffic from using tiled floors for at least 3 days after grouting is completed. Damp cure for 72 hours minimum.
- F Before final inspection, remove protective coverings and rinse neutral cleaner from tile surfaces.

End of Section

SECTION 09901

SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1: GENERAL

1.01 SCOPE OF WORK

- A Furnish all labor, materials, and equipment required for the surface preparation and application of shop primers on ferrous metals, excluding stainless steels, as specified herein.

1.02 RELATED WORK NOT INCLUDED

- A Other sections directly related to work covered in this section include the following:
 - 1. Section 09902 - Painting

1.03 SUBMITTALS

- A Submit to the Engineer as provided in the Submittals section for shop drawings, manufacturer's specifications and data on the proposed primers and detailed surface preparation, application procedures and dry mil thicknesses.
- B Submit representative physical samples of the proposed primers, if required by the Engineer.

PART 2: PRODUCTS

2.01 MATERIALS

- A Welding. All welded joints which will be fully or partially submerged shall be sealed watertight by continuous welds.
- B Edge Grinding. Sharp corners of cut or sheared edges shall be ground to a radius as required to ensure satisfactory paint adherence.
- C Surface Preparation. All ferrous metal surfaces, except motors, speed reducers, and stainless steel, shall be blast cleaned in conformance with the paint manufacturer's recommendations. All mill scale, rust, and contaminants shall be removed before shop primer is applied.
- D Shop Painting. Surfaces to be painted after installation shall be prepared for painting as recommended by the paint manufacturer for the intended service, and then shop painted with one or more coats of the specified primer.

- E Compatibility of Coating Systems. Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats specified in the Painting Section for use in the field and which are recommended for use together.

PART 3: EXECUTION

3.01 APPLICATION

A Surface Preparation and Priming

1. Non-submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming. Submerged components scheduled for priming, as defined above, shall be blast clean in accordance with SSPC-SP-10, near white, immediately prior to priming.
2. Surfaces shall be dry and free of dust, oil, grease and other foreign material before priming.
3. Shop prime in accordance with manufacturer's recommendations.

End of Section

SECTION 09902**PAINTING****PART 1: GENERAL****1.01 SCOPE OF WORK**

- A Furnish all materials, labor, equipment and incidentals required to perform all the painting necessary to complete this contract in its entirety.
- B It is the intent of these Specifications to paint all exposed structural and miscellaneous steel; steel doors and frames; door closers and surface sand/dust seals at painted doors; mechanical and electrical equipment, sluice gates, actuators, posts, conveying systems, pipe, fittings and valves; electrical conduit and appurtenances; exposed ventilating ducts, equipment and appurtenances; plaster walls and ceilings, concrete walls and ceilings, Architectural wood and plywood components, all as specified in the attached painting schedules and all other work obviously required to be painted unless otherwise specified. Minor items not mentioned in the schedule of work shall be included in the work of this Section where they come within the general intent of the specifications as stated herein.
- C "Paint" as used herein means all coating systems materials, including primers, emulsion, enamels, stains, sealers and fillers, and other applied materials whether used as prime, intermediate or finish coats.
- D The following items will not be painted:
 - 1. Concrete (unless otherwise specified in the painting schedules), cementitious finish, stone and granite cladding and tile work.
 - 2. Face brick.
 - 3. Finish hardware unless specifically noted otherwise.
 - 4. Non-ferrous metals and stainless steels, unless specifically noted otherwise.
 - 5. Packing glands and other adjustable parts and nameplates of mechanical equipment.
 - 6. Parts of buildings not exposed to sight, unless specifically noted otherwise.
 - 7. Pre-Finished items.
 - 8. Mechanical, electrical and instrumentation equipment which has been finished painted in the factory as specified.
 - 9. Rubber and plastic materials.

1.02 RELATED WORK

- A Other sections directly related to work covered in this section include the following:
1. Section 3300 - Concrete
 2. Section 04200 - Masonry
 3. Section 06400 - Engineerural Wood Work
 4. Section 09220 - Cement Plaster
 5. Section 09901 - Surface Preparation and Shop Painting.

1.03 SUBMITTALS

- A Product Data: Submit manufacturer's technical information including basic materials analysis and application instruction for each material proposed for use.
- B Samples: prior to beginning work, Engineer will furnish colour chips for surfaces to be painted. Use representative colours when preparing samples for review. Submit samples for Engineer's review of colour and texture only. Provide a listing of material and application for each coat of each finish sample.
1. On 300 x 300 mm hardboard, provide 2 samples of each colour and material, with texture to simulate actual conditions. Resubmit samples as requested until acceptable sheen, colour and texture is achieved.
 2. On actual wood surfaces, provide two 100 x 200 mm samples of natural and stained wood finish. Label and identify each as to location and application.
 3. On concrete masonry, provide two 100 mm square samples of masonry for each type of finish and colour; define filler, prime and finish coats.
 4. On actual wall surfaces and other interior and exterior building components, duplicate painted-finishes of prepared samples. Provide full-coat finish samples on at least 10 sq.m. of surface, as directed, until required sheen, colour and texture is obtained; simulate finished lighting conditions for review of in-place work.
 - a. Final acceptance of colours will be from samples applied on the job.

1.04 DELIVERY AND STORAGE

- A Deliver materials to job site in original, new and unopened packages and containers bearing manufacturer's name and label, and following information.
1. Name or title of material.

2. Fed. Spec. or British Standard number, if applicable.
 3. Manufacturer's stock number and date of manufacturer.
 4. Manufacturer's name.
 5. Contents by volume, for major pigment and vehicle constituents.
 6. Thinning instructions.
 7. Application instructions.
 8. Colour name and number.
- B** Store materials not in actual use in tightly covered containers. Maintain containers used in storage of paint in a clean conditions, free of foreign materials and residue.
1. Protect from freezing where necessary, Keep storage areas heat and orderly. Remove oily rags and waste daily. Take all precautions to ensure that workmen and work areas are adequately protected from fire hazards and health hazards resulting from handling, mixing and application of paints.

1.07 JOB CONDITIONS

- A** Apply water-base paints only when temperature of surfaces to be painted and the surrounding air temperatures are between 10°C and 40°C, unless otherwise permitted by paint manufacturer's printed instructions.
- B** Apply solvent-thinned paints only when temperature of surfaces to be painted and the surrounding air temperatures are between 7°C and 40°C, unless otherwise permitted by paint manufacturer's printed instruction.
- C** Do not apply coatings in snow, rain, fog or mist; or when relative humidity exceeds 85% or to damp or wet surfaces; unless otherwise permitted by coating manufacturer's printed instructions.
1. Painting may be continued during inclement weather only if areas and surfaces to be painted are enclosed and heated within temperature limits specified by paint manufacturer during application and drying periods.

PART 2: PRODUCTS

2.01 MATERIALS

- A** All painting materials shall be delivered to the mixing room in unbroken packages, bearing the manufacturer's brand and name. They shall be used without adulteration and mixed, thinned, and applied in strict accordance with manufacturer's directions for the applicable materials and surface and with the Engineer's approval before using.

- B Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with the finish paints to be used. Refer to the surface Preparation and shop Painting Section for special primers.
- C All paint used shall be guaranteed by the paint manufacturer to be fumeproof and suitable for an atmosphere containing hydrogen sulfide.
- D Materials shall be in full compliance with the requirements of pertinent codes and fire regulations. Proper containers outside of the buildings shall be provided and used for painting wastes, and no plumbing fixture shall be used for this purpose.
- E Material Quality: Provide best quality grade of various types of coatings as regularly manufactured by acceptable paint manufacturers. Use only materials displaying manufacturer's identification as a standard, best-grade product.
 - 1. Proprietary names used to designate colours or materials are not intended to imply that products of named manufacturers are required to exclusion of equivalent products of other manufacturers.
 - 2. Federal Specifications/ British Standards establish minimum acceptable quality for paint materials. Provide a written certification from paint manufacturer that materials provided meet or exceed these minimums.
 - 3. Manufacturer's products which comply with coating qualitative requirements of applicable federal specifications, yet differ in quantitative requirements, may be considered for use when acceptable to Engineer. Furnish material data & manufacturer's certificate of performance to Engineer for proposed substitutions.
- C Colour Pigments: Pure, non-fading, applicable types to suit substrates and service indicated.
 - 1. Lead content in pigment, if any, is limited to contain not more than 0.06 % lead, as lead metal based on the total non-volatile (dry-film) of paint by weight.

PART 3: EXECUTION

3.01 INSPECTION

- A Applicator must examine areas and conditions under which painting work is to be applied and notify Contractor in writing of conditions detrimental to proper and timely completion of work. Do not proceed with work until unsatisfactory conditions have been corrected in a manner acceptable to applicator.
- B Starting of painting work will be construed as applicator's acceptance of surfaces within any particular area.

- C Do not apply paint over dirt, rust, scale, grease, moisture, scuffed surfaces, or conditions otherwise detrimental to formation of a durable paint film.

3.02 SURFACE PREPARATION

- A General: Perform preparation & cleaning procedures in compliance with paint manufacturer's instructions and as herein specified, for each particular substrate condition.

1. Provide barrier coats over incompatible primers or remove and reprime as required. Notify Engineer in writing of any anticipated problems in using the specified coating systems with substrates primed by others.
2. Remove ironmongery, ironmongery accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be finish painted, or provide surface-applied protection prior to surface preparation and painting operations. Remove, if necessary, for complete painting of items & adjacent surfaces.

Following completion of painting of each space or area, reinstall removed items.

3. Clean surfaces to be painted before applying paint or surface treatments. Remove oil & grease prior to mechanical cleaning. Program cleaning and application so that contaminants from cleaning process will not fall on wet, newly-painted surfaces.

- B Cementitious Materials: Prepare cementitious surfaces of concrete, concrete block, cement plaster and cement-asbestos board to be painted by removing efflorescence, chalk, dust, dirt, grease, oils, and by roughening if required to remove glass.

1. Determine alkalinity and moisture content of surfaces to be painted by performing appropriate tests. If surfaces are found to be sufficiently alkaline to cause blistering and burning of finish paint, correct this condition before application of paint. Do not paint over surfaces where moisture content exceeds that permitted in manufacturer's printed instruction.
2. Clean concrete floor surfaces scheduled to be painted with a commercial solution of muriatic acid, or other etching cleaner. Flush floor with clean water to neutralise acids, and allow to dry before painting.

- C Wood: Clean wood surfaces to be painted of dirt, oil, or other foreign substances with scrapers, mineral spirits & sandpaper, as required. Sandpaper smooth those finished surfaces exposed to view, and dust off. Scrape and clean small, dry, seasoned knots and apply a thin coat of white shellac or other recommended knot sealer, before application of priming coat. After priming, fill holes and imperfections in finish surfaces with putty or plastic wood filler.

1. Prime, stain, or seal wood required to be job-painted immediately upon delivery to job. Prime edges, ends, faces, undersides, and backsides of such wood, including cabinets, counters, cases, paneling.
 2. When transparent finish is required, use clear varnish for backpriming.
 3. Backprime paneling on interior partitions only where masonry, plaster, or other wet wall construction occurs on backside.
 4. Seal tops, bottoms, and cut-outs of unprimed wood doors with a heavy coat of varnish or equivalent sealer immediately upon delivery to job.
- D Ferrous Metals: clean ferrous surfaces, which are not galvanised or shop-coated, of oil, grease, dirt, loose mill scale and other foreign substances by solvent or mechanical cleaning.
1. Touch-up shop applied prime coats wherever damaged or bare, where required by other sections of these specifications.
 2. Clean and touch-up with same type shop primer.
- E Galvanised Surfaces: Clean free of oil and surface contaminants with non-petroleum based solvent.

3.03 MATERIALS PREPARATION

- A General: Mix and prepare painting materials in accordance with manufacturer's directions.
- B Maintain containers used in mixing and application of paint in a clean condition, free of foreign materials and residue.
- C Stir materials before application to produce a mixture of uniform density, and as required during application. Do not stir film into material. Remove film and, if necessary, strain material before using.

3.04 APPLICATION

- A General: Apply paint in accordance with manufacturer's directions. Use applicators and techniques best suited for substrate and type of material being applied.
1. Paint, surface treatments, and finishes, are indicated in "schedules" of contract documents.
 2. Provide finish coats which are compatible with prime paints used.
 3. Apply additional coats when undercoats or other conditions show through final coat of paint, until paint film is of uniform finish, colour and appearance. Give special attention to insure that surfaces, including edges, corners, crevices, welds, and exposed fasteners receive a dry film thickness equivalent to that of flat surfaces.

4. Paint surfaces behind movable equipment and furniture same as similar exposed surfaces. Paint surfaces behind permanently -fixed equipment or furniture with prime coat only before final installation of equipment.
 5. Paint interior surfaces of ducts, where visible through registers or grilles, with a flat, non-specular black paint.
 6. Paint back sides of access panels, removable or hinged covers to match exposed surfaces.
 7. Finish exterior doors on tops, bottoms and side edges same as exterior faces, unless otherwise indicated.
- B Scheduling Painting Apply first-coat material to surfaces that have been cleaned, pretreated or otherwise prepared for painting as soon as practicable after preparation and before subsequent surfaces deterioration.
1. Allow sufficient time between successive coatings to permit proper drying. Do not recoat until paint has dried to where it feels firm, does not deform or feel sticky under moderate thumb pressure, and application of another coat of paint does not cause lifting or loss of adhesion of the undercoat.
- C. Minimum coating thickness: Apply materials at not less than manufacturer's recommended rate, to establish a total dry film thickness as indicated or, if not indicated, as recommended y coating manufacturer.
- D Mechanical and Electrical Work: Painting of mechanical and electrical work is limited to those items exposed in mechanical equipment rooms and in occupied spaces.
- E Mechanical items to be painted include, but are not limited to, the following:
1. Piping, pipe hangers, and supports.
 2. Heat exchangers.
 3. Tanks.
 4. Ductwork, insulation.
 5. Motor, mechanical equipment, and supports.
 6. Accessory items.
- F. Electrical items to be painted include, but are not limited to, the following:
1. Conduit and fittings.
 2. Switchgear.
- G Prime Coats:
1. Recoat primed and sealed surfaces where there is evidence of suction spots or unsealed areas in first coat, to assure a finish coat with no burn-through or other defects due to insufficient sealing.

- H Stipple Enamel Finish: Roll and redistribute paint to an even and fine texture. Leave no evidence of rolling such as laps, irregularity in texture, skid marks, or other surface imperfection.
- I Pigmented (opaque) Finished: completely cover to provide an opaque, smooth surface of uniform finish, colour, appearance and coverage. Cloudiness, spotting, holidays, laps, brush marks, runs, sags, ropiness or other surface imperfections will not be acceptable.
- J Transparent (Clear) Finishes: Use multiple coats to produce glass-smooth surface film of even luster. Provide a finish free of laps, cloudiness, colour irregularity, runs, brush marks, orange peel, nail holes, or other surface imperfections.
- K Completed Work: Match approved samples for colour, texture and coverage. Remove, refinish, or repaint work not in compliance with specific requirements.

3.05 FILED QUALITY CONTROL

- A The right is reserved by the Engineer to invoke following material testing procedure at any time, and any number of times during period of field painting.
 - 1. Engage services of an independent testing laboratory to sample paint being used. Samples of materials delivered to project site will be taken, identified and sealed, and certified in presence of Contractor.
 - 2. Testing laboratory will perform appropriate tests for any or all of following characteristics:

Abrasion resistance, apparent reflectivity, flexibility, washability, absorption, accelerated weathering, dry opacity, accelerated yellowness, recoating, skinning, colour retention, alkali resistance, and quantitative materials analysis .
- B If test results show that material being used does not comply with specified requirements, Contractor may be directed to stop painting work, and remove non-complying paint; pay for testing; repaint surfaces coated with rejected paint; remove rejected paint from previously painted surfaces if, upon repainting with specified paint, the two coatings are incompatible.

3.06 CLEAN-UP AND PROTECTION

- A Clean-Up: During progress of work, remove from site discarded materials, rubbish, cans and rags at end of each work day.
 - 1. Upon completion of painting work, clean window glass and other paint-spattered surfaces. Remove spattered paint by proper methods of washing and scraping, using care not to scratch or otherwise damage finished surfaces.

- B Protection: Protect work of other trades, whether to be painted or not, against damage by painting and finishing work. Correct damage by cleaning, repairing or replacing, and repainting, as directed by Engineer.
1. Provide “Wet Paint” Signs in Arabic/English and labourers native languages as required to protect newly-painted finishes. Remove temporary protective wrappings provided by others for protection of their work, after completion of painting operations.
 2. At completion of work by other trades, touch-up and restore all damaged or defaced painted surfaces.

3.07 EXTERIOR PAINT SCHEDULE

- A General: Provide the following paint systems for the various substrates, as indicated.
- B Concrete, Stucco and Masonry (Other than concrete masonry units):
1. Lusterless (Flat) Acrylic Finish: 3 coats with total dry film thickness not less than 90 microns.
 - a. First and Second Coats : Acrylic Emulsion (FS TT-P-19).
 2. Heavy-Duty Textured Coating: One coat with total dry film thickness not less than 375 microns.
 - a. First Coat: Heavy-duty, Textured Coating (FS TT-C-555, Type II).
- C Concrete Masonry Units:
1. Lusterless (Flat) Acrylic Finish : 3 coat over filler coat with total dry film thickness not less than 90 microns, excluding filler coat.
 - a. Filler Coat: Solvent Thinned block Filler for Porous Surfaces (FS TT-F-1098).
 - b. First and Second Finish Coats : Acrylic Emulsion (FS TT-P-19).
 2. Heavy-Duty Textured Coating: 2 coats with total dry film thickness not less than 650 microns.
 - a. First and Second Coats: Heavy-duty, Textured Coating (FS TT-C-555, Type II).

3.08 INTERIOR PAINT SCHEDULE

- A General: Provide the following paint systems for the various substrates, as indicated.
- B Concrete:
1. Lusterless (Flat) Emulsion Finish: 3 finish coated over filled surface.

- a. Filler Coat: Solvent-Thinned Block Filler (FS TT-F-1098). Apply filler coat at a rate to ensure complete coverage with pored filled.
- b. First, Second and third Finish Coats: Interior Latex Emulsion (FS TT-P-29).

End of Section