DIVISION 8

DOORS AND WINDOWS

BUILDING WORK

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DOORS AND WINDOWS

INDEX

SECTION 08114

STEEL DOORS AND FRAMES

PART 1: GENERAL

1.01 SCOPE OF WORK

A Furnish all labor, materials, equipment, and incidentals required and install the following as shown and as specified herein:

1. Steel flush hollow-metal doors and transom panels.
2. Decorative steel door and frames.
3. Car park Doors.
4. All fasteners, frame closure pieces, system reinforcing and appurtenances required.

1.02 RELATED WORK

A Other sections directly related to work covered in this section include the following:

1. Section 04200 - Masonry.
2. Section 06100 - Rough Carpentry.
3. Section 07900 - Caulking.
4. Section 08710 - Door Hardware.
5. Section 08800 - Glazing.
6. Section 09902 - Painting.

1.03 REFERENCES

A. ANSI A117.1 - Specifications for Making Buildings and Facilities Accessible to and Usable by Physically Handicapped People.

B. ASTM A525 - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process.

C. ASTM A525M - Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process [Metric].

D. ASTM A591/ A591M - Steel Sheet, Electrolytic Zinc-Coated, For Light Coating Class Applications.

E. ASTM C236 - Test Method for Steady-State Thermal Performance of Building Assemblies by Means of a Guarded Hot-Box.

F. ASTM E152 - Methods of Fire Tests of Door Assemblies.

G. ASTM E413 - Classification for Determination of Sound Transmission Class.

H. DHI (Door Hardware Institute) - The Installation of Commercial Steel Doors and Steel Frames, Insulated Steel Doors in Wood Frames and Builder's Hardware.

I. HMMA 802 - Manufacturing of Hollow Metal Doors and Frames.

J. HMMA 810 - Hollow Metal Doors.

K. HMMA 830 - Hardware Preparation and Locations for Hollow Metal Doors and Frames.

L. HMMA 840 - Installation and Storage of Hollow Metal Doors and Frames.

M. HMMA 850 - Fire Rated Hollow Metal Doors and Frames.

N. NFPA 80 - Fire Doors and Windows.

O. NFPA 252 - Fire Tests for Door Assemblies.

P. UL 10B - Fire Tests of Door Assemblies.

1.04 SUBMITTALS

A Submit to the Engineer, as provided in the submittals Section, data and shop drawings of all metal doors, frames, panels and appurtenances.

1. Shop drawings shall show elevations and details of each frame type, schedule of doors and frames, door elevations and details, conditions at openings with various wall thickness and materials, location and installation requirements for hardware, thickness of materials, joints and connections and trim.

B. Manufacturer's Installation Instructions: Indicate special installation instructions.

C. Manufacturer's Certificate: Certify that Products meet or exceed specified requirements.

D Hardware templates shall be furnished to the door manufacturer by the Contractor for correct hardware alignment and reinforcing.

E Provide samples and certification as follows:

1. Door frame corner with 150 mm long legs showing construction with the galvanized material specified, welding, touch-up and priming.
2. Door panel corner, 150 mm square, showing door and insulating materials, construction and finishing as specified above.

1.05 QUALITY ASSURANCE

A. Conform to requirements of HMMA 802, HMMA 810, HMMA 830, HMMA 840, HMMA 850, and ANSI A117.1.

B. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum five years experience.

1.06 PROJECT CONDITIONS

A. Coordinate the work with door opening construction, door frame and door hardware installation.

B. Sequence installation to ensure wire connections are achieved in an orderly and expeditious manner.

1.07 DELIVERY, STORAGE AND HANDLING

A Deliver materials in manufacturer's original unopened and undamaged packages with labels legible and intact. Doors and panels shall be individually wrapped in corrugated cardboard with wood strips on vertical edges and banded with metal straps. Store materials in unopened packages in a manner to prevent damage from the environment and construction operations. Handle in accordance with manufacturer's instructions.

PART 2: PRODUCTS

2.01 MATERIALS

A Galvanized steel sheets - Zinc-coated carbon steel sheets of commercial quality, complying with ASTM A526, with ASTM A525, G60 zinc coating, mill phosphatized.

B Zinc-rich primer - 95% metallic zinc dust primer in a vehicle compatible with the specified painting system. Apply to properly prepared substrates where galvanizing is damaged by fabrication. Follow with a full coat over all steel surfaces and components.

C Supports and anchors - Fabricate of not less than 1.5 mm (16 gage) sheet metal. Galvanize after fabrication units complying with ASTM A 153, Class B.

D Inserts, bolts and fasteners - Hot-dip galvanize, complying with ASTM A153, Class C or D as applicable.

2.02 FABRICATION, GENERAL

A Fabricate metal units to be rigid, neat in appearance, and free from defects, warp, or buckle. Accurately form metal to required sizes and profiles. Wherever practicable, fit and assemble units in the manufacturer's plant. Clearly identify work that cannot be permanently factory-assembled before shipment, to assure proper assembly at the project site.

Weld exposed joints continuously; grind, dress, and make smooth, flush, and invisible. Metallic filler to conceal manufacturing defects is not acceptable.

B Prepare metal units to receive mortised and concealed finish hardware, including cutouts, reinforcing, drilling and tapping in accordance with final Finish Hardware Schedule and templates provided by hardware supplier. Comply with applicable requirements of ANSI A115 series specifications for door and frame preparation for hardware.

C Reinforce metal units to receive surface-applied hardware. Drilling and tapping for surface-applied finish hardware may be done at project site.

D Shop Painting

1. Surface preparation and shop prime painting shall conform to all applicable specifications in Section 09901.

2.03 STEEL DOORS AND DOOR FRAMES

A Steel Flush Doors: constructed from 1.5 mm thick galvanized steel sheet double skin facing with lock seam joints at edges, reinforced internally with steel channel sections and with bonded core of impregnated honeycomb insulation. Doors are to be finished with factory applied corrosion inhibiting protective coating to receive paint and supplied complete with vision windows and louvre panels, as shown on the Drawings.

B Steel Full Louver Doors: constructed from galvanized steel angle channel or hollow section framing to form 100 x 45 mm perimeter frame with 75 x 2 mm zed profile horizontal fixed louvres at 50 mm spacings, with detachable flyscreens; all finished with factory applied corrosion inhibiting protective coating to receive paint.

C Decorative steel Doors and frames: constructed from galvanized steel hollow sections, welded and jointed of types, dimensions and patterns shown on the Drawings and supplied complete with frames. Doors are to be finished with factory applied corrosion inhibiting protection coating to receive paint.

D Steel Door Frames:

1. Steel Door Frames Internal Steel Doors: to the general requirements of BS 1245, but to non-standard sizes and profiles, constructed from 1.5 mm thick galvanized steel sheet, finished with factory applied corrosion inhibiting protective coating and supplied complete with transoms and glazing beads, as shown on the Drawings.

2. Steel Door Frames For External Steel Door: are to be generally as item G but constructed from 1.5 mm thick galvanized steel sheet.
3. Steel Door Frames For Fire Resisting Doors are to have a rebate minimum 25 mm deep and are to incorporate an intumescent strip.

2.04 APPURTENANCES

A Mullions and transom bars-Provide closed or tubular mullions and transom bars where indicated. Fasten mullions and transom bars at crossings and to jambs by butt welding. Reinforce joints between frame members with concealed clip angles or sleeves of same metal and thickness as frame.

B Head reinforcing-Where installed in masonry, leave vertical mullions in frames open at top for grouting.

C Jamb anchors. Furnish jamb anchors as required to secure frames to adjacent construction, formed of not less than 1.2 mm (18 gage) galvanized steel.

1. Masonry construction-Adjustable, flat, corrugated, or perforated, t-shaped to suit frame size, with leg not less than 50 mm wide by 250 mm long. Provide U.L. approved fixed anchors at labeled openings. Furnish at least 3 anchors per jamb up to 2250 mm height; 4 anchors up to 2400 mm jamb height; one additional anchor for each 600 mm or fraction thereof over 2400 mm height.

2. In-place concrete or masonry - Anchor frame jambs with minimum 10 mm (3/8-in) diameter concealed bolts into expansion shields or inserts for masonry and adhesion anchors for concrete 150 mm from top and bottom and 600 mm o.c., unless otherwise shown. Reinforce frames at anchor locations. Apply removable stop to cover anchor bolts unless otherwise indicated.

D Floor anchors - Provide floor anchors for each jamb and mullion which extends to floor, formed of not less than 1.9 mm (14 gage) galvanized steel sheet, as follows:

1. Monolithic concrete slabs - Clip type anchors, with 2 holes to receive fasteners, welded to bottom of jambs and mullions.

2. Separately finished tile areas and concrete slabs - Adjustable type with extension clips, allowing not less than 50 mm height adjustment. Terminate bottom of frames at finish floor surface.

E Head strut supports - Provide 10 mm x 50 mm (3/8-in x 2-in) vertical steel struts extending from top of frame to supporting construction above, unless frame is anchored to masonry or to other structural support at each jamb. At frames without mullions provide struts at 1200 mm O.C. along head members. Bend top of struts to provide flush contact for securing to supporting construction above. Provide adjustable bolted anchorage to frame jamb members with no parts of fasteners exposed in the finished work.

F Structural reinforcing members - Provide built-in as part of frame assembly where indicated at mullions, transoms, or other locations.

G Head reinforcing - For frames over 1200 mm wide in masonry wall openings, provide continuous steel channel or angle stiffener, not less than 2.7 mm (12 gage) for full width of opening, welded to back of frame at head.

H Spreader bars - Provide removable spreader bar across bottom of frames, tack welded to jambs and mullions.

I Plaster guards - Provide galvanized sheet steel plaster guards or dust cover boxes, welded to frame, at back of finish hardware cutouts where mortar or other materials might obstruct hardware installation.

2.05 STOPS AND MOLDINGS

A Provide stops and moldings around glazed panels in hollow metal units and in frames to receive doors and panels, where and as indicated.

B Form fixed stops and moldings integral with frame, unless otherwise indicated.

C Provide removable stops and moldings where and as indicated or required, formed of not less than 0.9 mm (20 gage) steel sheets matching steel of frames. Secure with countersunk machine screws spaced uniformly not more than 300 mm on center. Form corners with butted hairline joints.

D Coordinate width of rabbet between fixed and removable stops with type of glass or panel and type of installation indicated.

E Provide angles of not less than 1.5 mm (16 gage) for securing fixed transom panels to frames as approved.

2.06 SEALANTS

A Sealant shall be of the two-part ploloysulphide based compound.

PART 3: EXECUTION

3.01 INSTALLATION

A Install metal units and accessories in accordance with approved shop drawings, manufacturer's data, and as herein specified.

B Coordinate installation of glass and glazing.

C Before fixing frames; Prime wood subframe.

D Setting masonry anchorage devices - Provide masonry anchorage devices where required for securing hollow metal frames to in-place concrete or masonry construction. Set anchorage devices opposite each anchor location, in accordance with details on shop drawings and anchorage device manufacturer's instructions. Leave drilled holes rough, not reamed, and free from dust and debris.

E Placing Frames-Set frames accurately in position, plumbed, aligned, and braced securely until permanent anchors are set. After wall construction is complete, remove temporary braces and spreaders leaving surfaces smooth and undamaged.

1. In masonry construction, coordinate frame setting with the building of masonry walls.

2. At in-place concrete or masonry construction, set frames and secure in place with anchor bolts as specified.

3. Make field splices in frames as detailed on final approved shop drawings, welded and finished to match factory work.

4. Remove spreader bars only after frames or bucks have been properly set and secured.

3.02 ADJUSTMENT AND TOUCH-UP

A Leave work in complete and proper operating condition. Remove and replace defective work, including doors or frames which are warped, bowed or otherwise unacceptable.

B Immediately after erection, sand smooth any rusted or damaged areas of zinc primer and apply touch-up of same primer.

3.03 SEALING JOINTS

A Preparation, depth of sealant and application are to be strictly as sealant manufacturer's recommendations.

B Joint is to be thoroughly clean, dray and free from oil; finely abrade and prime as appropriate.

C Mask adjacent surfaces which would be difficult to clean if smeared with sealant

D Apply sealant ensuring maximum adhesion to sides of joint and a neat, smooth, clean finish.

End of Section

SECTION 08211

WOOD DOORS AND FRAMES

PART 1: GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install flush wood doors, and wood frames including shop finishing as required and specified herein.

1.02 RELATED WORK

A. Section 06100 - Rough carpentry.
B. Section 06200 - Finish carpentry.
C. Section 08710 - Door Hardware.
D. Section 08114 - Steel doors and frames: Steel frame for wood doors.
E. Section 09902 - Painting.

1.03 REFERENCES

A. ANSI A135.4 - Basic Hardboard.
B. ASTM E152 - Methods of Fire Tests of Door Assemblies.
C. ASTM E413 - Classification for Determination of Sound Transmission Class.
D. AWI - Quality Standards of the Architectural Woodwork Institute.
E. HPMA HP - Hardwood and Decorative Plywood.
F. NEMA (National Electric Manufacturers Association) LD3-High Pressure Decorative Laminates.
G. NFPA 80 - Fire Doors and Windows.
H. NFPA 252 - Standard Method of Fire Tests for Door Assemblies.
I. UL 10B - Fire Tests of Door Assemblies.
J. Warnock Hersey - Certification Listings for Fire Doors.

1.04 SUBMITTALS FOR REVIEW

A. Section 01340 - Submittals: Procedures for submittals.

B. Product Data: Indicate door core materials and construction; veneer species, type and characteristics.

C. Shop Drawings: Illustrate door opening criteria, elevations, sizes, types, swings, factory machining criteria, factory finishing criteria, identify cutouts for glazing and louvers.

D. Samples: Submit one sample of flush door construction, (120 x 80 cm) in size cut from bottom corner of door.

E. Samples: Submit two samples of door veneer, (150 x 200 mm) in size illustrating wood grain, stain color, and sheen for decorative doors and illustrating plastic laminate color for flush doors.

F. Samples: Submit one sample of solid decorative door construction, (120x80 cm) in size, complete with pattern.

1.05 SUBMITTALS FOR INFORMATION

A. Manufacturer's Installation Instructions: Indicate special installation instructions.

1.06 QUALITY ASSURANCE

A. Perform work in accordance with AWI Quality Standard Section 1300, Premium Grade. Maintain one copy on site.

B. Finish doors in accordance with AWI Quality Standard Section 1500.

C. Manufacturer: Company specializing in manufacturing the Products specified in this section with minimum three years experience.

1.07 DELIVERY, STORAGE, AND PROTECTION

A. Accept doors on site in manufacturer's packaging. Inspect for damage.

B. Protect doors with resilient packaging. Do not store in damp or wet areas; or in areas where sunlight might bleach veneer. Seal top and bottom edges if stored more than one week. Break seal on site to permit ventilation.

PART 2: PRODUCTS

2.01 DOOR CONSTRUCTION AND FACING

A. Flush Doors: shall be comply with BS 459 part 2 and shall consist of a timber core of at least 50% solid wood and a timber frame faced both sides with (5 mm) thick hardboard plywood glued and pressed to the core and lipped on all edges with beach wood suitable for clear finish,

2.02 ADHESIVE

A. Facing adhesive: Type I - waterproof

2.03 FABRICATION

A. Fabricate non-rated doors in accordance with AWI Quality Standards requirements.

B. Astragals for Double Doors: Treated wood, T shaped, overlapping and recessed at face edge, specifically for double doors.

C. Sound Rating For Single Door Leaf and Frame Assembly: ASTM E413, minimum STC 35.

D. Provide lock blocks at lock edge and top of door for closer for hardware reinforcement.

E. Vertical Exposed Edge of Stiles: Hardwood for transparent finish.

F. Fit door edge trim to edge of stiles after applying veneer facing.

G. Bond edge banding to cores.

H. Factory machine doors for finish hardware in accordance with hardware requirements and dimensions. Do not machine for surface hardware.

I. Factory fit doors for frame opening dimensions identified on shop drawings.

J. Cut and configure exterior door edge to receive recessed weather stripping devices.

K. Provide edge clearances in accordance with AWI 1600.

2.04 SHOP FINISH

A. Pre-finish wood doors at factory or finish shop.

B. Comply with recommendations of AWI for finishing of doors, including final sanding immediately before application of finishing materials.

1. Provide finishes of type agreed with the Engineer, to match sample held by the Engineer.

2.05 PRE-FITTING AND PREPARATION FOR HARDWARE

A. Pre-fit and pre-machine wood doors at factory.

B. Comply with tolerance requirements of AWI for pre-fitting. Machine doors for hardware requiring cutting of doors.

2.6 HARDWARE

A. finish shall be brass finish as specified in section 08710

PART 3: EXECUTION

3.01 EXAMINATION

A. Verify that opening sizes and tolerances are acceptable.

B. Do not install doors in frame openings that are not plumb or are out-of-tolerance for size or alignment.

3.02 INSTALLATION

A. Install doors in accordance with manufacturer's instructions.

B. Trim non-rated door width by cutting equally on both jamb edges.

C. Trim door height by cutting bottom edges to a maximum of 3/4 inch (19mm).

D. Machine cut for hardware.

E. Coordinate installation of doors with installation of frames specified in Section 08114 and hardware specified in Section 08710.

F. Coordinate installation of glass and glazing.

G. Install door louvers plumb and level.

3.03 INSTALLATION TOLERANCES

A. Conform to AWI requirements for fit and clearance tolerances.

B. Conform to AWI Section 01340 requirements for maximum diagonal distortion.

3.04 ADJUSTING

A. Adjust door for smooth and balanced door movement.

B. Adjust closer for full closure.

3.05 SCHEDULE

A. Refer to Door Schedule Drawings.

End of Section

SECTION 08520

ALUMINUM WINDOWS

PART 1: GENERAL

1.01 SCOPE OF WORK

A Furnish all labor, materials, equipment and incidentals required to install the complete aluminum window system including fixed, hopper and casement sash, glazing beads, mullions, sandwich panels, hardware, fasteners, caulking and screens within the system and appurtenances all as shown and as specified herein.

1.02 RELATED WORK

A Other sections directly related to work covered in this section include the following:

1. Section 06100 - Rough Carpentry.
2. Section 07005 - Waterproofing and Dampproofing.
3. Section 07900 - Caulking.
4. Section 08800 - Glazing.

1.03 SUBMITTALS

A Submit to the Engineer, as provided in the Submittals Section, shop drawings showing locations, size and details of construction and erection of aluminum windows, hardware, accessories, system caulking, and appurtenances. Submit complete manufacturer's product literature on the window system to be used.

B Samples

1. Submit two samples of each as follows:

a. Corner section - fixed frame and mullion.

b. Each different type of stainless steel fastener.

2. The above shall, upon approval, become the standard acceptance for the project with regard to construction and finish for each item.

1.04 QUALITY ASSURANCE

A Manufacturer shall have not less than five year's experience in manufacturer of aluminum windows.

B Erector shall have not less than five years' experience in installation of aluminum windows.

C Allowable tolerances: Size dimensions ± 2 mm.

1.05 INSPECTION BEFORE INSTALLATION

A All window components will be inspected before installation.

B All components which are abraded or dented or which are bent, bowed or show any other structural damage or distortion will be rejected and marked and shall be removed from the site. No component will be allowed to be straightened and then incorporated in the work.

PART 2: PRODUCTS

2.01 MATERIALS

A Aluminum alloy for windows and screens shall be meat the general requirements of ASTM B221 or BS 4873, constructed from aluminum alloy extruded sections and couplings, with electrostatically baked applied polyester finish, supplied complete with frames, sub-frames, mullions, transoms, sills, louvers, doors, opening portions and insect screens, as shown on the drawings, and with manufacturer's matching ironmongery, glazing beads, gaskets, weatherstrips, accessories and fixings. Units may be pre-glazed or glazed on site in accordance with the requirements of glazing section. Windows and supporting members shall be designed to withstand a wind load of 24 kg/sq m (5 PSF) and associated negative pressures.

Man: Saudi Aluminum Co. Ltd.
Riyadh - Saudi Arabia
Tel : 4054991
Fax : 4054555

Man: Aluminum Manufacturing Co. Ltd.
P.O. Box 7661, Jeddah 21472
Saudi Arabia
Tel : (2) 6915666
Fax : (2) 6915722

Or other equal and approved.

B Frames members shall be Hollow box sections and shall be designed for use with 6 mm thick single glazed, or double glazed; as shown on drawings.

C Glazing stops shall be snap-in type for either recessed or surface mounting and shall be two-piece to facilitate glazing installation. Stops shall have vinyl or neoprene seals in contact with glass.

D Concealed fasteners for window system shall be stainless steel, Type 305. Exposed fasteners shall be aluminum oval head matching aluminum components in finish.

E Insect screens shall be aluminum screens with aluminum frame for hinged and sliding windows and sliding doors.

F Sealant for caulking within the window system shall be an approved one part, gun grade, Thiokol polysulfide base sealant. Primer shall be as recommended by the manufacturer.

G Joint backing, where required, shall be accepted closed cell polyethylene foam rods of diameters to suit joint conditions.

H Anchors, clips, bolts and screws necessary to secure windows shall be provided, and unless otherwise specified shall be either aluminum or nonmagnetic stainless steel, or zinc coated steel.

I Ironmongery for opening windows are to have manufacturer's standard hinges, friction pivot hinges, sliders, handles and locks as necessary.

2.02 FABRICATION

A Fabricate windows in accordance with accepted shop drawings. Frame corners and intersections shall be mortised, double tenoned and riveted. Where frame sections are reversed, joints shall be coped and reinforced with splice plates. No applied weathering adaptors or liners will be accepted.

B Weather stripping shall be securely interlocked into both the inside and outside weathering grooves of the operating sash and shall run continuously. Adhesive applied weather stripping will not be allowed.

2.03 FINISHING

A Aluminum Finish shall be polyester resin powder electrostatically applied and baked to give minimum thickness of 70 microns, to meet the requirements of BS 6496. Colour as shown on drawing and approved by the Engineer. Manufacturer is to provide a 10 year warranty, agreeing to repair or replace defective coating, defined as abnormal deterioration, aging or weathering or loss of adhesion.

B. Exposed hardware finish shall be as aluminum colour.

2.04 GLAZING

A. External Windows:

Use 6mm thick blowgreen tinted float glass for external sheet and 6mm thick clear float glass for internal sheet.

B. For internal sheet of bathroom windows, use 6 mm thick obscured glass.

C. Internal Windows

Use 6 mm thick clear float glass .

2.05 CLEANING

A After fabrication, all aluminum components shall be chemically cleaned of all fabricating oils and foreign materials, matching samples as approved.

PART 3: EXECUTION

3.01 INSTALLATION

A All installation shall be performed by workmen experienced in the erection of these types of window. All work shall be done in strict conformance with the details shown, the shop drawings and the manufacturer's recommendations.

B Caulk metal-to-metal joints where required within window system as windows are installed.

C Windows shall be totally free of abrasions, nicks, scars, and other damage, and in good operating condition at final acceptance.

End of Section

SECTION 08710

HARDWARE

PART 1: GENERAL

1.01 SCOPE OF WORK

A Furnish and deliver to the project site all finish hardware for doors and additional padlocks as shown on drawings and hereinafter specified.

B Furnish all templates required by the manufacturers of the doors and frames to enable the manufacturers to make proper provision in their work to receive the finish hardware. All locks, lock strikes, and flush bolts shall be made to ANSI standard dimensions.

C. Types of hardware required include the following:

1. Hinges.
2. Pivots and floor springs.
3. Lockcases.
4. Lock cylinders and keys.
5. Bolts.
6. Exit devices.
7. Push/ pull units.
8. Overhead door closers.
9. Door furniture and special handles.
10. Door selectors.
11. Door trim units.
12. Protection plates.
13. Weatherstripping for exterior doors.
14. Sound stripping for interior doors.

1.02 RELATED WORK

A Other sections directly related to work covered in this section include under the following:

1. Section 06100 - Rough Carpentry.

2. Section 08114 - Steel Doors and Frames.

3. Section 08120 - Aluminum Doors and Frames.

4. Section 08211 - Wood Doors and Frames.

1.03 SUBMITTALS

A Samples

1. If required by the Engineer, submit a sample of any or all items of hardware proposed for review.

B Hardware Schedules

1. Submit to the Engineer for review a complete hardware schedule as provided in the Submittals Section for shop drawings.

2. No templates shall be distributed until the hardware schedule has been accepted by the Engineer.

3. Provide approved physical hardware items to door manufacturers if and as required for fabrication onto doors.

1.04 PRODUCT HANDLING

A Packing and Marking

1. All hardware shall have the required screws, bolts and fastenings necessary for proper installation, wrapped in paper and packed in the same package as the hardware. Each package shall be legibly labeled, indicating that portion of the work for which it is intended.

PART 2: PRODUCTS

2.01 MANUFACTURERS

A All hardware shall be best grade, entirely free from imperfections in manufacture and finish. Qualities, weights, and sizes specified herein are the minimum that will be accepted.

2.02 MATERIALS AND FABRICATION

A Hand of Door: Drawings shown direction of slide, swing or hand of each door leaf. Furnish each item or hardware for proper installation and operation of door movement as shown.

B. Manufacturer's Name Plate: Do not use manufacturer's products which have manufacturer's name or trade name displayed in a visible location (omit removable nameplates), except in conjunction with required UL labels and as otherwise acceptable to Architect.

1 - Manufacturer's identification will be permitted on rim of lock cylinders only.

C. Fasteners: Provide hardware manufactured to conform to published templates, generally prepared for machine screw installation. Do not provide hardware which has been prepared for self-tapping sheet metal screws, except as specifically indicated.

D. Furnish screws for installation, which match each hardware item. Provide Phillips type flat-head screws and not less than 5 sets of matched screwdrivers for each size of screw.

E. Provide concealed fasteners for hardware units which are exposed when door is closed. Do not use through bolts for installation where bolt head is exposed in other work. In such cases, provide sleeves for each through bolt or use sex screw fasteners.

F. Tools and Maintenance Instructions for Maintenance:

Furnish a complete set of specialized tools and maintenance instructions as needed for Owner's continued adjustment, maintenance, and removal and replacement of hardware.

2.03. HINGES, BUTTS AND PIVOTS

A. Templates: Except for hinges and pivots to be installed entirely (both leaves) into wood doors and frames, provide only template-produced units.

B. Screws: Comply with 2.02 section C, D and E.

C. Hinges shall have caged ball bearing races, (washer bearing type and similar will not be accepted). Hinge pins shall be stainless steel.

D. Number of Hinges: Provide a minimum of three hinges per door leaf up to a height of 2300 mm and one additional hinge for every 750 mm thereafter.

E. Provide intumescent plugs for all hinge screws.

2.04 LUCK CYLINDERS AND KEYING

A. General: Supplier will meet with Architect to finalize keying requirements and obtain final instructions in writing.

B. Multiple-building System: Except as otherwise indicated, provide new grandmaster key system for project.

C. Equip locks with cylinders which are construction keyed, only construction keys to be issued to the contractor and on instruction from the Architect invalidate such construction keys by operation of the grandmaster key in each keyway.

D. Equip locks with high security cylinders which comply with performance requirements for Grade 1 cylinders as listed in ANSI A156, which also UL listed and incorporate the double locking system as utilized in the designated HS74 series cylinders.

E. Lock cases shall be UL listed and comply with ANSI 115, shall be performance tested and certified to compare with the designated standard lockcase HD99 series. All lock cases shall have intumescent cover protection for the case body and intumescent plugs for the screw fasteners for the forend plates. Locks shall be provided that allow furniture such as lever roses to screw directly into the lock case using machine screws, to provide strength of fitting and rigidity.

F. Latch Bolt: Shall be a guided, three part, latch bolt with a minimum throw of 19 mm, be fully reversible without removal of case cover, contain an anti thrust bolt for security and shall be made of high grade stainless steel.

G. Deadbolt: For use on deadlocks shall have a minimum throw of 25mm and contain hardened steel rollers and incorporate a reinforced strike plate.

H. Strikes: Provide standard wrought box strike for al locks and latches, with curved lip extending to protect frame. Finish to match hardware set.

I. Metals: Construct cylinders from brass/ bronze, stainless steel or nickel silver.

J. Comply with Employer's instructions for masterkeying and, except as otherwise noted, provide individual change key for each lock which is not designated to be keyed alike with a group of related locks.

1. Permanently inscribe each key with the number or lock differ and the notation "DO NOT DUPLICATE".

K. Key Quantity: Furnish 3 change keys for each lock; 5 master keys for each suite of locks within the project and 5 grandmaster keys for the overall project.

All keys shall be delivered to the owner or Employer's representative either by security courier service or by the authorized manufacturer's representative.

L. Provide a key control system including tags and secure key boxes, to the Architect requirements and including tags with self locking clips, receipt forms, 3 way visible card index, temporary markers, permanent markers, and standard security metal cabinet to allow for 150 percent capacity of the total locks used in the project.

1. Provide complete cross index system set up by key manufacturer and place keys on markers and hooks in the cabinet as determined in the final key schedule.

2. Provide hinged-panel type cabinet, for wall mounting.

2.05 BOLTS AND EMERGENCY EXIT DEVICES

A. Provide dust-proof sockets for bolts, except where special threshold detail provides non-recessed socket for bolt.

B. Provide rebated flushbolts of the lever action type with a minimum size of 300 mm to door leaves of up to 2300 mm and longer bolts to suit doors over 2300 mm high.

C. Finish of bolts and sockets shall match related hardware.

D. Panic exit devices shall be made from high grade stainless steel, shall comply with BS 5725, provide dogging or holdback functions on doors used as day time entrances and external access via locks within the master key system to the direction of the Engineer.

E. Rabbetted Doors: Provide suitable rebate sets where meeting stiles of doors are indicated as being rabbetted. Such fittings shall match the related hardware on such doors.

2.06 PUSH/PULL UNITS

A. Concealed Fasteners: Provide manufacturer's special concealed fastener system in particular for "back to back" fixing requirements .

2.07 CLOSERS AND DOOR CONTROL DEVICES

A. Size of Units: except as otherwise specifically indicated, comply with the manufacturers recommendations for size of door control unit, depending upon size of door, exposure to weather and anticipated frequency of use.

B. Combination Door Closers and Holders: Provide units designed to hold door in open position under normal usage. Incorporate an integral electromagnetic holder mechanism designed for use with UL listed fire detectors, provided with normally closed switching contacts.

C. Flush Floor Plates: Provide finished metal flush floor plates for flush closers except where thresholds are indicated and cover plate is specified to be an integral part of threshold. Finish floor plate to match hardware, unless otherwise indicated.

E. Recessed Floor Plates: Provide recessed floor plates where no thresholds are indicated and floor closers are located in an area of resilient flooring, stone flooring or terrazzo. Recess plates at receive an insert of the floor finish materials, of the normal thickness as indicated. Provide extended spindle on floor springs as may be necessary to accommodate thick floor finish inserts.

2.08 DOOR TRIM UNITS

A. Fasteners: Provide manufacturer's standard concealed fasteners for door trim units (edge trim, viewers, roses, levers, escutcheons and similar).

2.09 WEATHERSTRIPPING

A. General: Except as otherwise indicated, provide continuous weatherstripping at each edge of each exterior door leaf. Provide type, sizes and profiles shown or scheduled. Provide non-corrosive fasteners as recommended by manufacturer for application indicated.

B. Replaceable Seal Strips: Provide only those units where resilient or flexible seal strip is easily replaceable and readily available from local stocks maintained by the manufacturer or distributor.

C. Weatherstripping at Jambs and Heads:

1. Provide bumper-type resilient insert and metal retainer strips, surface-applies unless shown as mortised or semi-mortised, or following metal, finish or resilient bumper material.

2. Provide Brush Pile insert of polypropylene or nylon woven pile and aluminum strip backing, complying with AAMA 701.2.

D. Weatherstripping at Door Bottom:

1. Provide threshold consisting of contact type resilient insert and metal housing of design and size shown, of following metal, finish and resilient seal strip.

2.10 HARDWARE FINISHES

A. Exposed hardware finishes shall be:

1. For Aluminum Doors: anodized finish, as aluminum colour.

2. For full flush and solid wood doors: Polished and Bright brass finish.

3. For steel doors: satin stainless steel - finish.

4. For wood costume casework: bright brass finish.

B. Provide fully matching finishes for all items where possible, to ensure uniformity of finish only one suite of internationally recognized hardware should be used, in accordance with requirements previously specified.

C. Provide quality of finish, including thickness of material, composition, hardness and other qualities complying with the designated standard units referenced in the Hardware Schedule.

PART 3: EXECUTION

3.01 INSTALLATION

A. Mount hardware in accordance with BS 4787 except as specifically indicated or required to comply with governing regulations, and except as the Engineer may otherwise direct.

B. Install each hardware item according to manufacturer's instructions and recommendations. Wherever cutting and fitting is required to install hardware onto or into surfaces which are later to be painted or finished in another way, coordinate removal, storage and reinstallation of hardware or provide surface protections with finishing work specified in the Division-9 sections. Do not install surface-mounted items until finished have been completed on the substrate.

C. Set units level, plumb and true to line and location Adjust and reinforce the attachment substrate as necessary for proper installation and operation.

D. Set thresholds for exterior doors in full bed of butyl - rubber of polyisobutylene mastic sealant.

3.02 ADJUST AND CLEAN

A. Adjust and check each operating item of hardware and each door, to ensure proper operation or function of every unit. Replace units which cannot be adjusted to operate freely and smoothly as intended for the application made.

B. Clean adjacent surfaces soiled by hardware installation.

C. Final adjustment: Wherever hardware installation is made more than one month prior to acceptance or during the week prior to acceptance or occupancy, and make final check and adjustment to all hardware items in such space or area. Adjust door control devices to compensate for final operation of heating & ventilating equipment.

D. Instruct Employer's Personnel in proper adjustment and maintenance of hardware and hardware finishes, during the final adjustment of hardware.

E. Continue Maintenance Service: Approximately six months after the acceptance of hardware in each area, the Installer, accompanied by the representative of the hardware manufacturer shall inspect and rectify any faults found. Faults of a major nature shall be detailed in a report to the Employer's representative.

F. The hardware manufacturer must be able to demonstrate to the satisfaction of the Employer and Engineer that they will supply suitably qualified personnel to the project both during construction and in a advisory capacity to ensure rectification of any maintenance problems after acceptance.

End of Section

DIVISION 9

FINISHES

BUILDING WORK

DIVISION 9

FINISHES

INDEX

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 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 pasticiser to ASTM - C 494 or BS 4887 and water-retaiyning 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 m 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 - THINNEST 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 Terrazzo tiles with Marble 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 Underbid: 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 09600

STONE FLOOR AND WALL TILING

PART 1: GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required to install natural stone, Marble and Granite floor, base, wall, stair tread and riser finish using mortar bed fixing material as selected and shown on drawings and as specified herein.

B Tile and control (expansion) joint pattern shall be as shown and as accepted.

1.02 RELATED WORK

A. Section 03350 - Concrete Finishes.

B. Section 07900 - Caulking.

C. Plumbing Work Sections.

1.03 REFERENCES

A. ANSI A118.1 - Dry-Set Portland Cement Mortar.

B. ANSI A118.3 - Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive.

C. ANSI A136.1 - Organic Adhesives for Installation of Ceramic Tile.

D. ASTM A185 - Welded Steel Wire, Fabric, Plain, for Concrete Reinforcement.

E. ASTM C33 - Concrete Aggregates.

F. ASTM C144 - Aggregate for Masonry Mortar.

G. ASTM C150 - Portland Cement.

H. ASTM C503 - Marble Dimension Stone (Exterior).

I. ASTM C568 - Limestone Dimension Stone.

J. ASTM C615 - Granite Building Stone.

K. ASTM C629 - Slate Dimension Stone.

L. ASTM C1142 - Ready-Mixed Mortar for Unit Masonry.

M. TCA (Tile Council of America) - Handbook for Ceramic Tile Installation.

1.04 SUBMITTALS

A. Shop Drawings: Indicate stone layout, patterns, color arrangement, perimeter conditions, junctions with dissimilar materials, control and expansion joints, thresholds, and setting details.

B. Submit stone supplier's installation instructions and field erection drawings.

C. Product Data: Provide instructions for using grout.

D. Samples: Mount stone and apply grout on two plywood panels, illustrating pattern, color variations, and grout joint size variations.

E. Submit sample of colored grout.

F. Submit stone samples for sealant compatibility testing.

1.05 MAINTENANCE DATA

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

B. Include list of liquids detrimental to appearance of stone finish.

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with TCA Handbook for instructions applicable to mortar setting bed thin set bed and grouting.

B. Maintain one copy of document on site.

1.07 MOCKUP

A. Construct mockup, 2 m long by 1.5 m wide, with finish grout, and specified accessories.

B. Locate where directed.

PART 2: PRODUCTS

2.01 NATURAL STONE SLABS AND FITTINGS GENERALLY

A. To be first quality stone, each type obtained from one strata, from one quarry and delivered in one shipment.

B. Slabs are to be hard and free from cracks and other defects to surfaces and edges which may impair structural integrity, function or appearance and are to be cut square and true with clean edges and uniform in shape and thickness.

C. Length and width dimensions of individual slabs are to be within ± 1 mm and thickness within 3 mm from those shown on the Drawings.

D. Submit suppliers test results for each type of stone for the following tests, which must meet the following:

	Item	Marble	Granite
Weight per unit of volume	ton/m3	2.7	2.57
Absorption coefficient	Wt %	0.11	0.33
Compression breaking load	kg/cm2	1300	1800
Flexural Strength	kg/cm2	200	115
Thermal Expansion	mm/m°C	0.0063	0.0075

E. Marble and granite slabs and fittings: are to be in the quarry's longest lengths possible, commensurate position in the works. Saddles to door openings, stair treads and risers and window sills less than 2 meters are to be in one length.

2.02 MARBLE MATERIALS

A. Marble: ASTM C503; free of defects detrimental to appearance or durability:

1. Unit Size: as shown on drawings.
2. Thickness: as shown on drawings.
3. Surface Finish: Polished.
4. types: to be as shown on the drawings.
5. The selected marble slabs shall have sharp edges, correctly cut or rubbed to produce the required aesthelic finish.
6. Marble slabs and fittings for shoe Racks and benches are to be as indicated and shown on the drawings.

2.03 ADHESIVE MATERIALS

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

Man: Ardex Ltd.
Homefield Road, Haverhill,
Suffolk CBO 8QP
England
Tel.: (0440) 63939
Tlx.: 818814
Man: Building Adhesives Ltd - BAL.
Longton Road

Trentham
Stoke-on-Trent ST4 8JB.
England
Tel.: (0782) 659921
Fax: (0782) 643909

Man: Miclar Exports Ltd
3/10 Shoreditch High St.
London Ee1 6PE
England
Tel.: (01) 247 8838
Tlx.: 888898

Or other equal and approved

2.04 GROUT MATERIALS

A. Shall be factory mixed with all required aggregate and pigment, the color shall be selected by the Engineer.

Man: Ardex Ltd.
Homefield Road, Haverhill,
Suffolk CBO 8QP
England
Tel.: (0440) 63939
Tlx.: (818814)

Man: Building Adhesives Ltd - BAL
Longton Road
Trentham
Stoke-on-Trent ST4 8JB.
Tel.: (0782) 659921
Tlx : 36574 Balad G

Man: Miclar Exports Ltd
3/10 Shoreditch High St.
London Ee1 6PE
England
Tel.: (01) 247 8838
Tlx.: 888898
Or other equal and approved

2.05 ACCESSORIES

A. Thresholds: Same stone type as flooring: finishes, colors and sizes as shown on drawings.

B. Sealant: shall be tow part poly sulfide as specified in Section 07900.

C. Cleaner: Recommended by stone producer and grout manufacturer which will not harm stone, joint materials, or adjacent surfaces.

D. Sealer: Colorless, slip and stain resistant which will not detrimentally affect stone and adjacent work.

2.06 MORTAR AND GROUT MIX

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

B Mix and proportion cementitious materials for site made mortar bed.

C. Add mortar color and admixtures in accordance with manufacturer's instructions. Control uniformity of mix and coloration.

2.07 STONE FABRICATION

A. Form stone into panel sizes and thickness required.

B. Form stair treads and risers to configuration as detailed.

PART 3: EXECUTION

3.01 EXAMINATION

A. Verify that surfaces are ready to receive work.

3.02 PREPARATION

A. Vacuum clean substrate surfaces; damp clean stone.

B. Seal substrate surface cracks with filler.

C. Clean stone prior to installation, with edges and surfaces free of dirt or foreign material.

D. Do not use wire brushes or implements which mark or damage exposed surfaces.

3.03 INSTALLATION - THIN SET METHOD

A. Install stone in accordance with stone fabricators and manufacturer's instructions.

B. Install stone, thresholds, stair treads, and grout in accordance with manufacturers instructions.

C. Lay stone units to pattern indicated. Do not interrupt tile pattern through openings.

D. Place thresholds at door frame openings, notching stone for door stop.

E. Cut and fit stone units tight to penetrations through unit. Ensure finish trim will cover cut edges. Form corners and bases neatly. Align floor and base joints.

F. Maintain uniform joint width subject to variance in tolerance allowed in stone unit size. Make joints watertight, without voids, cracks, excess mortar or excess grout.

G. Maintain joint width of 6 mm where abutting vertical surfaces or protrusions.

H. Sound test the units and after setting. Replace hollow sounding units.

I. Keep expansion and control joints free of mortar or grout. Apply sealant to joints.

J. Allow thin set materials to cure prior to grouting.

K. To accommodate joint grout, rake out joints 6 to 10 mm. Grout joints. Pack and work into voids. Neatly tool surface to a flush joint.

L. Apply sealant to junction of stone and dissimilar materials and junction of dissimilar planes.

M. Set stone in full mortar bed to support stone over full bearing surface. Accurately establish joint dimensions.

3.04 INSTALLATION - MORTAR BED METHOD

A. Install stone in accordance with stone fabricators and manufacturer's instructions.

B. Install mortar bed, tile, threshold, stair treads, and grout in accordance with manufacturer's instructions.

C. Apply mortar bed over cement screed surfaces to a thickness as shown on drawings.

D. Lay stone units to pattern indicated. Do not interrupt tile pattern through openings.

E. Set stone in full mortar bed to support stone over full bearing surface.

F. Place thresholds at door frame openings, notching stone for door stop.

G. Cut and fit stone units tight to penetrations through unit. Ensure finish trim will cover cut edges. Form corners and bases neatly. Align floor and base joints.

H. Maintain uniform joint width subject to variance in tolerance allowed in stone unit size. Make joints watertight, without voids, cracks, excess mortar or excess grout.

I. Maintain joint width of 5 mm where abutting vertical surfaces or protrusions.

J. Sound test the units after setting. Replace hollow sounding units.

K. Keep expansion and control joints free of mortar or grout. Apply sealant to joints.

L. Allow units to set for a minimum of 48 hours prior to grouting.

M. To accommodate joint grout, rake out joints 6 to 10 mm. Grout joints. Pack and work into voids. Neatly tool surface to a flush joint.

N. Apply sealant to junction of stone and dissimilar materials and junction of dissimilar planes.

3.05 CLEANING

1st. Clean stone and grout surfaces with cleaner; seal with sealer.

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 - Architectural 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 guarantee 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 neutralize aside, 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 Galvanized 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' on the Drawings.
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 backsides 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 and 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 swill 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 form 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 Architect.

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