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DIVISION 09 - FINISHES

SECTION 09200

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SECTION 09200

LATHING AND PLASTERING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 580/A 580M	(1995a) Stainless and Steel Wire
ASTM A 853	(1993) Steel Wire, Carbon, for General Use
ASTM B 164	(1993) Nickel-Copper Alloy Rod, Bar, and Wire
ASTM C 28	(1996) Gypsum Plasters
ASTM C 29/C 29M	(1997) Bulk Density (Unit Weight) and Voids in Aggregate
ASTM C 35	(1995) Inorganic Aggregates For Use in Gypsum Plaster
ASTM C 37	(1995) Gypsum Lath
ASTM C 61	(1995) Gypsum Keene's cement
ASTM C 150	(1997) Portland Cement
ASTM C 206	(1984; R 1992) Finishing Hydrated Lime
ASTM C 472	(1993) Physical Testing of Gypsum, Gypsum Plasters and Gypsum Concrete
ASTM C 587	(1996) Gypsum Veneer Plaster
ASTM C 588	(1995a) Gypsum Base for Veneer Plasters
ASTM C 645	(1996a) Nonstructural Steel Framing Members
ASTM C 754	(1997) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C 841	(1997) Installation of Interior Lathing and Furring

ASTM C 842	(1997) Application of Interior Gypsum Plaster
ASTM C 843	(1996) Application of Gypsum Veneer Plaster
ASTM C 844	(1996) Application of Gypsum Base to Receive Gypsum Veneer Plaster
ASTM C 847	(1995) Metal Lath
ASTM C 897	(1996) Aggregate for Job-Mixed Portland Cement-Based Plasters
ASTM C 926	(1995a) Application of Portland Cement-Based Plaster
ASTM C 933	(1996a) Welded Wire Lath
ASTM C 955	(1996a) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM C 1002	(1996a) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases
ASTM C 1032	(1996) Woven Wire Plaster Base

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Plastering Materials and Accessories; GA.

Manufacturer's pre-printed descriptive data, catalog cuts, and installation instructions for plastering materials and accessories.

SD-04 Drawings

Lath and Plaster; FIO.

Drawings including installation details, ceiling framing, and furring.

SD-13 Certificates

Gypsum Plaster; FIO.

Certification indicating that factory-mixed plaster provides a minimum compressive strength of not less than 6.9 MPa (1000 psi) 1000 psi when tested in accordance with ASTM C 472.

SD-14 Samples

Gypsum Plaster; FIO.

One 1 m 36 inch square sample panel of each specified finish.

1.3 QUALIFICATIONS

Manufacturer shall specialize in manufacturing the types of material specified, and shall have a minimum of 5 years of documented successful experience. Applicator shall specialize in the type of lath and plaster work required to meet requirements, with a minimum of 3 years of documented experience.

1.4 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered to project site in the original containers bearing the name of manufacturer, contents, and brand name. Plaster, cement, and lime shall be stored off the ground under weathertight cover and away from sweating walls and other damp surfaces until ready for use. Accessories shall be stored off the ground in a weathertight structure for protection. Damaged or deteriorated materials shall be removed from project site.

1.5 ENVIRONMENTAL CONDITIONS

A temperature between 4 degrees C 40 degrees F and 27 degrees C 80 degrees F shall be evenly maintained in the building for a period of not less than 1 week prior to application of plaster, and for a period of at least 1 week after the gypsum plaster is set, in accordance with ASTM C 842. Interior spaces shall be ventilated in accordance with ASTM C 842 immediately after applying plaster.

PART 2 PRODUCTS

2.1 NON-LOADBEARING WALLS

2.1.1 Studs

Studs for non-loadbearing walls shall conform to ASTM C 645. Studs shall be C-shaped, roll-formed steel with minimum uncoated design thickness of 0.45 mm (0.0179 in) 0.0179 in, 0.72 mm (0.0284 in) 0.0284 in, 0.84 mm (0.0329 in) 0.0329 in made from G40 hot-dip galvanized coated sheet as required by the Task Order.

2.1.2 Runner Tracks

Prefabricated floor and ceiling runner tracks shall conform to ASTM C 645. Tracks shall be prefabricated, U-shaped, unpunched web, thickness to match studs, made from G40 hot-dip galvanized coated sheet.

2.2 LOADBEARING STUD WALLS

2.2.1 Studs

Studs for loadbearing walls shall conform to ASTM C 955. Studs shall be C-shaped, roll-formed steel made from minimum G60 hot-dip galvanized coated sheet. Stud sizes and base metal design thickness shall be as shown.

2.2.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 955. Tracks shall be prefabricated, U-shaped with minimum 19 mm 3/4 inch flanges, unpunched web, made from G60 hot-dip galvanized coated sheet.

2.2.3 Bridging

Bridging in loadbearing walls shall conform to ASTM C 955. Bridging shall be minimum 19 mm 3/4 inch wide x 11 mm 7/16 inch deep cold-rolled steel channel with weld attachment clips at each stud location or V-bar type weld or screw attached to each stud flange. Bridging shall be adequate to provide lateral support for the stud.

2.3 METAL WALL FURRING

Metal wall furring channels shall conform to ASTM C 645. Furring channels shall be formed from cold-rolled steel, 19 mm 3/4 inch wide x 11 mm 7/16 inch deep, made from G40 hot-dip galvanized coated sheet.

2.4 SUSPENDED CEILING FRAMING

Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown.

The suspension system shall have a maximum deflection of L/240. Carrying channels shall be formed from minimum 1.40 mm thick (0.0548 in) 0.0548 in cold-rolled steel, 38 mm 1-1/2 inch wide x 11 mm 7/16 inch deep. Cross furring members shall conform to ASTM C 645, and shall be formed from cold-rolled steel, 19 mm 3/4 inch wide x 11 mm 7/16 inch deep. Carrying channels and furring members shall be made from hot-dip galvanized coated sheet.

2.5 TRIM, MOLDINGS, AND ACCESSORIES

2.5.1 Hangers

Suspended ceiling runner channel hangers shall be soft, annealed steel wire not less than No. 8 SWG nominal diameter, conforming to ASTM A 853 or flat iron or steel straps, at least 2 x 22 mm 3/32 x 7/8 inch size, coated with zinc, cadmium, or rust-inhibiting paint as required by the Task Order.

2.5.2 Fastenings

Tie wire, rings, and other fastenings shall be corrosion-resisting steel conforming to ASTM A 580/A 580M, composition 302, 304, or 316, Condition A, or nickel-copper alloy conforming to ASTM B 164, annealed condition.

Walls, partitions, and other vertical surfaces not incorporated in ceiling construction may be erected with soft, annealed steel conforming to ASTM A 853.

2.5.2.1 Tie Wire

Tie wire for constructing partitions and vertical furring, for securing metal lath to supports, and for lacing shall be not less than No. 18 SWG diameter. Tie wire for all other applications shall be not less than No. 16 SWG diameter.

2.5.2.2 Clips

Clips used in lieu of tie wire for securing furring channels to the runner

channels in ceiling construction shall be made from strips not less than 3 mm 1/8 inch thick or shall be hairpin clip formed of No. 8 SWG wire. Other clips and rings or fastenings of similar materials shall be equivalent in holding power to that provided by tie wire for the specific application.

2.5.3 Arch, Flexible Corner Beads

Flexible corner beads shall be fabricated of aluminum or vinyl 0.50 mm thick (0.0210 in) 0.0210 in galvanized steel 0.76 mm (0.030 inch) for 0.030 inch thick zinc alloy, as required by the Task Order, with minimum 32 mm 1-1/4 inch wide flanges and 3 mm 1/8 inch thick bead, designed to bend without buckles, kinks, or breaks in the nose.

2.5.4 Expanded Flange Corner Beads

Expanded flange corner beads shall be fabricated of vinyl or aluminum 0.50 mm thick (0.0210 in) 0.0210 in galvanized steel or 0.76 mm (0.030 inch) 0.030 inch thick zinc alloy, as required by the Task Order, with 64 mm 2-1/2 inch wide flanges and 3 mm 1/8 inch wide bead.

2.5.5 Bullnose Corner Beads

Bullnose corner beads shall be fabricated of vinyl or aluminum 0.50 mm thick (0.0210 in) 0.0210 in galvanized steel, as required by the Task Order, with 64 mm 2-1/2 inch wide flanges and 20 mm 3/4 inch bead.

2.5.6 Cornerites

Cornerites shall conform to ASTM C 847. Cornerites shall be fabricated of galvanized expanded metal lath to form an angle of at least 100 degrees, with outstanding legs of not less than 50 mm 2 inches.

2.5.7 Striplath

Striplath shall conform to ASTM C 847. Striplath shall be fabricated of galvanized steel sheet, 1.4 kg per square meter. 2.5 pounds per square yard.

2.5.8 Base or Parting Screed

Base screeds shall be fabricated of 0.50 mm thick (0.0210 in) 0.0210 in galvanized steel, 13 mm 1/2 inch depth, with not less than 50 mm 2 inch wide expansion flanges.

2.5.9 Casing Beads

Casing beads shall be fabricated of vinyl or galvanized 0.70 mm (0.0276 inch) 0.0276 inch thick steel 13 or 19 mm 1/2 or 3/4 inch depth, 25 or 50 mm 1 or 2 inch wide expansion wings, as required by the Task Order, front edge of face flange shaved for intended use, back slightly arched to provide a spring effect.

2.5.10 Control Joints

Control joints shall be designed for expansion and contraction of plaster work due to thermal exposure. Control joints shall be fabricated of vinyl 0.55 mm (0.0217 inch) 0.0217 inch thick galvanized steel for interior applications or 0.76 mm (0.030 inch) 0.030 inch thick zinc alloy for exterior applications, with perforated or expanded-metal wings.

2.5.11 Reveal Molding

Reveal moldings shall be fabricated of aluminum, vinyl, galvanized steel or zinc as required by the Task Order. Reveal molding shall be size and shape as shown.

2.5.12 Raised Column Trim

Raised column moldings shall be fabricated of aluminum and shall be shape and sizes as shown.

2.5.13 Screws

Self-drill steel screws shall conform to ASTM C 1002. Screws shall be Type S for use with steel framing and Type W for use with wood members.

2.6 METAL LATH

2.6.1 Expanded Metal Lath

Expanded metal lath shall conform to ASTM C 847. Lath shall be flat base lath, self-furring lath, flat rib lath or rib lath, as required by the Task Order, expanded from cold-rolled carbon sheet steel of commercial quality, coated with rust-inhibitive paint after fabrication, 1.8 kg per square meter 3.4 pounds per square yard, with or without backing as required by the Task Order.

2.6.2 Welded Wire Lath

Welded wire lath shall conform to ASTM C 933. Lath shall be flat base or self-furring type, as required by the Task Order, fabricated from not less than 1.6 mm (0.0625 inch) 0.0625 inch copper-bearing, cold-drawn, galvanized steel wire, with or without backing as required by the Task Order.

2.6.3 Woven Wire Lath

Woven wire lath shall conform to ASTM C 1032. Lath shall be flat base or self-furring type with or without stiffeners, with or without backing, as required by the Task Order, fabricated from copper-bearing, cold-drawn, galvanized steel wire not less than 1.40 mm (0.0548 in) 0.0548 in, thick with openings not to exceed 50 x 50 mm 2 x 2 inch welded.

2.7 GYPSUM LATH AND VENEER PLASTER BASE

2.7.1 Gypsum Lath

Gypsum lath shall conform to ASTM C 37. Lath shall be plain, aluminum foil backed, Type X or lead-backed for control of X-ray transmission, as required by the Task Order, designed to be used as a base for gypsum plaster.

2.7.2 Veneer Plaster Base

Veneer plaster base shall conform to ASTM C 588. Base shall be aluminum, foil backed or Type X, as required by the Task Order, and shall be designed to be used as a base for gypsum veneer plaster.

2.8 GYPSUM PLASTER

2.8.1 Ready-Mixed Gypsum Plaster

Ready-mixed plaster for use over gypsum or metal lath shall conform to ASTM C 28 for the following: ready-mixed plaster with vermiculite aggregate; ready-mixed plaster with perlite aggregates; ready-mixed plaster with sand aggregate. Ready-mixed gypsum plaster for use over masonry bases shall conform to ASTM C 28 for plaster with vermiculite aggregate. Ready-mixed plaster for use over veneer plaster bases shall conform to ASTM C 587.

2.8.2 Gypsum Neat Plaster

Gypsum neat plaster shall conform to ASTM C 28.

2.8.3 Gypsum Wood-Fibered Plaster

Gypsum wood-fibered plaster shall conform to ASTM C 28.

2.8.4 Gypsum Gauging Plaster for Finish Coats

Gypsum gauging plaster shall conform to ASTM C 28. Keene's quick-set cement for finish coats shall conform to ASTM C 61.

2.9 CEMENT PLASTER MATERIALS

2.9.1 Portland Cement

Portland cement shall conform to ASTM C 150, gray portland cement Type I, II, III, as required by the Task Order, or white portland cement Type I or II, as required by the Task Order, with 13 mm 1/2 inch chopped alkali-resistant fiberglass strands or polypropylene fibers, minimum 680 g 1-1/2 pounds per sack of cement.

2.9.2 Aggregates

The unit weight of aggregates shall be determined in accordance with ASTM C 29/C 29M. Gypsum aggregates shall conform to ASTM C 35. Portland cement based plaster aggregates shall conform to ASTM C 897, except that the gradation of natural or manufactured sand for portland-cement plaster shall be as follows:

Sieve Size (mm)	Sand, Percentage by Weight Retained on Each Sieve	
	Maximum	Minimum
4.75	0	--
2.36	8	2
1.18	38	22
0.60	78	52
0.30	97	65
0.15	100	97

Sieve Size (inches)	Sand, Percentage by Weight Retained on Each Sieve	
	Maximum	Minimum
4	0	--
8	8	2
16	38	22
30	78	52
50	97	65
100	100	97

2.9.3 Water

Water shall be clean, fresh, potable, and free from injurious amounts of oils, acids, alkalis and organic matter injurious to the plaster and to any metal in the system.

2.9.4 Lime

Lime shall conform to ASTM C 206, Type N-Normal hydrated finishing lime or Type S-Special hydrated finishing lime, as required by the Task Order, suitable for use in scratch brown and finish coats of portland-cement plaster.

2.10 WALL OPENING FRAMES

Steel frames for wall openings for doors, pass-through openings, and access panels shall be as specified in Section 08110 STEEL DOORS AND FRAMES or Section 05500 MISCELLANEOUS METAL. Wood frames, wood bucks, and blocking for wall openings for doors, pass-through openings, and access panels shall be as specified in Section 06100 ROUGH CARPENTRY.

PART 3 EXECUTION

3.1 PREPARATION

Project conditions shall be verified as ready to receive the work. Field measurements shall be verified for compliance with manufacturer's published recommendations. Beginning of installation means installer accepts existing conditions.

3.2 SUSPENDED CEILING FRAMING INSTALLATION

Suspended system shall be installed in accordance with ASTM C 841. Where channels are spliced, the ends shall be overlapped not less than 300 mm 12 inches for 38 mm 1-1/2 inch channels and not less than 200 mm 8 inches for 20 mm 3/4 inch channels with flanges of channels interlocked and securely tied near each end of the splice with two loops of the tie wire. Splices shall be staggered.

3.2.1 Hangers

Wire or strap hangers shall be attached to structural members in accordance with ASTM C 841, except hangers shall be spaced not more than 1220 mm 48 inches along runner channels and 900 mm 36 inches in the other direction or 1050 mm 42 inches in both directions unless otherwise indicated or approved. Locations of hangers shall be coordinated with other work. Hangers at ends of runner channels shall be located not more than 150 mm 6 inches from wall. Hanger wire shall be looped around bottom chord of open-web steel joist or secured to structural elements with suitable fasteners. Sags or twists in the suspended system shall be adjusted. Damaged or faulty parts shall be replaced.

3.2.2 Main Runners

Main runner channels shall be installed in accordance with ASTM C 841. Hanger wire shall be saddle-tied to runner channels, and the end of hanger wires shall be twisted three times around itself. Main runners shall not come in contact with abutting masonry or concrete walls and partitions. Main runners shall be located within 150 mm 6 inches of the paralleling wall to support the ends of cross furring.

3.2.3 Furring Channels

Furring channels shall be spaced in accordance with ASTM C 841 for the type of lath used. Furring channels shall be securely saddle-tied to the runner channels and to structural supports at each crossing with tie wire, hairpin clips, or equivalent clips or fastenings. Furring channels shall be located within 50 mm 2 inches of parallel walls and beams, and 15 mm 1/2 inch from abutting walls. When gypsum lath is used on ceilings, hat-shaped sheetmetal furring channels may be used in lieu of 19 mm 3/4 inch rolled steel furring channels. Gypsum lath shall be screw-applied at 200 mm 8 inches on centers along supports and not less than 10 mm 3/8 inch from edges of lath.

3.2.4 Light Fixtures and Air Diffusers

Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at appropriate locations to carry the weight of recessed or surface mounted light fixtures and air diffusers.

3.3 FURRED CEILING FRAMING INSTALLATION

Ceiling runners at continuous furred ceilings shall be applied directly to furring channels and secured thereto with tie wire, bolts, or screws at not more than 600 mm 24 inch centers.

3.4 WALL FRAMING INSTALLATION

3.4.1 Loadbearing Wall Framing

Load-bearing steel studs shall be spaced for the type of lath used at external corners, partition ends, and approximately 50 mm 2 inches each side of internal corners. Floor and ceiling runners shall be firmly secured to structural members with screws or bolts in expansion shields, hard-tempered stub nails, powder-actuated anchors, or by other approved methods at not more than 600 mm 24 inch centers. Studs shall be attached to runner tracks with rivets or screws. Runner to tracks shall be aligned to partition layout at floor and ceiling, and shall be secured to concrete slabs with minimum 22 mm 7/8 inch powder-driven pins or 19 mm 3/4 inch

concrete stub nails at no more than 1200 mm 48 inches on centers. Each stud shall be aligned, plumb and true to top and bottom runner tracks.

3.4.2 Non-Loadbearing Wall Framing

Nonload-bearing steel studs shall be installed in accordance with ASTM C 754 with spacings as indicated in ASTM C 841 for the type of lath used. Studs shall be aligned and secure in top and bottom runners at spacings indicated on drawings. One or Two beads of acoustic sealant, as required by the Task Order, shall be placed between runners and substrate to achieve the required air seal. Stud splicing is not acceptable. Corners shall be constructed with a minimum of three studs. Stud framing system shall be braced and made rigid.

3.4.3 Adjoining Walls and Columns

Studs which adjoin walls or columns shall be secured near the top and bottom, and at least one intermediate point, but not more than 1.5 m 5 feet on centers, with wire inserts, dovetail anchors, toggle bolts, or bolts set in expansion shields.

3.4.4 Wall Bracing

Partitions more than 3 m 10 feet long or 2.7 m 9 feet high shall be braced with 19 mm 3/4 inch steel channel stiffeners concealed horizontally. Stiffeners shall be spaced vertically not more than 2 m 6 feet and shall be secured to each stud. Unsupported partitions 6 m 20 feet or more in height shall be braced with 40 mm 1-1/2 inch channel type horizontal stiffeners.

3.4.5 Corners and Intersection

Corners and intersections of partitions shall be formed of three studs. Studs at internal corners shall be placed not more than 50 mm 2 inches from partition intersection.

3.4.6 Wall Openings

One loadbearing metal stud shall be installed at each jamb of door openings continuous from floor to ceiling, and shall be welded to jamb anchors and runner tracks. Jack studs shall be attached to runner track on interior of head of frame, and to runner track or 19 mm 3/4 inch channel at ceiling. A 19 mm 3/4 inch channel reinforcement shall be placed inside the partition 150 to 200 mm 6 to 8 inches above door openings continuously through two stud spaces on each side of jambs, and welded to the flange. Studs shall be doubled at wall openings, with not more than 50 mm 2 inches each side of openings. Stud placement shall be coordinated with supports and attachments. Intermediate studs above and below openings shall be secured at same spacing as wall studs. Stud framing shall extend to ceiling or through ceiling as indicated on drawings. Clearance shall be maintained between partition and structure to avoid deflection transfer to studs of partitions which extend through ceiling to structure. Placement of insulation in stud spaces shall be made inaccessible after studs are installed.

3.4.7 Bucks, Anchors and Blocking

Installation of bucks, anchors, and blocking shall be coordinated with electrical and mechanical work to be placed in or behind stud framing, and shall be coordinated with blocking requirements for support of plumbing

fixtures, toilet partitions, wall cabinets, toilet accessories, hardware and similar items scheduled for installation.

3.5 WALL FURRING INSTALLATION

Metal furring shall be installed in accordance with ASTM C 754 and ASTM C 841.

3.6 SINGLE/DOUBLE CHANNEL, AND STUDLESS SOLID PARTITION INSTALLATION

Channel studs for single channel and double channel stud partitions shall be spaced 400 mm 16 inches on centers and shall be secured to ceiling runners and to floor runners or base clips with wire ties or sheet-metal screws. Studs on each side of door openings shall be doubled and stiffened with a 6 x 25 mm 1/4 x 1 inch flat steel strut, shop-coated with rust-inhibiting paint. Ends of struts shall be bent and punched for bolting to floor and ceiling construction. Where rib metal lath is the plaster base in continuous lengths from ceiling runners to floor runners for partitions less than 3 m 10 feet in height, steel channel studs may be excluded from the partition except at locations previously specified for door openings. Rib lath shall be firmly attached to ceiling runner tracks or cornerite and to floor runner track or base by wire ties located not more than 200 mm 8 inches on centers. Studless rib lath partitions shall be limited to not less than 50 mm 2 inches thick. Partitions shall be as shown.

3.7 LATHING INSTALLATION

3.7.1 Metal Lath on Vertical Surfaces

Metal lath shall be applied with the long dimension across the supports, with true even surfaces, and without sags or buckles in accordance with ASTM C 841. Metal lath on vertical surfaces shall be oriented to provide maximum mechanical bond with plaster and the upper sheet shall be attached to overlap the lower sheet. When paper-backed lath is used, the upper sheet shall be attached to overlap the lower sheet. The lath shall be secured to supports at intervals not exceeding 150 mm 6 inches. Nails or staples shall be used for securing lath to wood supports. Tie wires, rings, clips, or other approved fasteners having equivalent holding power of the tie wires shall be used for securing the plaster base to metal supports and to concrete or masonry. Side-laps or junction of sides of plaster base shall be tied or otherwise secured at intervals not exceeding 225 mm 9 inches between supports, in addition to being secured to supports.

3.7.2 Metal Lath on Ceilings

Metal lath on ceilings shall be in accordance with ASTM C 841. Lath on unrestrained ceilings shall not be turned down at junction with wall or tied to wall lath or furring. Lath on restrained ceilings shall be turned down at junction with wall, or shall be applied to cornerite or corner bead.

3.7.3 Side and End Laps

Side and end laps of metal plaster bases shall be performed in accordance with ASTM C 841 for flat lath and ribbed lath.

3.7.4 Chases and Recesses

Chases and recesses shall be lathed for plastering. Openings over 300 mm

12 inches wide shall be bridged with furring channels spaced 300 mm 12 inches on centers. Openings 300 mm 12 inches wide and less do not need to be bridged. Lath shall extend 75 mm 3 inches beyond the edges of opening. Lath shall be securely fastened by nailing or tying. Lath shall be securely fastened with nails, screws or wire ties.

3.7.5 Installation of Gypsum Lath

Gypsum lath shall be installed in accordance with ASTM C 841. Spring clips or floating-wall-type attachment may be used in lieu of nails. Lath shall be cut and fitted to allow slight clearance around openings. Horizontal or vertical joints are not acceptable at corners of openings. End joints shall be made over supports. Where clip systems are approved, end joints shall be staggered in alternate courses. End joints shall not coincide with ceiling joints, and shall not occur in the same course on opposite side of support. Internal corners shall be reinforced with cornerites, and external corners shall be reinforced with corner beads. Internal corners of unrestrained ceilings shall not be reinforced with cornerites.

3.8 INSTALLATION OF GYPSUM BASE TO RECEIVE VENEER PLASTER

Gypsum base shall be installed in accordance with ASTM C 844. Base shall be cut and fitted to allow slight clearance around openings. Horizontal or vertical joints are not acceptable at corners of openings. End joints shall be made over supports. Where clip systems are approved, end joints shall be staggered in alternate courses. End joints shall not coincide with ceiling joints, and shall not occur in the same course on opposite side of support. Internal corners shall be reinforced with cornerites, and external corners shall be reinforced with corner beads. Internal corners of unrestrained ceilings shall not be reinforced with cornerites.

3.9 OPENINGS

Reinforcement shall be provided at corners of openings in plastered areas extending 300 mm 12 inches or more in any dimension by securing striplath diagonally at corners. Striplath shall be at least 150 mm 6 inches wide by 400 mm 16 inches long. Shorter lengths shall be used to preclude lapping striplath. Striplath shall be secured to lathing without extending fastenings into or around supporting members. Where plaster is applied directly to concrete or masonry surfaces, striplath shall be secured to the concrete or masonry.

3.9.1 Steel Frames

Steel frames shall be securely attached through built-in anchors to the nearest stud on each side of opening with tie wire, bolts, screws, or welding or bracing where bracing is specified. Steel frames shall be grouted solid with plaster grout and a groove shall be formed within the frame returns to receive lath and plaster.

3.9.2 Wood Frames

Wood frames shall be securely attached to the nearest stud in frame partitions and to wood bucks built into the solid partition. Sizes shall be as indicated for each type and size of wall or partition.

3.9.3 Ceiling Openings

Framing shall be provided for ceiling openings and supplemental supporting

members for items mounted in ceiling or attached to ceiling suspension system. Frames for openings shall be secured to lath support members. Frames provided with expanded metal flanges shall be secured to lath. Intermediate structural members shall be provided for attachment or suspension of support members.

3.9.4 Openings in Hollow Partitions

Hollow partition door openings shall be additionally braced by tying together each set of double-jamb studs with not less than four solid metal column clips evenly spaced along each jamb.

3.9.5 Openings in Partitions Not To Structure

Partitions not extending to the structural ceiling or structural supports or frame shall be strengthened at openings with angle bracing from each jamb location anchored to the structural ceiling or supports.

3.9.6 Cross Bracing

Cross bracing between partitions or similar bracing may be substituted for angle bracing as approved. Minor frames such as those required for access panels may be provided with expanded metal flanges which shall be attached to lath.

3.10 INSTALLATION OF TRIM, MOLDINGS, AND ACCESSORIES

Trim, moldings, and accessories shall be installed in standard lengths level and plumb to straight lines and as indicated on drawings. Fastenings shall be spaced not over 300 mm 12 inches on centers for single-flanged accessories and not over 600 mm 24 inches on centers on each flange of double-flanged accessories. Items shall be mitered or coped at corners, or prefabricated corners shall be used. Joints in straight runs shall be formed with splice or tie plates.

3.10.1 Base Screeds

Base screeds shall be installed approximately 75 mm 3 inches above finished floor elevation unless indicated otherwise.

3.10.2 Corner Beads

Corner beads shall be installed in standard lengths at external plastered corners, and shall be secured to furring members or supports.

3.10.3 Cornerites

Cornerites shall be installed at internal angles formed by abutting surfaces of gypsum lath or metal lath not turned down at horizontal corners or returned around vertical corners. Cornerites shall be secured to lathed surfaces. Cornerites shall be secured to concrete or masonry where plaster is applied directly to concrete or masonry surfaces. Cornerites shall not be installed at unrestrained ceilings.

3.10.4 Casing Beads

Casing beads shall be installed at the joints of dissimilar base materials in the same plane and at exposed edges of plaster including junctions of walls and ceilings except that beads shall not be installed at restrained

ceilings abutting plastered surfaces. At the perimeter of unrestrained suspended ceilings, the casing bead shall be secured to the ceiling to provide a 10 mm 3/8 inch opening between the abutting surfaces. The opening shall be sealed prior to plastering with sealant as specified in Section 07900 JOINT SEALING.

3.10.5 Expansion and Control Joint Beads

Expansion joint beads shall be installed as control joints in plasterwork at the locations indicated. Plaster base shall not be run continuous through control joints. Additional supports shall be installed as required to support the beads.

3.10.6 Trim

Trim shall be installed where indicated and as required to complete the plaster work.

3.11 PLASTER THICKNESS AND SURFACE EVENNESS

Plaster thickness and surface evenness shall be controlled by grounds or screeds of metal, wood, or plaster. Wood grounds are specified under Section 06100 ROUGH CARPENTRY. Plaster thickness shall be as shown.

3.11.1 Grounds and Screeds

Grounds shall be used for securing trim items, and for finished corners and terminations. Screeds shall be installed for base screeds when wood or metal grounds are not required. Temporary screeds shall be installed when permanent screeds or grounds cannot be used. On completion of approved base coats, temporary screeds shall be removed and voids immediately filled with plaster.

3.11.2 Plaster Screeds

Plaster screeds shall be used within the plastered areas to supplement wood and metal grounds and screeds.

3.12 PLASTER GROUT

Plaster grout shall be scratch-coat material mixed to a non-fluid consistency. Plaster grout shall be used to fill steel door frames and partition bases. Grout shall be placed and grooved prior to gypsum lathing operations. Heads and jambs of frames shall be filled solid with grout, and 13 mm 1/2 inch deep grooves shall be formed in the grout, while plastic, to receive gypsum lath.

3.13 PROPORTIONS AND MIXING

3.13.1 Portland Cement Plaster Base Coat

Base coat shall be proportioned and mixed in accordance with ASTM C 926 coat L or C as required by the Task Order.

3.13.2 Lime-Putty Finish

Lime-putty finish shall be mixed in the proportion of 1 part of gypsum gauging plaster, calcined gypsum, to 3 parts of lime putty by volume. The mix shall be approximately equivalent to one 45 kg 100 pound bag of gypsum

plaster to four 23 kg 50 pound bags of hydrated lime or 0.13 cubic meters 4.5 cubic feet of lime putty or 0.13 cubic meters 35 gallons of lime putty.

Perlite or vermiculite aggregated base coats shall have 23 kg 50 pounds of fine white sand or 0.014 cubic meters 1/2 cubic foot of perlite fines added for each 45 kg 100 pounds of gauging plaster.

3.13.3 Prepared-Gypsum Finish

Prepared-gypsum finish shall be mixed with water to the proper consistency in accordance with manufacturer's published instructions. Prepared-gypsum finish shall have a minimum compressive strength of not less than 2 MPa 300 psi when tested in accordance with ASTM C 472. Prepared gypsum finish shall be used only over sanded base coats.

3.13.4 Keene's Cement Finish

Keene's cement finish shall be mixed in the proportions of 45 kg 100 pounds of Keene's cement to 11 kg, 25 pounds, dry weight, of hydrated lime. The mix shall be approximately equivalent to one 45 kg 100 pound bag of Keene's cement to one-half 23 kg 50 pound bag of hydrated lime or 23 kg 50 pounds lime putty or 0.017 cubic meters 4-1/2 gallons lime putty. Subject to approval, 5 kg 10 pounds of fine white sand may be added to the above mix. When mixing mechanically, the water shall be put into the mixer first, then the lime, the white sand if used, and finally the Keene's cement.

3.13.5 High-Strength Gypsum Finish

High-strength gypsum finish shall be mixed by dry weights in proportions of 100 pounds of high-strength gypsum gauging plaster to 45 kg 100 pounds of hydrated lime or 90 kg 200 pounds of lime putty. Gypsum gauging plaster for high-strength finish coat shall be mixed with lime putty in accordance with ASTM C 28. Gauging plaster shall have a compressive strength not less than 21 MPa 3000 psi when tested in accordance with ASTM C 472. Factory-mixed gypsum finishing plasters shall equal or exceed the performance requirements of job-mixed finishing plasters.

3.13.6 Portland Cement-Plaster Finish

The finish coat shall be proportioned and mixed in accordance with ASTM C 926, coat FL or F as required by the Task Order.

3.14 MACHINE APPLICATION

A plastering machine may be used for the application of scratch and brown coats. Plaster for machine application shall be a special plaster compounded and packaged by the manufacturer for this purpose. Slump cone equipment shall be present on the jobsite when base-coat plastering begins, and until completion. Testing of the mix shall be the responsibility of the Contractor, but equipment shall be available for use by the Government.

Additional water shall not be added to the mix to allow pumping through extended hose lines to the plastering nozzle. The amount of water added to each batch of plaster shall be that quantity which results in a plaster slump of not more than 75 mm 3 inches for gypsum and 65 mm 2-1/2 inches for portland cement using a standard plaster slump cone or 150 mm 6 inches for gypsum and 125 mm 5 inches for portland cement using a concrete slump cone.

Application of plaster shall conform to the provisions of ASTM C 842.

3.15 QUALITY CONTROL

Fluidity or stiffness of plaster shall be tested with a standard 50 x 100 x 150 mm 2 x 4 x 6 inch plaster slump testing cone or by a 100 x 200 x 300 mm 4 x 8 x 12 inch concrete slump testing cone. Method of making slump test shall be as follows:

- a. Place cone on center of dry base plate located on a level, firm surface. Hold cone tightly against plate.
- b. Fill the cone with plaster obtained from the hose or nozzle, without air on the nozzle, puddling with tamping rod during the operation to eliminate air bubbles or voids.
- c. Screed plaster level with top of cone.
- d. Lift cone straight up from base plate in a slow and uniform motion, and place it on the base plate next to plaster sample.
- e. Lay a straightedge across top of cone, being careful not to disturb or jostle the plate, and measure the slump in millimeters inches from the bottom of the straightedge to the top of the plaster sample.

3.16 APPLICATION OF FINISHES

The finish coat may be omitted back of projecting bases, wainscots, structural-glass wall finish, cabinets, chalkboards, tackboards, bulletin boards, acoustic treatments, fixed equipment, and other locations where indicated. Finish coats shall not be applied above wainscots until wainscots have been installed. Plaster shall have a finish as required by the Task Order.

3.16.1 Interior Gypsum Plaster

Application of interior gypsum plaster (full thick) shall be in accordance with ASTM C 842. Nominal plaster thickness shall be as required by the Task Order.

3.16.2 Gypsum Veneer Plaster

Application of gypsum veneer plaster shall be in accordance with ASTM C 843. Plaster shall be one-component or two-component system as required by the Task Order.

3.16.3 Lime-Putty Finish

Lime-putty finish shall be applied over gypsum plaster base coats in accordance with ASTM C 842. The finish coat shall be 1.5 to 3 mm 1/16 to 1/8 inch thick and troweled smooth and free from blemishes.

3.16.4 Prepared-Gypsum Finish

Prepared-gypsum finish may be used in lieu of lime-putty finish, and shall be applied in accordance with the manufacturer's printed directions.

3.16.5 Keene's Cement Finish and High Strength Gypsum-Plaster Finish

Keene's cement finish and high-strength gypsum-plaster finish shall be applied in accordance with ASTM C 842. Where indicated on the finish schedule, either may be used at the Contractor's option. Neither finish

shall be used over lightweight-aggregate-plaster or portland-cement-plaster base coats. The finish coat shall be 1.5 to 3 mm 1/16 to 1/8 inch thick, and troweled smooth and free from blemishes and irregularities.

3.16.6 Portland Cement-Based Plaster

Two-coat and Three-coat portland cement-based plaster shall be applied in accordance with ASTM C 926. The final coat shall be finished to a true and even surface free from rough areas, checks, or blemishes. Nominal plaster finish thickness shall be as required by the Task Order.

3.17 PATCHING

Plaster showing oversanding, cracks, blisters, pits, checks, discoloration or other defects is not acceptable. Defective plaster work shall be removed and replaced with new plaster at the expense of Contractor. Patching of defective work will be permitted only when approved by the Contracting Officer. Patching shall match existing work in texture and color.

3.18 SAMPLES OF COMPLETED WORK

Samples of completed work may be taken by the Contracting Officer at any time for laboratory inspection and tests to determine conformance.

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SECTION 09225

STUCCO

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM C 150	(1997) Portland Cement
ASTM C 206	(1984; R 1992) Finishing Hydrated Lime
ASTM C 841	(1997) Installation of Interior Lathing and Furring
ASTM C 847	(1995) Metal Lath
ASTM C 897	(1996) Aggregate for Job-Mixed Portland Cement-Based Plasters
ASTM C 926	(1995a) Application of Portland Cement-Based Plaster
ASTM C 933	(1996a) Welded Wire Lath
ASTM C 1032	(1996) Woven Wire Plaster Base
ASTM C 1063	(1996) Installation of Lathing and Furring to Receive Interior and Exterior Portland Cement-Base Plaster
ASTM D 1784	(1997) Rigid Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Lathing and Stucco; Ga.

Drawings showing details of construction for reinforcement, furring, and grounds; including detailed description of the proposed job-mix proportions for base and finish coats; including identification of thickness of coats and locations where each mix and coating thickness will be used.

SD-06 Instructions

Materials; FIO.

Manufacturers installation instructions for stucco materials.

SD-14 Samples

Colored Stucco Finish Coat; GA.

Samples including both a fabricated portion of unit of work and color samples.

One 300 mm 12 inch square stucco panel showing finish texture and color and exposed reinforcement at the edges, one 300 mm 12 inch square of reinforcement, and a 300 mm 12 inch length of each accessory proposed, prior to proceeding with stucco work;

or as required by the Task Order:

A sample panel of stucco, constructed at the jobsite, and located as directed, to demonstrate installation procedures, texture and color, prior to proceeding with any stucco work. Panel size shall be a minimum of 1200 x 2400 mm 4 feet wide x 8 feet high; shall contain each type accessory proposed for use and shall be constructed in the vertical position. Sample panel shall have exposed reinforcement at the edges. Each phase of installation such as framing, scratch coat, brown coat, finish coat and curing procedures shall be demonstrated in the construction of the panel. One 300 mm 12 inch square of reinforcement and one 300 mm 12 inch length of each accessory proposed for use, shall be submitted prior to constructing the sample panel.

1.3 DELIVERY AND STORAGE

Packaged materials shall be delivered to the site in the original packages and containers with labels intact and seals unbroken. Cementitious materials shall be kept dry and stored off the ground under cover away from damp surfaces until ready to be used. Aggregate shall be covered to prevent the absorption or loss of moisture.

1.4 ENVIRONMENTAL CONDITIONS

Stucco shall not be applied when the ambient temperature is 4 degrees C/40 degrees F or lower, or when a drop in temperature below 4 degrees C/40 degrees F is expected within 48 hours after application.

PART 2 PRODUCTS

2.1 PORTLAND CEMENT

Portland cement shall conform to ASTM C 150, gray portland cement Type I, II or III or white portland cement, Type I, II or III as required by the Task Order.

2.2 COLORED STUCCO FINISH COAT

Colored stucco finish coat shall be a mill mixed product using white portland cement and requiring only the addition of and mixing with water for application. Color shall be as required by the Task Order.

2.3 LIME

Lime shall conform to ASTM C 206, Type S.

2.4 SAND

Sand aggregate for job-mixed base coat and job-mixed finish coat stucco shall conform to ASTM C 897.

2.5 ACCESSORIES

Accessories shall be roll formed galvanized steel, or rigid polyvinyl chloride (PVC), except that cornerite and striplath shall be formed from steel sheets with manufacturer's standard galvanized coating. Vinyl members shall be in accordance with ASTM D 1784. Welded wire corner reinforcements shall be zinc coated, galvanized 1.4 mm (17 gauge) 17 gauge steel wire conforming to ASTM A 185. Furring shall include hangers, bolts, inserts, clips, fastenings, and attachments of number, size, and design to develop the full strength of the members.

2.6 STEEL FRAMING

Steel framing shall be as shown and shall be manufacturers standard products with shop applied protective coating.

2.7 METAL LATH

Metal lath shall conform to ASTM C 847, types and weights in accordance with the various spacing shown in ASTM C 841. Lath for vertical application on steel and wood framing supports shall be expanded metal or welded or woven wire and shall have paper backing with a minimum vapor permeance of 287.2 ng per Pa per second per square meter (5 perms). 5 perms. Woven wire lath shall be a maximum 38 x 38 mm 1-1/2 x 1-1/2 inch mesh wire of not less than 1.37 mm 0.0540 inch nominal diameter and shall conform to ASTM C 1032. Welded wire lath shall conform to ASTM C 933, with openings not to exceed 50 x 50 mm. 2 x 2 inches. Expanded metal or wire lath shall be fabricated in a manner to provide not less than 6 mm 1/4 inch keying between wire and paper backing and keying shall be obtained by a uniform series of slots in a perforated face paper woven between the wires.

2.8 WATER

Water shall be clean, fresh, potable, and free from amounts of oils, acids, alkalis and organic matter that would be injurious to the stucco.

PART 3 EXECUTION

3.1 FRAMING

Framing shall be installed as indicated.

3.2 CONTROL JOINTS

Control joints shall be located as indicated on the drawings. Prefabricated control joint members shall be installed prior to the application of the stucco. Control joints shall be cleared of all stucco within the control area after stucco application and prior to final stucco set.

3.3 LATH

Lath shall be installed in accordance with ASTM C 841 or ASTM C 1063 except as otherwise specified. Metal and wire lath shall be applied straight, without buckles and with joints staggered. End laps of metal lath shall be not less than 25 mm. 1 inch. When paper-backed lath is used, the paper shall be split from the lath at all lap areas to provide a paper to paper and lath to lath lap. Horizontal joints shall be shiplapped. Lath shall be interrupted at all control joints.

3.3.1 Steel and Wood Supports

Metal lath without integral backing over vertical open or solid wood and steel backing frame construction shall be applied only after a backing of shiplapped waterproofed building paper or other approved material has been applied to the area to receive the stucco. Lath shall be secured to the wood frames with nails or staples spaced not over 150 mm 6 inches on centers along each support; and where sheets of lath are lapped, fasteners shall be driven so as to hold both lapped edges securely in place. Lath shall be secured to steel frames in accordance with ASTM C 841 or ASTM C 1063, as applicable.

3.3.2 On Concrete and Masonry

Lath shall be fastened every 200 mm 8 inches vertically and every 400 mm 16 inches horizontally. Where wood supports adjoin masonry or concrete in the same direction, casing bead, control joints, or reinforcement shall be provided as indicated.

3.3.3 Over Metal Lintels and Flashings

Lath over metal lintels shall be extended vertically over the angles to a height of not less than 150 mm 6 inches and horizontally across the underside of the lintels and shall be secured in an approved manner. Lath over metal flashings shall lap the flashings not less than 50 mm 2 inches and shall be extended vertically for a height of not less than 150 mm. 6 inches.

3.3.4 Special Shapes, Profiles, and Contours

Special shapes, profiles, and contours shall be formed with wood, metal or aluminum furring and reinforcing.

3.4 FURRING

Furring shall be installed to true lines and surfaces and shall be rigidly supported and secured in place.

3.5 PREPARATION OF SURFACES

Preparation of surfaces for application of stucco to solid bases such as stone, masonry or concrete shall conform to the applicable requirements of ASTM C 926.

3.6 PROPORTIONS AND MIXING

Proportions and mixing for job-mixed base coat and finish coat shall conform to the applicable requirements of ASTM C 926. Mixing of mill-mixed finish coat shall be in accordance with the manufacturer's directions.

3.7 STUCCO APPLICATION

Stucco shall be applied in three coats to a thickness of not less than 25 mm 1 inch as measured from the back plane of metal reinforcement, exclusive of ribs or dimples or from the face of solid backing or support, with or without metal reinforcement, to the finished stucco surface, including moderate texture variations. Stucco application shall conform to the applicable requirements of ASTM C 926 and the following:

3.7.1 Workmanship

Items or features of the work in connection with or adjoining the stucco shall be in place, plumb, straight, and true prior to beginning the stucco work. Metal and wire lath, where required, shall be in place and positioned to provide a good key at back of lath. Where lath is applied over copper, the copper shall be given a heavy coat of bituminous paint. Masonry surfaces to receive stucco shall be evenly dampened immediately prior to application of stucco. Each stucco coat shall be applied continuously in one general direction, without allowing mortar to dry at edges. Where it is impossible to work the full dimension of a wall surface in a continuous operation, jointing shall be made at a break, opening, or other natural division of the surface. Edges to be joined shall be dampened slightly to produce a smooth confluence. Exterior corners of stucco shall be slightly rounded. Stucco on soffit surfaces shall be pitched forward to form a drip.

3.7.2 Scratch Coat

Scratch coat shall be applied not less than 9 mm 3/8 inch thick under sufficient pressure to form good keys and to completely embed the reinforcement. Before the scratch coat has set, it shall be lightly scratched in one direction and vertical surfaces shall be scratched in the horizontal direction only. The scratch coat shall be fog cured for a minimum of 72 hours.

3.7.3 Brown Coat

The scratch coat shall be dampened evenly to obtain uniform suction before the brown coat is applied. There shall be no visible water on the surface when the brown coat is applied. The brown coat shall be applied to the scratch coat with sufficient pressure to force the stucco into the scratches and shall be brought to a plumb, true, even plane with rod or straightedge. When set sufficiently, the brown coat shall be uniformly floated with a dry float to promote densification of the coat and to provide a surface receptive to bonding of the finish coat. Brown coat shall be fog cured for a minimum of 72 hours.

3.7.4 Finish Coat

Surfaces of the brown coat shall be dampened not more than 1 hour before the finish coat is to be applied to a uniform wetness with no free-standing water on the surface. The finish coat shall have a smooth trowel, float,

trowel-textured, rough-textured, spray-textured or exposed aggregate finish, as required by the Task Order, and shall conform to the approved sample. The finish coat shall be fog cured for a minimum of 48 hours. Care shall be taken to prevent staining.

3.7.5 Surface Tolerance

When a 3 m 10 foot straightedge is placed at any location on the finished surface of the stucco, excluding rough-textured finish, the surface shall not vary more than 3 mm 1/8 inch from the straightedge.

3.8 CURING AND PROTECTION

Fog curing shall be accomplished by applying a fine mist of water to the stucco. Care shall be exercised during fog curing to avoid erosion damage to the stucco surfaces. A solid stream of water shall not be used. Frequency of fogging shall be not less than three times daily. When directed the Contractor shall protect the stucco from the direct rays of the sun during severe drying conditions using canvas, cloth or other approved sheet material.

3.9 PATCHING AND POINTING

Loose, cracked, damaged or defective work shall be replaced or patched as directed. Patching shall match existing work in texture and color and shall be finished flush.

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SECTION 09250
GYPSUM WALLBOARD

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.11	(1992) Interior Installation of Cementitious Backup Units
ANSI A118.9	(1992) Test Methods and Specifications for Cementitious Backer Units

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 580/A 580M	(1998) Stainless Steel Wire
ASTM A 853	(1993) Steel Wire, Carbon, for General Use
ASTM B 164	(1998) Nickel-Copper Alloy Rod, Bar, and Wire
ASTM C 36	(1997) Gypsum Wallboard
ASTM C 79/C 79M	(1997) Treated Core and Nontreated Core Gypsum Sheathing Board
ASTM C 475	(1994) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 514	(1996) Nails for the Application of Gypsum Board
ASTM C 557	(1993a) Adhesive for Fastening Gypsum Wallboard to Wood Framing
ASTM C 630/C 630M	(1996a) Water-Resistant Gypsum Backing Board
ASTM C 645	(1998) Nonstructural Steel Framing Members
ASTM C 754	(1997) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C 840	(1998) Application and Finishing of Gypsum Board

ASTM C 931/C 931M	(1995a) Exterior Gypsum Soffit Board
ASTM C 955	(1998) Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases
ASTM C 960/C 960M	(1997) Predecorated Gypsum Board
ASTM C 1002	(1998) Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases
ASTM C 1047	(1998) Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C 1177/C 1177M	(1996) Glass Mat Gypsum Substrate for Use as Sheathing
ASTM C 1178/C 1178M	(1996) Glass Mat Water-Resistant Gypsum Backing Panel

GYPSUM ASSOCIATION (GA)

GA 216	(1996) Application and Finishing of Gypsum Board
GA 600	(1997) Fire Resistance Design Manual

UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1998) Fire Resistance Directory (2 Vol.)
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1.2 SYSTEM DESCRIPTION

1.2.1 Fire-Rated Construction

Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements or GA requirements, and as required to meet pressurization requirements. Penetrations through rated partitions and ceilings shall be sealed tight in accordance with tested systems. Fire ratings shall be as indicated.

1.2.2 Pressurized Enclosures

Pressurized fire-rated gypsum board enclosures shall allow the mechanical and electrical life-safety systems to operate in accordance with the design intent. Air pressure within elevator shaft shall be 360 Pa. 7.5 psf. Air pressure within stair shaft shall be 240 Pa. 5.0 psf. Maximum mid-span deflection shall be L/360.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-04 Drawings

Steel Framing; GA. Control Joints; GA. Fire-Resistant Assemblies; GA.

Drawings and installation details for ceiling framing, furring, special wall framing, and framed openings in walls and ceilings.

SD-13 Certificates

Gypsum Wallboard; FIO. Water-Resistant Gypsum Board; FIO. Exterior Gypsum Soffit Board; FIO. Steel Framing; FIO. Fire-Rated Gypsum Board; FIO; Cementitious Backer Units; FIO.

Certificates stating that the steel framing and gypsum wallboard meet the specified requirements.

SD-14 Samples

Predecorated Gypsum Board; FIO.

Samples for each color and pattern of predecorated gypsum board. Where colors are not indicated, color selection samples of not less than four of manufacturer's standard colors shall be submitted.

1.4 QUALIFICATIONS

Manufacturer shall specialize in manufacturing the types of material specified and shall have a minimum of 5] years of documented successful experience. Installer shall specialize in the type of gypsum board work required and shall have a minimum of 3 years of documented successful experience.

1.5 DELIVERY, STORAGE AND HANDLING

Materials shall be delivered in original containers bearing the name of manufacturer, contents, and brand name. Materials shall be stored off the ground in a weathertight structure for protection. Gypsum boards shall be stacked flat, off floor and supported to prevent sagging and warpage. Adhesives and joint materials shall be stored in accordance with manufacturer's printed instructions. Damaged or deteriorated materials shall be removed from jobsite.

1.6 ENVIRONMENTAL CONDITIONS

Environmental conditions for application and finishing of gypsum board shall be in accordance with ASTM C 840. During the application of gypsum board without adhesive, a room temperature of not less than 4 degrees C 40 degrees F shall be maintained. During the application of gypsum board with adhesive, a room temperature of not less than 10 degrees C 50 degrees F shall be maintained for 48 hours prior to application and continuously afterwards until completely dry. Building spaces shall be ventilated to remove water not required for drying joint treatment materials. Drafts shall be avoided during dry hot weather to prevent materials from drying too rapidly.

PART 2 MATERIALS

2.1 NON-LOADBEARING STUD WALLS

2.1.1 Studs

Studs for non-loadbearing walls shall conform to ASTM C 645. Studs shall be C-shaped, roll formed steel with minimum uncoated design thickness of 0.45 mm (0.0179 in) 0.0179 in, 0.72 mm (0.0284 in) 0.0284 in or 0.084 mm (0.0329 in) 0.0329 in, as required by the Task Order, made from G40 hot-dip galvanized coated sheet.

2.1.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 645. Tracks shall be prefabricated, U-shaped with minimum 25 mm 1 inch flanges, unpunched web, thickness to match studs, made from G40 hot-dip galvanized coated sheet.

2.2 LOADBEARING STUD WALLS

2.2.1 Studs

Studs for loadbearing walls shall conform to ASTM C 955. Studs shall be C-shaped roll formed steel made from minimum G60 hot-dip galvanized coated sheet. Stud sizes and base metal design thickness shall be as shown.

2.2.2 Runner Tracks

Floor and ceiling runner tracks shall conform to ASTM C 955. Runners shall be prefabricated, U-shaped with minimum 19 mm 3/4 inch flanges, unpunched web, thickness to match studs, made from G60 hot-dip galvanized coated sheet.

2.2.3 Bridging

Bridging for loadbearing walls shall conform to ASTM C 955. Bridging shall be minimum 19 x 19 mm 3/4 x 3/4 inch cold-rolled steel channel with weld attachment clips at each stud or V-bar type weld or screw attached to each stud flange. Bridging shall be adequate to provide lateral support for the stud.

2.3 SUSPENDED CEILING FRAMING

Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown.

The suspension system shall have a maximum deflection of L/240. Carrying channels shall be formed from minimum 1.40 mm 0.0548 in thick cold-rolled steel, 38 x 19 mm. 1-1/2 x 3/4 inch. Furring members shall be formed from cold-rolled steel, 22 x 65 mm. 7/8 x 2-9/16 inch. Carrying channels and furring members shall be made from hot-dip galvanized coated sheet.

2.4 GYPSUM BOARD

Gypsum board shall have square-cut ends, tapered or beveled edges and shall be maximum possible length. Gypsum board thickness shall be as shown.

2.4.1 Standard Gypsum Board

Regular gypsum board shall conform to ASTM C 36, and shall be 1200 mm 48 inches wide.

2.4.2 Fire-Rated Gypsum Board

Fire-rated gypsum board shall conform to ASTM C 36, and shall be Type X or Type C as required, 1200 mm 48 inches wide.

2.4.3 Water-Resistant Gypsum Board

Water-resistant gypsum board shall conform to ASTM C 630/C 630M, regular or Type X, as required by the Task Order, with water-resistant paper faces, paintable surfaces, and shall be 1200 mm 48 inch width and maximum permissible length.

2.4.4 Foil-Backed Gypsum Board

Foil-backed gypsum board shall conform to ASTM C 36, regular or Type X, as required by the Task Order, 1200 mm 48 inches wide. Gypsum board shall have aluminum foil vapor retarder laminated to back surface.

2.4.5 Predecorated Gypsum Board

Predecorated gypsum board shall conform to ASTM C 960/C 960M, 1200 mm 48 inches wide, Class 1 with wallcovering applied in factory or Class II with decorative pattern applied in factory as required by the Task Order. Color shall be as required by the Task Order.

2.4.6 Shaftwall Liner Panel

Shaftwall liner panel shall conform to UL listing. Liner Panel shall be specifically manufactured for cavity shaftwall system, with water-resistant paper faces, bevel edges, single lengths to fit required conditions, 25.4 or 19.05 mm 1 or 3/4 inch thick, as required by the Task Order, by 600 mm 24 inches wide.

2.4.7 Exterior Gypsum Soffit Board

Exterior gypsum soffit board shall conform to ASTM C 931/C 931M, regular or Type X, as required by the Task Order, 1200 mm 48 inches wide.

2.4.8 Exterior Sheathing Board

Exterior sheathing board shall conform to ASTM C 79/C 79M, Type X, shall have water-resistant core, water-repellant paper faces each side, with tongue-and-groove edges, and be 600 mm 24 inches wide, or square edges and 1200 mm 48 inches wide.

Glass mat gypsum sheathing shall conform to ASTM C 1177/C 1177M, shall have a water-resistant core with water and mold/mildew resistant fiberglass faces embedded into the core and shall have square edges 1200 mm 48 inches wide by 12.7 mm 1/2 inch or 15.8 mm 5/8 inch thick as required by the Task Order.

2.4.9 Water-Resistant Gypsum Backing Panel

Glass mat water-resistant gypsum backing panels shall conform to ASTM C 1178/C 1178M, shall have a water-resistant core with water and mold/mildew resistant fiberglass faces embedded into the core and shall have square edges 1200 mm 48 inches wide by 12.7 mm 1/2 inch or 15.8 mm 5/8 inch thick as required by the Task Order.

2.5 TRIM, MOLDINGS, AND ACCESSORIES

2.5.1 Taping and Embedding Compound

Taping and embedding compound shall conform to ASTM C 475. Compound shall be specifically formulated and manufactured for use in embedding tape at gypsum wallboard joints and fastener heads, and shall be compatible with tape and substrate.

2.5.2 Finishing or Topping Compound

Finishing or topping compound shall conform to ASTM C 475. Compound shall be specifically formulated and manufactured for use as a finishing compound for gypsum board.

2.5.3 All-Purpose Compound

All-purpose compound shall be specifically formulated and manufactured to use as a taping and finishing compound, and shall be compatible with tape and substrate.

2.5.4 Joint Tape

Joint tape shall conform to ASTM C 475 and shall be as recommended by gypsum board manufacturer.

2.5.5 Trim, Control Joints, Beads, Stops and Nosings

Items used to protect edges, corners, and to provide architectural features shall be in accordance with ASTM C 1047.

2.6 FASTENINGS AND ADHESIVES

2.6.1 Nails

Nails shall conform to ASTM C 514. Nails shall be hard-drawn low or medium-low carbon steel, suitable for intended use. Special nails for predecorated gypsum board shall be as recommended by predecorated gypsum board manufacturer.

2.6.2 Screws

Screws shall conform to ASTM C 1002. Screws shall be self-drilling and self-tapping steel, Type G for gypsum board to gypsum board, Type S for wood or light-gauge steel framing and Type W for wood framing.

2.6.3 Adhesives

Adhesives shall conform to ASTM C 557. Adhesives shall be formulated to bond gypsum board to wood framing members. For securing gypsum board to metal framing, adhesive shall be as recommended by gypsum board manufacturer.

2.6.4 Hangers

Suspended ceiling runner channel hangers shall be soft, annealed steel wire not less than No. 8 SWG, conforming to ASTM A 853 or flat iron or steel straps, at least 2 x 22 mm 3/32 x 7/8 inch size, coated with zinc, cadmium, or rust-inhibiting paint as required by the Task Order.

2.6.5 Wire and Clip Type Fastenings

Tie wire, clips, rings, and other fastenings shall be corrosion-resisting steel conforming to ASTM A 580/A 580M, composition 302, 304, or 316, Condition A, or nickel-copper alloy conforming to ASTM B 164, annealed condition except that walls, partitions, and other vertical surfaces not incorporated in ceiling construction may be erected with soft, annealed steel conforming to ASTM A 853.

2.6.5.1 Tie Wire

Tie wire for constructing partitions and vertical furring, for securing metal lath to supports, and for lacing shall be not less than No. 18 SWG. Tie wire for other applications shall be not less than No. 16 SWG.

2.6.5.2 Clips

Clips used in lieu of tie wire for securing the furring channels to the runner channels in ceiling construction shall be made from strip not less than 3 mm 1/8 inch thick or shall be hairpin clip, formed of wire not less than 0.4 mm 0.01620 inch nominal diameter. Other clips and rings or fastenings of similar materials shall be equivalent in holding power to that provided by tie wire for the specific application.

2.7 CEMENTITIOUS BACKER UNITS

Cementitious backer units shall comply with ANSI A118.9.

PART 3 EXECUTION

3.1 INTERIOR WALL FRAMING

Steel framing and furring members shall be installed in accordance with ASTM C 754. Members shall be in alignment with spacings not to exceed the maximum spacings indicated on drawings. Runners shall be aligned accurately at the floor and ceiling and securely anchored.

3.1.1 Wall Openings

The framing system shall provide for the installation and anchorage of the required subframes or finish frames for wall openings at doors, pass-through openings, and access panels. Partitions abutting continuous suspended ceilings shall be strengthened for rigidity at rough openings of more than 750 mm 30 inches wide. Studs at openings shall be 0.84 mm (0.0329 in) 0.0329 in minimum bare metal thickness and spot grouted at jamb anchor inserts. Double studs shall be fastened together with screws and secured to floor and overhead runners. Two studs shall be used for framing solid-core doors, doors over 900 mm 36 inches wide and extra-heavy doors such as X-ray room doors.

3.1.2 Wall Control Joints

Control joints for expansion and contraction in the walls shall be constructed with double studs installed 13 mm 1/2 inch apart in interior walls or wall furrings where indicated on drawings. Control joint spacing shall not exceed 9 m. 30 feet. Ceiling-height door frames may be used as vertical control joints. Door frames of less than ceiling height may be used as control joints only if standard control joints extend to ceiling

from both corners of top of door frame. Control joints between studs shall be filled with firesafing insulation in fire rated partitions.

3.1.3 Blocking

Blocking shall be provided as necessary for mounted equipment. Blocking shall be metal or wood and shall be cut to fit between framing members. Blocking shall be rigidly anchored to the framing members. Under no circumstances will accessories or other wall mounted equipment be anchored directly to gypsum wallboard.

3.2 SHAFT WALL FRAMING

The shaft wall system shall be installed in accordance with the system manufacturer's published instructions. Bucks, anchors, blocking and other items placed in or behind shaft wall framing shall be coordinated with electrical and mechanical work. Fireproofing materials which are damaged or removed during shaft wall construction shall be patched or replaced.

3.3 SUSPENDED CEILING FRAMING

Suspended ceiling system framing shall be installed in accordance with ASTM C 754.

3.3.1 Hangers

Hangers shall be spaced not more than 1200 mm 48 inches along runner channels and 900 mm 36 inches in the other direction or 1050 mm 42 inches in both directions unless otherwise indicated. Locations of hanger wires shall be coordinated with other work. Hangers at ends of runner channels shall be located not more than 150 mm 6 inches from wall. Hanger wire shall be looped around bottom chord of open-web steel joists, or secured to structural elements with suitable fasteners. Sags or twists which develop in the suspended system shall be adjusted. Damaged or faulty parts shall be replaced.

3.3.2 Main Runners

Main runner channels shall be installed in accordance with ASTM C 754. Hanger wires shall be double strand saddle-tied to runner channels and the ends of hanger wire shall be twisted three times around itself. Main runners shall be located to within 150 mm 6 inches of the paralleling wall to support the ends of cross furring. Main runners shall not come in contact with abutting masonry or concrete walls. Where main runners are spliced, ends shall be overlapped 300 mm 12 inches with flanges of channels interlocked, and shall be securely tied at each end of splice with wire looped twice around the channels.

3.3.3 Furring Channels

Furring channels shall be spaced in accordance with ASTM C 754. Furring channels shall be secured to the runner channels and to structural supports at each crossing with tie wire, hairpin clips, or equivalent fastenings. Furring channels shall be located within 50 mm 2 inches of parallel walls and beams, and shall be cut 13 mm 1/2 inch short of abutting walls.

3.3.4 Ceiling Openings

Support members shall be provided as required at ceiling openings for

access panels, recessed light fixtures, and air supply or exhaust. Support members shall be not less than 38 mm 1-1/2 inch main runner channels and vertically installed suspension wires or straps shall be located to provide at least the minimum support specified herein for furring and wallboard attachment. Intermediate structural members not a part of the structural system, shall be provided for attachment or suspension of support members.

3.3.5 Light Fixtures and Air Diffusers

Light fixtures and air diffusers shall be supported directly from suspended ceiling runners. Wires shall be provided at appropriate locations to carry the weight of recessed or surface mounted light fixtures and air diffusers.

3.3.6 Control Joints

Ceiling control joints for expansion and contraction shall be located where indicated on drawings. A control joint or intermediate blocking shall be installed where ceiling framing members change direction.

3.3.6.1 Interior Ceilings With Perimeter Relief

Control joints shall be installed so that linear dimensions between control joints shall not exceed 15 m 50 feet in either direction nor more than 230 square meters. 2500 square feet.

3.3.6.2 Interior Ceilings Without Perimeter Relief

Control joints shall be installed so that linear dimensions between control joints shall not exceed 9 m 30 feet in either direction nor more than 84 square meters. 900 square feet.

3.3.6.3 Exterior Ceilings

Control joints shall be installed so the linear dimensions between control joints shall not exceed 9 m 30 feet in either direction nor more than 84 square meters. 900 square feet.

3.4 APPLICATION OF GYPSUM BOARD

Gypsum board shall be installed in accordance with ASTM C 840 and GA 216 and as specified. Paragraph 17.3.1 GENERAL of ASTM C 840 which permits usage of water resistant gypsum board as a base for adhesive application of ceramic or plastic tile on ceilings, does not apply. Edges and ends of gypsum boards shall be cut to obtain neat fitting joints. End joints of adjoining boards shall be staggered, and shall be staggered on opposite sides of wall. Boards shall be applied with moderate contact without forcing in place. Holes for pipes, fixtures or other small openings shall be cut with a tool which will provide a neat fit. Screws shall be driven so that the heads are slightly below the plane of paper face. Fracturing the paper face or damaging the core shall be avoided. Trim shall be installed at external and internal angles formed by the intersecting gypsum board surfaces with other surfaces. Corner beads shall be installed to vertical and horizontal corners in accordance with manufacturer's published instructions.

3.4.1 Two-Ply Gypsum Board

Second layer of gypsum board shall be applied perpendicular to first layer with joints staggered and secured with mechanical fasteners or adhesive as

required by the Task Order. The use of adhesive shall be in accordance with ASTM C 840.

3.4.2 Foil-Backed Gypsum Board

Foil-backed gypsum board shall be placed with reflective surface against framing members.

3.4.3 Water-Resistant Gypsum Board

Water-resistant gypsum board shall be installed at the locations indicated.

3.4.4 Adhesively-Applied Gypsum Board

Walls scheduled to receive adhesively-applied gypsum board shall be dry, free of dust, oil, or form release agents, protrusions or voids, or foreign matter that would affect a proper bond.

3.4.5 Exterior Gypsum Sheathing

Exterior gypsum sheathing and glass mat gypsum sheathing shall be flashed at openings so that water intrusion will not contact the sheathing. Vertical end and edge joints shall abut over the centers of framing members and shall be offset a minimum of one framing space between adjacent rows of gypsum sheathing. Sheathing shall be installed in accordance with manufacturer's instructions.

3.5 TRIM, MOLDINGS, AND ACCESSORIES INSTALLATION

Trim, moldings and accessories shall be installed in accordance with GA 216.

3.6 TAPING AND FINISHING

Gypsum board taping and finishing shall be performed in accordance with ASTM C 840. Boards shall be kept free of dirt, oil and other foreign matter that could cause a lack of bond. Screw heads, dents, gouges, and cut-outs shall be filled with joint compound and sanded. Accessories at exposed joints, edges, corners, openings, and similar locations shall be taped, floated with joint compound, and sanded to produce surfaces ready for gypsum board finishes.

3.7 APPLICATION OF CEMENTITIOUS BACKER UNITS

Cementitious backer units shall be installed in accordance with ANSI A108.11. Fasteners shall be the type designed for cement board application.

3.8 FIRE-RESISTANT ASSEMBLIES

Gypsum wallboard construction for fire-rated assemblies shall be in accordance with UL Fire Resist Dir, or GA 600 for the design number indicated on drawings.

3.9 PATCHING

Surface defects and damage shall be corrected as required to leave gypsum board smooth, uniform in appearance, and ready to receive finish as specified.

-- End of Section --

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DIVISION 09 - FINISHES

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SECTION 09310

CERAMIC TILE

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.1A	(1992) Installation of Ceramic Tile in the Wet-Set Method, with Portland Cement Mortar
ANSI A108.1B	(1992) Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex Portland Cement Mortar
ANSI A108.4	(1992) Installation of Ceramic Tile with Organic Adhesives or Water Cleanable Tile Setting Epoxy Adhesive
ANSI A108.5	(1992) Installation of Ceramic Tile with Dry-Set Portland Cement Mortar or Latex-Portland Cement Mortar
ANSI A108.6	(1992) Installation of Ceramic Tile with Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy
ANSI A108.7	(1992) Electrically Conductive Ceramic Tile Installed with Conductive Dry-Set Portland Cement Mortar
ANSI A108.8	(1992) Installation of Ceramic Tile with Chemical Resistant Furan Mortar and Grout
ANSI A108.10	(1992) Installation of Grout in Tilework
ANSI A118.1	(1992) Dry-Set Portland Cement Mortar
ANSI A118.2	(1992) Conductive Dry-Set Portland Cement Mortar
ANSI A118.3	(1992) Chemical Resistant, Water Cleanable Tile Setting and Grouting Epoxy and Water Cleanable Tile Setting Epoxy Adhesive
ANSI A118.4	(1992) Latex-Portland Cement Mortar

ANSI A118.5	(1992) Chemical Resistant Furan Mortars and Grouts for Tile
ANSI A118.6	(1992) Ceramic Tile Grouts
ANSI A136.1	(1992) Organic Adhesives for Installation of Ceramic Tile
ANSI A137.1	(1988) Ceramic Tile

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM A 185	(1997) Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
ASTM C 33	(1997) Concrete Aggregates
ASTM C 144	(1997) Aggregate for Masonry Mortar
ASTM C 150	(1997) Portland Cement
ASTM C 206	(1984; R 1997) Finishing Hydrated Lime
ASTM C 207	(1991; R 1997) Hydrated Lime for Masonry Purposes
ASTM C 241	(1990) Abrasion Resistance of Stone Subjected to Foot Traffic
ASTM C 373	(1988; R 1994) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
ASTM C 648	(1984; R 1994) Breaking Strength of Ceramic Tile
ASTM C 847	(1995) Metal Lath
ASTM C 1026	(1987; R 1996) Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling
ASTM C 1027	(1984; R 1990) Determining Visible Abrasion Resistance of Glazed Ceramic Tile
ASTM C 1028	(1996) Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method

MARBLE INSTITUTE OF AMERICA (MIA)

MIA Design Manual	(1991) Design Manual IV Dimensional Stone
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NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 99	(1999) Health Care Facilities
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TILE COUNCIL OF AMERICA (TCA)

TCA Hdbk

(1997) Handbook for Ceramic Tile
Installation

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Tile; GA. Setting-Bed; GA. Mortar, Grout, and Adhesive; GA.

Manufacturer's catalog data.

SD-06 Instructions

Tile; FIO. Mortar and Grout; FIO.

Manufacturers preprinted installation and cleaning instructions.

SD-09 Reports

Testing; FIO.

Copy of results for electrical resistance tests.

SD-13 Certificates

Tile; FIO. Mortar, Grout, and Adhesive; FIO.

Certificates indicating conformance with specified requirements. A master grade certificate shall be furnished for tile.

SD-14 Samples

Tile; FIO. Accessories; FIO. Marble Thresholds; FIO.

Samples of sufficient size to show color range, pattern, type and joints.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Materials shall be kept dry, protected from weather, and stored under cover in accordance with manufacturer's instructions.

1.4 ENVIRONMENTAL REQUIREMENTS

Ceramic tile work shall not be performed unless the substrate and ambient temperature is at least 10 degrees C 50 degrees F and rising. Temperature shall be maintained above 10 degrees C 50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used they shall be vented to the outside to avoid carbon dioxide damage to new tilework.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a 1-year period shall be provided.

PART 2 PRODUCTS

2.1 TILE

Tile shall be standard grade conforming to ANSI A137.1. Containers shall be grade sealed. Seals shall be marked to correspond with the marks on the signed master grade certificate. Tile shall be impact resistant with a minimum breaking strength for wall tile of 41 kg 90 lbs and 113 kg 250 lbs for floor tile in accordance with ASTM C 648. Tile for cold climate projects shall be rated frost resistant by the manufacturer as determined by ASTM C 1026. Water absorption shall be 0.50 maximum percent in accordance with ASTM C 373. Floor tile shall have a minimum coefficient of friction of 0.50 or 0.60 wet and dry, as required by the Task Order, in accordance with ASTM C 1028. Floor tile shall be Class III-Medium Heavy, IV-Heavy or IV Plus-Extra Heavy Traffic, as required by the Task Order, durability classification as rated by the manufacturer when tested in accordance with ASTM C 1027 for abrasion resistance as related to foot traffic.

2.1.1 Mosaic Tile

Ceramic mosaic tile and trim shall be unglazed natural clay or conductive, as required by the Task Order, with cushion edges or porcelain unpolished or polished, as required by the Task Order, with sharply formed face as required by the Task Order. Tile size shall be 25 x 25 mm 1 x 1 inch, 25 x 50 mm 1 x 2 inches, 50 x 50 mm 2 x 2 inches or a mixture of standard sizes in a stock pattern as required by the Task Order. Color shall be as required by the Task Order.

2.1.2 Quarry Tile

Quarry tile and trim shall be unglazed with smooth surface or abrasive surface as required by the Task Order. Tile shall be 150 x 150 x 13 mm 6 x 6 x 1/2 inch. Color shall be as required by the Task Order.

2.1.3 Detectable Warning Tile

Detectable warning tile shall be unglazed with raised truncated domes with a diameter of nominal 23 mm 0.9 inch at a height of nominal 5 mm 0.2 inch and a center-to-center spacing of nominal 60 mm 2.35 inches and shall contrast visually with adjoining surfaces. Tile shall be 150 x 150 x 13 mm 6 x 6 x 1/2 inch. Color shall be as required by the Task Order.

2.1.4 Glazed Wall Tile

Glazed wall tile and trim shall be cushion edged with bright or matte glaze as required by the Task Order. Tile shall be 106 x 106, 106 x 150 or 150 x 150 mm. 4-1/4 x 4-1/4, 4-1/4 x 6 or 6 x 6 inches. Color shall be as required by the Task Order.

2.1.5 Accessories

Accessories shall be the built-in type of the same materials and finish as the wall tile.

2.2 SETTING-BED

The setting-bed shall be composed of the following:

2.2.1 Aggregate for Concrete Fill

Aggregate shall conform to ASTM C 33. Maximum size of coarse aggregate shall not be greater than one-half the thickness of concrete fill.

2.2.2 Portland Cement

Cement shall conform to ASTM C 150, Type I, white for wall mortar and gray for other uses.

2.2.3 Sand

Sand shall conform to ASTM C 144.

2.2.4 Hydrated Lime

Hydrated lime shall conform to ASTM C 206, Type S or ASTM C 207, Type S.

2.2.5 Metal Lath

Metal lath shall be flat expanded type conforming to ASTM C 847, and weighing not less than 1.4 kg/square meter. 2.5 pounds per square yard.

2.2.6 Reinforcing Wire Fabric

Wire fabric shall conform to ASTM A 185. Wire shall be either 50 x 50 mm 2 x 2 inch mesh, 16/16 wire or 38 x 50 mm 1-1/2 x 2 inch mesh, 16/13 wire.

2.3 WATER

Water shall be potable.

2.4 MORTAR, GROUT, AND ADHESIVE

Mortar, grout, and adhesive shall conform to the following:

2.4.1 Dry-Set Portland Cement Mortar

ANSI A118.1.

2.4.2 Conductive Dry-Set Mortar

ANSI A118.2.

2.4.3 Latex-Portland Cement Mortar

ANSI A118.4.

2.4.4 Ceramic Tile Grout

ANSI A118.6; sand portland cement grout, dry-set grout, latex-portland cement grout, commercial portland cement grout or silicone rubber grout as required by the Task Order.

2.4.5 Organic Adhesive

ANSI A136.1, Type I.

2.4.6 Epoxy Resin Grout

ANSI A118.3.

2.4.7 Furan Resin Grout

ANSI A118.5 and consist of an intimate mixture of furfuryl-alcohol resin with carbon filler and catalyst.

2.5 MARBLE THRESHOLDS

Marble thresholds shall be of size required by drawings or conditions. Marble shall be Group A as classified by MIA Design Manual. Marble shall have a fine sand-rubbed finish and shall be white, pink or gray in color as approved by the Contracting Officer. Marble abrasion shall be not less than 12.0 when tested in accordance with ASTM C 241.

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

Surface to receive tile shall be inspected and shall conform to the requirements of ANSI A108.1A or ANSI A108.1B for surface conditions for the type setting bed specified and for workmanship. Variations of surface to be tiled shall fall within maximum values shown below:

TYPE	WALLS	FLOORS
Dry-Set Mortar	3 mm in 2.4 meters	3.0 mm in 3 meters
Organic Adhesives	3 mm in 2.4 meters	1.5 mm in 1 meters
Latex portland cement mortar	3 mm in 2.4 meters	3.0 mm in 3 meters
Epoxy	3 mm in 2.4 meters	3.0 mm in 3 meters

TYPE	WALLS	FLOORS
Dry-Set Mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Organic Adhesives	1/8 inch in 8 ft.	1/16 inch in 3 ft.
Latex portland cement mortar	1/8 inch in 8 ft.	1/8 inch in 10 ft.
Epoxy	1/8 inch in 8 ft.	1/8 inch in 10 ft.

3.2 GENERAL INSTALLATION REQUIREMENTS

Tile work shall not be started until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Floor tile installation shall not be started in spaces requiring wall tile until after wall tile has been installed. Tile in colors and patterns indicated shall be applied in the area shown on the drawings. Tile shall be installed with the respective surfaces in true even planes to the elevations and grades shown. Special shapes shall be provided as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Tile bases and coves shall be solidly backed with mortar.

3.3 INSTALLATION OF WALL TILE

Wall tile shall be installed in accordance with the TCA Hdbk, method as required by the Task Order.

3.3.1 Workable or Cured Mortar Bed

Tile shall be installed over a workable mortar bed or a cured mortar bed at the option of the Contractor. A 0.102 mm 4 mil polyethylene membrane, metal lath, and scratch coat shall also be installed. Workable mortar bed, materials, and installation of tile shall conform to ANSI A108.1A. Cured mortar bed and materials shall conform to ANSI A108.1B.

3.3.2 Dry-Set Mortar and Latex-Portland Cement Mortar

Dry-set or Latex-portland cement shall be used to install tile in accordance with ANSI A108.5. Latex portland cement shall be used when installing porcelain ceramic tile.

3.3.3 Organic Adhesive

Organic adhesive installation of ceramic tile shall conform to ANSI A108.4.

3.3.4 Furan Mortar and Grout

Furan mortar and grout installation shall conform to ANSI A108.8.

3.4 INSTALLATION OF FLOOR TILE

Floor tile shall be installed in accordance with TCA Hdbk, method as required by the Task Order. Shower receptors shall be installed in accordance with TCA Hdbk, method B414 or B415 as required by the Task Order.

3.4.1 Workable or Cured Mortar Bed

Floor tile shall be installed over a workable mortar bed or a cured mortar bed at the option of the Contractor. Workable mortar bed materials and installation shall conform to ANSI A108.1A. Cured mortar bed and materials shall conform to ANSI A108.1B. Joints between quarry tile shall be between 6.35 mm (1/4 inch) 1/4 inch and 9.53 mm (3/8 inch) 3/8 inch in width and shall be uniform in width.

3.4.2 Dry-Set and Latex-Portland Cement

Dry-set or Latex-portland cement mortar shall be used to install tile directly over properly cured, plane, clean concrete slabs in accordance with ANSI A108.5. Latex portland cement shall be used when installing porcelain ceramic tile.

3.4.3 Resinous Grout

When resinous grout is indicated, quarry tile shall be grouted with either furan or epoxy resin grout. Joints shall be raked and cleaned to the full depth of the tile and neutralized when recommended by the resin manufacturer. Epoxy resin grout shall be installed in conformance with ANSI A108.6. Furan resin grout shall be installed in accordance with manufacturer's instructions. Tile installed with furan resin shall be coated with wax by the tile manufacturer. Installation of resin grout shall be in strict accordance with manufacturer's instructions for proportioning, mixing, installing, and curing. Recommended temperature shall be maintained in the area and on the surface to be grouted. After

grouting, tile shall be left free of grout stain.

3.4.4 Ceramic Tile Grout

Ceramic Tile grout shall be prepared and installed in accordance with ANSI A108.10.

3.4.5 Concrete Fill

Concrete fill shall be 24.1 MPa 3500 psi concrete, mixed to as dry a consistency as practicable composed by volume of 1 part portland cement to 3 parts fine aggregate to 4 parts coarse aggregate, and mixed with water to as dry a consistency as practicable as required by the Task Order. The fill shall be spread, tamped, and screeded to a true plane, and pitched to drains or leveled as shown. Concrete fill shall be thoroughly damp cured before application of setting-bed material. Concrete fill shall be reinforced with one layer of reinforcement, with the uncut edges lapped the width of one mesh and the cut ends and edges lapped not less than 50 mm. 2 inches. Laps shall be tied together with 1.3 mm (18 gauge) 18 gauge wire every 250 mm 10 inches along the finished edges and every 150 mm 6 inches along the cut ends and edges. The reinforcement shall be supported and secured in the centers of concrete fills. The mesh shall be continuous; except where expansion joints occur, mesh shall be cut and discontinued across such joints. Reinforced concrete fill shall be provided under the setting-bed where the distance between the under-floor surface and the finished tile floor surface is 50 mm 2 inches or greater, and shall be of such thickness that the mortar setting-bed over the concrete fill shall be not less nor more than the thickness required in the specified TCA Hdbk methods.

3.5 INSTALLATION OF CONDUCTIVE FLOORING

Conductive ceramic mosaic tile floors shall be installed in accordance with ANSI A108.7.

3.6 INSTALLATION OF MARBLE THRESHOLDS

Thresholds shall be installed where indicated in a manner similar to that of the ceramic tile floor. Thresholds shall be the full width of the opening. Head joints at ends shall not exceed 6 mm 1/4 inch in width and shall be grouted full as specified for ceramic tile.

3.7 TESTING

Electrical resistance tests shall be performed on conductive flooring in the presence of the Contracting Officer by a technician experienced in such work and a copy of the test results shall be furnished. Test procedures, testing apparatus, and test results shall be in accordance with the provisions for Conductive Flooring in NFPA 99.

3.8 EXPANSION JOINTS

Joints shall be formed as indicated and sealed as specified in Section 07900 JOINT SEALING.

3.8.1 Walls

Expansion joints shall be provided at control joints in backing material. Wherever backing material changes, an expansion joint shall be installed to

separate the different materials.

3.8.2 Floors

Expansion joints shall be provided over construction joints, control joints, and expansion joints in concrete slabs. Expansion joints shall be provided where tile abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 7.2 to 10.8 m 24 to 36 feet each way in large interior floor areas and 3.6 to 4.8 m 12 to 16 feet each way in large exterior areas or areas exposed to direct sunlight or moisture. Expansion joints shall extend through setting-beds and fill.

3.9 CLEANING AND PROTECTING

Upon completion, tile surfaces shall be thoroughly cleaned in accordance with manufacturer's approved cleaning instructions. Acid shall not be used for cleaning glazed tile. Floor tile with resinous grout or with factory mixed grout shall be cleaned in accordance with instructions of the grout manufacturer. After the grout has set, tile wall surfaces shall be given a protective coat of a noncorrosive soap or other approved method of protection. Tiled floor areas shall be covered with building paper before foot traffic is permitted over the finished tile floors. Board walkways shall be laid on tiled floors that are to be continuously used as passageways by workmen. Damaged or defective tiles shall be replaced.

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SECTION 09510

ACOUSTICAL CEILINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 635	(1995) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C 636	(1996) Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM E 119	(1995a) Fire Tests of Building Construction and Materials
ASTM E 580	(1996) Application of Ceiling Suspension Systems for Acoustical Tile and Lay In Panels in Areas Requiring Seismic Restraint
ASTM E 1264	(1990) Standard Classification for Acoustical Ceiling Products
ASTM E 1414	(1991a) Standard Test for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

COE TECHNICAL INSTRUCTIONS (TI)

TI 809-04	(1998) Seismic Design for Buildings
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UNDERWRITERS LABORATORIES (UL)

UL Fire Resist Dir	(1997) Fire Resistance Directory (2 Vol)
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1.2 GENERAL REQUIREMENTS

Acoustical treatment shall consist of sound controlling units mechanically mounted on a ceiling suspension system. The unit size, texture, finish, and color shall be as specified. The Contractor has the option to substitute inch-pound (I-P) Recessed Light Fixtures (RLF) for metric RLF. If the Contractor opts to furnish I-P RLF, other ceiling elements like acoustical ceiling tiles, air diffusers, air registers and grills, shall also be I-P products. The Contractor shall coordinate the whole ceiling system with other details, like the location of access panels and ceiling

penetrations, etc., shown on the drawings. If I-P products are used, the Contractor shall be responsible for all associated labor and materials and for the final assembly and performance of the specified work and products. The location and extent of acoustical treatment shall be as shown on the drawings. Reclamation of mineral fiber acoustical ceiling panels to be removed from the job site shall be in accordance with paragraph RECLAMATION PROCEDURES.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Acoustical Ceiling System; GA.

Manufacturer's descriptive data, catalog cuts, and installation instructions. Submittals which do not provide adequate data for the product evaluation will be rejected.

SD-04 Drawings

Acoustical Ceiling System; FIO.

Drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

SD-09 Reports

Fire Resistive Ceilings; FIO. Ceiling Attenuation Class and Test; FIO.

Reports by an independent testing laboratory attesting that acoustical ceiling systems meet specified fire endurance and/or sound transmission requirements. Data attesting to conformance of the proposed system to Underwriters Laboratories requirements for the fire endurance rating listed in UL Fire Resist Dir may be submitted in lieu of test reports.

SD-13 Certificates

Acoustical Units; FIO.

Certificate attesting that the mineral based acoustical units furnished for the project contains recycled material and showing an estimated percent of such material.

SD-14 Samples

Acoustical Units; FIO.

Two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Materials

shall be carefully handled and stored in dry, watertight enclosures. Immediately before installation, acoustical units shall be stored for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation.

1.5 ENVIRONMENTAL REQUIREMENTS

A uniform temperature of not less than 16 degrees C 60 degrees F nor more than 29 degrees C 85 degrees F and a relative humidity of not more than 70 percent shall be maintained before, during, and after installation of acoustical units.

1.6 SCHEDULING

Interior finish work such as plastering, concrete and terrazzo work shall be complete and dry before installation. Mechanical, electrical, and other work above the ceiling line shall be completed and heating, ventilating, and air conditioning systems shall be installed and operating in order to maintain temperature and humidity requirements.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided. Standard performance guarantee or warranty shall contain an agreement to repair or replace acoustical panels that fail within the warranty period. Failures include, but are not limited to, sagging and warping of panels; rusting and manufacturers defects of grid system.

1.8 EXTRA MATERIALS

Spare tiles of each color shall be furnished at the rate of 5 tiles for each 1000 tiles installed. Tiles shall be from the same lot as those installed.

PART 2 PRODUCTS

2.1 ACOUSTICAL UNITS

Acoustical units shall conform to ASTM E 1264, Class A, and the following requirements:

2.1.1 Units for Exposed-Grid System

Type: III (mineral fiber with painted finish), IV (mineral fiber with membrane-faced overlay), IX (mineral fiber with scrubbable finish), XI (mineral fiber with fabric faced overlay) or XII (fiberglass base with membrane-faced overlay) as required by the Task Order. Type III, IV, IX and XI acoustical units, as required by the Task Order, shall have a minimum recycled material content of 18 percent.

Minimum NRC: 0.55 when tested on mounting No. E-400

Pattern: as required by the Task Order.

Nominal size: 600 by 1200 mm. 24 by 48 inches.

Edge detail: Trimmed and butt.

Finish: Factory-applied standard finish or color finish as required by the Task Order.

Minimum LR coefficient: 0.70.

Minimum CAC: 40.

2.1.2 Units for Concealed-Grid System

Type: III (mineral fiber with painted finish), IV (mineral fiber with membrane-faced overlay) or IX (mineral fiber with scrubbable finish) as required by the Task Order. Acoustical units shall have a minimum recycled material content of 18 percent.

Minimum NRC: 0.55 when tested on mounting No. E-400.

Pattern: as required by the Task Order.

Nominal size: 300 by 300 mm. 12 by 12 inches.

Edge detail: beveled or square as required by the Task Order.

Joint detail: kerfed and rabbeted or tongue and grooved as required by the Task Order.

Finish: Factory-applied standard finish or color finish as required by the Task Order.

Minimum LR coefficient: 0.70.

Minimum CAC: 40.

2.1.3 Metal Pans

Type: V (steel), VI stainless steel or VII (aluminum) perforated pans with acoustical insulation backing as required by the Task Order.

Minimum NRC: 0.55 when tested on mounting No. E-400.

Pattern: as required by the Task Order.

Nominal size: 600 by 600 mm. 24 by 24 inches.

Edge detail: Manufacturer's standard.

Joint detail: Beveled.

Finish: Factory-applied standard finish.

Pads: Completely enclosed, of material and thickness required for acoustical and fire test ratings.

Minimum LR coefficient: 0.70.

2.2 SUSPENSION SYSTEM

Suspension system shall be standard, fire-resistive; exposed-grid, concealed-grid; or standard width flange, narrow width flange or narrow

width slotted flange, and shall conform to ASTM C 635 for intermediate-duty systems or for heavy-duty systems as required by the Task Order. Surfaces exposed to view shall be aluminum or steel with a factory-applied white or color baked-enamel finish, or aluminum with a clear anodized finish, or aluminum with colored factory-applied vinyl paint finish as required by the Task Order. Wall molding shall have a flange of not less than 23 mm 15/16 inch. Inside and outside corner caps or Standard, Overlapped or Mitered corners shall be provided as required by the Task Order. Suspended ceiling framing system shall have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. The suspension system shall have a maximum deflection of 1/360 of span length. Seismic details shall conform to the guidance in TI 809-04 and ASTM E 580.

2.3 HANGERS

Hangers shall be galvanized steel wire. Hangers and attachment shall support a minimum 1330 N 300 pound ultimate vertical load without failure of supporting material or attachment.

2.4 ACCESS PANELS

Access panels shall match adjacent acoustical units and shall be designed and equipped with suitable framing and fastenings for removal and replacement without damage. Panel shall be not less than 300 by 300 mm 12 by 12 inches or more than 300 by 600 mm. 12 by 24 inches. An identification plate of 0.8 mm 0.032 inch thick aluminum, 19 mm 3/4 inch in diameter, stamped with the letters "AP" and finished the same as the unit, shall be attached near one corner on the face of each access panel.

2.5 FIRE RESISTIVE CEILINGS

Acoustical ceiling systems indicated as fire resistant shall be rated for fire endurance as indicated when tested in accordance with ASTM E 119. Suspended ceiling shall have been tested with a specimen roof or floor assembly representative of the indicated construction, including mechanical and electrical work within ceiling space openings for light fixtures, and air outlets, and access panels. Ceiling assembly rating shall be 1, 1-1/2, 2, 3 or 4 hour concealed grid system or exposed grid system as required by the Task Order.

2.6 FINISHES

Acoustical units and suspension system members shall have manufacturer's standard textures, patterns and finishes as specified. Ceiling suspension system components shall be treated to inhibit corrosion.

2.7 COLORS AND PATTERNS

Colors and patterns for acoustical units and suspension system components shall be as required by the Task Order.

2.8 CEILING ATTENUATION CLASS AND TEST

Ceiling attenuation class (CAC) range of acoustical units, when required, shall be determined in accordance with ASTM E 1414. Test ceiling shall be continuous at the partition and shall be assembled in the suspension system in the same manner that the ceiling will be installed on the project. System shall be tested with all acoustical units installed.

PART 3 EXECUTION

3.1 INSTALLATION

Acoustical work shall be provided complete with necessary fastenings, clips, and other accessories required for a complete installation. Mechanical fastenings shall not be exposed in the finished work. Hangers shall be laid out for each individual room or space. Hangers shall be placed to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Main runners and carrying channels shall be kept clear of abutting walls and partitions. At least two main runners shall be provided for each ceiling span. Wherever required to bypass an object with the hanger wires, a subsuspension system shall be installed, so that all hanger wires will be plumb.

3.1.1 Suspension System

Suspension system shall be installed in accordance with ASTM C 636 and as specified herein. There shall be no hanger wires or other loads suspended from underside of steel decking.

3.1.1.1 Plumb Hangers

Hangers shall be plumb and shall not press against insulation covering ducts and pipes.

3.1.1.2 Splayed Hangers

Where hangers must be splayed (sloped or slanted) around obstructions, the resulting horizontal force shall be offset by bracing, countersplaying, or other acceptable means.

3.1.2 Wall Molding

Wall molding shall be provided where ceilings abut vertical surfaces. Wall molding shall be secured not more than 75 mm 3 inches from ends of each length and not more than 400 mm 16 inches on centers between end fastenings. Wall molding springs shall be provided at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Acoustical Units

Acoustical units shall be installed in accordance with the approved installation instructions of the manufacturer. Edges of acoustical units shall be in close contact with metal supports, with each other, and in true alignment. Acoustical units shall be arranged so that units less than one-half width are minimized. Units in exposed-grid system shall be held in place with manufacturer's standard hold-down clips, if units weigh less than 5 kg per square m 1 psf or if required for fire resistance rating.

3.2 CEILING ACCESS PANELS

Ceiling access panels shall be located directly under the items which require access.

3.3 CLEANING

Following installation, dirty or discolored surfaces of acoustical units shall be cleaned and left free from defects. Units that are damaged or

improperly installed shall be removed and new units provided as directed.

3.4 RECLAMATION PROCEDURES

Ceiling tile, designated for recycling by the Contracting Officer, shall be neatly stacked on 1220 by 1220 mm 4 by 4 foot pallets not higher than 1220 mm 4 foot. Panels shall be completely dry. Pallets shall then be shrink wrapped and symmetrically stacked on top of each other without falling over. Disposal shall be in accordance with Section 02220 DEMOLITION.

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SECTION 09650
RESILIENT FLOORING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 2240	(1997) Rubber Property - Durometer Hardness
ASTM D 4078	(1992; R 1996) Water Emulsion Floor Polish
ASTM E 648	(1997) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM E 662	(1995) Specific Optical Density of Smoke Generated by Solid Materials
ASTM F 1066	(1995a) Vinyl Composition Floor Tile
ASTM F 1303	(1997) Sheet Vinyl Floor Covering with Backing
ASTM F 1344	(1993) Rubber Floor Tile
ASTM F 1700	(1996) Solid Vinyl Floor Tile

1.2 FIRE RESISTANCE REQUIREMENTS

Flooring in corridors and exits shall have a minimum average critical radiant flux of 0.22 or 0.45 watts per square centimeter, as required by the Task Order, when tested in accordance with ASTM E 648. The smoke density rating shall be less than 450 when tested in accordance with ASTM E 662.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Resilient Flooring and Accessories; GA.

Manufacturer's descriptive data and installation instructions including cleaning and maintenance instructions.

SD-09 Reports

Resilient Flooring and Accessories; FIO.

Copies of test reports showing that representative product samples of the flooring proposed for use have been tested by an independent testing laboratory within the past three years or when formulation change occurred and conforms to the requirements specified.

SD-14 Samples

Resilient Flooring and Accessories; GA.

Three samples of each indicated color and type of flooring and base. Sample size shall be minimum 60 x 100 mm. 2-1/2 x 4 inches.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the building site in original unopened containers bearing the manufacturer's name, project identification, and handling instructions. Materials shall be stored in a clean dry area with temperature maintained above 21 degrees C 70 degrees F for 2 days prior to installation, and shall be stacked according to manufacturer's recommendations. Materials shall be protected from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances.

1.5 ENVIRONMENTAL REQUIREMENTS

Areas to receive resilient flooring shall be maintained at a temperature above 21 degrees C 70 degrees F and below 38 degrees C 100 degrees F for 2 days before application, during application and 2 days after application. A minimum temperature of 13 degrees C 55 degrees F shall be maintained thereafter.

1.6 SCHEDULING

Resilient flooring application shall be scheduled after the completion of other work which would damage the finished surface of the flooring.

1.7 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

1.8 EXTRA MATERIALS

Extra flooring material of each color and pattern shall be furnished at the rate of 5 tiles for each 1000 tiles and 0.5 m square meters 5 square feet for each 92 square meters 1000 square feet of sheet flooring installed. Extra materials shall be from the same lot as those installed. Extra base material composed of 6 m20 linear feet of each color shall be furnished.

PART 2 PRODUCTS

2.1 VINYL-COMPOSITION TILE

Vinyl-composition tile shall conform to ASTM F 1066, Class 1, (solid color tile), Class 2, (through pattern tile), Composition 1, asbestos-free, and shall be 300 mm 12 inches square and 2.4 mm or 3.2 mm 3/32 or 1/8 inch thick as required by the Task Order. Tile shall have the color and pattern uniformly distributed throughout the thickness of the tile. Flooring in any one continuous area shall be from the same lot and shall have the same shade and pattern.

2.2 SHEET VINYL FLOORING

Sheet vinyl flooring shall be composed of a homogeneous, vinyl composition.

Flooring shall be not less than 1800 mm 72 inches wide. Sheet vinyl flooring with backing shall conform to ASTM F 1303, Type II, Grade 1 (minimum wear layer thickness 1.27 mm 0.050 inches and minimum overall thickness 2.03 mm 0.080 inches or Type I, Grade 1, minimum wear layer thickness 0.51 mm 0.020 inches and minimum overall thickness of 1.65 mm 0.065 inches; or Sheet vinyl flooring without backing shall meet the overall thickness 2.03 mm, 0.080 inches, composition, flexibility, indentation, and the solvent resistance requirements of ASTM F 1303, Type II. The solid vinyl color and pattern shall extend through the total thickness of the material. High quality vinyl welding rods for heat welding of joints shall be provided.

2.3 SOLID VINYL TILE

Solid vinyl tile shall conform to ASTM F 1700 Class I, Type A or B as required by the Task Order. Tile shall be 225, 300, 400 or 450 mm square 9, 12, 16 or 18 inches square by 3 mm 1/8 inch thick as required by the Task Order. Tiles shall be of solid un laminated construction.

2.4 RUBBER FLOORING

2.4.1 Rubber Tile

Rubber tile shall conform to ASTM F 1344 Class 1 homogeneous construction, Type A (solid color) or Type B (through mottled), as required by the Task Order, 300 mm square. 12 inches square as required by the Task Order. Surface shall be smooth, raised, round, square, diamond or minipastille studs with chamfered edges as required by the Task Order. Stud profile shall be high or low as required by the Task Order. Overall thickness shall be 3 mm 1/8 inch thick.

2.4.2 Sheet Rubber Flooring

Sheet rubber shall conform to ASTM F 1344 Class 1 homogeneous construction.

Type A (solid color) or Type B (through mottled), as required by the Task Order, 1 meter 36 inches wide. Surface shall be smooth or embossed as required by the Task Order. Overall thickness shall be 3 mm 1/8 inch thick.

2.5 STAIR TREADS, RISERS, AND STRINGERS

Treads, risers, and stringers shall conform to composition rubber compounded from a mixture of synthetic and reclaimed rubber. Overall thickness at treads shall be not less than 3 mm 1/8 inch. Durometer hardness shall be 90, plus or minus 5, when tested in accordance with ASTM D 2240 or vinyl compounded from virgin polymer or copolymer of vinyl chloride resin, plasticized with phosphate or phthalate esters. Overall thickness shall be not less than 2 mm 3/32 inch as required by the Task

Order. Design shall be either a one piece nosing/tread/riser or a two piece nosing/tread with a matching coved riser. Installation shall include stringer angles on both the wall and banister sides, and landing trim. Surface of treads shall be raised stud, rectangle, diamond or ribbed pattern; smooth or smooth with abrasive non-slip inserts as required by the Task Order.

2.6 RESILIENT BASE

Base shall be manufacturers standard rubber or vinyl, straight style installed with carpet); coved style (installed with resilient flooring) or butt toe cove (installed with 3 mm 1/8 inch thick flooring) as required by the Task Order. Base shall be 100 or 150 mm 4 or 6 inches high and a minimum 3 mm 1/8 inch thick as required by the Task Order. Preformed outside corners shall be furnished.

2.7 INTEGRAL COVED BASE

A vinyl or rubber; or square or round cap strip and vinyl, rubber, or wood fillet strip with a minimum radius of 19 mm 3/4 inch shall be provided for integral coved bases as required by the Task Order.

2.8 FEATURE STRIP

Feature strips shall be vinyl or rubber, 25 mm 1 inch wide, and of thickness to match the flooring as required by the Task Order. Color shall be as required by the Task Order.

2.9 TRANSITION STRIP

A vinyl or rubber transition strip tapered to meet abutting material shall be provided as required by the Task Order.

2.10 ADHESIVE

Adhesive for flooring and wall base shall be as recommended by the flooring manufacturer.

2.11 POLISH

Polish shall conform to ASTM D 4078.

2.12 CAULKING AND SEALANTS

Caulking and sealants shall be in accordance with Section 07900 JOINT SEALING.

2.13 MANUFACTURER'S COLOR AND TEXTURE

Color and texture shall be as required by the Task Order.

PART 3 EXECUTION

3.1 EXAMINATION/VERIFICATION OF CONDITIONS

The Contractor shall examine and verify that site conditions are in agreement with the design package and shall report all conditions that will prevent a proper installation. The Contractor shall not take any corrective action without written permission from the Government.

3.2 SURFACE PREPARATION

Flooring shall be in a smooth, true, level plane, except where indicated as sloped. Before any work under this section is begun, all defects such as rough or scaling concrete, low spots, high spots, and uneven surfaces shall have been corrected, and all damaged portions of concrete slabs shall have been repaired as recommended by the flooring manufacturer. Concrete curing compounds, other than the type that does not adversely affect adhesion, shall be entirely removed from the slabs. Paint, varnish, oils, release agents, sealers, waxers, and adhesives shall be removed, as recommended by the flooring manufacturer.

3.3 MOISTURE TEST

The suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content shall be determined by a moisture test as recommended by the flooring manufacturer.

3.4 INSTALLATION OF VINYL-COMPOSITION TILE AND SOLID VINYL TILE

Tile flooring shall be installed with adhesive in accordance with the manufacturer's installation instructions. Tile lines and joints shall be kept square, symmetrical, tight, and even. Edge width shall vary as necessary to maintain full-size tiles in the field, but no edge tile shall be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Edge tile shall be cut, fitted, and scribed to walls and partitions after field flooring has been applied.

3.5 INSTALLATION OF SHEET VINYL FLOORING

Sheet vinyl flooring shall be installed with adhesive in accordance with the manufacturer's written installation instructions. Flooring shall be fitted to the room by hand cutting, straight scribing, or pattern scribing as necessary to suit job conditions. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Seams shall be cut by overlapping or underscribing as recommended by the manufacturer. Seams and edges of sheet vinyl flooring shall be bonded or welded as recommended by the manufacturer. Flooring shall be installed with an integral coved base.

3.6 INSTALLATION OF RUBBER FLOORING

Rubber flooring shall be installed with adhesive in accordance with the manufacturer's written installation instructions. Lines and joints shall be kept square, symmetrical, tight, and even. Edge width shall vary as necessary to maintain full-size sheets or tiles in the field, but no edge pieces shall be less than one-half the field size, except where irregular shaped rooms make it impossible. Flooring shall be cut to, and fitted around, all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Edges shall be cut, fitted, and scribed to walls and partitions after field flooring has been applied.

3.7 INSTALLATION OF FEATURE STRIPS

Edge strips shall be secured with adhesive as recommended by the manufacturer. Edge strips shall be provided at locations where flooring

termination is higher than the adjacent finished flooring, except at doorways where thresholds are provided.

3.8 INSTALLATION OF RESILIENT BASE

Wall base shall be installed with adhesive in accordance with the manufacturer's written instructions. Base joints shall be tight and base shall be even with adjacent resilient flooring. Voids along the top edge of base at masonry walls shall be filled with caulk.

3.9 INSTALLATION OF TREADS AND RISERS

Stair treads and risers shall be installed with adhesive in accordance with the manufacturer's written installation instructions. Treads and risers shall cover the full width of the stairs. Stairs wider than manufacturer's standard lengths shall have equal length pieces butted together to cover the treads.

3.10 INSTALLATION OF INTEGRAL COVERED BASE

Integral coved base shall be formed by extending the flooring material 100 or 150 mm 4 or 6 inches onto the wall surface as required by the Task Order. Cove shall be supported by a plastic, rubber or wood coved filler having a minimum radius of 19 mm. 3/4 inch. Coved base shall be installed with adhesive in accordance with the manufacturer's written instructions. A metal or vinyl cap strip shall be provided at the top of the base. Voids along the top edge of base at masonry walls shall be filled with caulk.

3.11 CLEANING

Immediately upon completion of installation of tile in a room or an area, flooring and adjacent surfaces shall be cleaned to remove all surplus adhesive. After installation, flooring shall be washed with a cleaning solution, rinsed thoroughly with clear cold water, and, except for raised pattern rubber flooring, rubber tile and sheet rubber flooring, rubber stair treads, and static control vinyl tile, given two coats of polish in accordance with manufacturers written instructions. After each polish coat, floors shall be buffed to an even luster with an electric polishing machine. Raised pattern rubber flooring, rubber tile and sheet rubber flooring, rubber stair treads, and static control vinyl tile shall be cleaned and maintained as recommended by the manufacturer.

3.12 PROTECTION

From the time of laying until acceptance, flooring shall be protected from damage as recommended by the flooring manufacturer. Flooring which becomes damaged, loose, broken, or curled shall be removed and replaced.

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SECTION 09680

CARPET

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC TM 16	(1993) Test Method: Colorfastness to Light
AATCC TM 134	(1991) Test Method: Electrostatic Propensity of Carpets
AATCC TM 165	(1993) Test Method: Colorfastness to Crocking: Carpets - AATCC Crockmeter Method
AATCC TM 174	(1993) Test Method: Antimicrobial Activity Assessment of Carpet

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 297	(1993) Rubber Products - Chemical Analysis
ASTM D 418	(1993; R 1997) Pile Yarn Floor Covering Construction
ASTM D 1423	(1992) Twist in Yarns by the Direct-Counting Method
ASTM D 1667	(1997) Flexible Cellular Materials - Vinyl Chloride Polymers and Copolymers (Closed-Cell Foam)
ASTM D 3278	(1996) Test Methods for Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D 3676	(1996a) Rubber Cellular Cushion Used for Carpet or Rug Underlay
ASTM E 648	(1997) Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(1996) Commercial Carpet Installation Standard
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CODE OF FEDERAL REGULATIONS (CFR)

16 CFR 1630 Standard for the Surface Flammability of
Carpet and Rugs (FF 1-70)

GERMANY INSTITUTE FOR STANDARDIZATION (DEUTSCHES INSTITUT FÜR
NORMUNG) (DIN)

DIN 54318 (1986) Machine-Made Textile Floor
Coverings; Determination of Dimensional
Changes Due to the Effects of Varied Water
and Heat Conditions; Identical with ISO
2551 Edition 1981

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Carpet and Accessories; GA.

Manufacturer's catalog data and printed documentation stating physical characteristics, durability, resistance to fading, and flame resistance characteristics for each type of carpet material and installation accessory.

SD-04 Drawings

Installation; FIO.

Three copies of drawings indicating areas receiving carpet, carpet types, textures and patterns, direction of pile, location of seams, and locations of edge molding.

SD-06 Instructions

Carpet and Accessories; FIO.

Three copies of the manufacturer's printed installation instructions for the carpet, including preparation of substrate, seaming techniques, and recommended adhesives and tapes.

SD-09 Reports

Moisture and Alkalinity Tests; GA.

Three copies of test reports of moisture and alkalinity content of concrete slab stating date of test, person conducting the test, and the area tested.

SD-13 Certificates

Carpet and Accessories; FIO.

Certificates of compliance from a laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards and Technology attesting that each type of carpet and carpet with cushion

material conforms to the standards specified.

SD-14 Samples

Carpet and Accessories; FIO.

- a. Carpet: Two "Production Quality" samples 675 x 450 mm 27 x 18 inches of each carpet proposed for use, showing quality, pattern, and color specified.
- b. Vinyl or Aluminum Moldings: Two pieces of each type at least 300 mm. 12 inches long.
- c. Special Treatment Materials: Two samples showing system and installation method.

SD-19 Operation and Maintenance Manuals

Carpet and Accessories; GA.

Three copies of carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods, and cleaning cycles.

1.3 REGULATORY REQUIREMENTS

Carpet and adhesives shall bear the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) label. Carpet type bearing the label will indicate that the carpet has been tested and meets the criteria of the CRI IAQ Carpet Testing Program, and minimizes the impact on indoor air quality.

1.4 DELIVERY AND STORAGE

Materials shall be delivered to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, dye lot number, and related information. Materials shall be stored in a clean, dry, well ventilated area, protected from damage and soiling, and shall be maintained at a temperature above 16 degrees C 60 degrees F for 2 days prior to installation.

1.5 ENVIRONMENTAL REQUIREMENTS

Areas in which carpeting is to be installed shall be maintained at a temperature above 16 degrees C 60 degrees F for 2 days before installation, during installation, and for 2 days after installation. A minimum temperature of 13 degrees C 55 degrees F shall be maintained thereafter for the duration of the contract. Traffic or movement of furniture or equipment in carpeted area shall not be permitted for 24 hours after installation. Other work which would damage the carpet shall be completed prior to installation of carpet.

1.6 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one-year period shall be provided.

1.7 EXTRA MATERIAL

Extra material from same dye lot consisting of full width continuous

broadloom and uncut carpet tiles shall be provided for future maintenance. A minimum of 5 percent of total square meters/square yards of each carpet type, pattern, and color shall be provided.

PART 2 PRODUCTS

2.1 CARPET

Carpet shall be first quality; free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Carpet materials and treatments shall be reasonably nonallergenic and free of other recognized health hazards. All grade carpets shall have a static control construction which gives adequate durability and performance.

2.1.1 Physical Characteristics

Carpet shall comply with the following:

- a. Carpet Construction: Tufted, Woven or Bonded as required by the Task Order.
- b. Type: Broadloom 3.6 m 12 feet minimum usable carpet width with exception of corridors and stairs. Modular tile 450 x 450, 500 x 500 or 600 x 600 mm square 18 x 18, 20 x 20 or 24 x 24 inches square, as required by the Task Order, with 0.15 percent growth/shrink rate in accordance with DIN 54318.
- c. Pile Type: Level-loop, Multilevel loop, Cut and loop, Frieze, Cut pile, Random sheared or Level tip shear as required by the Task Order.
- d. Pile Fiber: Commercial branded nylon continuous filament, branded nylon staple; wool or wool blend with Wool Bureau certification; polyethylene terephthalate (PET) 100% recycled fiber or polypropylene as required by the Task Order.
- e. Pile or Wire Height: Minimum height in accordance with ASTM D 418 as required by the Task Order.
- f. Yarn Ply: Minimum 2 in accordance with ASTM D 1423.
- g. Gauge or Pitch: Minimum, as required by the Task Order, in accordance with ASTM D 418.
- h. Stitches or Rows/Wires: Minimum, as required by the Task Order.
- i. Finished Pile Yarn Weight: Minimum, as required by the Task Order. This does not include weight of backings. Weight shall be determined in accordance with ASTM D 418.
- j. Pile Density: Minimum as required by the Task Order.
- k. Dye Method:

Solution dyed, Stock dyed, Yarn (or Skein) dyed, Piece dyed, Space dye or Continuous dye as required by the Task Order.

- l. Backing Materials: Primary backing materials shall be those

customarily used and accepted by the trade for each type of carpet, polypropylene or synthetic hardback. Secondary backing to suit project requirements shall be those customarily used and accepted by the trade for each type of carpet, except when a special unitary back designed for gluedown is provided.

2.1.2 Performance Requirements

- a. **Static Control:** Static control shall be provided to permanently control static buildup to less than 3.5 or 2.0 kV, as required by the Task Order, when tested at 20 percent relative humidity and 21 degrees C 70 degrees F in accordance with AATCC TM 134.
- b. **Flammability and Critical Radiant Flux Requirements:** Carpet shall comply with 16 CFR 1630. Carpet in corridors and exits shall have a minimum average critical radiant flux of 0.22 or 0.45 watts per square centimeter, as required by the Task Order, when tested in accordance with ASTM E 648.
- c. **Tuft Bind:** Tuft bind force required to pull a tuft or loop free from carpet backing shall be a minimum 40 N 9 pound average force for loop pile, 18 N 4 pound average force for cut pile.
- d. **Additional Performance Characteristics:**
 - (1) **Antimicrobial:** Nontoxic antimicrobial treatment in accordance with AATCC TM 174, Part I (qualitative), guaranteed by the carpet manufacturer to last the life of the carpet.
 - (2) **Attached Cushion:** Attached cushion shall be latex foam rubber with minimum weight of 0.850 kg/m sq. (30 oz/sq. yard), 30 oz/sq. yard, minimum thickness of 2.54 mm (0.100 inch), 0.100 inch, minimum density of 272.31 kg/m cu. (17 lb/cubic foot, 17 lb/cubic foot, minimum compression resistance of 34.5 kPa (5 psi), 5 psi, and maximum compression set of 15 percent in accordance with ASTM D 3676, chemically frothed urethane with minimum weight of 0.057 kg/m sq. (18 oz/sq. yard), 18 oz/sq. yard, minimum density of 16.02 kg/m cu. (11 lb/cubic foot) 11 lb/cubic foot or mechanically frothed urethane with minimum weight of 6.71 kg/m sq. (22 oz/sq. yard), 22 oz/sq. yard, minimum density of 224.26 kg/m cu. (14 lb/cubic foot), 14 lb/cubic foot, minimum thickness of 2.54 mm (0.100 inch), 0.100 inch, and maximum compression resistance of 34.47 kPa (5 psi), 5 psi, and compression set of 15 percent in accordance with ASTM D 3676; ethylene vinyl acetate (EVA) or polyvinyl chloride (PVC) with minimum weight of 1.25 kg/m sq. (28 oz/sq. yard), 28 oz/sq. yard, minimum thickness of 3.81 mm (0.150 inch), 0.150 inch, and minimum density of 240.27 kg/m cu. (15 lb/cubic foot), 15 lb/cubic foot and a maximum compression set of 15 percent in accordance with ASTM D 1667. Maximum ash content shall not exceed 50 percent when tested in accordance with ASTM D 297. Cushion shall pass accelerated aging test in accordance with ASTM D 3676.
- e. **Colorfastness to Crocking:** Dry and wet crocking shall comply with AATCC TM 165 and shall have a minimum rating of step 4 on the AATCC Color Transference Chart for all colors.
- f. **Colorfastness to Light:** Colorfastness to light shall comply with AATCC TM 16 and shall have a minimum 4 grey scale rating after 40

hours.

- g. Delamination Strength: Delamination strength for tufted carpet with a secondary back shall be minimum of 440 N/m 2.5 lb./inch

2.2 ADHESIVES AND CONCRETE PRIMER

Adhesives and concrete primers for installation of carpet shall be waterproof, nonflammable, meet local air-quality standards, and shall be as recommended by the carpet manufacturer. Seam adhesive shall be waterproof, nonflammable, and nonstaining as recommended by the carpet manufacturer. Release adhesive for modular tile carpet shall be as recommended by the carpet manufacturer. Adhesives flashpoint shall be minimum 60 degrees C 140 degrees F in accordance with ASTM D 3278.

2.3 MOLDING

Aluminum molding shall be a hammered surface, pinless clamp-down type, designed for the type of carpet being installed. Finish shall be natural color anodized or prefinished color as required by the Task Order. Floor flange shall be a minimum 38 mm 1-1/2 inches wide and face shall be a minimum 16 mm 5/8 inch wide. Vinyl molding shall be heavy-duty and designed for the type of carpet being installed. Floor flange shall be a minimum 50 mm 2 inches wide. Color shall be as required by the Task Order.

2.4 TAPE

Tape for seams shall be as recommended by the carpet manufacturer for the type of seam used in installation.

2.5 COLOR, TEXTURE, AND PATTERN

Color, texture, and pattern shall be as required by the Task Order.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Carpet shall not be installed on surfaces that are unsuitable and will prevent a proper installation. Holes, cracks, depressions, or rough areas shall be repaired using material recommended by the carpet or adhesive manufacturer. Floor shall be free of any foreign materials and swept broom clean. Before beginning work, subfloor shall be tested with glue and carpet to determine "open time" and bond.

3.2 MOISTURE AND ALKALINITY TEST

Concrete slab shall be tested for moisture content and excessive alkalinity in accordance with CRI 104. The moisture content shall not exceed a hygrometer reading of 65 percent.

3.3 PREPARATION OF CONCRETE SUBFLOOR

Installation of the carpeting shall not commence until concrete substrate is at least 90 days old. The concrete surfaces shall be prepared in accordance with instructions of the carpet manufacturer. Type of concrete sealer, when required, shall be compatible with the carpet.

3.4 INSTALLATION

Installation shall be in accordance with the manufacturer's instructions and CRI 104. Edges of carpet meeting hard surface flooring shall be protected with molding. Installation shall be in accordance with the molding manufacturer's instructions.

3.4.1 Broadloom Installation

Broadloom carpet shall be installed direct glue down or pre-applied adhesive glue down, as required by the Task Order, and shall be smooth, uniform, and secure, with a minimum of seams. Seams shall be uniform, unnoticeable, and treated with a seam adhesive. Side seams shall be run toward the light where practical and where such layout does not increase the number of seams. Breadths shall be installed parallel, with carpet pile in the same direction. Patterns shall be accurately matched. Cutouts, as at door jambs, columns and ducts shall be neatly cut and fitted securely. Seams at doorways shall be located parallel to and centered directly under doors. Seams shall not be made perpendicular to doors or at pivot points. Seams at changes in directions of corridors shall follow the wall line parallel to the carpet direction. Corridors with widths less than 1.8 m 6 feet shall have the carpet laid lengthwise down the corridors.

3.4.2 Modular Tile Installation

Modular tiles shall be installed with permanent vinyl-compatible or release adhesive and shall be snugly jointed together as required by the Task Order. Tiles shall be laid in the same direction or an alternating pattern with accessibility to the subfloor where required as required by the Task Order.

3.5 CLEANING AND PROTECTION

3.5.1 Cleaning

After installation of the carpet, debris, scraps, and other foreign matter shall be removed. Soiled spots and adhesive shall be removed from the face of the carpet with appropriate spot remover. Protruding face yarn shall be cut off and removed. Carpet shall be vacuumed clean.

3.5.2 Protection

The installed carpet shall be protected from soiling and damage with heavy, reinforced, nonstaining kraft paper, plywood, or hardboard sheets. Edges of kraft paper protection shall be lapped and secured to provide a continuous cover. Traffic shall be restricted for at least 45 hours. Protective covering shall be removed when directed by the Contracting Officer.

3.6 REMNANTS

Remnants remaining from the installation, consisting of scrap pieces more than 600 mm 2 feet in dimension with more than 0.6 square meters 6 square feet total, shall be provided. Non-retained scraps shall be removed from site.

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SECTION 09720

WALLCOVERINGS

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 423	(1990a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM E 84	(1996a) Surface Burning Characteristics of Building Materials
ASTM F 793	(1993) Standard Classification of Wallcovering by Durability Characteristics

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Wallcovering and Accessories; GA.

Manufacturer's descriptive data, documentation stating physical characteristics, flame resistance, mildew and germicidal characteristics.

SD-06 Instructions

Installation; FIO.

Preprinted installation instructions for wallcovering and accessories.

Maintenance; FIO.

Preprinted cleaning and maintenance instructions for wallcovering and accessories.

SD-13 Certificates

Wallcovering; FIO.

Manufacturer's statement attesting that the product furnished meets or exceeds specification requirements. The statement must; be dated after the

award of the contract, state Contractor's name and address, name the project and location, and list the requirements being certified.

SD-14 Samples

Wallcovering and Accessories; GA.

Three samples of each indicated type, pattern, and color of wallcovering. Samples of wall covering shall be minimum 125 x 175 mm 5 x 7 inches and of sufficient size to show pattern repeat. Three samples of each indicated type corner guard and wainscot cap.

1.3 DELIVERY AND STORAGE

Materials shall be delivered to the site in manufacturers original unopened containers labeled with manufacturers name, pattern, texture, size and related information. Materials shall be stored in accordance with the manufacturer's instructions in a clean dry ventilated area with temperature maintained above 16 degrees C 60 degrees F for two days prior to installation.

1.4 ENVIRONMENTAL REQUIREMENTS

Areas to receive wallcovering shall be maintained at a temperature above 16 degrees C 60 degrees F for 7 days before, during, and 7 days after application.

1.5 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one-year period shall be provided.

1.6 EXTRA MATERIALS

Extra material from the same dye lot consisting of 0.5 m 0.5 yards of full-width wallcovering for each 30 linear meters 32 linear yards of wallcovering installed shall be provided for maintenance.

PART 2 PRODUCTS

2.1 WALLCOVERINGS

Wallcoverings shall be material designed specifically for the specified use. The wallcovering shall contain a non-mercury based mildewcide. The wallcovering shall be type made without the use of cadmium based stabilizers. Wallcovering shall have a Class A flame spread rating of 0-25 and smoke development rating of 0-50 when tested in accordance with ASTM E 84.

2.1.1 Vinyl Wallcovering

Vinyl wallcovering shall be a vinyl coated woven or nonwoven fabric with germicidal additives and shall conform to ASTM F 793, Category IV, Type I, (0.270 to 0.440 kg 8 to 13 ounces) or V Type II, (0.445 to 0.815 kg 13.1 to 24 ounces), as required by the Task Order, total weight per square meter yard and width as required by the Task Order.

2.1.2 Fabric Wallcovering

Fabric wallcovering shall be a woven fabric with paper or acrylic backing and shall be colorfast, stain, and soil resistant. Fabric wallcovering shall meet or exceed the following:

- a. Face fiber content: as required by the Task Order.
- b. Total weight: as required by the Task Order.
- c. Width: as required by the Task Order.

2.1.3 Acoustical Wallcovering

Acoustical wallcovering shall be synthetic material or vinyl coated fabric with porous surface with fused back as required by the Task Order. Acoustical wall covering shall meet or exceed the following:

- a. Total weight: as required by the Task Order.
- b. Width: as required by the Task Order.
- c. NRC rating in accordance with ASTM C 423; minimum NRC as required by the Task Order.

2.1.4 Wallcovering Border

Wallcovering border shall be nonwoven vinyl cellulose/polyester blend or vinyl coated strippable paper back. Border shall conform to ASTM F 793, Category I, Decorative, II, Decorative or III, Decorative as required by the Task Order.

- a. Total weight: as required by the Task Order.
- b. Width: as required by the Task Order.

2.2 WALL LINER

Wall liner shall be a non-woven polyester cellulose blend having a minimum weight of 0.125 kg/square meter 3.7 ounces per square yard and a total minimum thickness of 0.33 mm 0.013 inches. Wall liner shall have a Class A flame spread rating of 0-25 and smoke development rating of 0-50 when tested in accordance with ASTM E 84.

2.3 CORNER GUARDS

Corner guards shall be 2 mm 3/32 inch thick and shall cover 19 mm 3/4 inch each side of corner at right angles. Corner guards shall be clear, polycarbonate, vinyl or rubber from the same lot and color.

2.4 WAINSCOT CAP

Wainscot cap shall be satin-finished extruded aluminum about 19 mm 3/4 inch high, feathered at bottom edge, with an approximate 5 mm 3/16 inch exposed face on top edge, and grooved to receive the covering.

2.5 PRIMER AND ADHESIVE

Primer and adhesive shall be of a type recommended by the wallcovering manufacturer and shall contain a non-mercury based mildewcide. Adhesive shall be strippable type. Adhesive to install cap shall be of a type

recommended by the manufacturer of the wainscot cap.

2.6 COLOR, TEXTURE, AND PATTERN

Color, texture, and pattern shall be as required by the Task Order.

PART 3 EXECUTION

3.1 EXAMINATION

Contractor shall inspect all areas and conditions under which wallcoverings are to be installed. Contractor shall notify in writing of any conditions detrimental to the proper and timely completion of the installation. Work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

Wallcovering shall not be applied to surfaces that are rough, that contain stains that will bleed through the wallcovering, or that are otherwise unsuitable for proper installation. Cracks and holes shall be filled and rough spots shall be sanded smooth. Surfaces to receive wallcovering shall be thoroughly dry. Plaster surfaces shall age at least 30 days prior to installation of vinyl wallcoverings. Interior surfaces of exterior masonry walls shall be sealed to prevent moisture penetration, then primed with a wallcovering primer in accordance with the manufacturer's instructions. Moisture content of plaster, concrete, and masonry shall be tested with an electric moisture meter and reading shall be not more than 5 percent. Masonry walls shall have flush joints. Concrete and masonry walls shall be coated with a thin coat of joint compound or cement plaster as a substrate preparation. To promote adequate adhesion of wall lining over masonry walls, the walls shall be primed as recommended by the wall lining manufacturer. Surface of walls shall be primed as required by manufacturer's instructions to permit ultimate removal of wallcovering from the wall surface. Primer shall be allowed to completely dry before adhesive application.

3.3 INSTALLATION

3.3.1 Wall Lining

Wall lining shall be installed over masonry walls that are to receive wallcovering. Lining shall be installed in accordance with the manufacturer's installation instructions. Lining shall be installed perpendicular to wallcovering to prevent overlapping of seams between lining and wallcovering.

3.3.2 Vinyl and Fabric Wallcovering

Wallcovering shall be installed in accordance with the manufacturer's installation instructions. Glue and adhesive spillage shall be immediately removed from wallcovering face and seams with a remover recommended by the manufacturer. After the installation is complete, the fabric wallcovering shall be vacuumed with a ceiling to floor motion.

3.3.3 Corner Guards and Wainscot Cap

Corner guards and wainscot cap shall be installed on all exposed corners and in accordance with the manufacturer's printed instructions. Corner

guards shall run from top of base to wainscot cap or ceiling, if no wainscot, in a continuous length.

3.4 CLEAN-UP

Upon completion of the work, wallcovering shall be left clean and free of dirt or soiling. Surplus materials, rubbish, and debris resulting from the wallcovering installation shall be removed and area shall be left clean.

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SECTION 09840

ACOUSTICAL WALL TREATMENT

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC TM 16 (1993) Test Method: Colorfastness to Light

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 423 (1990a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM D 1117 (1997) Nonwoven Fabrics

ASTM D 5034 (1995) Breaking Strength and Elongation of Textile Fabrics (Grab Test)

ASTM E 84 (1996a) Surface Burning Characteristics of Building Materials

INTERNATIONAL CONFERENCE OF BUILDING OFFICIALS (ICBO)

ICBO-Bldg Code (1997) Uniform Building Code (3 Vol)

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Acoustical Wall Panels; GA.

Manufacturer's descriptive data and catalog cuts.

SD-04 Drawings

Acoustical Wall Panels; FIO.

Drawings showing plan locations, elevations and details. Drawings shall include details of method of anchorage, location of doors and other openings, base detail and shape and thickness of materials.

SD-06 Instructions

Acoustical Wall Panels; FIO.

Manufacturer's installation instructions and recommended cleaning instructions.

SD-13 Certificates

Acoustical Wall Panels; FIO.

Certificates of compliance from an independent laboratory accredited by the National Laboratory Accreditation Program of the National Institute of Standards. A label or listing from the testing laboratory will be acceptable evidence of compliance.

SD-14 Samples

Acoustical Wall Panels; FIO.

Manufacturer's standard fabric swatches, minimum 450 mm 18 inches wide by 600 mm 24 inches long 2 samples of each color range specified.

1.3 DELIVERY AND STORAGE

Materials delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variations, dirt, dust, or other contaminants.

1.4 WARRANTY

Manufacturer's standard performance guarantees or warranties that extend beyond a one year period shall be provided.

PART 2 PRODUCTS

2.1 FABRIC COVERED ACOUSTICAL WALL PANELS

Acoustical wall panels shall consist of prefinished factory assembled, seamless fabric covered, fiber glass or mineral fiber core system as described below. Wall panels shall be manufactured to the dimensions and configurations shown on the drawings. Perimeter edges shall be non-reinforced or reinforced by either an aluminum frame or a formulated resin edge hardener as required by the Task Order. Acoustical wall panels installed in non-sprinklered areas must comply with the requirements of ICBO Bldg Code, Standard 42-2.

- a. Panel Width: Panel width shall be as required by the Task Order.
- b. Panel Height: Panel height shall be as required by the Task Order.
- c. Thickness: Panel thickness shall be as required to meet the indicated NRC range.
- d. Fabric Covering: Seamless non-woven, embossed texture, needle punched 100 percent polyester, minimum 0.034 kg per linear meter. 11 ounces per linear yard. Tear strength shall be minimum 110 N 25 pounds machine direction and minimum 178 N 40 pounds cross-machine direction in accordance with ASTM D 1117. Tensile

strength shall be minimum 220 N 50 pounds machine direction and minimum 330 N 75 pounds cross-machine direction in accordance with ASTM D 5034, plain woven 2-ply 100 percent polyester, minimum 0.47 kg per linear meter. 15 ounces per linear yard. Tear strength shall be minimum 129 N. 29 pounds. Tensile strength shall be 667 N 150 pounds minimum in accordance with ASTM D 5034 or perforated vinyl covering with fabric backing, minimum 0.62 kg per linear meter 20 ounces per linear yard total weight as required by the Task Order. Fabric covering shall be stretched free of wrinkles and then bonded to the edges and back or bonded directly to the panel face, edges, and back of panel a minimum distance standard with the manufacturer. Light fastness (fadeometer) shall be approximately 40 hours in accordance with AATCC TM-16.

- e. Fire rating for the complete composite system: Class A, 200 or less smoke density and flame spread less than 25, when tested in accordance with ASTM E 84.
- f. Substrate: Fiber glass or mineral fiber.
- g. Noise Reduction Coefficient (NRC) Range: 0.50-0.60 or 0.80-0.90, as required by the Task Order, ASTM C 423.
- h. Edge Detail: Half bevel, Bevel, Radius, Square or Mitered edge as required by the Task Order.
- i. Core Type: Standard acoustical, High impact acoustical or Acoustical/tackable core as required by the Task Order.
- J. Mounting: Acoustical panels shall be mounted by manufacturer's standard concealed spline, mechanical fasteners, magnetic fasteners, hook and loop or adhesive mounting as required by the Task Order.
- k. Color: Color shall be as required by the Task Order.

PART 3 EXECUTION

3.1 SURFACE CONDITIONS

Walls shall be clean, smooth, oil free and prepared in accordance with panel manufacturer's instructions. Installation shall not begin until all wet work, such as, plastering, painting, and concrete are completely dry.

3.2 INSTALLATION

Panel installation shall be by personnel familiar with and normally engaged in installation of acoustical wall panels. Panels shall be applied in accordance with the manufacturer's installation instructions.

3.3 CLEANING

Following installation, dirty or stained panel surfaces shall be cleaned in accordance with manufacturer's instructions and left free from defects. Panels that are damaged, discolored, or improperly installed shall be removed and new panels provided as directed.

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SECTION 09900

PAINTING, GENERAL

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH Limit Values	(1996) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices
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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM C 150	(1997) Portland Cement
ASTM D 3273	(1994) Resistance to Growth of Mold on the Surface of Interior Coating in an Environmental Chamber
ASTM D 3274	(1995) Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation
ASTM D 4214	(1998) Evaluating Degree of Chalking of Exterior Paint Films
ASTM D 4258	(1999) Surface Cleaning Concrete for Coating

COMMERCIAL ITEM DESCRIPTIONS (CID)

CID A-A-1500	(Rev A; Notice 1) Sealer, Surface (Latex Block Filler)
CID A-A-1546	(Rev A) Rubbing Varnish
CID A-A-1632	(Basic) Varnish, Asphalt
CID A-A-1788	(Basic) Varnish, Oil: Interior
CID A-A-2246	(Rev B) Paint, Latex
CID A-A-2247	(Basic) Paint, Latex (Semigloss, Interior)
CID A-A-2248	(Basic) Paint, Latex, (Flat, Interior)
CID A-A-2335	(Basic) Sealer, Surface (Varnish Type,

	Wood and Cork Floors)
CID A-A-2336	(Rev A) Primer Coating (Alkyd, Exterior Wood, White and Tints)
CID A-A-2339	(Basic) Stain (Wood, Solvent-Dye Type)
CID A-A-2542	(Basic) Sealer, Terrazzo and Concrete Floors, Waterbased
CID A-A-2834	(Basic) Urethane, Waterborne (Low VOC, Clear)
CID A-A-2867	(Basic) Coating, Polyurethane, Single Component Moisture Cure, Aliphatic
CID A-A-2962	(Rev A) Enamel, Alkyd (Metric)
CID A-A-2994	(Basic) Primer Coating, Interior, for Walls and Wood

FEDERAL AVIATION ADMINISTRATION (FAA)

FAA AC 70/7460-1	(Rev J) Obstruction Marking and Lighting
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FEDERAL SPECIFICATIONS (FS)

FS TT-C-542	(Rev E) Coating, Polyurethane, Oil-Free, Moisture Curing
FS TT-C-555	(Rev B; Am 1) Coating, Textured (for Interior and Exterior Masonry Surfaces)
FS TT-E-2784	(Rev A) Enamel (Acrylic-Emulsion, Exterior Gloss and Semigloss) (Metric)
FS TT-P-28	(Rev G; Notice 1) Paint, Aluminum, Heat Resisting (1200 Degrees F.)
FS TT-S-708	(Rev A; Am 2; Notice 1) Stain, Oil; Semi-Transparent, Wood, Exterior
FS TT-S-001992	(Basic; Notice 1) Stain, Latex, Exterior for Wood Surfaces

MAPLE FLOORING MANUFACTURERS ASSOCIATION (MFMA)

MFMA-03	(1997) Floor Sealer and Finish List and Specifications for Heavy Duty and Gymnasium Sealers and Finishes for Maple, Beech and Birch Floors: MFMA Floor Finish List Number 16
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STEEL STRUCTURES PAINTING COUNCIL (SSPC)

SSPC Paint 5	(1995) Zinc Dust, Zinc Oxide and Phenolic Varnish Paint
SSPC Paint 18	(1991) Chlorinated Rubber Intermediate

Coat Paint

SSPC Paint 20	(1991) Zinc-Rich Primers (Type I - Inorganic and Type II - Organic)
SSPC Paint 23	(1982) Latex Primer for Steel surfaces
SSPC Paint 25	(1991) Red Iron Oxide, Zinc Oxide, Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)
SSPC SP 1	(1982) Solvent Cleaning
SSPC SP 2	(1995) Hand Tool Cleaning
SSPC SP 3	(1995) Power Tool Cleaning
SSPC SP 6/NACE 3	(1994) Commercial Blast Cleaning
SSPC SP 7/NACE 4	(1994) Brush-Off Blast Cleaning

1.2 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Paint; GA.

The names, quantity represented, and intended use for the proprietary brands of materials proposed to be substituted for the specified materials regardless of quantities in states where VOC content limitations apply.

SD-06 Instructions

Mixing and Thinning; FIO. Application; FIO.

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each coating system. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times between coats for epoxy, moisture-curing polyurethane, and liquid glaze coatings. Detailed application instructions for textured coatings shall be provided.

SD-09 Reports

Paint; GA.

A statement as to the quantity represented and the intended use, plus the following test report for batches in excess of 200 L: 50 gallons:

- a. A test report showing that the proposed batch to be used meets specified requirements:
- b. A test report showing that a previous batch of the same formulation as the batch to be used met specified requirements,

plus, on the proposed batch to be used, a report of test results for properties of weight per liter, gallon, viscosity, fineness of grind, drying time, color, and gloss.

SD-13 Certificates

Lead; FIO. Mildewcide and Insecticide; FIO. Volatile Organic Compound (VOC) Content; GA.

Certificate stating that paints for interior use contain no mercurial mildewcide or insecticide. Certificate stating that paints proposed for use contain not more than 0.06 percent lead by weight of the total nonvolatile. Certificate stating that paints proposed for use meet Federal VOC regulations and those of the of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located.

SD-14 Samples

Moisture-Curing Polyurethane; GA.

A complete moisture-curing polyurethane system applied to a panel of the same material as that on which the coating will be applied in the work and for each color specified. The sample panels will be used for quality control in applying the system.

Paint; FIO.

While the material is at the site or source of supply, and at a time agreeable to the Contractor and the Contracting Officer, a 1 liter 1 quart sample of each color and batch, except for quantities of 200 liters 50 gallons or less, shall be taken by random selection from the sealed containers by the Contractor in the presence of a representative of the Contracting Officer. The contents of the containers to be sampled shall be thoroughly mixed to ensure that the sample is representative. Samples shall be identified by designated name, specification number, manufacturer name and address, batch number, project contract number, intended use, and quantity involved.

1.3 PACKAGING, LABELING, AND STORING

Paints shall be in sealed containers that legibly show the designated name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer. Pigmented paints shall be furnished in containers not larger than 20 liters.

5 gallons. Paints and thinner shall be stored in accordance with the manufacturer's written directions and as a minimum stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures between 4 and 35 degrees C. 40 and 95 degrees F. Paints shall be stored on the project site or segregated at the source of supply sufficiently in advance of need to allow 30 days for testing.

1.4 APPROVAL OF MATERIALS

When samples are tested, approval of materials will be based on tests of the samples; otherwise, materials will be approved based on test reports furnished with them. If materials are approved based on test reports

furnished, samples will be retained by the Government for testing should the materials appear defective during or after application. In addition to any other remedies under the contract the cost of retesting defective materials will be at the Contractor's expense.

1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the paint manufacturer, the ambient temperature shall be between 7 and 35 degrees C 45 and 95 degrees F when applying coatings other than water-thinned, epoxy, and moisture-curing polyurethane coatings. Water-thinned coatings shall be applied only when ambient temperature is between 10 and 32 degrees C. 50 and 90 degrees F. Epoxy, and moisture-curing polyurethane coatings shall be applied only within the minimum and maximum temperatures recommended by the coating manufacturer. Moisture-curing polyurethane shall not be applied when the relative humidity is below 30 percent.

1.6 SAFETY AND HEALTH

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Worker Exposures

Exposure of workers to hazardous chemical substances shall not exceed limits established by ACGIH Limit Values, or as required by a more stringent applicable regulation.

1.6.2 Toxic Compounds

Toxic products having ineffective physiological warning properties, such as no or low odor or irritation levels, shall not be used unless approved by the Contracting Officer.

1.6.3 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MDSS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive mists and odors from the painting operations. Workers involved in preparation, painting and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.6.4 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from preparation, painting and clean-up operations.

PART 2 PRODUCTS

2.1 PAINT

The term "paint" as used herein includes emulsions, enamels, paints, stains, varnishes, sealers, cement-emulsion filler, and other coatings, whether used as prime, intermediate, or finish coat. Paint shall conform to the requirements listed in the painting schedules at the end of this section, except when the required amount of a material of a particular batch is 200 liters 50 gallons or less, an approved first-line proprietary paint material with similar intended formulation, usage and color to that specified may be used. Additional requirements are as follows:

2.1.1 Colors and Tints

Colors shall be as selected from manufacturer's standard colors, as indicated. Manufacturer's standard color is for identification of color only. Tinting of epoxy and urethane paints shall be done by the manufacturer. Stains shall conform in shade to manufacturer's standard color. The color of the undercoats shall vary slightly from the color of the next coat.

2.1.2 Mildewcide and Insecticide

Paint specified for all coats applied to fabrics and vapor barrier jackets over insulation and surfaces shall contain a mildewcide that will not adversely affect the color, texture, or durability of the coating. The mildewcide shall be incorporated into the paint by the manufacturer and shall attain a surface disfigurement rating of 8 or greater when tested in accordance with ASTM D 3273 and evaluated in accordance with ASTM D 3274. Mercurial mildewcide shall not be used in interior paint. Insecticides shall not be used in paint.

2.1.3 Lead

Paints containing lead in excess of 0.06 percent by weight of the total nonvolatile content (calculated as lead metal) shall not be used.

2.1.4 Chromium

Paints containing zinc chromate or strontium chromate pigments shall not be used.

2.1.5 Volatile Organic Compound (VOC) Content

Paints shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards and shall conform to the restrictions of the local air pollution control authority.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Surfaces contaminated by coating materials shall be restored to original condition.

3.2 SURFACE PREPARATION

Surfaces to be painted shall be clean and free of foreign matter before application of paint or surface treatments. Oil and grease shall be removed prior to mechanical cleaning. Cleaning shall be programmed so that dust and other contaminants will not fall on wet, newly painted surfaces. Exposed ferrous metals such as nail heads on or in contact with surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.2.1 Concrete, Stucco and Masonry Surfaces

Concrete, stucco and masonry surfaces shall be allowed to dry at least 30 days before painting, except concrete slab on grade which shall be allowed to cure 90 days before painting. Surfaces shall be cleaned in accordance with ASTM D 4258. Glaze, efflorescence, laitance, dirt, grease, oil, asphalt, surface deposits of free iron and other foreign matter shall be removed prior to painting. Surfaces to receive polyurethane or epoxy coatings shall be acid-etched or mechanically abraded as specified by the coating manufacturer, rinsed with water, allowed to dry, and treated with the manufacturer's recommended conditioner prior to application of the first coat.

3.2.2 Ferrous Surfaces

Ferrous surfaces including those that have been shop-coated, shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1. Surfaces that contain loose rust, loose mill scale, and other foreign substances shall be cleaned mechanically with hand tools according to SSPC SP 2, power tools according to SSPC SP 3 or by sandblasting according to SSPC SP 7/NACE 4. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

3.2.3 Nonferrous Metallic Surfaces

Galvanized, aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces shall be solvent-cleaned or detergent-washed in accordance with SSPC SP 1.

3.2.4 Gypsum Board Surfaces

Gypsum board surfaces shall be dry and shall have all loose dirt and dust removed by brushing with a soft brush, rubbing with a cloth, or vacuum-cleaning prior to application of the first-coat material. A damp cloth or sponge may be used if paint will be water-based.

3.2.5 Mastic-Type Surfaces

Mastic-type surfaces shall be prepared by removing foreign material.

3.2.6 Plaster Surfaces

Plaster shall age at least 30 days before painting. Plaster shall be clean and free from loose matter and shall have an instrument-measured moisture content not exceeding 8 percent.

3.2.7 Wood Surfaces

Wood surfaces shall be cleaned of foreign matter. Moisture content of the

wood shall not exceed 12 percent as measured by a moisture meter, unless otherwise authorized. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints. Small, dry seasoned knots shall be scraped, cleaned, and given a thin coat of commercial knot sealer, before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or, if it is still soft, removed with mineral spirits or turpentine, and the resinous area shall be thinly coated with knot sealer. Finishing nails shall be set, and all holes and surface imperfections shall be primed. After priming, holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, colored to match the finish coat if natural finish is required, allowed to dry, and sanded smooth. Putty or wood filler shall be compatible with subsequent coatings.

3.2.7.1 Interior Wood Stain

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth.

3.2.7.2 Sanding of Wood Floors

Method of sanding of wood floors will be specified in task order. Floors of oak or similar open-grain wood shall be filled with wood filler recommended by the finish manufacturer and the excess filler removed.

3.2.8 Previously Painted Surfaces

Previously painted surfaces specified to be repainted or damaged during construction shall be thoroughly cleaned of all grease, dirt, dust or other foreign matter. Blistering, cracking, flaking and peeling or other deteriorated coatings shall be removed. Slick surfaces shall be roughened. Damaged areas such as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas. Edges of chipped paint shall be feather edged and sanded smooth. Rusty metal surfaces shall be cleaned as per SSPC requirements. Solvent, mechanical, or chemical cleaning methods shall be used to provide surfaces suitable for painting. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8. New, proposed coatings shall be compatible with existing coatings. If existing surfaces are glossy, the gloss shall be reduced.

3.3 MIXING AND THINNING

When thinning is approved as necessary to suit surface, temperature, weather conditions, or application methods, paints may be thinned in accordance with the manufacturer's directions. When thinning is allowed, paints shall be thinned immediately prior to application with not more than 0.125 L 1 pint of suitable thinner per liter. gallon. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.3.1 Cement-Emulsion Filler Coat

Cement and aggregate shall be dry-mixed so that uniform distribution and

intermixing are obtained. Mixing liquid and one-half of the total amount of water shall be premixed and added gradually to the white portland cement and aggregate with constant stirring until a thick, smooth material is obtained. Emulsion paint shall then be added to the mixture and stirred until uniformity is obtained. The blend shall have a thick, creamy consistency. The remainder of the water shall be added if necessary to obtain a material with adequate application properties. Blending resin emulsion or emulsion paint with any other component shall be done with caution; too rapid an agitation will cause air entrapment and foaming.

3.3.2 Two-Component Systems

Two-component systems shall be mixed in accordance with manufacturer's instructions. Any thinning of the first coat to ensure proper penetration and sealing shall be as recommended by the manufacturer for each type of substrate.

3.4 APPLICATION

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application. Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces. Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

3.4.1 Ventilation

Affected areas shall be ventilated during paint application so that workers exposure to chemical substances shall not exceed limits as established by ACGIH Limit Values, or as required by a more stringent applicable regulation. Interior work zones having a volume of 280 cubic meters 10,000 cubic feet or less shall be ventilated at a minimum of 2 air exchanges per hour. Ventilation in larger work zones shall be maintained by means of mechanical exhaust. Solvent vapors shall be exhausted outdoors, away from air intakes and workers. Return air inlets in the work zone shall be temporarily sealed before start of work until the coatings have dried.

3.4.2 Respirators

Operators and personnel in the vicinity of operating paint sprayers shall wear respirators.

3.4.3 First Coat

The first coat on plaster, gypsum wallboard, and other surfaces shall include repeated touching up of suction spots or overall application of primer or sealer to produce uniform color and gloss. Excess sealer shall be wiped off after each application. The first coat on both faces of wood doors shall be applied at essentially the same time. Glazed doors and

sashes shall be given the specified coating system within 3 weeks of the time they are glazed, but not before the glazing material has set; paint shall overlay glass about 1.78 mm 70 mils all around. Each varnish coat shall be sanded lightly prior to application of subsequent coats.

3.4.4 Timing

Surfaces that have been cleaned, pretreated, and otherwise prepared for painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Sufficient time shall elapse between successive coats to permit proper drying. This period shall be modified as necessary to suit weather conditions. Oil-based or oleoresinous solvent-type paints shall be considered dry for recoating when the paint feels firm, does not deform or feel sticky under moderate pressure of the thumb, and the application of another coat of paint does not cause the undercoat to lift or lose adhesion. Manufacturer's instructions for application, curing and drying time between coats of two-component systems shall be followed.

3.4.5 Stains

Stain shall be applied at the rate specified in the manufacturer's printed directions. Oil-type stain shall be applied by brushing with the grain for the full length of the board or course of siding.

3.4.6 Fillers

Concrete and masonry surface voids shall be filled; however, surface irregularities need not be completely filled. The dried filler shall be uniform and free of pinholes. Filler shall not be applied over caulking compound.

3.4.6.1 Cement-Emulsion Filler

Immediately before filler application, surfaces shall be dampened uniformly and thoroughly, with no free surface water visible, by several applications of potable water with a fog spray, allowing time between the sprayings for water to be absorbed. Cement-emulsion filler shall be scrubbed into the surface vigorously with a stiff-bristled brush having tampico or palmyra bristles not longer than 63 mm. 2-1/2 inches. At least 24 hours shall elapse before applying exterior emulsion paint over cement-emulsion filler.

When the ambient temperature is over 29 degrees C, 85 degrees F, cement-emulsion filler surfaces shall be dampened lightly with a fog spray of potable water immediately prior to application of the subsequent paint coat.

3.4.6.2 Latex Filler

Latex filler, CID A-A-1500, shall be applied according to the manufacturer's instructions. Surface voids shall be filled and excess filler shall be removed from the surface with a rubber squeegee. The filler shall be allowed to dry the length of time specified by the manufacturer prior to applying successive coats of paint.

3.4.7 Textured Coating

Application of textured coating, FS TT-C-555, shall be as specified in the manufacturer's printed directions.

3.4.8 Ferrous-Metal Primer

Primer for ferrous-metal shall be applied to ferrous surfaces to receive paint other than asphalt varnish prior to deterioration of the prepared surface. The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

3.5 PIPE COLOR CODE MARKING

Pipes in exposed areas and in accessible pipe spaces shall be provided with color band and titles adjacent to all valves, except those provided at plumbing fixtures, at not more than 12 meter 40 foot spacing on straight pipe runs, adjacent to change in direction, and on both sides where pipes pass through walls or floors. Color code marking shall be of the color listed in TABLE I and the size listed in TABLE II. The arrows shall be installed adjacent to each band to indicate the direction of flow in the pipe. The legends shall be printed in upper-case black letters as listed in TABLE I. Letter sizes shall be as listed in TABLE II. Marking shall be painted or applied using colored, pressure-sensitive adhesive markers of standard manufacture. Paint shall be as specified for insulated and uninsulated piping.

TABLE I. COLOR CODES FOR MARKING PIPE

Material	Band	Letters and Arrow*	Legend
Cold water (potable)	Green	White	POTABLE WATER
Fire protection water	Red	White	FIRE PR. WATER
Fire Sprinkler Water	Red	White	FIRE SPR. WATER
Hot water (domestic)	Green	White	H.W.
Hot water recirculating (domestic)	Green	White	H.W.R.
High temp. water supply	Yellow	Black	H.T.W.S.
High temp. water return	Yellow	Black	H.T.W.R.
Boiler feed water	Yellow	Black	B.F.
Low temp. water supply (heating)	Yellow	Black	L.T.W.S.
Low temp. water return (heating)	Yellow	Black	L.T.W.R.
Condenser water supply	Green	White	COND. W.S.
Condenser water return	Green	White	COND. W.R.
Chilled water supply	Green	White	C.H.W.S.
Chilled water return	Green	White	C.H.W.R.
Treated water	Green	White	TR. WATER
Chemical feed	Yellow	Black	CH. FEED
Compressed air	Blue	White	COMP. AIR
Natural gas	Yellow	Black	NAT. GAS
Propane Gas	Yellow	Black	PROP. GAS
Refrigerants	Blue	White	REFRIGERANT
Fuel oil	Yellow	Black	FUEL OIL
Steam	Yellow	Black	STEAM
Condensate	Yellow	Black	CONDENSATE
Hydraulic fluid under 4.1 MPa 600 psi	Green	White	HYDRAULIC FLUID-_____PSI
Hydraulic fluid 4.1 MPa 600 psi			

TABLE I. COLOR CODES FOR MARKING PIPE

Material and Greater	Band Yellow	Letters and Arrow* Black	Legend HYDRAULIC FLUID-_____PSI
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TABLE II. COLOR CODE MARKING SIZES

Outside Diameter of Pipe Covering (mm)	Width of Color Band (mm)	Arrow Length x Width (mm)	Size of Legend Letters and Numerals (mm)
Less than 38	200	200 x 57	13
38 to 60	200	200 x 57	19
60 to 150	300	200 x 57	31
200 to 225	600	300 x 110	63
Over 250	800	300 x 115	88

TABLE II. COLOR CODE MARKING SIZES

Outside Diameter of Pipe Covering (Inches)	Length of Color Band (inches)	Arrow Length x Width (Inches)	Size of Legend Letters and Numerals (Inches)
Less than 1-1/2	8	8 x 2-1/4	1/2
1-1/2 to 2-3/8	8	8 x 2-1/4	3/4
2-1/2 to 7-7/8	12	8 x 2-1/4	1-1/4
8 to 10	24	12 x 4-1/2	2-1/2
Over 10	32	12 x 4-1/2	3-1/2

3.6 MISCELLANEOUS PAINTING

3.6.1 Lettering

Lettering shall be provided as scheduled on the drawings, shall be block type, and shall be water-type decalcomania, finished with a protective coating of spar varnish. Samples shall be approved before application.

3.6.2 Obstructions To Aviation

Obstructions to aviation shall be painted in the pattern and color prescribed by FAA AC 70/7460-1.

3.7 SURFACES TO BE PAINTED

Surfaces listed in the painting schedules at the end of this section, other than those listed in paragraph SURFACES NOT TO BE PAINTED, shall be painted as scheduled.

3.8 SURFACES NOT TO BE PAINTED

Surfaces in the areas, as required by the Task Order, shall not be painted. In addition, surfaces of hardware, fittings, and other factory finished items shall not be painted.

3.9 CLEANING

Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. Upon completion of the work, staging, scaffolding, and containers shall be removed from the site or destroyed in an approved manner. Paint and other deposits on adjacent surfaces shall be removed and the entire job left clean and acceptable.

3.10 PAINTING SCHEDULES

The following painting schedules identify the surfaces to be painted and prescribe the paint to be used and the number of coats of paint to be applied. Contractor options are indicated by -----or----- between optional systems or coats.

EXTERIOR PAINTING SCHEDULE

<u>Surface</u>	<u>First Coat</u>	<u>Second Coat</u>	<u>Third Coat</u>
Concrete masonry units.	Cement-emulsion filler	FS TT-E-2784 Type III	None
	CID A-A-1500	FS TT-E-2784 Type III	None
	FS TT-E-2784 Type III	FS TT-E-2784 Type III	None
Concrete, unless specified.	FS TT-E-2784	FS TT-E-2784	None
Concrete: walls	SSPC Paint 18	SSPC Paint 18	SSPC Paint 18

NOTE: Cement-emulsion filler coat shall be acrylic-based and shall consist of the following ingredients in the proportion stated: white portland cement, ASTM C 150, Type I, 7.5 kg; 16.5 pounds; aggregate 15 kg; 33.5 pounds; mixing liquid, factory-prepared acrylic containing 46 to 47 percent solids, 3 liters; 0.75 gallon; potable water 4 liters 1.0 gallon maximum; exterior emulsion paint, FS TT-E-2784 Type III 4 liters. 1.0 gallon. Aggregate shall consist of Washed silica sand of the following gradation:

<u>U.S. Sieve Size</u>	<u>Percent Sand (by Weight) Passing Individual Sieve</u>
0.850 mm (20)	100
0.600 mm (30)	95 - 100
0.300 mm (50)	30 - 65
0.150 mm (100)	0 - 10
0.075 mm (200)	0 - 1

EXTERIOR PAINTING SCHEDULE

<u>Surface</u>	<u>First Coat</u> by volume	<u>Second Coat</u>	<u>Third Coat</u>
Stucco.	FS TT-E-2784 Type III	FS TT-E-2784 Type III	None
	Primer as recommended by FS TT-C-555 manufacturer	FS TT-C-555 Type II	None
Wood, unless otherwise specified.	CID A-A-2336	FS TT-E-2784 Type *	FS TT-E-2784 Type *
	FS TT-E-2784 Type III	FS TT-E-2784 Type *	FS TT-E-2784 Type *
Wood: Steps, platforms, floors, of open porches.	FS TT-E-2784 Type III	FS TT-E-2784 Type I	FS TT-E-2784 Type I
Wood: stain finish.	FS TT-S-708	None	None
	FS TT-S-001992 Class B	FS TT-S-001992 Class B	None
Hardboard: factory primed.	FS TT-E-2784 Type *	FS TT-E-2784 Type *	None
Ferrous metal unless otherwise specified	SSPC Paint 5	CID A-A-2962 Type I Class ** Grade C	CID A-A-2962 Type 1 Class ** Grade C
	SSPC Paint 25	CID A-A-2962 Type I Class ** Grade C	CID A-A-2962 Type 1 Class ** Grade C
	SSPC Paint 23	FS TT-E-2784 Type I or II	FS TT-E-2784 Type I or II

EXTERIOR PAINTING SCHEDULE

<u>Surface</u>	<u>First Coat</u>	<u>Second Coat</u>	<u>Third Coat</u>
Ferrous metal: subject to high temperature, up to 232 degrees C (450 degrees F).	SSPC Paint 20 Type I	None	None
Ferrous metal: subject to high temperature, from 232 degrees C to 649 degrees C (450 degrees F to 1200 degrees F).	FS TT-P-28	FS TT-P-28	None
NOTE: Commercial blast-cleaning, SSPC SP 6/NACE 3 required. No pretreatment. Maximum total system thickness: 0.102 mm.4 mil.			
Galvanized metal.	FS TT-E-2784 Type III	FS TT-E-2784 Type *	FS TT-E-2784 Type *
Aluminum aluminum-alloy, and other non- ferrous metal (non-galvanized)	CID A-A-2867 FS TT-E-2784 Type III	CID A-A-2867 FS TT-E-2784 Type *	None FS TT-E-2784 Type *
Aviation Obstructions			
Masonry & Concrete	FS TT-E-2784 Type III	FS TT-E-2784 Type I	None
Aviation Obstructions			
Ferrous Metal	SSPC Paint 25	CID A-A-2962 Type I Class ** Grade C	CID A-A-2962 Type I Class ** Grade C
	CID A-A-2867	CID A-A-2867	None
	SSPC Paint 23	FS TT-E-2784 Type I	FS TT-E-2784 Type I

EXTERIOR PAINTING SCHEDULE

Surface

First Coat

Second Coat

INTERIOR PAINTING SCHEDULE

<u>Surface</u>	<u>First Coat</u>	<u>Second Coat</u>	<u>Third Coat</u>
Plaster, gypsum board, concrete, and concrete masonry units not requiring a smooth finish, unless otherwise specified.	CID A-A-2994 Type II	CID A-A-2246	None
		-----or-----	
		CID A-A-2247	None
		CID A-A-2248	None
Concrete masonry units requiring a smooth finish	CID A-A-1500	CID A-A-2994 Type II	CID A-A-2246
			-----or-----
			CID A-A-2247
			-----or-----
			CID A-A-2248
Concrete: ceilings.	Primer as recommended by FS TT-C-555 manufacturer	FS TT-C-555 Type I	None
Concrete: floors requiring dust reduction.	CID A-A-2542 Type I	None	None
Concrete masonry units in food-preparation, food-serving, restrooms and laundry areas, unless otherwise specified	CID A-A-1500	CID A-A-2994 Type II	FS TT-E-2784
Plaster and gypsum board: in food-preparation, food-serving, restrooms and laundry areas, unless otherwise specified.	CID A-A-2994 Type II	FS TT-E-2784 Type *	None

Concrete masonry units: in, shower areas, and areas requiring a high degree of sanitation, unless otherwise specified.	CID A-A-1500	CID A-A-2994 Type II	FS TT-E-2784 Type *
Plaster and gypsum board: in shower areas, and areas requiring a high degree of sanitation, unless otherwise specified.	CID A-A-2994 Type II	FS TT-E-2784 Type *	None
Concrete masonry units, plaster, and gypsum board: for walls in heavy traffic areas in space as follows:	CID A-A-1500	CID A-A-2994 Type II	CID A-A-2246 -----or----- CID A-A-2247
Hardboard.	CID A-A-2994 Type I	CID A-A-2246 -----or----- CID A-A-2247 -----or----- CID A-A-2248	CID A-A-2246 CID A-A-2247 CID A-A-2248
Ferrous Metal unless otherwise specified	SSPC Paint 25	CID A-A-2962 Type I Class ** Grade C	CID A-A-2962 Type I Class ** Grade C
	SSPC Paint 23	FS TT-E-2784 Type I or II	FS TT-E-2784 Type I or II
	CID A-A-2867	CID A-A-2867	None
Aluminum and	CID A-A-2867	CID A-A-2867	None

aluminum alloy unless otherwise specified.	FS TT-E-2784 Type III	FS TT-E-2784 Type I or II	FS TT-E-2784 Type I or II
Ferrous metal in concealed damp spaces or in exposed areas having unpainted adjacent surfaces.	CID A-A-1632	None	None
Ferrous metal factory-primed mechanical and electrical equipment.	Two coats of paint as recommended by the equipment manufacturer		None
Galvanized metal:	FS TT-E-2784	FS TT-E-2784	None
	SSPC Paint 5	CID A-A-2962 Type I Class ** Grade C	CID A-A-2962 Type I Class ** Grade C
	SSPC Paint 25	CID A-A-2962 Type I ** Grade C	CID A-A-2962 Type I ** Grade C
	SSPC Paint 23	FS TT-E-2784 Type *	FS TT-E-2784 Type *
Wood: specified.	CID A-A-2994	CID A-A-2246	None
	-----or-----		
Wood: stain and	Commercially	CID A-A-1788 In addition a fourth coat of Class I	CID A-A-1788
	CID A-A-2339	CID A-A-2834 Type I Class **	CID A-A-2834 Type I Class **

In addition a fourth coat of
 CID A-A-2834
 Type I
 Class **

Wood: floors to receive paint finish.	CID A-A-2994 Type I	FS TT-E-2784 Type * Type I or II	FS TT-E-2784 Type * Type I or II
Wood: floors, except gymnasium floors, to receive stain or natural finish in spaces.	FS TT-C-542 Type I, Class A	FS TT-C-542 Type I, Class A	None
Wood: gymnasium floors.	CID A-A-2335	CID A-A-2335	Oleoresinous-type gymnasium floor finish. per MFMA-03
	FS TT-C-542 Type I, Class A	FS TT-C-542 Type I, Class A	None
Wood: handrails.	CID A-A-1788 Type * Class **	CID A-A-1788 Type * Class **	CID A-A-1788
	CID A-A-1546	CID A-A-1546	CID A-A-1546
Wood: natural finish.	CID A-A-1546	CID A-A-1546	CID A-A-1546
Ferrous Metal: Convector enclosures, electrical conduit runs: metallic tubing uninsulated ducts and pipes, pipe hangers, louvers, grilles, and air outlets, in areas having painted adjacent surfaces.	SSPC Paint 23	None	None

Aluminum and Galvanized Surface Metal:			
Convactor	FS TT-E-2784	CID A-A-2246	CID A-A-2246
electrical		CID A-A-2247	CID A-A-2247
conduit runs		-----or-----	
metallic tubing		CID A-A-2248	CID A-A-2248

ducts and pipes,
pipe hangers,
louvers, grilles,

in areas having
painted adjacent

Metal: surfaces subject to high temperature, up to 232 degrees C (450 degrees F).	SSPC Paint 20 Type I	None	None
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Metal: surfaces subject to temperature from 232 degrees C to 649 degrees C (450 degrees F to 1200 degrees F).	FS TT-P-28	FS TT-P-28	None
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NOTE: Commercial blast-cleaning, SSPC SP 6/NACE 3 or better required.
No pretreatment. Maximum total dry film thickness:
0.102 mm.4 mil.

Facing of vapor barrier jackets of presized or adhesive finished cloth cover insulation on pipes, ducts, and equipment.	Two coats of paint to match adjacent areas	None
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-- End of Section --

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DIVISION 09 - FINISHES

SECTION 09995

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SECTION 09995

PREPARATION OF HISTORIC WOOD AND METAL SURFACES FOR PAINTING

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH-02 (1997) Threshold Limit Values for Chemical Substances and Physical Agents Biological Exposure Indices

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 1730 (1967; R 1993) Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting

ASTM D 1731 (1967; R 1993) Preparation of Hot-Dip Aluminum Surfaces for Painting

ASTM D 3274 (1995) Evaluating Degree of Surface Disfigurement of Paint Films by Microbial (Fungal or Algal) Growth or Soil and Dirt Accumulation

ASTM D 3359 (1995a) Measuring Adhesion by Tape Test

ASTM D 4214 (1997) Evaluating Degree of Chalking of Exterior Paint Films

THE SOCIETY FOR PROTECTIVE COATING (SSPC)

SSPC PA Guide 5 (1990) Guide to Maintenance Painting Programs

SSPC SP 1 (1982) Solvent Cleaning

SSPC SP 2 (1995) Hand Tool Cleaning

SSPC SP 3 (1995) Power Tool Cleaning

SSPC SP 5/NACE 1 (1994) White Metal Blast Cleaning

SSPC SP 6/NACE 3 (1994) Commercial Blast Cleaning

SSPC SP 7/NACE 4 (1994) Brush-Off Blast Cleaning

SSPC SP 10/NACE 2

(1994) Near-White Blast Cleaning

1.2 WORK PLAN

The procedures proposed for the accomplishment of the work shall provide for safe conduct of the work, careful removal and disposition of materials specified to be salvaged, protection of property which is to remain undisturbed, and coordination with other work in progress. The work plan shall include a Safety and Health plan describing procedures for handling monitoring, and disposition of VOCs and other hazardous and toxic materials. The procedures shall include a detailed description of the methods and equipment to be used for each operation, and the sequence of operations. The Contractor shall test the materials designated by the Contracting Officer.

1.3 SUBMITTALS

Government approval is required for submittals with a "GA" designation; submittals having an "FIO" designation are for information only. The following shall be submitted in accordance with Section 01330 SUBMITTAL PROCEDURES:

SD-01 Data

Materials; GA.

The names, quantity represented, and intended use for proprietary brands of materials proposed to be substituted for the specified materials when the required quantity of a particular batch is 200 liters 50 gallons or less.

SD-06 Instructions

Materials; FIO.

Manufacturer's current printed product description, material safety data sheets (MSDS) and technical data sheets for each product. Detailed mixing, thinning and application instructions, minimum and maximum application temperature, and curing and drying times shall be provided for each product submitted.

SD-08 Statements

Qualifications; GA.

A statement certified by the Contractor attesting that the experience and qualifications of the workers (journeymen) comply with the specifications.

SD-13 Certificates

Work Plan; FIO.

Certificate stating that products proposed for use meet the VOC regulations of the local Air Pollution Control Districts having jurisdiction over the geographical area in which the project is located.

SD-18 Records

Work Plan; FIO.

One copy of the Work Plan.

1.4 PACKAGING, LABELING, AND STORING

Paint removers, solvents, and other chemicals used for surface preparation shall be in sealed containers that legibly show the designated name, formula or specification number, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name of manufacturer. Such materials shall be furnished in containers not larger than 20 liters; 5 gallons; they shall be stored in accordance with the manufacturer's written directions; and as a minimum stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors and at temperatures between 4 and 35 degrees C. 40 and 95 degrees F.

1.5 ENVIRONMENTAL CONDITIONS

Unless otherwise recommended by the product manufacturer, the ambient temperature shall be between 7 and 35 degrees C 45 and 95 degrees F when applying paint removers, solvents, or other preparation materials.

1.6 SAFETY AND HEALTH

Work shall comply with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in the CONTRACT CLAUSES. The Activity Hazard Analysis shall include analyses of the potential impact of surface preparation operations on personnel and on others involved in and adjacent to the work zone.

1.6.1 Worker Exposures

Exposure of workers to chemical substances shall not exceed limits as established by ACGIH-02.

1.6.2 Training

Workers having access to an affected work area shall be informed of the contents of the applicable material data safety sheets (MSDS) and shall be informed of potential health and safety hazard and protective controls associated with materials used on the project. An affected work area is one which may receive dust, mists, and odors from the surface preparation operations. Workers involved in surface preparation and clean-up shall be trained in the safe handling and application, and the exposure limit, for each material which the worker will use in the project. Personnel having a need to use respirators and masks shall be instructed in the use and maintenance of such equipment.

1.6.3 Coordination

Work shall be coordinated to minimize exposure of building occupants, other Contractor personnel, and visitors to mists and odors from surface preparation and cleaning operations.

1.7 QUALIFICATIONS

The Contractor shall provide qualified workers trained and experienced in the preparation for painting of wood and metal surfaces in historic structures and shall submit documentation of 5 consecutive years of work of this type. A list of similar jobs shall be provided identifying when,

where, and for whom the work was done. A current point-of-contact for identified references shall be provided.

PART 2 PRODUCTS

2.1 PAINT REMOVERS

Chemical paint removers shall be a commercial item specifically manufactured for the type of paint to be removed.

2.2 EPOXY CONSOLIDANTS

2.2.1 Liquid Consolidant

Liquid wood consolidant shall consist of a 2-part, low-viscosity liquid epoxy that meets the criteria of Table 1.

2.2.2 Epoxy Paste

Epoxy paste shall consist of a 2-part, thixotropic paste that meets the criteria of Table 1.

TABLE 1

	LIQUID CONSOLIDANT	EPOXY PASTE
Properties	Low-Viscosity Liquid	No-Slump, Thixotropic Paste
Toxicity	Low	Very Low
Toxicity Cured	Non-Toxic	Non-Toxic
Ratios	1:1 by Volume	1:1 by Volume
Pot Life @ Room Temp.	30 minutes min.	50 minutes min.
Hardening @ Room Temp.	1 hr. or longer	1 hr. or longer
Hardening @ 60 deg. C	16 min. or less	18 min. or less
Viscosity Poises @ 22 deg. C	4.7 max.	Thixotropic paste
Solids	95 percent min.	98 percent min.
Tensile Strength	27.6 MPa	17.25 MPa
Elongation	50 percent	4 percent
Compressive Strength		
Failure	131 MPa	---
Yield	24 MPa	38 MPa

TABLE 1

	LIQUID CONSOLIDANT	EPOXY PASTE
Properties	Low-Viscosity Liquid	No-Slump, Thixotropic Paste
Toxicity	Low	Very Low
Toxicity Cured	Non-Toxic	Non-Toxic
Ratios	1:1 by Volume	1:1 by Volume
Pot Life @ Room Temp.	30 minutes min.	50 minutes min.
Hardening @ Room Temp.	1 hr. or longer	1 hr. or longer
Hardening @ 140 deg. F	16 min. or less	18 min. or less
Viscosity Poises @ 72 deg. F	4.7 max.	Thixotropic paste
Solids	95 percent min.	98 percent min.
Tensile Strength	4000 psi	2500 psi
Elongation	50 percent	4 percent
Compressive Strength		
Failure	19000 psi	---
Yield	3500 psi	5500 psi

PART 3 EXECUTION

3.1 GENERAL REQUIREMENTS

Methods used for preparation of historic wood and metal surfaces for painting shall be the gentlest possible to achieve the desired results. Historic substrate materials shall not be damaged or marred in the process of surface preparations. Samples of the existing paint finishes shall be collected and analyzed for the purpose of documentation or matching, if required by the Task Order. Material and application requirements for paints are covered in Section 09900 PAINTING, GENERAL.

3.2 VENTILATION

Interior work zones having a volume of 280 cubic meters 10,000 cubic feet or less shall be ventilated at a minimum of 2 air exchanges per hour. Ventilation in larger work zones shall be maintained by means of mechanical exhaust. Solvent vapors shall be exhausted outdoors, away from air intakes and workers. Return air inlets in the work zone shall be temporarily sealed before start of work until the prepared surfaces have dried. Operators and personnel in the vicinity of paint removal processes involving chemicals or mechanical action (sanding or blasting) shall wear respirators.

3.3 PROTECTION OF AREAS NOT TO BE PAINTED

Items not to be painted which are in contact with or adjacent to painted surfaces shall be removed or protected prior to surface preparation and painting operations. Items removed prior to painting shall be replaced when painting is completed. Following completion of painting, workers skilled in the trades involved shall reinstall removed items. Surfaces contaminated by preparation materials shall be restored to original condition.

3.4 CLEANING OF SURFACES

Surfaces to be painted shall be clean and free of grease, dirt, dust and other foreign matter before application of paint or surface treatments. After cleaning, surfaces shall exhibit a surface disfigurement rating of 7 or greater when evaluated in accordance with ASTM D 3274. Dirt and surface contaminants shall be cleaned by brush with solutions of water and detergent or trisodium phosphate, then rinsed clean with water and let dry.

Surfaces on which mildew or other microbiological growth is present shall be cleaned with a detergent solution containing household bleach. Oil and grease shall be removed with clean cloths and cleaning solvents prior to mechanical cleaning. Cleaning solvents shall be of low toxicity with a flashpoint in excess of 38 degrees C. 100 degrees F. Cleaning shall be programmed so that dust and other contaminants will not fall on newly prepared or newly painted surfaces.

3.5 EXISTING PAINT

Existing paint shall be tested for adhesion to substrate per ASTM D 3359, Test Method A and shall obtain a rating of 4 or better in order to be considered sound. Existing paint meeting this requirement may be considered a satisfactory base for repainting.

3.6 PAINT REMOVAL

Flaking, cracking, blistering, peeling or otherwise deteriorated paint shall be removed by scraping with hand scrapers. After scraping, removal of large areas of paint or paint on architectural details shall be accomplished using sanders, heat guns or heat plates, or chemical paint removers. Paint shall be removed to bare substrate or first sound paint layer. Open flame heat devices shall not be used. Mechanical paint removal shall not damage or mar the substrate material.

3.6.1 Chemical Paint Removers

Chemical paint removers shall be used in accordance with manufacturer's recommendations. If chemical strippers are used, substrate shall be neutralized after stripping to a pH of 5 to 8.5.

3.6.2 Lead Paint

In preparation of lead-based painted surfaces for repainting, procedures described in Section 02090 LEAD-BASED PAINT (LBP) ABATEMENT AND DISPOSAL shall be followed.

3.7 SURFACE PREPARATION

After cleaning and removal of deteriorated paint, edges of remaining chipped paint shall be feather-edged and sanded smooth. Damaged areas such

as, but not limited to, nail holes, cracks, chips, and spalls shall be repaired with suitable material to match adjacent undamaged areas. Slick surfaces shall be roughened. Rusty metal surfaces shall be cleaned per SSPC SP 1, SSPC SP 2, SSPC SP 3, SSPC SP 5/NACE 1, SSPC SP 6/NACE 3, SSPC SP 7/NACE 4 or SSPC SP 10/NACE 2 as required by the Task Order. Chalk shall be removed so that when tested in accordance with ASTM D 4214, the chalk resistance rating is no less than 8. New, proposed coatings shall be compatible with existing coatings. If existing surfaces are glossy, the gloss shall be reduced.

3.8 WOOD SURFACES

Wood surfaces shall be cleaned of foreign matter. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints. Small, dry seasoned knots shall be scraped, cleaned, and given a thin coat of commercial knot sealer before application of the priming coat. Pitch on large, open, unseasoned knots and all other beads or streaks of pitch shall be scraped off, or, if it is still soft, removed with mineral spirits or turpentine, and the resinous area shall be thinly coated with knot sealer.

3.8.1 Interior Wood Surfaces

Interior wood surfaces to receive stain shall be sanded. Oak and other open-grain wood to receive stain shall be given a coat of wood filler recommended by the finish manufacturer not less than 8 hours before the application of stain; excess filler shall be removed and the surface sanded smooth. Method of sanding of wood floors will be specified in the task order. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter, unless otherwise authorized.

3.8.2 Wood Repair

Badly decayed areas shall be removed and repaired. Areas and pieces decayed beyond repair shall be replaced with new pieces that match originals in all respects. Moderately decayed areas, weathered, or gouged wood shall be patched with approved patching compounds, and shall be sanded smooth. The source or cause of wood decay shall be identified and corrected prior to application of patching materials. Wet wood shall be completely dried to a moisture content not exceeding 12 percent, as measured by a moisture meter, to its full depth before patching, unless otherwise authorized. Wood that is to be patched shall be clean of dust, grease, and loose paint.

3.8.2.1 Epoxy Wood Repair

Epoxy wood repair materials shall be applied in accordance with manufacturer's written instructions. Health and safety instructions shall be followed in accordance with the manufacturer's instructions. Clean mixing equipment shall be used to avoid contamination. Mix and proportions shall be as directed by the manufacturer. Batches shall be only large enough to complete the specific job intended. Patching materials shall be completely cured before painting or reinstallation of patched pieces.

3.8.2.2 Epoxy Consolidant and Epoxy Paste

Epoxy liquid wood consolidant shall be used: 1) to penetrate and impregnate deteriorated wood sections in order to reinforce wood fibers that have become softened or absorbent. 2) as a primer for areas that are

to receive epoxy paste filler. Epoxy paste shall be used to fill areas where portions of wood are missing such as holes, cracks, gaps, gouges, and other voids.

3.8.3 Exposed Ferrous Metals

Exposed ferrous metals such as nail heads on or in contact with wood surfaces to be painted with water-thinned paints, shall be spot-primed with a suitable corrosion-inhibitive primer capable of preventing flash rusting and compatible with the coating specified for the adjacent areas.

3.8.4 Finishing Nails

Finishing nails shall be set, and all holes and surface imperfections shall be primed. After priming, holes and imperfections in finish surfaces shall be filled with putty or plastic wood filler, colored to match the finish coat if natural finish is required, allowed to dry, and sanded smooth. Putty or wood filler shall be compatible with subsequent coatings.

3.8.5 Wood Preservative

Areas of bare wood in exterior locations prone to excessive moisture or standing water shall be treated with a commercial, fungicide, paintable water repellent/preservative. Water repellent/preservatives shall not be used on interior surfaces.

3.9 METAL SURFACES

Metal surfaces shall be cleaned of foreign matter. Programs for preparation of metal shall be per SSPC PA Guide 5. Grease, oil, and other soluble contaminants shall be removed by solvent cleaning per SSPC SP 1. Surfaces shall be free from soils and corrosion; e.g. grease, oil, solder flux, welding flux, weld spatter, sand, rust, scale, and other contaminants that might interfere with the application of the new finish. Cleaning methods shall be the gentlest possible to achieve the desired result. Metals which are soft, thin, or exhibit fine detail shall not be abrasively cleaned. Evidence of corrosion or contamination on a previously cleaned surface shall be cause for recleaning prior to painting.

3.9.1 Ferrous Surfaces

Ferrous surfaces that contain loose rust, loose mill scale, and other foreign substances shall be cleaned mechanically with hand tools according to SSPC SP 2, power tools according to SSPC SP 3 or by blast cleaning according to SSPC SP 5/NACE 1, SSPC SP 6/NACE 3, SSPC SP 7/NACE 4, or SSPC SP 10/NACE 2 as required by the Task Order. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

3.9.2 Nonferrous Metallic Surfaces

Galvanized, aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces shall be solvent-cleaned in accordance with SSPC SP 1.

3.9.2.1 Aluminum

Aluminum surfaces shall be treated per ASTM D 1730 or ASTM D 1731. Steel wool, steel brushes and uninhibited caustic etching solutions, such as sodium hydroxide, shall not be used on aluminum.

3.9.2.2 Zinc

Zinc surfaces including zinc-coated substrates, shall be cleaned prior to painting as follows: degrease, soak in a mild and inhibited alkaline cleaner, rinse with clean overflowing water, clean anodically in an acid (e.g. 0.25 to 0.75 percent sulfuric acid), and rinse with clean overflowing water.

3.10 TIMING

Surfaces that have been cleaned, pretreated, and otherwise prepared for painting shall be given a coat of the specified first coat as soon as practical after such pretreatment has been completed, but prior to any deterioration of the prepared surface. Unless otherwise directed, the first coat primer shall be applied within 48 hours of surface preparation.

3.11 SURFACES TO BE PREPARED FOR PAINTING

Surfaces shall be prepared as specified and as shown in the painting schedule in Section 09900 PAINTING, GENERAL and as required by the Task Order.

3.12 CLEANING

Cloths, cotton waste and other debris that might constitute a fire hazard shall be placed in closed metal containers and removed at the end of each day. Containers shall be removed from the site or destroyed in an approved manner. Preparation materials and other deposits on adjacent surfaces shall be removed and the entire job left clean and ready for painting.

-- End of Section --