

**SECTION 08 11 13
HOLLOW METAL FRAMES**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies, steel frames and related components.
- B. Terms relating to steel frames as defined in ANSI A123.1 and as specified.

1.2 RELATED WORK

- A. Coiling Counter doors: Section 08 33 00, COILING COUNTER DOORS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Glazing: Section 08 80 00, GLAZING.
- D. Lead Lining of Frames: Section 13 49 00 RADIATION PROTECTION.
- E. Card readers: Section 28 13 16, ACCESS CONTROL SYSTEM.

1.3 TESTING

- A. An independent testing laboratory shall perform testing.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers Literature and Data:
 - 1. Fire rated doors and frames, showing conformance with NFPA 80 and Underwriters Laboratory, Inc., or Intertek Testing Services or Factory Mutual fire rating requirements.

1.5 SHIPMENT

- A. Prior to shipment label each door and frame to show location, size, door swing and other pertinent information.
- B. Fasten temporary steel spreaders across the bottom of each door frame.

1.6 STORAGE AND HANDLING

- A. Store doors and frames at the site under cover.
- B. Protect from rust and damage during storage and erection until completion.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Door and Hardware Institute (DHI):
 - All5 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)

- C. Steel Door Institute (SDI):
 113-01 (R2006).....Thermal Transmittance of Steel Door and Frame
 Assemblies
- D. American National Standard Institute:
 A250.8-2003 (R2008).....Specifications for Standard Steel Doors and
 Frames
- E. American Society for Testing and Materials (ASTM):
 A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel
 Steel Plate, Sheet, and Strip
 A568/568-M-11.....Steel, Sheet, Carbon, and High-Strength, Low-
 alloy, Hot-Rolled and Cold-Rolled
 A1008-10.....Steel, sheet, Cold-Rolled, Carbon, Structural,
 High Strength Low Alloy and High Strength Low
 Alloy with Improved Formability
 B209/209M-10.....Aluminum and Aluminum-Alloy Sheet and Plate
 B221/221M-12.....Aluminum and Aluminum-Alloy Extruded Bars,
 Rods, Wire, Profiles and Tubes
 D1621-10.....Compressive Properties of Rigid Cellular
 Plastics
 E90-09.....Laboratory Measurement of Airborne Sound
 Transmission Loss of Building Partitions
- F. The National Association Architectural Metal Manufacturers (NAAMM):
 Metal Finishes Manual (AMP 500-06)
- G. National Fire Protection Association (NFPA):
 80-13.....Fire Doors and Fire Windows
- H. Underwriters Laboratories, Inc. (UL):
 Fire Resistance Directory
- I. Intertek Testing Services (ITS):
 Certifications Listings...Latest Edition
- J. Factory Mutual System (FM):
 Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A167, Type 302 or 304; finish, NAAMM Number 4.
- B. Sheet Steel: ASTM A1008, cold-rolled for panels (face sheets) of doors.
- C. Anchors, Fastenings and Accessories: Fastenings anchors, clips
 connecting members and sleeves from zinc coated steel.
- D. Prime Paint: Paint that meets or exceeds the requirements of A250.8.

2.2 METAL FRAMES

A. General:

1. ANSI A250.8, 1.3 mm (0.053 inch) thick sheet steel, types and styles as shown or scheduled.
2. Frames for labeled fire rated doors and windows.
 - a. Comply with NFPA 80. Test by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual.
 - b. Fire rated labels of approving laboratory permanently attached to frames as evidence of conformance with these requirements. Provide labels of metal or engraved stamp, with raised or incised markings.
3. Frames for lead-lined doors:
 - a. Frames for doors 900 mm (3 feet) or less in width and having lead lining of 1 mm or less in thickness, and not shown to have structural steel supports: Minimum 1.7 mm (0.067 inch) thick.
 - b. Frames for doors over 900 mm (3 feet) in width or having lead-lining more than 1 mm in thickness shown to be supported by and attached to structural steel subframes: Minimum 1.3 mm (0.053 inch) thick.
4. Frames for doors specified to have automatic door operators; service window: minimum 1.7 mm (0.067 inch) thick.
5. Knocked-down frames are acceptable.

B. Reinforcement and Covers:

1. ANSI A250.8 for, minimum thickness of steel reinforcement welded to back of frames.
2. Provide mortar guards securely fastened to back of hardware reinforcements.

C. Terminated (Hospital, 6") Stops: ANSI A250.8.

D. Glazed Openings:

- a. Integral stop on corridor, or secure side of door.
- b. Design rabbet width and depth to receive glazing material or panel shown or specified.

E. Frame Anchors:

1. Floor anchors:
 - a. Where floor fills occur, provide extension type floor anchors to compensate for depth of fill.

- b. At bottom of jamb use 1.3 mm (0.053 inch) thick steel clip angles welded to jamb and drilled to receive two 6 mm (1/4 inch) floor bolts.
 - c. Where mullions occur, provide 2.3 mm (0.093 inch) thick steel channel anchors, drilled for two 6 mm (1/4 inch) floor bolts and frame anchor screws.
 - d. Where sill sections occur, provide continuous 1 mm (0.042 inch) thick steel rough bucks drilled for 6 mm (1/4 inch) floor bolts and frame anchor screws. Space floor bolts at 50 mm (24 inches) on center.
2. Jamb anchors:
- a. Locate anchors on jambs near top and bottom of each frame, and at intermediate points not over 600 mm (24 inches) apart, except for fire rated frames space anchors as required by labeling authority.
 - b. Form jamb anchors of not less than 1 mm (0.042 inch) thick steel unless otherwise specified.
 - c. Anchors for stud partitions: Either weld to frame or use lock-in snap-in type. Provide tabs for securing anchor to the sides of the studs.
 - d. Anchors for observation windows and other continuous frames set in stud partitions.
 - 1) In addition to jamb anchors, weld clip anchors to sills and heads of continuous frames over 1200 mm (4 feet) long.
 - 2) Anchors spaced 600 mm (24 inches) on centers maximum.
 - e. Modify frame anchors to fit special frame and wall construction and provide special anchors where shown or required.

2.3 SHOP PAINTING

- A. ANSI A250.8.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Plumb, align and brace frames securely until permanent anchors are set.
 - 1. Use triangular bracing near each corner on both sides of frames with temporary wood spreaders at midpoint.
 - 2. Use wood spreaders at bottom of frame if the shipping spreader is removed.
 - 3. Protect frame from accidental abuse.

4. Where construction will permit concealment, leave the shipping spreaders in place after installation, otherwise remove the spreaders after the frames are set and anchored.
5. Remove wood spreaders and braces only after the walls are built and jamb anchors are secured.

B. Floor Anchors:

1. Anchor the bottom of door frames to floor with two 6 mm (1/4 inch) diameter expansion bolts.
2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:

1. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.

- D. Install anchors for labeled fire rated doors to provide rating as required.

3.2 INSTALLATION OF DOORS AND APPLICATION OF HARDWARE

- A. Install doors and hardware as specified in Sections Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, INTERIOR WOOD DOORS, Section 08 71 00, DOOR HARDWARE.

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**SECTION 08 14 00
INTERIOR WOOD DOORS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior flush doors with pre-finish, pre-fit option.
- B. Section includes fire rated doors, and smoke doors.

1.2 RELATED WORK

- A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Overhead doors: Section 08 33 00, COILING COUNTER DOORS.
- C. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.
- D. Installation of doors and hardware: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 14 00, INTERIOR WOOD DOORS, or Section 08 71 00, DOOR HARDWARE.
- E. Glazing: Section 08 80 00, GLAZING.
- F. Lead lined wood door: Section 13 49 00, RADIATION PROTECTION.
- G. Card readers: Section 28 13 16, ACCESS CONTROL SYSTEM

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Show every door in project and schedule location in building.
 - 2. Indicate type, grade, finish and size; include pertinent details.
 - 3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.
- C. Manufacturer's Literature and Data:
 - 1. Labeled fire rated doors showing conformance with NFPA 80.
- D. Laboratory Test Reports:
 - 1. Screw holding capacity test report in accordance with WDMA T.M.10.
 - 2. Split resistance test report in accordance with WDMA T.M.5.
 - 3. Cycle/Slam test report in accordance with WDMA T.M.7.
 - 4. Hinge-Loading test report in accordance with WDMA T.M.8.

1.4 WARRANTY

- A. Doors are subject to terms of Article titled "Warranty of Construction", FAR clause 52.246-21, except that warranty shall be as follows:

- 1. For interior doors, manufacturer's warranty for lifetime of original installation.

1.5 DELIVERY AND STORAGE

- A. Factory seal doors and accessories in minimum of 6 mill polyethylene bags or cardboard packages which shall remain unbroken during delivery and storage.
- B. Store in accordance with WDMA I.S.1-A, Job Site Information.
- C. Label package for door opening where used.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. Window and Door Manufacturers Association (WDMA):
 - I.S.1A-11.....Architectural Wood Flush Doors
 - I.S.4-09.....Water-Repellent Preservative Non-Pressure Treatment for Millwork
 - I.S.6A-11.....Architectural Wood Stile and Rail Doors
 - T.M.6-08.....Adhesive (Glue Bond) Durability Test Method
 - T.M.7-08.....Cycle-Slam Test Method
 - T.M.8-08.....Hinge Loading Test Method
 - T.M.10-08.....Screwholding Test Method
- C. National Fire Protection Association (NFPA):
 - 80-10.....Protection of Buildings from Exterior Fire
 - 252-08.....Fire Tests of Door Assemblies
- D. ASTM International (ASTM):
 - E90-09.....Laboratory Measurements of Airborne Sound Transmission Loss

PART 2 - PRODUCTS

2.1 FLUSH DOORS

- A. General:
 - 1. Meet requirements of WDMA I.S.1-A, Extra Heavy Duty.
 - 2. Adhesive: Type II
 - 3. Thickness: 45 mm (1-3/4 inches) unless otherwise shown or specified.
- B. Laminate Face:
 - 1. .050" high pressure decorative laminate meeting or exceeding NEMA Standards L023 Type CP50.
 - 2. Match newer existing Clear Birch Woodgrain Doors (not dark colored doors).

C. Glazing:

1. On non-labeled doors use applied wood stops nailed tight on room side and attached on opposite side with flathead, countersunk wood screws, spaced approximately 125 mm (5 inches) on centers.

D. Fire rated wood doors:

1. Fire Performance Rating:
 - a. "B" label, 1-1/2 hours.
 - b. "C" label, 3/4 hour.
2. Labels:
 - a. Doors shall conform to the requirements of ASTM E2074, or NFPA 252, and, carry an identifying label from a qualified testing and inspection agency for class of door or opening shown designating fire performance rating.
 - b. Metal labels with raised or incised markings.
3. Performance Criteria for Stiles of doors utilizing standard mortise leaf hinges:
 - a. Hinge Loading: WDMA T.M.8. Average of 10 test samples for Extra Heavy Duty doors.
 - b. Direct screw withdrawal: WDMA T.M.10 for Extra Heavy Duty doors. Average of 10 test samples using a steel, fully threaded #12 wood screw.
 - c. Cycle Slam: 1,000,000 cycles with no loose hinge screws or other visible signs of failure when tested in accordance with WDMA T.M.7.
4. Additional Hardware Reinforcement:
 - a. Provide fire rated doors with hardware reinforcement blocking.
 - b. Size of lock blocks as required to secure hardware specified.
 - c. Top, bottom and intermediate rail blocks shall measure not less than 125 mm (five inches) minimum by full core width.
 - d. Reinforcement blocking in compliance with manufacturer's labeling requirements.
 - e. Mineral material similar to core is not acceptable.
5. Other Core Components: Manufacturer's standard as allowed by the labeling requirements.
6. Provide steel frame approved for use in labeled doors for vision panels.

7. Provide steel astragal on pair of doors.

E. Smoke Barrier Doors:

1. Rating Label: "S", metal label with raised or incised marking.
2. For glazed openings use steel frames approved for use in labeled doors.
3. Provide a steel astragal on one leaf of pairs of doors, including double egress doors.

2.2 PREFINISH, PREFIT OPTION

- A. Flush doors may be factory machined to receive hardware, bevels, undercuts, cutouts, accessories and fitting for frame.
- B. Factory fitting to conform to specification for shop and field fitting, including factory application of sealer to edge and routings.

2.3 IDENTIFICATION MARK:

- A. On top edge of door.
- B. Either a stamp, brand or other indelible mark, giving manufacturer's name, door's trade name, construction of door, code date of manufacture and quality.
- C. Accompanied by either of the following additional requirements:
 1. An identification mark or a separate certification including name of inspection organization.
 2. Identification of standards for door, including glue type.
 3. Identification of veneer and quality certification.

PART 3 - EXECUTION

3.1 DOOR PREPARATION

- A. Field, shop or factory preparation: Do not violate the qualified testing and inspection agency label requirements for fire rated doors.
- B. Clearances between Doors and Frames and Floors:
 1. Maximum 3 mm (1/8 inch) clearance at the jambs, heads, and meeting stiles, and a 19 mm (3/4 inch) clearance at bottom, except as otherwise specified.
- C. Provide cutouts for special details required and specified.
- D. Rout doors for hardware using templates and location heights specified in Section, 08 71 00 DOOR HARDWARE.
- E. Fit doors to frame, bevel lock edge of doors 3 mm (1/8 inch) for each 50 mm (two inches) of door thickness undercut where shown.
- F. Immediately after fitting and cutting of doors for hardware, seal cut edges of doors with two coats of water resistant sealer.

- G. Finish surfaces, including both faces, top and bottom and edges of the doors smooth to touch.
- H. Apply a steel astragal on the opposite side of active door on pairs of fire rated doors.
- I. Apply a steel astragal to meeting style of active leaf of pair of doors or double egress smoke doors.

3.2 INSTALLATION OF DOORS APPLICATION OF HARDWARE

- A. Install doors and hardware as specified in this Section.

3.3 DOOR PROTECTION

- A. As door installation is completed, place polyethylene bag or cardboard shipping container over door and tape in place.
- B. Provide protective covering over knobs and handles in addition to covering door.
- C. Maintain covering in good condition until removal is approved by Project Engineer.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 SUMMARY

A. Section Includes:

1. Access doors and panels installed in walls and ceilings.

1.2 RELATED REQUIREMENTS

- A. Field Painting: Section 09 91 00, PAINTING.
- B. Access Doors for Control or Drain Valves: Section 21 10 00, WATER-BASED FIRE-SUPPRESSION SYSTEMS.
- C. Access Doors for Plumbing Valves: Section 22 40 00, PLUMBING FIXTURES.
- D. Locations of Access Doors for Ductwork Cleanouts: Section 23 31 00, HVAC DUCTS AND CASINGS.

1.3 APPLICABLE PUBLICATIONS

- A. Comply with references to extent specified in this section.
- B. American Welding Society (AWS):
1. D1.3/D1.3M-08 - Structural Welding Code - Sheet Steel.
- C. ASTM International (ASTM):
1. A653/A653M-15 - Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Sip Process.
 2. A1008/A1008M-15 - Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Baked Hardenable.
 3. A666-15 - Annealed or Cold-Worked Austenitic Stainless Steel sheet, Strip, Plate, and Flat Bar.
 4. E119-15 - Fire Test of Building Construction and Materials.
- D. National Fire Protection Association (NFPA):
1. 80-16 - Fire Doors and Other Opening Protectives.
 2. 251-12 - Fire Tests of Door Assemblies.
- E. National Association of Architectural Metal Manufacturers (NAAMM):
1. AMP 500-06 - Metal Finishes Manual.
- F. UL LLC (UL):
1. Listed - Online Certifications Directory.
 2. 10B-08 - Standard for Fire Tests of Door Assemblies.
 3. 263-11 - Fire Tests of Building Construction and Materials.

1.4 SUBMITTALS

- A. Submittal Procedures: Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Submittal Drawings:
 - 1. Show size, configuration, and fabrication and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Description of each product.
 - 2. Installation instructions.

1.5 DELIVERY

- A. Deliver products in manufacturer's original sealed packaging.
- B. Mark packaging, legibly. Indicate manufacturer's name or brand, type, production run number, and manufacture date.
- C. Before installation, return or dispose of products within distorted, damaged, or opened packaging.

1.6 STORAGE AND HANDLING

- A. Store products indoors in dry, weathertight facility.
- B. Protect products from damage during handling and construction operations.

1.7 FIELD CONDITIONS

- A. Field Measurements: Verify field conditions affecting access door fabrication and installation. Show field measurements on Submittal Drawings.
 - 1. Coordinate field measurement and fabrication schedule to avoid delay.

1.8 WARRANTY

- A. Construction Warranty: FAR clause 52.246-21, "Warranty of Construction."

PART 2 - PRODUCTS**2.1 MATERIALS**

- A. Steel Sheet: ASTM A1008/A1008M.

2.2 PRODUCTS - GENERAL

- A. Provide each product from one manufacturer.

2.3 ACCESS DOORS, FLUSH PANEL

- A. Door Panel:
 - 1. 1.9 mm (0.07 inch) thick steel steel sheet.

2. Reinforce to maintain flat surface.

B. Frame:

1. 1.5 mm (0.06 inch) thick steel sheet, depth and configuration to suit material and construction type where installed.
2. Frame Flange: Provide at units installed in gypsum board.
3. Exposed Joints in Flange: Weld and grind smooth.

C. Hinge:

1. Concealed spring hinge, 175 degrees of opening.
2. Removable hinge pin to allow removal of door panel from frame.

D. Lock:

1. Flush, screwdriver-operated cam lock.

2.4 FABRICATION - GENERAL

A. Sizes: 450 mm (18 inches) square and 600 mm (24 inches) square door.

B. Component Fabrication: Straight, square, flat and in same plane where required.

1. Exposed Edges: Slightly rounded, without burrs, snags and sharp edges.
2. Exposed Welds: Continuous, ground smooth.
3. Welding: AWS D1.3/D1.3M.

C. Locks and Non-Continuous Hinges: Provide in numbers required to maintain alignment of door panel with frame.

D. Anchoring: Make provisions in frame for anchoring to adjacent construction. Provide anchors in size, number and location on four sides to secure access door to substrate.

2.5 FINISHES

A. Steel Paint Finish:

1. Powder-Coat Finish: Manufacturer's standard two-coat finish system consisting of the following:
 - a. One coat primer.
 - b. One coat thermosetting topcoat.
 - c. Dry-film Thickness: 0.05 mm (2 mils) minimum.
 - d. Color: Match gypsum board ceiling paint color.

2.6 ACCESSORIES

A. Fasteners: Type and size recommended by access door manufacturer, to suit application.

PART 3 - EXECUTION**3.1 PREPARATION**

- A. Examine and verify substrate suitability for product installation.
 - 1. Verify access door locations and sizes provide required maintenance access to installed building services components.
- B. Protect existing construction and completed work from damage.

3.2 INSTALLATION - GENERAL

- A. Install products according to manufacturer's instructions and approved submittal drawings.
 - 1. When manufacturer's instructions deviate from specifications, submit proposed resolution for Contracting Officer's Representative consideration.
- B. Install access doors and panels permitting access to service valves, traps, dampers, cleanouts, and other mechanical, electrical and conveyor control items concealed in walls and partitions, and concealed above gypsum board ceilings.
- C. Install flush access panels in gypsum board ceilings.

3.3 ACCESS DOOR AND FRAME INSTALLATION

- A. Wall Installations: Install access doors in openings with sides vertical.
- B. Ceiling Installations: Install access doors parallel to ceiling suspension grid or room partitions.
- C. Frames with Flanges: Overlap opening, with face uniformly spaced from finish surface.
- D. Secure frames to adjacent construction with fasteners.
- E. Install type, size and quantity of anchoring device suitable for material surrounding opening to maintain alignment, and resist displacement, during normal use of access door.
- F. Field Painting Primed Access Doors: Comply with the requirements of Section 09 91 00, PAINTING.

3.4 ADJUSTMENT

- A. Adjust hardware so door panel opens freely.
- B. Adjust door when closed so door panel is centered in frame.

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**SECTION 08 33 00
COILING COUNTER DOORS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies coiling doors of sizes shown, complete as specified.

1.2 RELATED WORK

- A. Lock cylinders for cylindrical locks: Section 08 71 00, DOOR HARDWARE.
- B. Electric devices and wiring: DIVISION 26, ELECTRICAL.

1.3 MANUFACTURER'S AND INSTALLER'S QUALIFICATIONS

- A. Coiling doors shall be products of manufacturers regularly engaged in manufacturing items of type specified.
- B. Install items under direct supervision of manufacturer's representative or trained personnel.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Each type of door showing details of construction, accessories and hardware, electrical and mechanical items supporting brackets for motors, location, and ratings of motors, and safety devices.
 - 2. Wiring diagrams for motors and controls, including wiring diagram for door, showing electrical interlock of motor with manually operated dead lock, electrical rough-in.
- C. Manufacturer's Literature and Data:
 - 1. Brochures or catalog cuts, each type door.
 - 2. Manufacturer's installation procedures and instructions.
 - 3. Maintenance instructions, parts lists.
- D. Certificates:
 - 1. Attesting doors, anchors and hardware will withstand the horizontal loads specified.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A36/A36M-08.....Structural Steel

- A240/A240M-14.....Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
- A653/A653M-10.....Steel Sheet, Zinc-Coated (Galvanized) Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- B209/209M-07.....Aluminum and Aluminum-Alloy Sheet and Plate
- B221/B221M-08.....Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
- C. National Electrical Manufacturers Association (NEMA):
- ICS 1-00(R2008).....Industrial Control and Systems General Requirements
- ICS 2-00(R2005).....Industrial Control, and Systems, Controllers, Contactors, and Overload Relays
- ICS 6-93 (R2006).....Industrial Control and Systems Enclosures
- MG 1-10.....Motors and Generators
- ST 20-92 (R1997).....Dry-Type Transformers for General Applications
- D. National Fire Protection Association (NFPA):
- 70-11.....National Electrical Code 1999 Edition
- E. National Association of Architectural Metal Manufacturers (NAAMM):
- AMP 500 Series.....Metal Finishes Manual

PART 2 - PRODUCTS

2.1 MATERIAL

- A. Steel: A653 for forming operation. ASTM A36 for structural sections.
- B. Aluminum, Plate and Sheet: ASTM B209/B209M
- C. Aluminum, Extruded: ASTM B221/B221M

2.2 DESIGN REQUIREMENTS

- A. Coiling counter doors shall be spring counter balanced, overhead coiling type, inside face mounted with guides at jambs set back a sufficient distance to provide a clear opening when door is in open position.
- B. All motor operators shall have manual emergency mechanical operators. Provide pole with hook and crank handle to engage operator to raise or lower shutter.

2.3 FABRICATION

- A. Curtains:

1. Form of interlocking slats of aluminum of shapes standard with the manufacturer.
 2. Thickness of aluminum slats shall be as follows:
 - a. For doors less than 4500 mm (15 feet wide): 1 mm (0.040 inch).
- B. Bottom Bar:
1. Two angles of equal weight, one on each side, standard extruded aluminum members not less than 3 mm (0.125 inch) thick.
 2. Bottom bar designed to receive safety device, and be securely fastened to bottom of curtain.
- C. Barrel and Spring Counterbalance:
1. Curtain shall coil on a barrel supported at end of opening on brackets and be balanced by helical springs.
 2. Barrel fabricated of steel pipe or commercial welded steel tubing of proper diameter and thickness for the size of curtain, to limit deflection with curtain rolled up, not to exceed 1 in 400 (0.03 inch per foot) of span.
 3. Close ends of barrel with cast iron plugs, machined to fit the opening.
 4. Within the barrel, install an oil-tempered, helical, counter balancing steel spring, capable of producing sufficient torque to assure easy operation of the door curtain from any position.
 5. At least 80 percent of the door weight shall be counter balanced at any position.
 6. Spring-tension shall be adjustable from outside of bracket without removing the hood or motor operator.
- D. Brackets:
1. Steel plate designed to form end closure and support for hood and the end of the barrel assembly.
 2. End of barrel or shaft shall screw into bracket hubs fabricated of cast iron or steel.
 3. Equip bracket hubs or barrel plugs with prelubricated ball bearings, shielded or sealed.
- E. Hoods:
1. Aluminum, not less than 1 mm (0.040 inch) thick.
 2. Form hood to fit contour of end brackets.
 3. Reinforce at top and bottom edges with rolled beads, rods or angles.
 4. Fasten to brackets with screws or bolts and provide for attachment to wall with bolts.

F. Guides:

1. Manufacturer's standard formed sections or angles of steel.
 - a. Steel sections not less than 5 mm (3/16 inch) thick.
2. Form a channel pocket of sufficient depth to retain the curtain in place under the horizontal pressure specified, and prevent ends of curtain from slipping out of guide slots.
3. Top sections flared for smooth entry of curtain to vertical sections that will facilitate entry of curtain.
4. Provide stops to limit curtain travel above top of guides.
5. Provide guide of aluminum with replaceable wear strips to prevent metal to metal contact.
6. Mounting brackets shall provide closure between guides and jambs.

G. Locking:

1. Cylinder locks shall receive standard screw in cylinders furnished under Section, 08 71 00 DOOR HARDWARE. All other lock hardware is by Coiling Door Manufacturer.
2. For motor operated doors provide cylinder dead lock type locking device on the inside, key operated from both sides, interlocked with motor to prevent motor from operating when locks are activated.

2.4 ELECTRIC MOTOR OPERATORS

A. Provide operators complete with electric motor, machine cut reduction gears, steel chain and sprockets, magnetic brake, overload protection, brackets, push button controls, limit switches, magnetic reversing contactor, and other accessories necessary for proper operation including emergency manual operator.

B. Design:

1. Design the operator so that the motor may be removed without disturbing the limit-switch timing and without affecting the emergency manual operators.
2. Make provision for emergency manual operation of door by chain-gear mechanism.
3. Arrange the emergency manual operating mechanism so that it may be immediately put into and out of operation from the floor with an electrical or mechanical device, which will disconnect the motor from the operating mechanism when the emergency manual operating mechanism is engaged, and its use shall not affect the timing of the limit switches, in case of electrical failure.

4. Provide interlock with motor to prevent motor from operating when manual locks are activated.

C. Motors:

1. Motors shall conform to NEMA MG1, suitable for operation on current of the characteristics indicated, and shall operate at not more than 3600 rpm. Single-phase motors shall not have commutation or more than one starting contact. Motor enclosures shall be the drip proof type of NEMA TENV type.
2. Motors shall be high starting torque, reversible type, of sufficient horsepower and torque output to move the door in either direction from any position, and produce a door travel speed of not less than 0.66 foot or more than one foot per second, without exceeding the rated capacity.

D. Controls:

1. The control equipment shall conform to NEMA ICS 1 and 2.
2. Control enclosures shall be NEMA ICS 6, Type 12 or Type 4, except that contractor enclosures may be Type 1.
3. Remote control switches shall be at least 1500 mm (5 feet) above the floor line, and located so that the operator will have complete visibility of the door at all times.
4. Each door motor shall have an enclosed, across-the-line type, magnetic reversing contactor, thermal overload protection, solenoid operated brake, limit switches, and remote control switches at locations shown.
5. Use three-button type, push button switch on interior, unless noted to be key activated, with the buttons marked, OPEN, CLOSE, and STOP.
 - a. The OPEN and STOP buttons shall be of the type requiring only momentary pressure to operate. The CLOSE button shall be of the type requiring constant pressure to maintain the closing motion of the door. When the door is in motion, and the STOP button is pressed, the door shall stop instantly and remain in the stop position; from the stop position, the door may then be operated in either direction by the OPEN or Close buttons.
 - b. Push buttons shall be full-guarded to prevent accidental operation.
6. Provide limit switches to automatically stop the doors at their fully open and closed positions. Positions of the limit switches shall be readily adjustable.

7. Safety device:

- a. The bottom bar of power-operated doors shall have a fail safe safety device that will immediately stop and reverse the door in its closing travel upon contact with an obstruction in the door opening, or upon failure of the device, or any component of the device, or any component of the control system, and cause the door to return to its full open position. The door closing circuit shall be electrically locked out, and the door shall be operable manually until the failure or damage has been corrected.
- b. Safety device shall not be used as a limit switch.
- c. Safety device connecting cable to motor shall be flexible "Type SO" cable and spring loaded automatic take up reel or equivalent device, as required for proper operation of the doors.

8. Transformer:

- a. Provide a control transformer in power circuits as necessary to reduce the voltage on the control circuits to 120 volts or less.
- b. The transformer shall conform to NEMA ST20.

2.5 FINISHES

A. Aluminum: Finish exposed metal surfaces as follows:

- 1. AA-C22A41 medium matte, with clear anodic coating, Class I Architectural, 0.7 mils thick.

PART 3 - EXECUTION**3.1 INSTALLATION**

- A. Install doors in accordance with approved shop drawings and manufacturer's instructions.
- B. Locate anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories accurately.
- C. Securely attach guides to adjoining construction with not less than 9 mm (3/8 inch) diameter bolts, near each end and spaced not over 600 mm (24 inches) apart.
- D. Locate control switches where shown.
- E. Install all electric devices and wiring as specified in DIVISION 26 ELECTRICAL and DIVISION 28 - ELECTRONIC SAFETY AND SECURITY

3.2 REPAIR

- A. Coiling Doors shall be lubricated, properly adjusted, and demonstrated to operate freely.

3.3 PROTECTION

- A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze or other metals not compatible with aluminum by one of the following:
 - 1. Paint the dissimilar metal with a prime coat of zinc-Molybdate or other suitable primer, followed by two coats of aluminum paint.
 - 2. Place an approved caulking compound, or a non-absorptive tape, or gasket between the aluminum and the dissimilar metal.

3.4 INSPECTION

- A. Upon completion, doors shall be free from warp, twist, or distortion.

- - - E N D - - -

SECTION 08 71 00
DOOR HARDWARE

PART 1 - GENERAL

1.1 DESCRIPTION

- A. The work in this section includes the furnishing of all finish hardware as described in the specification and as required by hardware group numbers as shown on the drawings. Refer to the general conditions, special conditions and instructions to bidders for other requirements.

1.2 RELATED WORK

- A. Application of Hardware: Section 08 14 00, INTERIOR WOOD DOORS; Section 08 11 13, HOLLOW METAL DOORS AND FRAMES; Section 08 33 00, COILING COUNTER DOORS; and Section 13 49 00 RADIATION PROTECTION.
- B. Caulking: Section 07 92 00, JOINT SEALANTS.
- C. Painting: Section 09 91 00, PAINTING.

1.3 GENERAL

- A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.
- B. Hardware for Labeled Fire Doors and Exit Doors: Conform to requirements of NFPA 80 for labeled fire doors and to NFPA 101 for exit doors, as well as to other requirements specified. Provide hardware listed by UL, except where heavier materials, large size, or better grades are specified herein under paragraph HARDWARE SETS. In lieu of UL labeling and listing, test reports from a nationally recognized testing agency may be submitted showing that hardware has been tested in accordance with UL test methods and that it conforms to NFPA requirements.
- C. Hardware for application on metal and wood doors and frames shall be made to standard templates. Furnish templates to the fabricator of these items in sufficient time so as not to delay the construction.
- D. The following items shall be of the same manufacturer, except as otherwise specified:
1. Mortise locksets.
 2. Hinges for hollow metal and wood doors.
 3. Surface applied overhead door closers.
 4. Exit devices.

1.4 SUBMITTALS

- A. Within thirty (30) days after the contract is awarded and before any hardware is ordered, submit six (6) copies of a complete, detailed hardware schedule for review. If resubmissions are required, one (1)

copy will be returned with proper notations. Resubmit four (4) copies. After final reviewed schedule is returned send copies and templates to fabricators requiring the same.

B. Hardware Schedule: Prepare and submit hardware schedule in the following form:

Hardware Item	Quantity	Size	Reference Publication Type No.	Finish	Mfr. Name and Catalog No.	Key Control Symbols	UL Mark (if fire rated and listed)	ANSI/BHMA Finish Designation
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C. The schedule cover page shall include the VA project name, VA Project Number, VA Contract Number, hardware supplier, firm name of general contractor, architectural firm, name and manufacturers reference list of symbols used to abbreviate names of hardware manufacturers.

D. Catalog cuts of each piece of hardware shall accompany the hardware schedule.

E. Templates:

1. Furnish a final hardware schedule and templates to door frame suppliers. If required, the hardware supplier shall furnish physical hardware to the door and frame manufacturers for application.
2. All reinforcements required to adapt hardware to metal doors or frames shall be supplied by the door and/or frame manufacturers.

F. Samples and Manufacturers' Literature:

1. Samples: All hardware items (proposed for the project) that have not been previously approved by Builders Hardware Manufacturers Association shall be submitted for approval. Tag and mark all items with manufacturer's name, catalog number and project number.
2. Samples are not required for hardware listed in the specifications by manufacturer's catalog number, if the contractor proposes to use the manufacturer's product specified.

1.5 DELIVERY, MARKING, PACKING AND STORAGE

A. All hardware shall be delivered to the jobsite or, upon request to the door and/or frame manufacturers in the manufacturer's original cartons, marked to correspond with the reviewed hardware schedule. The general contractor shall be responsible for the protection and storage of all hardware. All items shall be packed to prevent damage in transit.

B. Deliver items of hardware to job site in their original containers, complete with necessary appurtenances including screws, keys, and instructions. Tag one of each different item of hardware and deliver to Project Engineer for reference purposes. Tag shall identify item by project specification type or number and manufacturer's catalog number. These items shall remain on file in Project Engineer's office.

1.6 KEYING

A. All cylinders shall be keyed to match existing, equal to Best Corp. System. Provide removable core cylinders that are removable only with a special key or tool without disassembly of knob or lockset. Cylinders shall be 7 pin type. Provide cores, pins, etc. and VA Locksmith will set up.

1.7 FINISHES

A. Unless otherwise indicated, finishes shall be as follows:

Butts	Exterior:	US32D
	Interior:	US26D
Locksets		US26D
Closers		SPRAY ALUMINUM
Exit Devices		US32D
Pushes, Pulls, Kicks		US32D
Stops, Holders		US32D
Miscellaneous		US26D/32D/28

1.8 APPLICABLE PUBLICATIONS

A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only. In text, hardware items are referred to by series, types, etc., listed in such specifications and standards, except as otherwise specified.

B. American Society for Testing and Materials (ASTM):

F883-04.....	Padlocks
E2180-07.....	Standard Test Method for Determining the Activity of Incorporated Antimicrobial Agent(s) In Polymeric or Hydrophobic Materials

C. American National Standards Institute/Builders Hardware Manufacturers Association (ANSI/BHMA):

A156.1-06.....	Butts and Hinges
A156.2-03.....	Bored and Pre-assembled Locks and Latches

- A156.3-08.....Exit Devices, Coordinators, and Auto Flush Bolts
- A156.4-08.....Door Controls (Closers)
- A156.5-01.....Auxiliary Locks and Associated Products
- A156.6-05.....Architectural Door Trim
- A156.8-05.....Door Controls-Overhead Stops and Holders
- A156.12-05Interconnected Locks and Latches
- A156.13-05.....Mortise Locks and Latches Series 1000
- A156.14-07Sliding and Folding Door Hardware
- A156.15-06.....Release Devices-Closer Holder, Electromagnetic and Electromechanical
- A156.16-08.....Auxiliary Hardware
- A156.17-04Self-Closing Hinges and Pivots
- A156.18-06.....Materials and Finishes
- A156.20-06Strap and Tee Hinges, and Hasps
- A156.21-09.....Thresholds
- A156.22-05.....Door Gasketing and Edge Seal Systems
- A156.23-04.....Electromagnetic Locks
- A156.24-03.....Delayed Egress Locking Systems
- A156.25-07Electrified Locking Devices
- A156.26-06.....Continuous Hinges
- A156.28-07Master Keying Systems
- A156.29-07Exit Locks and Alarms
- A156.30-03High Security Cylinders
- A156.31-07Electric Strikes and Frame Mounted Actuators
- A250.8-03.....Standard Steel Doors and Frames
- D. National Fire Protection Association (NFPA):
 - 80-10.....Fire Doors and Fire Windows
 - 101-09.....Life Safety Code
- E. Underwriters Laboratories, Inc. (UL):
 - Building Materials Directory (2008)

PART 2 - PRODUCTS

- A. Hardware shall include all necessary fasteners. All fasteners shall be of the proper type, size, material and finish for its intended purpose. All screws, exposed either when the door is open or closed shall have Phillips heads.

2.1 HINGES

A. ANSI A156.1 Equal to the following butt types which are considered acceptable:

	Hager	Stanley	McKinney	PBB	Gov't#
TYPE 1	BB1199	FBB199	T4A3386	4B51	A2111
TYPE 2	BB1168	FBB168	T4A3786	4B81	A8111
TYPE 3	BB1279	FBB179	TA2714	BB81	A8112
TYPE 4	1279	F179	T2714	PB81	A8133
TYPE 5	BB1191	FBB191	TA2314	BB51	A5112
TYPE 6	1250	2060	1502	SP81	

B. Ball bearing butts shall be furnished for all exterior doors, doors with closers, and doors over 36" wide.

C. Butt types shall be furnished as follows:

- Exterior Outswinging Doors Type 1 x NRP
- Vestibule doors Type 2
- Interior Doors over 3'0" Wide ... Type 2
- Interior Doors thru 3'0" Wide ... Type 3 or 4
- (All interior reverse bevel doors with lockable functions shall have NRP type butts.)
- As indicated in groups..... Type 5 or 6

D. Butt quantities and sizes shall be as follows:

- Two butts for doors up to 5'-0" high.
- Provide one butt for every 30" of height unless otherwise indicated in spec groups.
- 1 3/4" Exterior Doors 4 1/2" x 4 1/2"
- 1 3/4" Interior Doors 4 1/2" x 4 1/2"

E. Provide proper butt width to clear trim and allow full 180 degree swing.

F. All butts shall have flat button tips unless otherwise noted in hardware groups. Hinges for exterior doors shall have non-removable pins. See Hardware Groups for special butt requirements.

2.2 LOCKSETS AND LATCHSETS

A. Locksets and latchsets shall be heavy duty mortise type equal to:

Brand	Series	Design
Sargent (or equal)	8200	WTJ-26D

1. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
2. Closers shall have full size cover.

3. Closers shall have adjustable hydraulic back-check and separate valves for closing and latching speed.
- B. Locksets, latchsets, trim and cylinders shall be the product of one manufacturer unless otherwise indicated above. Cylinders shall be BEST Corp. 7 pin tumblers. Unless otherwise indicated, all locksets, deadlocks and latchsets shall be 2 3/4" backsets. Bolt throw on pairs of doors shall be not less than 5/8". Lever handle locksets and latchsets with base metal other than aluminum shall have U.L. required fire stop to prevent latchbolt from returning into the lock body during fire.
- C. Provide wrought boxes and strikes with proper length to protect trim not to project more than 1/8" beyond trim, frame or inactive leaf. Where required, provide open back strike that is protected to allow practical and secure operation.
- D. Combination lock with integral lever shall be equal to the following:
- | Brand | Series |
|---------|--------|
| Simplex | L1021 |
1. Fully mechanical lock (no batteries)
 2. Key override with small format seven pin best core
 3. Satin Chrome 26D (626) finish
 4. Latch throw 3/4 inch.

2.3 EXIT DEVICES

- A. All exit devices shall be U.L. listed for panic. Exit devices for labeled doors shall be listed and labeled as "Fire Exit Hardware".
- B. All devices shall be thru bolted when applied to mineral core doors unless doors are properly reinforced with blocking.
- C. All devices shall be the product of one manufacturer with application and function being exact.
- D. Function numbers used in the groups of this specification are Von Duprin.
- E. Equal to the following Manufacturers:

Von DUPRIN	PRECISION
99	2000
996L	1700/4900
PS873-2	ELR152

2.4 DOOR CLOSERS

- A. Door closers shall have cast iron or aluminum shells. The arms shall be forged. Finish shall match the hardware on the side of the door to which the closer is mounted. All door closers shall have full rack and pinion mechanism with adjustable control for "sweep", "latch", and "backcheck" speeds. All adjustments shall require the use of tamper-proof tools or valve keys. Closers shall be equipped with adjustable spring power to adjust the closer size from size 2 to size 6.
- B. Furnish inverted installations, parallel arms, holder arms, drop plates, etc. as required to suit conditions. With closers mounted as follows unless details or other conditions dictate otherwise:
 - 1. Room side of corridor doors.
 - 2. Inside of exterior doors (use parallel arm or top jamb mounting)
 - 3. Stair side of stairways.Closer shall be attached with thru-bolts on the following:
 - 1. Mineral core doors.
 - 2. Lead lined doors.
- C. Hardware schedule shall indicate the closer manufacturer, finish, accessories, and degree of opening for each item.
- D. Equal to the following Manufacturers:

LCN	NORTON	SARGENT
4041	7500	351
4040SE	PT7700	351EHT/D

2.5 DOOR TRIM

- A. Unless otherwise indicated, all push plates shall be 6" x 16" for flush doors and 4" x 16" for doors which will not accept 6" plates.
- B. Unless otherwise indicated, all door pulls shall be ¾" round material with 8" centers and 2 5/8" projection for interior doors. For exterior doors furnish pulls with 1" round material 10" centers and 2 ½" projection. Concealed screw mounting shall be used whenever thru-bolt attachment would leave an exposed screw.
- C. All kick plates 16 ga. (.050) Stainless Steel Finish: 32D. Width of kick plates and armor plates shall be 2" LDW on single door and 1" LDW on pairs of doors. All kickplates shall be 8" high. All armor plates shall be 35" high.
- D. Equal to the following Manufacturers:
 - Burns Industries, Inc.

Hiawatha Hardware Co.
Quality Hardware Co.
Triangle Brass Mfg. Co., Inc.

2.6 FLUSH BOLTS

- A. ANSI A156.16 Inactive leaves of pairs shall have two flush bolts, Glynn-Johnson FB6, where used with locks and latches. Where doors are over 96", furnish 24" top rods. The bottom bolt shall be provided with a dust proof strike, DP-2, where thresholds are not used. No manual flush bolts shall be used on fire doors.
- B. On inactive leaves of pairs of labeled doors furnish FB7 or FB8, (as needed), as manufactured by Glynn-Johnson Corp. or equal. Dustproof strikes shall be DP-2 as manufactured by Glynn-Johnson Corp. or equal. Products by Door Controls Int'l and Ives, or equal, are acceptable.

2.7 COORDINATORS

- A. ANSI A156.16 Coordinators shall be COR as manufactured by Glynn-Johnson Corp. or equal, complete with fillers, mounting brackets, and strike preps as needed. Products by Door Controls International and Ives, or equal, are acceptable.

2.8 STOPS AND HOLDERS

- A. ANSI A156.16 and ANSI A156.8 Furnish a stop or holder for each door whether or not equipped with a closer. Interior doors requiring a stop shall have one of the following as indicated by conditions: 50W, 60W, WB11, WB11A, RB3, RB4, RB6 or 90 series.
Note: Use 90 Series when an overhead stop is required on labeled doors. Use 360 Series, when required, on lead-lined doors. If closer is used CUSH or H-CUSH arm is acceptable. Floor or base stops shall be used only where definitely specified or absolutely unavoidable.
- B. Interior doors requiring a stop and holder shall have one of the following as indicated by surrounding conditions: W20, W20A, W40 or 90 series.
- C. Exterior and vestibule doors requiring a stop and holder shall have one of the following as indicated by surrounding conditions: W20 or 90M series.
- D. Exterior doors opening against a 1-1/2" or 2" pipe rail shall be furnished with a W20 x pipe adapter block, where conditions allow.
- E. Doors which are capable of swinging more than 110 degrees before striking a wall shall have an overhead type stop.

2.9 THRESHOLDS

A. Thresholds shall be equal to Pemko 171 Series, not to exceed ½" in height, unless specified or detailed otherwise. Where thresholds occur at openings with one or more mullions, they shall be cut for the mullions and extended continuously for the entire opening.

2.10 WEATHERSTRIPPING AND SMOKE SEALING

- A. Unless otherwise indicated, weatherstripping shall be closed cell sponge neoprene, similar to Reese 755. Apply weatherstripping to head and jambs of exterior hollow metal frames.
- B. Sweep strips shall be similar to Reese 964, extruded aluminum frame with 7/8" nylon brush insert.
- C. All labeled fire shall have gaskets Reese 797F. Pairs of doors with 2 vertical rod exit devices to have astragal similar to Reese 964. Where latchbolt at 40" height is used, door manufacturer to supply lap type astragal with 797F applied to interior of astragal by this section. Astragal to be applied to outside of active leaf.
- D. Threshold and Weatherstripping Manufacturers

Equal to	Reese	Pemko	Nat'l Grd	Seal-eze
Threshold	S425	171A	425E	
Sweep	964	18061	C607A	D480
Gasket	F797	PK55D	9090	
Weatherstrip	755	2891APK	700N	
Astragals	964	18061	A605	A180
Door bottoms	320	4131	220	

2.11 KEYS

A. Furnish keys in quantities as follows:
 Cylinder locks 2 keys each

PART 3 - EXECUTION

3.1 APPLICATION

- A. For existing buildings locate hardware on doors at heights to match existing hardware. The Contractor shall visit the site, verify location of existing hardware and submit locations to Project Engineer for approval.
- B. Holes and mortises in wood doors for locks and other hardware shall be cut with a jig approved or provided by the manufacturer of the item

applied. All locks shall be mounted so the key enters the cylinder with the smooth side down. After hardware has been fitted, escutcheons and face-applied hardware shall be removed or masked until final painting has been completed. Hardware shall be reinstalled after painting is complete, properly adjusted, tested and left in perfect working condition.

- C. After locks have been re-installed; the installer shall show in presence of Project Engineer that keys operate their respective locks in accordance with keying requirements. Installation of locks which do not meet specified keying requirements shall be considered sufficient justification for rejection and replacement of all locks installed on project. The installer shall seal its keys in one of the supplied envelopes. The keys shall be delivered to the owner or hardware supplier, together with surplus envelopes for installation into key cabinet.
- D. Prior to completion of the job determine that all closers are in proper adjustment. No closer shall complete its full closing cycle in less than 4 to 6 seconds and there shall be no abrupt change in speed between the "sweep" and "latch" speeds. All knobs, levers, and latchbolts shall be free from binding. Turn all wrenches and adjusting tools, as provided with the hardware, to the owner.
- E. Hardware applied to wood labeled doors shall be fastened with thru-bolts and nuts.
- F. Thresholds shall be set in a bed of mastic.

3.2 HARDWARE GROUPS AND SUFFIXES

- A. The following schedule of hardware groups shall be considered a guide only and the supplier is cautioned to refer to the general conditions, special conditions, and the preamble to this section. It shall be the hardware suppliers responsibility to furnish all required hardware.
- B. Refer to the door schedule for hardware group required for each opening. Ignore hardware groups not used on the door schedule.
- C. Hardware group suffixes (example 2C) on drawings:
 - "A"- Add armor plate and door edge guards (2 for double-acting doors). Apply to push side of door. Refer to preamble for detailed information.
 - "B"- Inactive leaf of pairs shall be equipped with flush bolts, and dustproof strikes (automatic flush bolts with coordinator and closer for labeled pairs) butts and stop.

- "C"- Add closer. Refer to preamble for detailed information.
- "D"- Add delayed action function to closer specified.
- "E"- Add fire/smoke life safety device unit. Refer to preamble for detailed information. Unit shall be similar to LCN 4040SE or approved equal. If door needs a stop option along with hold-open option, use either a CUSH arm on the closer with a SEH holder or use a overhead type stop with a pull side mounted fire/smoke life safety device. All electrical connections are specified in Division 16. Verify voltage with electrical engineer.
- "G"- Add door edge guard. Refer to preamble for detailed information. Use DE-1A or equal.
- "H"- Add hold-open feature to closer or magnetic holder as detailed if labeled opening. Refer to preamble for detailed information. All electrical connections are specified in Division 16.
- "K"- Add kickplate. Refer to preamble for detailed information.
- "L"- All mortised hardware shall be lead lined, including knobs and roses. Add L147 pivot with ML19 intermediate pivots spaced at same intervals as butts. (Equal to Ives) Add door edge and kickplates.
- "P"- Change specified closer to CUSH type arm or use overhead type stop. Use brackets or spacers.
- "Q"- Change specified closer to H-CUSH type arm. Use proper brackets or spacers.
- "S"- Add electric strike. Equal to Folger-Adam 310 Series to match latching mechanism application. If locking device is a panic device, use "EL" option with power supply and power transfer as required by device manufacturer.
- "T"- Add a deadbolt, cylinder outside, turnpiece inside.
- "W"- Supply threshold weatherstrip & sweep as required. For exterior pairs, furnish astragal similar to Reese 964 each leaf.
- "X"- Operator to be supplied by others, omit closer.
- "Z"- Add alarm feature to (1) device similar to Von Duprin "ALK" option. Furnish power supply and power transfer as required by manufacturer of device.
- * Indicates - furnish GJWB11, WB11A, or GJ450/90 series where 50W or 60W is not applicable.

D. Hardware Groups:

HARDWARE SETS

<p><u>GROUP 6</u> Each door shall have: 1 Pivot set EP-5J (Equal to McKINNEY) 1 Double lip strike/stop CSS-9 (Equal to McKINNEY) 1 Privacy set 8265-WTJ. Function: Latch bolt by lever either side EXCEPT when push button inside unlocks outside lever. Push button released by turning inside lever or by closing door. Emergency button on outside unlocks outside lever and releases inside lever. 1 Wall stop 50W *</p>	<p><u>GROUP 12</u> Each door shall have: Butts as required. 1 Lockset 8205-WTJ (office function) Function: Latchbolt by lever either side EXCEPT when outside lever is locked by toggle in lock front. Key outside retracts latch bolt. Deadlocking latch. 1 Cylinder as required. 1 Wall stop 60W *</p>
<p><u>GROUP 13</u> Each door shall have: Butts as required. 1 Lockset 8237-WTJ (classroom function) Function: Latch bolt by lever either side EXCEPT when key outside locks outside lever. Deadlocking latch. 1 Cylinder as required. 1 Wall stop 50W *</p>	<p><u>GROUP 31</u> Each door shall have: Butts as required. 1 Privacy set 8265-WTJ Function: Latch bolt by lever either side EXCEPT when push/turn button inside locks outside lever. Push/turn button released by turning inside lever or by closing door. Emergency button on outside unlocks outside lever and releases inside button. 1 Closer as required. 1 Kickplate as required. 1 Wall stop 60W *</p>

HARDWARE SETS

<p><u>GROUP 32</u></p> <p>Each door shall have:</p> <p>Butts as required.</p> <p>1 Lockset 8205-WTU (office function)</p> <p>Function:</p> <p>Latch bolt by lever either side EXCEPT when outside lever is locked by toggle in lock face.</p> <p>Key outside retracts latch bolt. Deadlocking latch.</p> <p>1 Closer as required. 1 Cylinder as required. 1 Kickplate as required. 1 Wall stop 60W *</p>	<p><u>GROUP 34</u></p> <p>Each door shall have:</p> <p>Butts as required.</p> <p>1 Lockset 8204-WTU (storeroom function)</p> <p>Function:</p> <p>Latch bolt by lever inside only. Outside lever always RIGID. Key outside retracts latch bolt. Deadlocking latch.</p> <p>1 Closer as required 1 Cylinder as required. 1 Kickplate as required. 1 Wall stop 50W *</p>
<p><u>GROUP 34E</u></p> <p>Each pair shall have:</p> <p>Butts as required, including one CECB-FBB (Transfer & monitor hinge)</p> <p>1 Lockset 8271 Electric (Fail Secure). Include required power supply.</p> <p>Function:</p> <p>Key outside retracts latch bolt when outside locked by Card Reader Security System.</p> <p>Lever outside retracts latch bolt except when outside locked. Lever outside can only be unlocked by Card Reader Solenoid.</p> <p>lever inside always retracts Latch bolt.</p> <p>2 Flush Bolts 1 Dustproof strike 1 Overhead stop 4 Kickplates as required.</p>	<p><u>GROUP 35</u></p> <p>Each door shall have:</p> <p>Butts as required.</p> <p>1 Lockset L1021</p> <p>Function:</p> <p>Latch bolt by lever inside only. Outside lever always RIGID. Push button combination or key outside retracts latch bolt. Deadlocking latch.</p> <p>1 Closer as required 1 Cylinder as required. 1 Kickplate as required. 1 Wall stop 50W *</p>

HARDWARE SETS

<p><u>GROUP 81</u></p> <p>Each pair shall have:</p> <p>Butts as required.</p> <p>2 Exit devices 9927EO-F</p> <p>Function:</p> <p>No outside operation.</p> <p>2 Closers as required.</p> <p>2 Kickplates as required.</p>	<p><u>GROUP 82</u></p> <p>Each pair shall have:</p> <p>Butts as required.</p> <p>1 Exit device 9927L or 9927L-F (L-NL if required)</p> <p>Function:</p> <p>Key outside locks or unlocks lever trim.</p> <p>1 Exit device 9927EO or 9927EO-F</p> <p>Function:</p> <p>No outside operation.</p> <p>1 or 2 cylinders as required.</p> <p>2 Closers as required.</p> <p>2 Kickplates as required.</p> <p>2 Wall stops 50W *</p>
<p><u>GROUP 86</u></p> <p>Each pair shall have:</p> <p>Butts as required.</p> <p>2 Exit devices 9927L or 9927L-F</p> <p>Function:</p> <p>Key locks or unlocks outside trim.</p> <p>2 Cylinders as required.</p> <p>2 Closers as required.</p> <p>2 Kickplates as required.</p> <p>2 Magnetic holders FM998 (Verify voltage with Electrical Engineer.)</p>	<p><u>GROUP 90</u></p> <p>Each door shall have:</p> <p>Butts as required.</p> <p>1 Push as required.</p> <p>1 Pull as required.</p> <p>1 Closer as required.</p> <p>1 Kickplate as required.</p> <p>1 Wall stop 50W *</p>
<p><u>GROUP 92</u></p> <p>Each door shall have:</p> <p>Butts as required.</p> <p>1 Push/pull latch 1580P (Trimco)</p> <p>Function:</p> <p>Latchbolt by paddle either side.</p> <p>1 Closer as required.</p> <p>1 Kickplate as required.</p> <p>1 Wall stop 50W *</p>	<p><u>GROUP 98</u></p> <p>Each door shall have:</p> <p>Butts as required.</p> <p>1 Push/pull latch 1580P (Trimco)</p> <p>Function:</p> <p>Latchbolt by paddle either side.</p> <p>Wall stop 60W *</p>

* Use overhead stop if 60W not applicable.

- - - E N D - - -

SECTION 08 71 13
AUTOMATIC DOOR OPERATORS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies equipment, controls and accessories for automatic operation of swing doors.

1.2 RELATED WORK

- A. Door hardware; Section 08 71 00, DOOR HARDWARE.
- B. Section 28 13 16, ACCESS CONTROL SYSTEM.
- C. Glass and glazing of doors and frames; Section 08 80 00, GLAZING.
- D. Electric general wiring, connections and equipment requirements; Division 26, ELECTRICAL.
- E. Section 28 31 00, FIRE DETECTION AND ALARM.

1.3 QUALITY ASSURANCE

- A. Automatic door operators, controls and other equipment shall be products of a manufacturer regularly engaged in manufacturing such equipment for a minimum of three years.
- B. One type of automatic door equipment shall be used throughout the building.
- C. Equipment installer shall have specialized experience and shall be approved by the manufacturer.

1.4 WARRANTY

- A. Automatic door operators shall be subject to the terms of the "Warranty of Construction", FAR clause 52.246-21, except that the Warranty period shall be two years in lieu of one year.

1.5 MAINTENANCE MANUALS

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on automatic door operators.

1.6 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's literature and data describing operators, power units, controls, door hardware and safety devices.
- C. Shop Drawings:
 - 1. Showing location of controls and safety devices in relationship to each automatically operated door.

- 2. Showing layout, profiles, product components, including anchorage, accessories, as applicable.
- 3. Submit templates, wiring diagrams, fabrication details and other information to coordinate the proper installation of the automatic door operators.
- D. Submit in writing to Project Engineer that items listed in Article 1.3 are in compliance.

1.7 DESIGN CRITERIA

- A. As a minimum automatic door equipment shall comply with the requirements of BHMA 156.10. Except as otherwise noted on drawings, provide operators which will move the doors from the fully closed to fully opened position in three seconds maximum time interval, when speed adjustment is at maximum setting.
- B. Equipment: Conforming to UL 325. Provide key operated power disconnect wall switch for each door installation with cylinder keyed into Fargo VA Best Corp. System.
- C. Electrical Wiring, Connections and Equipment: Provide all motor, starter, controls, associated devices, and interconnecting wiring required for the installation. Equipment and wiring shall be as specified in Division 26, ELECTRICAL.

1.8 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. Builders Hardware Manufacturers Association, Inc. (BHMA):
A156.10-05.....Power Operated Pedestrian Doors (BHMA 1601)
- C. National Fire Protection Association (NFPA):
101-09.....Life Safety Code
- D. Underwriters Laboratory (UL):
325-10.....Door, Drapery, Gate, Louver, and Window
Operators and Systems

1.9 DELIVERY AND STORAGE

- A. Delivery shall be in factory's original, unopened, undamaged container with identification labels attached.

PART 2 - PRODUCTS

2.1 SWING DOOR OPERATORS

- A. General: Swing door operators shall be of institutional type, door panel size 600 mm to 1250 mm (2'-0" to 5'-0") width, weight not to

exceed 300 kg (600 pounds), electric operated for overhead mounting within the header or transom. Furnish metal mounting supports, brackets and other accessories necessary for the installation of operators at the head of the door frames. The motor on automatic door operator shall be provided with an interlock so that the motor will not operate when doors are electrically locked from opening.

- B. Operators shall have checking mechanism providing cushioning action at last part of door travel, in both opening and closing cycle. Operators shall be capable of recycling doors instantaneously to full open position from any point in the closing cycle when control switch is activated. Operators shall, when automatic power is interrupted or shut-off, permit doors to easily open manually without damage to automatic operator system.
- C. Operator, enclosed in housing, shall open door by energizing motor and shall stop by electrically reducing voltage and stalling motor against mechanical stop. Door shall close by means of spring energy, and close force shall be controlled by gear system and motor being used as dynamic break without power, or controlled by hydraulic closer in electro-hydraulic operators. System shall operate as manual door control in event of power failure. Opening and closing speeds shall be adjustable:
1. Operator Housing: Housing shall be a minimum of 112 mm (4-1/2 inches) wide by 140 mm (5.5 inches) high aluminum extrusions with enclosed end caps for application to 100 mm (4 inches) and larger frame systems. All structural sections shall have a minimum thickness of 3.2 mm (0.125 inch) and be fabricated of a minimum of 6063-T5 aluminum alloy.
 2. Power Operator: Completely assembled and sealed unit which shall include gear drive transmission, mechanical spring and bearings, all located in aluminum case and filled with special lubricant for extreme temperature conditions. Complete unit shall be rubber mounted with provisions for easy maintenance and replacement, without removing door from pivots or frame.
 3. Connecting hardware shall have drive arm attached to door with a pin linkage rotating in a self-lubricating bearing. Door shall not pivot on shaft of operator.
 4. Electrical Control: Operator shall have a self contained electrical control unit, including necessary transformers, relays, rectifiers,

and other electronic components for proper operation and switching of power operator. All connecting harnesses shall have interlocking plugs.

2.2 MICROPROCESSOR CONTROLS

- A. The system shall include a multi-function microprocessor control providing adjustable hold open time (1-30 seconds), LED indications for sensor input signals and operator status and power assist close options. Control shall be capable of receiving activation signals from any device with normally open dry contact output. All activation modes shall provide fully adjustable opening speed.
- B. The door shall be held open by low voltage applied to the continuous duty motor. The control shall include an adjustable safety circuit that monitors door operation and stops the opening direction of the door if an obstruction is sensed. The motor shall include a recycle feature that reopens the door if an obstruction is sensed at any point during the closing cycle. The control shall include a standard three position key switch with functions for ON, OFF, and HOLD OPEN.

2.3 POWER UNITS

- A. Each power unit shall be self-contained, electric operated and independent of the door operator. Capacity and size of power circuits shall be in accordance with automatic door operator manufacturer's specifications and Division 26 - ELECTRICAL.

2.4 DOOR CONTROLS

- A. Opening and closing actions of doors shall be actuated by controls and safety devices specified, and conform to ANSI 156.10. Controls shall cause doors to open instantly when control device is actuated; hold doors in open positions; then, cause doors to close, unless safety device or reactivated control interrupts operation.
- B. Manual Controls:
 - 1. Push Plate Wall Switch: Recess type, stainless steel push plate minimum 100 mm by 100 mm (four-inch by four-inch), with 13 mm (1/2-inch) high letters "To Operate Door--Push" engraved on face of plate.
 - 2. Card Reader: Interface with card reader as actuating device to initiate opening. No push plate required at card reader locations.

2.5 SAFETY DEVICES

- A. General: Area over which doors swing or slide shall be a safety section and anyone standing in path of door's movement shall be protected by a safety device.
- B. Each swing door shall have installed on the pull side a presence sensor to detect any person standing in the door swing path and prevent the door from opening.
- C. Time delay switches shall be adjustable between 3 to 60 seconds and shall control closing cycle of doors.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Coordinate installation of equipment with other related work. Manual controls and power disconnect switches shall be recessed or semi-flush mounted in partitions. Secure operator components to adjacent construction with suitable fastenings. Conceal conduits, piping, and electric equipment, in finish work.
- B. Install power units in locations shown. Where units are to be mounted on walls, provide metal supports or shelves for the units. All equipment, including time delay switches, shall be accessible for maintenance and adjustment.
- C. Operators shall be adjusted and must function properly for the type of traffic (pedestrians, carts, stretchers and wheelchairs) expected to pass through doors. Each door leaf of pairs of doors shall open and close in synchronization. On pairs of doors, operators shall allow either door to be opened manually without the other door opening.
- D. Install controls at positions shown and make them convenient for particular traffic expected to pass through openings. Maximum height of push plate wall switches from finished floors shall be 40 inches unless otherwise approved by the Project Engineer.

3.2 INSTRUCTIONS

- A. Following the installation and final adjustments of the door operators, the installer shall fully instruct VA personnel on the operating, servicing and safety requirements for the swing and sliding automatic door operators.
- B. Coordinate instruction to VA personnel with VA Project Engineer.

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SECTION 08 80 00
GLAZING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies glass, plastic, related glazing materials and accessories. Glazing products specified apply to factory or field glazed items.

1.2 RELATED WORK

- A. Factory glazed by manufacturer in following units:
1. Mirrors: Section 10 28 00, TOILET ACCESSORIES.

1.3 LABELS

- A. Temporary labels:
1. Provide temporary label on each light of glass identifying manufacturer or brand and glass type, quality and nominal thickness.
2. Label in accordance with NFRC (National Fenestration Rating Council) label requirements.
3. Temporary labels shall remain intact until glass is approved by Project Engineer.
- B. Permanent labels:
1. Locate in corner for each pane.
2. Label in accordance with ANSI Z97.1 and SGCC (Safety Glass Certification Council) label requirements.
a. Tempered glass.
b. Laminated glass or have certificate for panes without permanent label.
c. Organic coated glass.

1.4 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Certificates:
1. Certificates stating that wire glass, meets requirements for safety glazing material as specified in ANSI Z97.1.
- C. Warranty: Submit written guaranty, conforming to General Condition requirements, and to "Warranty of Construction" Article in this Section.
- D. Manufacturer's Literature and Data:
1. Glass, each kind required.
2. Transparent (one-way vision glass) mirrors.

- 3. Glazing cushion.
- 4. Sealing compound.

E. Samples:

- 1. Transparent (one-way vision glass) mirrors.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Delivery: Schedule delivery to coincide with glazing schedules so minimum handling of crates is required. Do not open crates except as required for inspection for shipping damage.
- B. Storage: Store cases according to printed instructions on case, in areas least subject to traffic or falling objects. Keep storage area clean and dry.
- C. Handling: Unpack cases following printed instructions on case. Stack individual windows on edge leaned slightly against upright supports with separators between each.

1.6 PROJECT CONDITIONS

- A. Field Measurements: Field measure openings before ordering tempered glass products. Be responsible for proper fit of field measured products.
- B. Manufacturer Warranty: Manufacturer shall warranty their glazing from the date of installation and final acceptance by the Government as follows. Submit manufacturer warranty.

1.7 WARRANTY

- A. Warranty: Conform to terms of "Warranty of Construction", FAR clause 52.246-21.

1.8 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Architectural Manufacturers Association (AAMA):
 - 800.....Test Methods for Sealants
 - 810.1-77.....Expanded Cellular Glazing Tape
- C. American National Standards Institute (ANSI):
 - Z97.1-09.....Safety Glazing Material Used in Building -
Safety Performance Specifications and Methods
of Test.
- D. American Society for Testing and Materials (ASTM):
 - C542-05.....Lock-Strip Gaskets

- C716-06.....Installing Lock-Strip Gaskets and Infill
Glazing Materials.
- C794-10.....Adhesion-in-Peel of Elastomeric Joint Sealants
- C864-05.....Dense Elastomeric Compression Seal Gaskets,
Setting Blocks, and Spacers
- C920-11.....Elastomeric Joint Sealants
- C964-07.....Standard Guide for Lock-Strip Gasket Glazing
- C1036-06.....Flat Glass
- C1048-12.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated
and Uncoated Glass.
- C1376-10.....Pyrolytic and Vacuum Deposition Coatings on
Flat Glass
- D635-10.....Rate of Burning and/or Extent and Time of
Burning of Self-Supporting Plastic in a
Horizontal Position
- E84-10.....Surface Burning Characteristics of Building
Materials
- E119-10.....Standard Test Methods for Fire Test of Building
Construction and Material
- E. Code of Federal Regulations (CFR):
16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 2010
- F. Glass Association of North America (GANA):
2010 Edition.....GANA Glazing Manual
2008 Edition.....GANA Sealant Manual
2009 Edition.....GANA Laminated Glazing Reference Manual
2010 Edition.....GANA Protective Glazing Reference Manual
- G. International Code Council (ICC):
IBC.....International Building Code
- H. Intertek Testing Services - Warnock Hersey (ITS-WHI)
- I. National Fire Protection Association (NFPA):
80-13.....Fire Doors and Windows.
252-12.....Standard Method of Fire Test of Door Assemblies
257-12.....Standard on Fire Test for Window and Glass
Block Assemblies
- J. National Fenestration Rating Council (NFRC)
- K. Safety Glazing Certification Council (SGCC) 2012:
Certified Products Directory (Issued Semi-Annually).
- L. Unified Facilities Criteria (UFC):

4-010-01-03(R2007).....DOD Minimum Antiterrorism Standards for
Buildings

M. U.S. Veterans Administration:

Physical Security Design Manual for VA Facilities (VAPSDG); Life Safety
Protected

Physical Security Design Manual for VA Facilities (VAPSDG); Mission
Critical Facilities

Architectural Design Manual for VA Facilities (VASDM)

N. Environmental Protection Agency (EPA):

40 CFR 59(2014).....National Volatile Organic Compound Emission
Standards for Consumer and Commercial Products

PART 2 - PRODUCT

2.1 GLASS

- A. Use thickness stated unless specified otherwise in assemblies.
- B. Obtain glass units from single source from single manufacturer for each glass type.
- C. Clear Glass:
 - 1. ASTM C1036, Type I, Class 1, Quality q3.
 - 2. Thickness, 6 mm (1/4 inch).
- D. Patterned and Wired Flat Glass:
 - 1. ASTM C1036, Type II, Class 1, Form 1, Pattern P1, Finish F1, Quality Q5, Mesh m1.
 - 2. Thickness, 6 mm (1/4 inch).

2.2 HEAT-TREATED GLASS

- A. Clear Tempered Glass:
 - 1. ASTM C1048, Kind HS, Condition A, Type I, Class 1, Quality q3.
 - 2. Thickness, 6 mm (1/4 inch).

2.3 COATED GLASS

- A. Transparent Mirror (One-way Vision Glass)
 - 1. ASTM C1036, Type I, Class 1, Quality q2: Grey Glass.
 - 2. Thickness: 6 mm (1/4 inch).
 - 3. Coated one face with a hard adherent reflective film of chromium or other coating of proven equivalent durability.
 - 4. Visible light transmittance; eight per cent, plus or minus two percent.
 - 5. Visible light reflectance; sixty percent, plus or minus five percent.
 - 6. Light ratio; mirror side 10 or more; observer side one or less.

7. Assemble with coating covered and protected with a layer of clear glass not less than 3 mm (1/8 inch) thick.
8. Clean interface glass prior to assembly.
9. Tape edge to seal and hold panes together.

2.4 GLAZING ACCESSORIES

- A. As required to supplement the accessories provided with the items to be glazed and to provide a complete installation. Ferrous metal accessories exposed in the finished work shall have a finish that will not corrode or stain while in service.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Verification of Conditions:
 1. Examine openings for glass and glazing units; determine they are proper size; plumb; square; and level before installation is started.
 2. Verify that glazing openings conform with details, dimensions and tolerances indicated on manufacturer's approved shop drawings.
- B. Advise Contractor of conditions which may adversely affect glass and glazing unit installation, prior to commencement of installation: Do not proceed with installation until unsatisfactory conditions have been corrected.

3.2 PREPARATION

- A. For sealant glazing, prepare glazing surfaces in accordance with GANA-02 Sealant Manual.
- B. Determine glazing unit size and edge clearances by measuring the actual unit to receive the glazing.
- C. Shop fabricate and cut glass with smooth, straight edges of full size required by openings to provide GANA recommended edge clearances.
- D. Verify that components used are compatible.
- E. Clean and dry glazing surfaces.
- F. Prime surfaces scheduled to receive sealants, as determined by preconstruction sealant-substrate testing.

3.3 INSTALLATION - GENERAL

- A. Install in accordance with GANA-01 Glazing Manual and GANA-02 Sealant Manual unless specified otherwise.
- B. Glaze in accordance with recommendations of glazing and framing manufacturers, and as required to meet the Performance Test Requirements specified in other applicable sections of specifications.

- C. Set glazing without bending, twisting, or forcing of units.
- D. Do not allow glass to rest on or contact any framing member.
- E. Glaze doors and operable sash, in a securely fixed or closed and locked position, until sealant, glazing compound, or putty has thoroughly set.
- F. Transparent (One-Way-Vision Glass) Mirror: Use continuous channel glazing gasket.

3.4 REPLACEMENT AND CLEANING

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by Project Engineer.
- B. Replace cracked, broken, and imperfect glass, or glass which has been installed improperly.
- C. Leave glass, putty, and other setting material in clean, whole, and acceptable condition.

3.5 PROTECTION

- A. Protect finished surfaces from damage during erection, and after completion of work. Strippable plastic coatings on colored anodized finish are not acceptable.

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SECTION 09 05 16
SUBSURFACE PREPARATION FOR FLOOR FINISHES

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies subsurface preparation requirements for areas to receive the installation of applied flooring. This section includes removal of existing floor coverings, testing concrete for moisture and pH, remedial floor coating for concrete floor slabs having unsatisfactory moisture or pH conditions, and floor leveling and repair as required.

1.2 RELATED WORK

- A. Section 07 92 00, JOINT SEALANTS.
- B. Section 09 65 16, RESILIENT SHEET FLOORING, Section 09 65 19, RESILIENT TILE FLOORING, and Section 09 68 00, CARPETING.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA and TEST DATA.
- B. Written approval confirming product compatibility with subfloor material manufacturer and the flooring manufacturer
- C. Product Data:
 - 1. Moisture remediation system
 - 2. Underlayment Primer
 - 3. Cementitious Self-Leveling Underlayment
 - 4. Cementitious Trowel-Applied Underlayment (Not suitable for resinous floor finishes)
- D. Test Data:
 - 1. Moisture test and pH results performed by a qualified independent testing agency or warranty holding manufacturer's technical representative.

1.4 DELIVERY AND STORAGE

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

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):

D638-10 (2010)	Test Method for Tensile Properties of Plastics
D4259-88 (2012)	Standard Practice for Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance.
C109/C109M -12 (2012)	Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or [50-mm] Cube Specimens) Modified Air Cure Only
D7234-12 (2012)	Standard Test Method for Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers.
E96/E96M - 12 (2012)	Standard Test Methods for Water Vapor Transmission of Materials
F710-11 (2011)	Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring
F1869-11 (2011)	Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170-11 (2011)	Standard Test Method for Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes
C348-08 (2008)	Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
C191-13 (2013)	Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle

PART 2 - PRODUCTS

2.1 MOISTURE REMEDIATION COATING

A. System Descriptions:

1. High-solids, epoxy system designed to suppress excess moisture in concrete prior to an overlayment. For use under VCT and carpet where issues caused by moisture vapor are a concern.

B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up.

C. System Components: Verify specific requirements as systems vary by manufacturer. Verify build up layers and installation method. Verify compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. Liquid applied coating:

- a. Resin: epoxy.
- b. Formulation Description: Multiple component high solids.
- c. Application: Per manufacturer's written installation requirements.

- d. Thickness: minimum 10 mils
- D. Material Vapor Permeance: Application shall achieve a permeance rating of less than 0.1 perm in accordance with ASTM E96/E96M.
- E. Maximum RH requirement: 100% testing in accordance with ASTM F2170.

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	SCAMD Rule 1113	25 grams per liter
Permeance	ASTM E96	0.1 perms
Tensile Modulus	ASTM D638	1.9X10 ⁵ psi
Percent Elongation	ASTM D638	12%
Cure Rate	Per manufacture's Data	4 hours Tack free with 24hr recoat window
Bond Strength	ASTM D7234	100% bond to concrete failure

2.2 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

- A. System Descriptions:
- High performance self-leveling underlayment resurfacer. Single component, self-leveling, cementitious material designed for easy application as an underlayment for all types of flooring materials. It is used for substrate repair and leveling.
- B. Products: Subject to compliance with applicable fire, health, environmental, and safety requirements for storage, handling, installation, and clean up. Gypsum-based products are unacceptable.
- C. System Characteristics:
- Wearing Surface: smooth
 - Thickness: Per architectural drawings, ranging from feathered edge to 1", per application. Applications greater than 1" require additional 3/8" aggregate to mix or as recommended by manufacturer.
- D. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.
- E. Compressive Strength: Minimum 4100 psi in 28 days in accordance with ASTM C109/C109M.
- F. Flexural Strength: Minimum 1000 psi in 28 days in accordance with ASTM C348
- G. Dry Time: Underlayment shall receive the application of floor coverings in 16 hours.

- H. Primer: compatible and as recommended by manufacturer for use over intended substrate
- I. System Components: Manufacturer's standard components that are compatible with each other and as follows:
1. Primer:
 - a. Resin: copolymer
 - b. Formulation Description: single component ready to use.
 - c. Application Method: Squeegee and medium nap roller.
All puddles shall be removed, and material shall be allowed to dry, 1-2 hours at 70F/21C.
 - d. Number of Coats: (1) one.
 2. Grout Resurfacing Base:
 - a. Formulation Description: Single component, cementitious self-leveling high-early and high-ultimate strength grout.
 - b. Application Method: colloidal mix pump, cam rake, spike roll.
 - 1) Thickness of Coats: Per architectural scope, 1" lifts.
 - 2) Number of Coats: More than one if needed.
 - c. Aggregates: for applications greater than linch, require additional 3/8" aggregate to mix.

Property	Test	Value
Compressive Strength	ASTM C109/C109M	2,200 psi @ 24 hrs 3,000 psi @ 7 days
Initial set time Final Set time	ASTM C191	30-45 min. 1 to 1.5 hours
Bond Strength	ASTM D7234	100% bond to concrete failure

2.3 CEMENTITIOUS TROWEL-APPLIED UNDERLAYMENT (NOT SUITABLE FOR RESINOUS FLOOR FINISHES)

- A. Underlayment shall be calcium aluminate cement-based, containing Portland cement. Gypsum-based products are unacceptable.
- B. Compressive Strength: Minimum 4000 psi in 28 days
- C. Trowel-applied underlayment shall not contain silica quartz (sand).
- D. Dry Time: Underlayment shall receive the application of floor covering in 15-20 minutes.

PART 3 - EXECUTION

3.1 ENVIRONMENTAL REQUIREMENTS

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before testing and not less than three days after testing.

- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation.
- C. Do not install materials when the temperatures of the substrate or materials are not within 60-85 degrees F/ 16-30 degrees C.

3.2 SURFACE PREPARATION

- A. Existing concrete slabs with existing floor coverings:
 - 1. Conduct visual observation of existing floor covering for adhesion, water damage, alkaline deposits, and other defects.
 - 2. Remove existing floor covering and adhesives. Comply with local, state and federal regulations and the RFCI Recommended Work Practices for Removal of Resilient Floor Coverings, as applicable to the floor covering being removed.
- B. Concrete shall meet the requirements of ASTM F710 and be sound, solid, clean, and free of all oil, grease, dirt, curing compounds, and any substance that might act as a bond-breaker before application. As required prepare slab by mechanical methods. No chemicals or solvents shall be used.
- C. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated.
- D. Prepare concrete substrates per ASTM D4259 as follows:
 - 1. Dry abrasive blasting.
 - 2. Wet abrasive blasting.
 - 3. Vacuum-assisted abrasive blasting.
 - 4. Centrifugal-shot abrasive blasting.
 - 5. Comply with manufacturer's written instructions.
 - 6. Maintain negative pressure and provide dust control barriers to isolate floor prep from adjacent areas.
- E. Repair damaged and deteriorated concrete according to flooring manufacturer's written recommendations.
- F. Verify that concrete substrates are dry.
- G. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of per flooring manufactures formal and project specific written recommendation.
- H. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity per flooring manufacture's formal and project specific written recommendation.

- I. Provide a written report showing test placement and results.
- J. Prepare joints in accordance with material manufacturer's instructions.
- K. Alkalinity: Measure surface pH in accordance with procedures provided in ASTM F710 or as outlined by qualified testing agency or flooring manufacturer's technical representative.
- L. Tolerances: Subsurface shall meet the flatness and levelness tolerance specified on drawings or recommended by the floor finish manufacturer. Tolerance shall also not to exceed 1/4" deviation in 10'. As required, install underlayment to achieve required tolerance.
- M. Other Subsurface: For all other subsurface conditions, such as wood or metal, contact the floor finish or underlayment manufacturer, as appropriate, for proper preparation practices.

3.3 MOISTURE REMEDIATION COATING:

- A. Where results of relative humidity testing (ASTM F2170) exceed the requirements of the specified flooring manufacturer, apply remedial coating as specified to correct excessive moisture condition.
- B. Prior to remedial floor coating installation mechanically prepare the concrete surface to provide a concrete surface profile in accordance with ASTM D4259.
- C. Mix and apply moisture remediation coating in accordance with manufacturer's instructions.

3.4 CEMENTITIOUS UNDERLAYMENT:

- A. Install cementitious self-leveling underlayment as required to correct surface defects, floor flatness or levelness corrections to meet the tolerance requirements, address non-moving cracks or joints, and provide a smooth surface for the installation of floor covering.
- B. Mix and apply in accordance with manufacturer's instructions.

3.5 PROTECTION

- A. Prior to the installation of the finish flooring, the surface of the underlayment should be protected from abuse by other trades by the use of plywood, tempered hardwood, or other suitable protection course.

3.6 FIELD QUALITY CONTROL

- A. Where specified, field sampling of products shall be conducted by a qualified, independent testing facility.

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**SECTION 09 22 16
NON-STRUCTURAL METAL FRAMING**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies steel studs wall systems, shaft wall systems, ceiling or soffit suspended or furred framing, wall furring, fasteners, and accessories for the screw attachment of gypsum board, plaster bases or other building boards.

1.2 RELATED WORK

- A. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.
- B. Ceiling suspension systems for acoustical tile or panels: Section 09 51 00, ACOUSTICAL CEILINGS, Section 09 29 00, GYPSUM BOARD.

1.3 TERMINOLOGY

- A. Description of terms shall be in accordance with ASTM C754, ASTM C11, ASTM C841 and as specified.
- B. Thickness of steel specified is the minimum bare (uncoated) steel thickness.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Studs, runners and accessories.
 - 2. Hanger inserts.
 - 3. Channels (Rolled steel).
 - 4. Furring channels.
 - 5. Screws, clips and other fasteners.
- C. Test Results: Fire rating test designation, each fire rating required for each assembly.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

- A. In accordance with the requirements of ASTM C754.

1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society For Testing And Materials (ASTM)
A641-09.....Zinc-Coated (Galvanized) Carbon Steel Wire

A653/653M-11.....	Specification for Steel Sheet, Zinc Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by Hot-Dip Process.
C11-10.....	Terminology Relating to Gypsum and Related Building Materials and Systems
C635-07.....	Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings
C636-08.....	Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
C645-09.....	Non-Structural Steel Framing Members
C754-11.....	Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
C841-03(R2008).....	Installation of Interior Lathing and Furring
C954-10.....	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from 0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness
E580-11.....	Application of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Requiring Moderate Seismic Restraint.

PART 2 - PRODUCTS

2.1 PROTECTIVE COATING

- A. Galvanize steel studs, runners (track), rigid (hat section) furring channels, "Z" shaped furring channels, and resilient furring channels, with coating designation of G-60 minimum, per ASTM 123.

2.2 STEEL STUDS AND RUNNERS (TRACK)

- A. ASTM C645, modified for thickness specified and sizes as shown.
 - 1. Use ASTM A653/A653M steel, 0.8 mm (0.0329-inch) thick bare metal (33 mil).
 - 2. Runners same thickness as studs.
- B. Provide not less than two cutouts in web of each stud, approximately 300 mm (12 inches) from each end, and intermediate cutouts on approximately 600 mm (24-inch) centers.
- C. Doubled studs for openings and studs for supporting concrete backer-board.
- D. Studs 3600 mm (12 feet) or less in length shall be in one piece.

2.3 FURRING CHANNELS

- A. Rigid furring channels (hat shape): ASTM C645.
- B. Resilient furring channels:
 - 1. Not less than 0.45 mm (0.0179-inch) thick bare metal.
 - 2. Semi-hat shape, only one flange for anchorage with channel web leg slotted on anchorage side, channel web leg on other side stiffens fastener surface but shall not contact anchorage surface other channel leg is attached to.
- C. "Z" Furring Channels:
 - 1. Not less than 0.45 mm (0.0179-inch)-thick bare metal, with 32 mm (1-1/4 inch) and 19 mm (3/4-inch) flanges.
 - 2. Web furring depth to suit thickness of insulation with slotted perforations.
- D. Rolled Steel Channels: ASTM C754, cold rolled; or, ASTM C841, cold rolled.

2.4 FASTENERS, CLIPS, AND OTHER METAL ACCESSORIES

- A. ASTM C754, except as otherwise specified.
- B. For fire rated construction: Type and size same as used in fire rating test.
- C. Fasteners for steel studs thicker than 0.84 mm (0.033-inch) thick. Use ASTM C954 steel drill screws of size and type recommended by the manufacturer of the material being fastened.
- D. Clips: ASTM C841 (paragraph 6.11), manufacturer's standard items. Clips used in lieu of tie wire shall have holding power equivalent to that provided by the tie wire for the specific application.
- E. Tie Wire and Hanger Wire:
 - 1. ASTM A641, soft temper, Class 1 coating.
 - 2. Gage (diameter) as specified in ASTM C754 or ASTM C841.
- F. Attachments for Wall Furring:
 - 1. Manufacturers standard items fabricated from zinc-coated (galvanized) steel sheet.
 - 2. For concrete or masonry walls: Metal slots with adjustable inserts or adjustable wall furring brackets. Spacers may be fabricated from 1 mm (0.0396-inch) thick galvanized steel with corrugated edges.
- G. Power Actuated Fasteners: Type and size as recommended by the manufacturer of the material being fastened.

PART 3 - EXECUTION**3.1 INSTALLATION CRITERIA**

- A. Where fire rated construction is required for walls, partitions, columns, beams and floor-ceiling assemblies, the construction shall be same as that used in fire rating test.
- B. Construction requirements for fire rated assemblies and materials shall be as shown and specified, the provisions of the Scope paragraph (1.2) of ASTM C754 and ASTM C841 regarding details of construction shall not apply.
- C. All corridor walls (new and existing) are to extend to deck above. Field verify retained existing corridor walls and existing walls becoming corridor walls; extend any found not extending to deck above.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Install studs vertically, spaced not more than 400 mm (16 inches) on center.
- C. Cut studs 6 mm to 9 mm (1/4 to 3/8-inch) less than floor to underside of structure overhead when extended to underside of structure overhead.
- D. Extend studs to underside of structure overhead.
- E. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back.
 - 2. Fasten back to back studs together with 9 mm (3/8-inch) long Type S pan head screws at not less than 600 mm (two feet) on center, staggered along webs.
 - 3. Studs fastened flange to flange shall have splice plates on both sides approximately 50 X 75 mm (2 by 3 inches) screwed to each stud with two screws in each stud. Locate splice plates at 600 mm (24 inches) on center between runner tracks.
- F. Fastening Studs:
 - 1. Fasten studs located adjacent to partition intersections, corners and studs at jambs of openings to flange of runner tracks with two screws through each end of each stud and flange of runner.
 - 2. Do not fasten studs to top runner track when studs extend to underside of structure overhead.
- G. Chase Wall Partitions:

1. Locate cross braces for chase wall partitions to permit the installation of pipes, conduits, carriers and similar items.
 2. Use studs or runners as cross bracing not less than 63 mm (2-1/2 inches wide).
- H. Form building expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the expansion joint.
- I. Form control joint, with double studs spaced 13 mm (1/2-inch) apart.

3.3 INSTALLING WALL FURRING FOR FINISH APPLIED TO ONE SIDE ONLY

- A. In accordance with ASTM C754, or ASTM C841 except as otherwise specified or shown.
- B. Wall furring-Stud System:
1. Framed with 63 mm (2-1/2 inch) or narrower studs, installed vertically, spaced 400 mm (16 inches) on center.
 2. Brace as specified in ASTM C754 for Wall Furring-Stud System or brace with sections or runners or studs placed horizontally at not less than three foot vertical intervals on side without finish.
 3. Securely fasten braces to each stud with two Type S pan head screws at each bearing.
- C. Direct attachment to masonry or concrete; rigid channels or "Z" channels:
1. Install rigid (hat section) furring channels horizontally, spaced at 400 mm (16 inches) on center.
 2. Install "Z" furring channels vertically, spaced not more than 600 mm (24 inches) on center.
 3. At corners where rigid furring channels are positioned horizontally, provide mitered joints in furring channels.
 4. Ends of spliced furring channels shall be nested not less than 200 mm (8 inches).
 5. Fasten furring channels to walls with power-actuated drive pins or hardened steel concrete nails. Where channels are spliced, provide two fasteners in each flange.
 6. Locate furring channels at interior and exterior corners in accordance with wall finish material manufacturers printed erection instructions. Locate "Z" channels within 100 mm (4 inches) of corner.
- D. Installing Wall Furring-Bracket System: Install vertically; space furring channels not more than 400 mm (16 inches) on center.

3.4 INSTALLING SUPPORTS REQUIRED BY OTHER TRADES

- A. Provide for attachment and support of electrical outlets, plumbing, laboratory or heating fixtures, recessed type plumbing fixture accessories, access panel frames, wall bumpers, wood seats, toilet stall partitions, dressing booth partitions, urinal screens, chalkboards, tackboards, wall-hung casework, handrail brackets, recessed fire extinguisher cabinets and other items like auto door buttons and auto door operators supported by stud construction.
- B. Provide additional studs where required. Install metal backing plates, or special metal shapes as required, securely fastened to metal studs.

3.5 INSTALLING FURRED AND SUSPENDED CEILINGS OR SOFFITS

- A. Install furred and suspended ceilings or soffits in accordance with ASTM C754 or ASTM C841 except as otherwise specified or shown for screw attached gypsum board ceilings and for plaster ceilings or soffits.
 - 1. Space framing at 400 mm (16-inch) centers for gypsum board anchorage.
- B. Concrete slabs on steel decking composite construction:
 - 1. Use pull down tabs when available.
 - 2. Use power activated fasteners when direct attachment to structural framing can not be accomplished.
- C. Where bar joists or beams are more than 1200 mm (48 inches) apart, provide intermediate hangers so that spacing between supports does not exceed 1200 mm (48 inches). Use clips, bolts, or wire ties for direct attachment to steel framing.
- D. Existing concrete construction exposed or concrete on steel decking:
 - 1. Use power actuated fasteners either eye pin, threaded studs or drive pins for type of hanger attachment required.
 - 2. Install fasteners at approximate mid height of concrete beams or joists. Do not install in bottom of beams or joists.

3.6 TOLERANCES

- A. Fastening surface for application of subsequent materials shall not vary more than 3 mm (1/8-inch) from the layout line.
- B. Plumb and align vertical members within 3 mm (1/8-inch.)
- C. Level or align ceilings within 3 mm (1/8-inch.)

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SECTION 09 29 00
GYPSUM BOARD

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies installation and finishing of gypsum board.

1.2 RELATED WORK

A. Installation of steel framing members for walls, partitions, furring, soffits, and ceilings: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.

B. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.

C. Lay in gypsum board ceiling panels: Section 09 51 00, ACOUSTICAL CEILING.

C. Lead lined wallboard: Section 13 49 00, RADIATION PROTECTION.

1.3 TERMINOLOGY

A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.

B. "Yoked": Gypsum board cut out for opening with no joint at the opening (along door jamb or above the door).

1.4 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Manufacturer's Literature and Data:

1. Cornerbead and edge trim.
2. Finishing materials.
3. Laminating adhesive.
4. Gypsum board, each type.

C. Test Results:

1. Fire rating test, each fire rating required for each assembly.
2. Sound rating test.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

A. In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

A. In accordance with the requirements of ASTM C840.

1.7 APPLICABLE PUBLICATIONS

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

B. American Society for Testing And Materials (ASTM):

- C11-08.....Terminology Relating to Gypsum and Related Building Materials and Systems
- C475-02.....Joint Compound and Joint Tape for Finishing Gypsum Board
- C840-08.....Application and Finishing of Gypsum Board
- C919-08.....Sealants in Acoustical Applications
- C954-07.....Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases to Steel Stud from 0.033 in. (0.84mm) to 0.112 in. (2.84mm) in thickness
- C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
- C1047-05.....Accessories for Gypsum Wallboard and Gypsum Veneer Base
- C1177-06.....Glass Mat Gypsum Substrate for Use as Sheathing
- C1658-06.....Glass Mat Gypsum Panels
- C1396-06.....Gypsum Board
- E84-08.....Surface Burning Characteristics of Building Materials
- C. Underwriters Laboratories Inc. (UL):
Latest Edition.....Fire Resistance Directory
- D. Inchcape Testing Services (ITS):
Latest Editions.....Certification Listings

PART 2 - PRODUCTS

2.1 GYPSUM BOARD

- A. Gypsum Board: ASTM C1396, Type X, Fire rated, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.
- B. Water Resistant Gypsum Backing Board: ASTM C620, Type X, Fire rated, 16 mm (5/8 inch) thick.
- C. Gypsum cores shall contain maximum percentage of post industrial recycled gypsum content available in the area (a minimum of 95 percent post industrial recycled gypsum content). Paper facings shall contain 100 percent post-consumer recycled paper content.

2.2 ACCESSORIES

- A. ASTM C1047, except form of 0.39 mm (0.015 inch) thick zinc coated steel sheet or rigid PVC plastic.

- B. Flanges not less than 22 mm (7/8 inch) wide with punchouts or deformations as required to provide compound bond.

2.3 FASTENERS

- A. ASTM C1002 and ASTM C840, except as otherwise specified.
- B. ASTM C954, for steel studs thicker than 0.04 mm (0.33 inch).
- C. Select screws of size and type recommended by the manufacturer of the material being fastened.
- D. For fire rated construction, type and size same as used in fire rating test.
- E. Clips: Zinc-coated (galvanized) steel; gypsum board manufacturer's standard items.

2.4 FINISHING MATERIALS AND LAMINATING ADHESIVE

- A. ASTM C475 and ASTM C840. Free of antifreeze, vinyl adhesives, preservatives, biocides and other VOC. Adhesive shall contain a maximum VOC content of 50 g/l.

PART 3 - EXECUTION

3.1 GYPSUM BOARD HEIGHTS

- A. Extend all layers of gypsum board from floor to underside of structure overhead. Field verify retained existing corridor walls and walls becoming corridor walls; extend all layers of gypsum board found not extending to underside of structure overhead.

3.2 INSTALLING GYPSUM BOARD

- A. Coordinate installation of gypsum board with other trades and related work.
- B. Install gypsum board in accordance with ASTM C840, except as otherwise specified.
- C. Moisture and Mold-Resistant Assemblies: Provide and install moisture and mold-resistant glass mat gypsum wallboard products with moisture-resistant surfaces complying with ASTM C1658 where shown and in locations which might be subject to moisture exposure during construction.
- D. Use gypsum boards in maximum practical lengths to minimize number of end joints.
- E. Bring gypsum board into contact, but do not force into place.
- F. Ceilings:
 - 1. For single-ply construction, use perpendicular application.
 - 2. For two-ply assemblies:
 - a. Use perpendicular application.

- b. Apply face ply of gypsum board so that joints of face ply do not occur at joints of base ply with joints over framing members.
- G. Walls (Except Shaft Walls):
1. Install gypsum board with 1/2" to 5/8" gap between gypsum board bottom and floor.
 2. When gypsum board is installed parallel to framing members, space fasteners 300 mm (12 inches) on center in field of the board, and 200 mm (8 inches) on center along edges.
 3. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
 4. Stagger screws on abutting edges or ends.
 5. For single-ply construction, apply gypsum board with long dimension either parallel or perpendicular to framing members as required to minimize number of joints except gypsum board shall be applied vertically over "Z" furring channels.
 6. For two-ply gypsum board assemblies, apply base ply of gypsum board to assure minimum number of joints in face layer. Apply face ply of wallboard to base ply so that joints of face ply do not occur at joints of base ply with joints over framing members.
 7. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply or three-ply application requirements.
 8. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of openings if gypsum board is not "yoked". Use one system throughout.
 - b. Not required for wall lengths less than 9000 mm (30 feet).
 - c. Extend control joints the full height of the wall or length of soffit/ceiling membrane.
- H. Fire and Smoke Partitions:
1. Cut gypsum board for a space approximately 3 mm to 6 mm (1/8 to 1/4 inch) wide around partition perimeter.
 2. Coordinate for application of caulking or sealants to space prior to taping and finishing.
 3. Use sealing compound (ASTM C919) to fill the annular spaces between all receptacle boxes and the partition finish material through which the boxes protrude to seal all holes and/or openings on the back and sides of the boxes.

I. Electrical and Telecommunications Boxes:

1. Seal annular spaces between electrical and telecommunications receptacle boxes and gypsum board partitions.

J. Accessories:

1. Set accessories plumb, level and true to line, neatly mitered at corners and intersections, and securely attach to supporting surfaces as specified.
2. Install in one piece, without the limits of the longest commercially available lengths.
3. Corner Beads:
 - a. Install at all vertical and horizontal external corners and where shown.
 - b. Use screws only. Do not use crimping tool.
4. Edge Trim (casings Beads):
 - a. At both sides of expansion and control joints unless shown otherwise.
 - b. Where gypsum board terminates against dissimilar materials and at perimeter of openings, except where covered by flanges, casings or permanently built-in equipment.
 - c. Where gypsum board surfaces of non-load bearing assemblies abut load bearing members.
 - d. Where shown.

3.3 FINISHING OF GYPSUM BOARD

- A. Finish joints, edges, corners, and fastener heads in accordance with ASTM C840. Use Level 4 finish for all finished areas open to public view.
- B. Before proceeding with installation of finishing materials, assure the following:
 1. Gypsum board is fastened and held close to framing or furring.
 2. Fastening heads in gypsum board are slightly below surface in dimple formed by driving tool.
- C. Finish joints, fasteners, and all openings, including openings around penetrations, on that part of the gypsum board extending above suspended ceilings to seal surface of construction. After the installation of hanger rods, hanger wires, supports, equipment,

conduits, piping and similar work, seal remaining openings and maintain the integrity of the rated construction.

3.4 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including nondecorated surfaces.
- B. Patch holes or openings 13 mm (1/2 inch) or less in diameter, or equivalent size, with a setting type finishing compound or patching plaster.
- C. Repair holes or openings over 13 mm (1/2 inch) diameter, or equivalent size, with 16 mm (5/8 inch) thick gypsum board secured in such a manner as to provide solid substrate equivalent to undamaged surface.
- D. Tape and refinish scratched, abraded or damaged finish surfaces including cracks and joints in non decorated surface to provide fire protection equivalent to the fire rated construction.

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SECTION 09 30 13
CERAMIC TILING

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies ceramic tile.

1.2 RELATED WORK

A. Preformed sealant joints in tile flooring: Section 07 95 13, EXPANSION JOINT COVER ASSEMBLIES.

B. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.

C. Metal and resilient edge strips at joints with new resilient flooring, and carpeting: Section 09 65 19, RESILIENT TILE FLOORING, Section 09 68 00, CARPETING.

1.3 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

1. Mosaic floor tile, each type, color, size and pattern.
2. Wall (or wainscot) tile, each color, size and pattern.
3. Trim shapes, bullnose cap and cove including bullnose cap and base pieces at internal and external corners of vertical surfaces, each type, color, and size.

C. Product Data:

1. Ceramic tile, marked to show each type, size, and shape required.
2. Cementitious backer unit.
3. Elastomeric liquid applied waterproofing membrane and bond coat.
4. Reinforcing tape.
5. Leveling compound.
6. Latex-Portland cement mortar and grout.
7. Commercial Portland cement grout.
8. Fasteners.

D. Certification:

1. Master grade, ANSI A137.1.
2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
 - a. Commercial Portland cement grout.
 - b. Cementitious backer unit.
 - c. Elastomeric liquid applied waterproofing membrane and bond coat.
 - d. Reinforcing tape.

- e. Latex-Portland cement mortar and grout.
- f. Leveling compound.
- g. Factory mounted tile suitability for application in wet area specified under 2.1, A, 3 with list of successful in-service performance locations.

1.4 DELIVERY AND STORAGE

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

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
 - A108.1C-11.....Contractors Option; Installation of Ceramic Tile in the Wet-Set method with Portland Cement Mortar or Installation of Ceramic Tile on a Cured Portland Cement Mortar Setting Bed with Dry-Set or Latex-Portland Cement Mortar
 - A137.1-12.....Ceramic Tile
- C. American Society For Testing And Materials (ASTM):
 - C109/C109M-11.....Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2 inch. or [50-mm] Cube Specimens)
 - C348-08.....Standard Test Method for Flexural Strength of Hydraulic-Cement Mortars
 - C627-10.....Evaluating Ceramic Floor Tile Installation Systems Using the Robinson-Type Floor Tester
 - C954-11.....Steel Drill Screws for the Application of Gypsum Board on Metal Plaster Base to Steel Studs from 0.033 in (0.84 mm) to 0.112 in (2.84 mm) in thickness
 - C1002-07.....Steel Self-Piercing Tapping Screws for the Application of Panel Products
 - C1027-09.....Determining "Visible Abrasion Resistance on Glazed Ceramic Tile"

C1127-09.....Standard Guide for Use of High Solids Content,
Cold Liquid-Applied Elastomeric Waterproofing
Membrane with an Integral Wearing Surface

C1325-08.....Non-Asbestos Fiber-Mat Reinforced Cementitious
Backer Units

D. Tile Council of America, Inc. (TCA):

2007.....Handbook for Ceramic Tile Installation

PART 2 - PRODUCTS

2.1 TILE

A. Comply with ANSI A137.1, Standard Grade, except as modified:

1. Inspection procedures listed under the Appendix of ANSI A137.1.

2. Abrasion Resistance Classification:

a. Tested in accordance with values listed in Table 1, ASTM C 1027.

b. Class V, 12000 revolutions for floors in Corridors, Kitchens,
Storage including Refrigerated Rooms

c. Class IV, 6000 revolutions for remaining areas.

3. Slip Resistant Tile for Floors:

a. Coefficient of friction, when tested in accordance with ANSI
A137.1, required for level of performance:

1) Equal to or greater than 0.42 for interior tile floors when
wet.

4. Mosaic tile may be mounted or joined together by a resinous bonding
material along tile edges.

5. Do not use back mounted tiles unless certified by manufacturer as
noted in paragraph 1.3.D.

6. Factory Blending: For tile with color variations, within the ranges
selected during sample submittals blend tile in the factory and
package so tile units taken from one package show the same range in
colors as those taken from other packages and match approved
samples.

7. Factory-Applied Temporary Protective Coating:

a. Protect exposed face surfaces (top surface) of tile against
adherence of mortar and grout by pre-coating with a continuous
film of petroleum paraffin wax, applied hot.

b. Do not coat unexposed tile surfaces.

c. Pre-wax tiles set or grouted with latex modified mortars.

- B. Unglazed Ceramic Mosaic Tile: Nominal 6 mm (1/4 inch) thick with cushion edges, product: Equal to Daltile, Keystones, Color: Architectural Gray, No. D109, 2x2 mosaic.
- C. Glazed Wall Tile: Cushion edges, glazing, product: Equal to Daltile, Matte, Color: Matte Biscuit, No. K775, Size: 4-1/4"x4-1/4".
- D. Trim Shapes:
 - 1. Conform to applicable requirements of adjoining floor and wall tile.
 - 2. Use trim shapes sizes conforming to size of adjoining field wall tile.
 - 3. Internal and External Corners:
 - a. Square internal and external corner joints are not acceptable.
 - b. External corners including edges: Use bullnose shapes.
 - c. Internal corners: Use cove shapes.
 - d. Base to floor internal corners: Use special shapes providing integral cove vertical and horizontal joint.
 - e. Base to floor external corners: Use special shapes providing bullnose vertical edge with integral cove horizontal joint. Use stop at bottom of openings having bullnose return to wall.
 - f. Wall top edge internal corners: Use special shapes providing integral cove vertical joint with bullnose top edge.
 - g. Wall top edge external corners: Use special shapes providing bullnose vertical and horizontal joint edge.
 - h. For unglazed ceramic mosaic and glazed wall tile installed in Portland cement mortar setting bed, use cove and bullnose shapes as applicable. When ceramic mosaic wall and base tile is required, use C Series cove and bullnose shapes.
 - i. For unglazed ceramic mosaic and glazed wall tile installed in dry-set Portland cement mortar, latex-Portland cement mortar, and organic adhesive (thin set methods), use cove and surface bullnose shapes as applicable.

2.2 CEMENTITIOUS BACKER UNITS

- A. Use in showers or wet areas.
- B. ASTM C1325.
- C. Use cementitious backer units in maximum available lengths.

2.3 JOINT MATERIALS FOR CEMENTITIOUS BACKER UNITS

- A. Reinforcing Tape: Vinyl coated woven glass fiber mesh tape, open weave, 50 mm (2 inches) wide. Tape with pressure sensitive adhesive backing will not be permitted.

- B. Tape Embedding Material: Latex-Portland cement mortar complying with ANSI A108.1.
- C. Joint material, including reinforcing tape, and tape embedding material, shall be as specifically recommended by the backer unit manufacturer.

2.4 FASTENERS

- A. Screws for cementitious backer units.
 - 1. Standard screws for gypsum board are not acceptable.
 - 2. Minimum 11 mm (7/16 inch) diameter head, corrosion resistant coated, with washers.
 - 3. ASTM C954 for steel 1 mm (0.033 inch) thick.
 - 4. ASTM C1002 for steel framing less than 0.0329 inch thick.
- B. Washers: Galvanized steel, 13 mm (1/2 inch) minimum diameter.

2.5 SETTING MATERIALS OR BOND COATS

- A. Conform to TCA Handbook for Ceramic Tile Installation.
- B. Latex-Portland Cement Mortar: ANSI A108.1.
 - 1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A108.1.
 - 2. Prepackaged Dry-Mortar Mix: Factory-prepared mixture of Portland cement; dry, redispersible, ethylene vinyl acetate additive; and other ingredients to which only water needs to be added at Project site.
- C. Elastomeric Waterproofing Membrane and Bond Coat:
 - 1. TCA F122-02.
 - 2. ANSI A108.1.
 - 3. One component polyurethane, liquid applied material having the following additional physical properties:
 - a. Hardness: Shore "A" between 40-60.
 - b. Elongation: Between 300-600 percent.
 - c. Tensile strength: Between 40-60 psig.
 - d. No volatile compounds.
 - 4. Coal tar modified urethanes are not acceptable.

2.6 GROUTING MATERIALS

- A. Coloring Pigments:
 - 1. Pure mineral pigments, limeproof and nonfading, complying with ASTM C979.
 - 2. Add coloring pigments to grout by the manufacturer.
 - 3. Job colored grout is not acceptable.

4. Use is required in Commercial Portland Cement Grout, and Latex-Portland Cement Grout.

B. Commercial Portland Cement Grout: ANSI A108.1 color as specified.

C. Latex-Portland Cement Grout: ANSI A108.1 color as specified.

1. Unsanded grout mixture for joints 3.2 mm (1/8 inch) and narrower.

2. Sanded grout mixture for joints 3.2 mm (1/8 inch) and wider.

D. Colors:

1. Unglazed Ceramic Mosaic Floors: Equal to TEC, Color: Standard Gray, No. 933.

1. Glazed Ceramic Walls: Equal to TEC, Color: Standard White, No. 931.

2.7 PATCHING AND LEVELING COMPOUND

A. Portland cement base, polymer-modified, self-leveling compound, manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.

B. Shall have minimum following physical properties:

1. Compressive strength - 25 MPa (3500 psig) per ASTM C109/C109M.

2. Flexural strength - 7 MPa (1000 psig) per ASTM C348 (28 day value).

3. Tensile strength - 600 psi per ANSI 118.7.

4. Density - 1.9.

C. Capable of being applied in layers up to 38 mm (1-1/2 inches) thick without fillers and up to 100 mm (four inches) thick with fillers, being brought to a feather edge, and being trowelled to a smooth finish.

D. Primers, fillers, and reinforcement as required by manufacturer for application and substrate condition.

E. Ready for use in 48 hours after application.

2.8 WATER

A. Clean, potable and free from salts and other injurious elements to mortar and grout materials.

2.9 CLEANING COMPOUNDS

A. Specifically designed for cleaning masonry and concrete and which will not prevent bond of subsequent tile setting materials including patching and leveling compounds and elastomeric waterproofing membrane and coat.

B. Materials containing acid or caustic material not acceptable.

PART 3 - EXECUTION**3.1 ENVIRONMENTAL REQUIREMENTS**

- A. Maintain ambient temperature of work areas at not less than 16 degree C (60 degrees F), without interruption, for not less than 24 hours before installation and not less than three days after installation.
- B. Maintain higher temperatures for a longer period of time where required by manufacturer's recommendation and ANSI Specifications for installation.
- C. Do not install tile when the temperature is above 38 degrees C (100 degrees F).
- D. Do not install materials when the temperature of the substrate is below 16 degrees C (60 degrees F).
- E. Do not allow temperature to fall below 10 degrees C (50 degrees F) after fourth day of completion of tile work.

3.2 ALLOWABLE TOLERANCE

- A. Variation in plane of sub-floor, including concrete fills leveling compounds and mortar beds:
 - 1. Not more than 1 in 500 (1/4 inch in 10 feet) from required elevation where Portland cement mortar setting bed is used.
 - 2. Not more than 1 in 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds and chemical-resistant bond coats are used.
- B. Variation in Plane of Wall Surfaces:
 - 1. Not more than 1 in 400 (1/4 inch in eight feet) from required plane where Portland cement mortar setting bed is used.
 - 2. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar or organic adhesive setting materials is used.

3.3 SURFACE PREPARATION

- A. Patching and Leveling:
 - 1. Mix and apply patching and leveling compound in accordance with manufacturer's instructions.
 - 2. Fill holes and cracks and align concrete floors that are out of required plane with patching and leveling compound.
 - a. Thickness of compound as required to bring finish tile system to elevation shown.
 - b. Float finish except finish smooth for elastomeric waterproofing.

- c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 3. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- B. Walls:
1. Apply leveling coats of material compatible with wall surface and tile setting material to wall surfaces, other than concrete and masonry that are out of required plane.
- C. Existing Floors and Walls:
1. Remove existing composition floor finishes and adhesive. Prepare surface by grinding, chipping, self-contained power blast cleaning or other suitable mechanical methods to completely expose uncontaminated concrete or masonry surfaces. Follow safety requirements of ANSI A10.20.
 2. Remove existing concrete fill or topping to structural slab. Clean and level the substrate for new setting bed and waterproof membrane or cleavage membrane.
 3. Where new tile bases are required to finish flush with plaster above or where they are extensions of similar bases in conjunction with existing floor tiles cut channel in floor slab and expose rough wall construction sufficiently to accommodate new tile base and setting material.

3.4 CEMENTITIOUS BACKER UNITS

- A. Remove polyethylene wrapping from cementitious backer units and separate to allow for air circulation. Allow moisture content of backer units to dry down to a maximum of 35 percent before applying joint treatment and tile.
- B. Install in accordance with ANSI A108.1 except as specified otherwise.
- C. Install units horizontally or vertically to minimize joints with end joints over framing members. Units with rounded edges; face rounded edge away from studs to form a V joint for joint treatment.
- D. Secure cementitious backer units to each framing member with screws spaced not more than 200 mm (eight inches) on center and not closer than 13 mm (1/2 inch) from the edge of the backer unit or as recommended by backer unit manufacturer. Install screws so that the screw heads are flush with the surface of the backer unit.

- E. Where backer unit joins shower pans or waterproofing, lap backer unit over turned up waterproof system. Install fasteners only through top one-inch of turned up waterproof systems.
- F. Do not install joint treatment for seven days after installation of cementitious backer unit.
- G. Joint Treatment:
 - 1. Fill horizontal and vertical joints and corners with latex-Portland cement mortar. Apply fiberglass tape over joints and corners and embed with same mortar.
 - 2. Leave 6 mm (1/4 inch) space for sealant at lips of tubs, sinks, or other plumbing receptors.

3.5 CERAMIC TILE - GENERAL

- A. Comply with ANSI A108 series of tile installation standards in "Specifications for Installation of Ceramic Tile" applicable to methods of installation.
- B. Comply with TCA Installation Guidelines:
- C. Bond Coats:
 - 1. Set floor tile in elastomeric bond coat over elastomeric membrane ANSI 108. 13, TCA System F122.
 - 2. Set wall tile installed over concrete backer board in latex-Portland cement mortar, ANSI A108.1B.
 - 3. Set trim shapes in same material specified for setting adjoining tile.
- D. Workmanship:
 - 1. Lay out tile work so that no tile less than one-half full size is used. Make all cuts on the outer edge of the field.
 - 2. Set tile firmly in place with finish surfaces in true planes. Align tile flush with adjacent tile unless shown otherwise.
 - 3. Form intersections and returns accurately.
 - 4. Cut and drill tile neatly without marring surface.
 - 5. Cut edges of tile abutting penetrations, finish, or built-in items:
 - a. Fit tile closely around electrical outlets, piping, fixtures and fittings, so that plates, escutcheons, collars and flanges will overlap cut edge of tile.
 - b. Seal tile joints water tight as specified in Section 07 92 00, JOINT SEALANTS, around electrical outlets, piping fixtures and fittings before cover plates and escutcheons are set in place.

6. Completed work shall be free from hollow sounding areas and loose, cracked or defective tile.
7. Remove and reset tiles that are out of plane or misaligned.
8. Floors:
 - a. Extend floor tile beneath casework and equipment.
 - b. Align finish surface of new tile work flush with other and existing adjoining floor finish where shown.
 - c. In areas where floor drains occur, slope to drains where shown.
 - d. Shove and vibrate tiles over 200 mm (8 inches) square to achieve full support of bond coat.
9. Walls:
 - a. Cover walls and partitions, including pilasters, furred areas, and freestanding columns from floor to ceiling, or from floor to nominal wainscot heights shown with tile.
 - b. Finish reveals of openings with tile, except where other finish materials are shown or specified.
 - c. At window openings, provide tile stools and reveals, except where other finish materials are shown or specified.
 - d. Finish wall surfaces behind and at sides of casework and equipment.
10. Joints:
 - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.
 - b. Make joints 2 mm (1/16 inch) wide for glazed wall tile and mosaic tile work, 4 mm (1/8" inch) wide for porcelain floor tile.
11. Back Buttering: For installations indicated below, obtain 100 percent mortar coverage by complying with applicable special requirements for back buttering of tile in referenced ANSI A108 series of tile installation standards:
 - a. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches or larger).

3.6 THIN SET CERAMIC TILE INSTALLED WITH LATEX-PORTLAND CEMENT MORTAR

- A. Installation of Tile: ANSI A108.1, except as specified otherwise.
- B. Slope tile work to drains not less than 1 in 100 (1/8 inch per foot).

3.7 CERAMIC TILE INSTALLED WITH ELASTOMERIC BOND COAT

- A. Surface Preparation: Prepare surfaces as specified in paragraph 3.3G
- B. Installation of Elastomeric Membrane: ANSI A108.1 and TCA F122-02.

1. Prime surfaces, where required, in accordance with manufacturer's instructions.
 2. Install first coat of membrane material in accordance with manufacturer's instructions, in thickness of 0.75 to 1.3 mm (30 to 50 mils).
 3. Extend material over flashing rings of drains and turn up vertical surfaces not less than 100 mm (four inches) above finish floor surface.
 4. When material has set, recoat areas with a second coat of elastomeric membrane material for a total thickness of 1.3 to 1.9 mm (50 to 75 mils).
 5. After curing test for leaks with 25 mm (one inch) of water for 24 hours.
- C. Installation of Tile in Elastomeric Membrane:
1. Spread no more material than can be covered with tile before material starts to set.
 2. Apply tile in second coat of elastomeric membrane material in accordance with the coating manufacturer's instructions in lieu at aggregate surfacing specified in ASTM C1127. Do not install top coat over tile.

3.8 GROUTING

- A. Grout Type and Location:
1. Grout for glazed wall and base tile, unglazed mosaic tile, and porcelain tile: Portland cement grout, latex-Portland cement grout, or commercial Portland cement grout.
- B. Workmanship:
1. Install and cure grout in accordance with the applicable standard.
 2. Portland Cement grout: ANSI A108.1.
 3. Commercial Portland Cement Grout: ANSI A108.1 and in accordance with the manufacturer's printed instructions.

3.9 MOVEMENT JOINTS

- A. Prepare tile expansion, isolation, construction and contraction joints for installation of sealant. Refer to Section 07 92 00, JOINT SEALANTS.
- B. TCA details EJ 171-02.
- C. At expansion joints, rake out joint full depth of tile and setting bed and mortar bed. Do not cut waterproof or isolation membrane.
- D. Rake out grout at joints between tile, at toe of base, not less than 6 mm (1/4 inch) deep.

3.10 CLEANING

- A. Thoroughly sponge and wash tile. Polish glazed surfaces with clean dry cloths.
- B. Methods and materials used shall not damage or impair appearance of tile surfaces.
- C. The use of acid or acid cleaners on glazed tile surfaces is prohibited.
- D. Clean tile grouted with commercial Portland cement grout and tile set in elastomeric bond coat as recommended by the manufacturer of the grout and bond coat.

3.11 PROTECTION

- A. Keep traffic off tile floor, until grout and setting material is firmly set and cured.
- B. Where traffic occurs over tile floor, cover tile floor with not less than 9 mm (3/8 inch) thick plywood, wood particle board, or hardboard securely taped in place. Do not remove protective cover until time for final inspection. Clean tile of any tape, adhesive and stains.

3.12 OWNER INVENTORY

- A. Provide one (1) case minimum of each type of tile used to be turned over to the VA upon completion of the project.
- B. Label with VA Project Title, VA Project Number and VA Contract Number.

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**SECTION 09 51 00
ACOUSTICAL CEILINGS**

PART 1- GENERAL

1.1 DESCRIPTION

- A. Metal ceiling suspension system for acoustical ceilings.
- B. Acoustical units.

1.2 SUBMITTAL

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Ceiling suspension system, each type, showing complete details of installation, including suspension system specified to match existing and upward access system details for concealed grid systems.
 - 2. Acoustical units, each type
- C. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

1.3 DEFINITIONS

- A. Standard definitions as defined in ASTM C634.
- B. Terminology as defined in ASTM E1264.

1.4 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in the text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A641/A641M-09.....Zinc-coated (Galvanized) Carbon Steel Wire
 - A653/A653M-11.....Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-coated (Galvannealed) by the Hot-Dip Process
 - C423-09.....Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
 - C634-11.....Standard Terminology Relating to Environmental Acoustics
 - C635-13.....Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
 - C636-13.....Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels
 - E84-13.....Surface Burning Characteristics of Building Materials
 - E119-12.....Fire Tests of Building Construction and Materials

- E413-10.....Classification for Rating Sound Insulation.
 E580-11.....Application of Ceiling Suspension Systems for
 Acoustical Tile and Lay-in Panels in Areas
 Requiring Seismic Restraint
 E1264-08e1.....Classification for Acoustical Ceiling Products
 C. International Organization for Standardization (ISO)
 ISO 14644-1.....Classification of Air Cleanliness

PART 2- PRODUCTS

2.1 METAL SUSPENSION SYSTEM

- A. ASTM C635, heavy-duty system, except as otherwise specified.
1. Ceiling suspension system members may be fabricated from the following unless specified otherwise.
 - a. Galvanized cold-rolled steel, bonderized.
 2. Use same construction for cross runners as main runners. Use of lighter-duty sections for cross runners is not acceptable.
- B. Exposed grid suspension system for support of lay-in panels:
1. Exposed grid width not less than 22 mm (7/8 inch) with not less than 8 mm (5/16 inch) panel bearing surface.
 2. Fabricate wall molding and other special molding from the same material with same exposed width and finish as the exposed grid members.
 3. On exposed metal surfaces apply baked-on enamel flat texture finish in color to match adjacent acoustical units unless specified otherwise.

2.2 PERIMETER SEAL

- A. Vinyl, polyethylene or polyurethane open cell sponge material having density of 1.3 plus or minus 10 percent, compression set less than 10 percent with pressure sensitive adhesive coating on one side.
- B. Thickness as required to fill voids between back of wall molding and finish wall.
- C. Not less than 9 mm (3/8 inch) wide strip.

2.3 WIRE

- A. ASTM A641.
- B. For wire hangers: Minimum diameter 2.68 mm (0.1055 inch).
- C. For bracing wires: Minimum diameter 3.43 mm (0.1350 inch).

2.4 ANCHORS AND INSERTS

- A. Use anchors or inserts to support twice the loads imposed by hangers attached thereto.
- B. Power Actuated Drive Pins:
1. Power Actuated Drive Pins: Fed. Spec. FF-P394 Type A and Class as required to resist twice the imposed load.

2. Threaded Stud: Style SC for concrete, Style SS for steel.

3. Eye Pin: Style EP.

C. Clips:

1. Galvanized steel.

2. Designed to clamp to steel beam or bar joists, or secure framing member together.

3. Designed to rigidly secure framing members together.

4. Designed to sustain twice the loads imposed by hangers or items supported.

D. Tile Splines: ASTM C635.

2.5 CARRYING CHANNELS FOR SECONDARY FRAMING

A. Fabricate from cold-rolled or hot-rolled steel, black asphaltic paint finish, free of rust.

B. Weighing not less than the following, per 300 m (per thousand linear feet):

Size mm	Size Inches	Cold-rolled		Hot-rolled	
		Kg	Pound	Kg	Pound
38	1 1/2	215.4	475	508	1120
50	2	267.6	590	571.5	1260

2.6 ACOUSTICAL UNITS

A. General:

1. Ceiling Tile shall meet minimum 37% bio-based content in accordance with USDA Bio-Preferred Product requirements.

2. ASTM E1264, weighing 3.6 kg/m² (3/4 psf) minimum for mineral fiber panels or tile.

3. Class A Flame Spread: ASTM 84

4. Minimum NRC (Noise Reduction Coefficient): 0.55 unless specified otherwise: ASTM C423.

5. Minimum CAC (Ceiling Attenuation Class): 40-44 range unless specified otherwise: ASTM E413.

6. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.75 on the exposed surfaces.

7. Lay-in panels: Sizes as shown, with square edges.

a. ACT A: Equal to Armstrong, Celotex or USG, Color: White.

b. ACT B: Equal to Armstrong, Clean Room VL unperforated Class 5 (Class 100), Color: White.

2.7 ACCESS IDENTIFICATION

A. Markers:

1. Use colored markers with pressure sensitive adhesive on one side.

2. Make colored markers of paper or plastic, 6 to 9 mm (1/4 to 3/8 inch) in diameter.
- B. Use markers of the same diameter throughout building.
- C. Color Code: Use following color markers for service identification:

Color.....	Service
Red.....	Sprinkler System: Valves and Controls
Green.....	Domestic Water: Valves and Controls
Yellow.....	Chilled Water and Heating Water
Red Tag, White Letters....	Ductwork: Fire Dampers (match existing)
Blue.....	Ductwork: Dampers and Controls
Black.....	Gas: Laboratory, Medical, Air and Vacuum
White Tag, Black Letters ...	VAVs (match existing)

PART 3 EXECUTION

3.1 CEILING TREATMENT

- A. Treatment of ceilings shall include sides and soffits of ceiling beams, furred work 600 mm (24 inches) wide and over, and vertical surfaces at changes in ceiling heights unless otherwise shown. Install acoustic tiles after wet finishes have been installed and solvents have cured.
- B. Lay out acoustical units symmetrically about center lines of each room or space unless shown otherwise on reflected ceiling plan.
- C. Moldings:
 1. Install metal wall molding at perimeter of room, column, or edge at vertical surfaces.
 2. Install special shaped molding at changes in ceiling heights and at other breaks in ceiling construction to support acoustical units and to conceal their edges.
- D. Perimeter Seal:
 1. Install perimeter seal between vertical leg of wall molding and finish wall, partition, and other vertical surfaces.
 2. Install perimeter seal to finish flush with exposed faces of horizontal legs of wall molding.
- E. Existing ceiling:
 1. Where extension of existing ceilings occur, match existing.
 2. Where acoustical units are salvaged and reinstalled or joined, use salvaged units within a space. Do not mix new and salvaged units within a space which results in contrast between old and new acoustic units.
 3. Comply with specifications for new acoustical units for new units required to match appearance of existing units.

3.2 CEILING SUSPENSION SYSTEM INSTALLATION

- A. General:

1. Install metal suspension system for acoustical tile and lay-in panels in accordance with ASTM C636, except as specified otherwise.
2. Use direct or indirect hung suspension system or combination thereof as defined in ASTM C635.
3. Support a maximum area of 1.48 m² (16 sf) of ceiling per hanger.
4. Prevent deflection in excess of 1/360 of span of cross runner and main runner.
5. Provide extra hangers, including a minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system.
6. Provide not less than 100 mm (4 inch) clearance from the exposed face of the acoustical units to the underside of ducts, pipe, conduit, secondary suspension channels, concrete beams or joists; and steel beam or bar joist unless furred system is shown,
7. Use main runners not less than 1200 mm (48 inches) in length.
8. Install hanger wires vertically. Angled wires are not acceptable except for seismic restraint bracing wires.

B. Anchorage to Structure:

1. Concrete:
 - a. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger and bracing wire. Install in sides of concrete beams or joists at mid height.
2. Steel:
 - a. When steel framing does not permit installation of hanger wires at spacing required, install carrying channels for attachment of hanger wires.
 - (1) Size and space carrying channels to insure that the maximum deflection specified will not be exceeded.
 - (2) Attach hangers to steel carrying channels, spaced four feet on center, unless area supported or deflection exceeds the amount specified.
 - b. Attach carrying channels to the bottom flange of steel beams spaced not 1200 mm (4 feet) on center before fire proofing is installed. Weld or use steel clips to attach to beam to develop full strength of carrying channel.
 - c. Patch to match all fireproofing.

C. Direct Hung Suspension System:

1. As illustrated in ASTM C635.
2. Support main runners by hanger wires attached directly to the structure overhead.

3. Maximum spacing of hangers, 1200 mm (4 feet) on centers unless interference occurs by mechanical systems. Use indirect hung suspension system where not possible to maintain hanger spacing.

D. Indirect Hung Suspension System:

1. As illustrated in ASTM C635.
2. Space carrying channels for indirect hung suspension system not more than 1200 mm (4 feet) on center. Space hangers for carrying channels not more than 2400 mm (8 feet) on center or for carrying channels less than 1200 mm (4 feet) on center so as to insure that specified requirements are not exceeded.
3. Support main runners by specially designed clips attached to carrying channels.

3.3 ACOUSTICAL UNIT INSTALLATION

- A. Cut acoustic units for perimeter borders and penetrations to fit tight against penetration for joint not concealed by molding.
- B. Install lay-in acoustic panels in exposed grid with not less than 6 mm (1/4 inch) bearing at edges on supports.
 1. Install tile to lay level and in full contact with exposed grid.
 2. Replace cracked, broken, stained, dirty, or tile not cut for minimum bearing.
- C. Markers:
 1. Install markers of color code specified to identify the various concealed piping, mechanical, and plumbing systems.
 2. Attach colored markers to exposed grid on opposite sides of the units providing access.
 3. Attach marker on exposed ceiling surface of upward access acoustical unit.

3.4 CLEAN-UP AND COMPLETION

- A. Replace damaged, discolored, dirty, cracked and broken acoustical units.
- B. Leave finished work free from defects.

3.5 OWNER INVENTORY

- A. Provide ten (10) percent additional of each type of acoustical unit used to be turned over to VA upon completion of project.

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**SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES**

PART 1 - GENERAL

1.1 DESCRIPTION

A. This section specifies the installation of vinyl base.

1.2 RELATED WORK

A. Integral base with sheet flooring: Section 09 65 16, RESILIENT SHEET FLOORING.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Description of each product.
 2. Base and stair material manufacturer's recommendations for adhesives.
 3. Application and installation instructions.
- C. Samples:
1. Base: 150 mm (6 inches) long, each type and color.
 2. Adhesive: Literature indicating each type.

1.4 DELIVERY

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

1.5 STORAGE

- A. Store materials in weather tight and dry storage facility.
- B. Protect material from damage by handling and construction operations before, during, and after installation.

1.6 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
- F1344-10.....Rubber Floor Tile
- F1861-08.....Resilient Wall Base
- C. Federal Specifications (Fed. Spec.):
- RR-T-650E.....Treads, Metallic and Non-Metallic, Nonskid

PART 2 - PRODUCTS**2.1 GENERAL**

- A. Use only products by the same manufacturer and from the same production run.

2.2 RESILIENT BASE

- A. ASTM F1861, 3 mm (1/8 inch) thick, 100 mm (4 inches) high, Thermoplastics, Group 2-layered. Style B-cove.
- B. Where carpet occurs, use Style A-straight.
- C. Use only one type of base throughout.
- D. Product: Equal to Johnsonite, Color: Fawn, No. 80.

2.3 ADHESIVES

- A. Use products recommended by the material manufacturer for the conditions of use.
- B. Use low-VOC adhesive during installation. Water based adhesive with low VOC is preferred over solvent based adhesive.

PART 3 - EXECUTION**3.1 PROJECT CONDITIONS**

- A. Maintain temperature of materials above 21 degrees C (70 degrees F), for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 21 degrees C and 27 degrees C (70 degrees F and 80 degrees F) for at least 48 hours, before, during, and after installation.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.

3.2 INSTALLATION REQUIREMENTS

- A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Project Engineer.
- B. Submit proposed installation deviation from this specification to the Project Engineer indicating the differences in the method of installation.
- C. The Project Engineer reserves the right to have test portions of material installation removed to check for non-uniform adhesion and spotty adhesive coverage.

3.3 PREPARATION

- A. Examine surfaces on which material is to be installed.
- B. Fill cracks, pits, and dents with leveling compound.
- C. Level to 3 mm (1/8 inch) maximum variations.
- D. Do not use adhesive for leveling or filling.
- E. Grind, sand, or cut away protrusions; grind high spots.

- F. Clean substrate area of oil, grease, dust, paint, and deleterious substances.
- G. Substrate area dry and cured. Perform manufacturer's recommended bond and moisture test.
- H. Preparation of existing installation:
 - 1. Remove existing base including adhesive.
 - 2. Do not use solvents to remove adhesives.
 - 3. Prepare substrate as specified.

3.4 BASE INSTALLATION

- A. Location:
 - 1. Unless otherwise specified or shown, where base is scheduled, install base over toe space of base of casework, lockers, laboratory, pharmacy furniture island cabinets and where other equipment occurs.
 - 2. Extend base scheduled for room into adjacent closet, alcoves, and around columns.
- B. Application:
 - 1. Apply adhesive uniformly with no bare spots.
 - 2. Set base with joints aligned and butted to touch for entire height.
 - 3. Before starting installation, layout base material to provide the minimum number of joints with no strip less than 600 mm (24 inches) length.
 - a. Short pieces to save material will not be permitted.
 - b. Locate joints as remote from corners as the material lengths or the wall configuration will permit.
- C. Form corners and end stops as follows:
 - 1. Score back of outside corner.
 - 2. Score face of inside corner and notch cove.
- D. Roll base for complete adhesion.

3.5 CLEANING AND PROTECTION

- A. Clean all exposed surfaces of base and adjoining areas of adhesive spatter before it sets.
- B. Keep traffic off resilient material for at least 72 hours after installation.
- C. Clean and polish materials in the following order:
 - 1. After two weeks, scrub resilient base, materials with a minimum amount of water and a mild detergent. Leave surfaces clean and free of detergent residue. Polish resilient base to a gloss finish.
 - 2. Do not polish rubber materials.
- D. When construction traffic is anticipated, cover materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until removal is directed by the Project Engineer.

- E. Where protective materials are removed and immediately prior to acceptance, replace damaged materials and re-clean resilient materials. Damaged materials are defined as having cuts, gouges, scrapes or tears and not fully adhered.

3.6 OWNER INVENTORY

- A. Provide one (1) 120' roll of each base type used and ten (10) percent additional of other materials to be turned over to VA upon completion of project.
- B. Label with VA Product Number, VA Project Title, VA Contract Number and color designation from specifications.

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SECTION 09 65 16
RESILIENT SHEET FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This Section specifies the installation of sheet flooring with backing and integral cove base.
- B Installation of sheet flooring including following:
 - 1. Heat welded seams.
 - 2. Integral cove base: Installed at intersection of floor and vertical surfaces.

1.2 QUALITY CONTROL-QUALIFICATIONS

- A. The Contracting Officer shall approve products or service of proposed manufacturer, suppliers, and installers, and the Contractor shall submit certification that:
 - 1. Heat welded seaming is manufacturer's prescribed method of installation.
 - 2. Installer is approved by manufacturer of materials and has technical qualifications, experience, trained personnel, and facilities to install specified items.
 - 3. Manufacturer's product submitted has been in satisfactory operation, on three installations similar and equivalent in size to this project for three years. Submit list of installations.
- B. The sheet vinyl floor coverings shall meet fire performance characteristics as determined by testing products, per ASTM test method, indicated below by Underwriters Laboratories, Inc. (UL) or another recognized testing and inspecting agency acceptable to authorities having jurisdiction.
 - 1. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E648.
 - 2. Smoke Density: Less than 450 per ASTM E662.
- C. The floor covering manufacturer shall certify that products supplied for installation comply with local regulations controlling use of volatile organic compounds (VOC's).

1.3 SUBMITTALS

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES, submit following:
- B. Manufacturer's Literature and Data:
 - 1. Description of resilient material and accessories to be provided.
 - 2. Resilient material manufacturer's recommendations for adhesives, weld rods, sealants, and underlayment.

3. Application and installation instructions.

C. Samples:

1. Sheet material, 38 mm by 300 mm (1-1/2 inch by 12 inch), of each color and pattern with a welded seam using proposed welding rod 300 mm (12 inches) square for each type, pattern and color.
2. Cap strip and fillet strip, 300 mm (12 inches) for integral base.
3. Shop Drawings and Certificates: Layout of joints showing patterns where joints are expressed, and type and location of obscure type joints. Indicate orientation of directional patterns.
4. Certificates: Quality Control Certificate Submittals and lists specified in paragraph, QUALIFICATIONS.

1.4 PROJECT CONDITIONS

- A. Maintain temperature of floor materials and room, where work occurs, above 18 degrees C (65 degrees F) and below 38 degrees C (100 degrees F) for 48 hours before, during and for 48 hours after installation. After above period, room temperature shall not fall below 13 degrees C (55 degrees F).
- B. Construction in or near areas to receive flooring work shall be complete, dry and cured. Do not install resilient flooring over slabs until they have been cured and are sufficiently dry to achieve a bond with adhesive. Follow flooring manufacturer's recommendations for bond and moisture testing.
- C. Building shall be permanently enclosed. Schedule construction so that floor receives no construction traffic when completed.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver materials to site in original sealed packages or containers; labeled for identification with manufacturer's name and brand.
- B. Deliver sheet flooring full width roll, completely enclosed in factory wrap, clearly marked with the manufacturer's number, type and color, production run number and manufacture date.
- C. Store materials in weathertight and dry storage facility. Protect from damage due to handling, weather, and construction operations before, during and after installation. Store sheet flooring on end with ambient temperatures maintained as recommended by manufacturer.
- D. Store sheet flooring on end.
- E. Move sheet vinyl floor coverings and installation accessories into spaces where they will be installed at least 48 hours in advance of installation.

1.6 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society For Testing Materials (ASTM):
- E648-10.....Critical Radiant Flux of Floor-Covering Systems
Using a Radiant Energy Source.
- E662-12.....Specific Optical Density of Smoke Generated by
Solid Materials.
- F710-08.....Practice for Preparing Concrete Floors and Other
Monolithic Floors to Receive Resilient Flooring.
- F1303-04(2009).....Sheet Vinyl Floor Covering with Backing.
- F1869-10.....Moisture Vapor Emission Rate of Concrete
Subfloor using Anhydrous Calcium Chloride
- F1913-04(2010).....Sheet Vinyl Flooring without Backing
- F2170-09.....Determining Relative Humidity in Concrete Floor
Slabs using In-situ Probes
- C. Resilient Floor Covering Institute (RFCI):
- Recommended Work Practices for Removal of Resilient Floor Coverings.

1.7 SCHEDULING

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

1.8 WARRANTY

- A. Submit written warranty, in accordance with FAR clause 52.246-21, Warranty of Construction requirements except that warranty period shall be extended to include two (2) years.

PART 2 - PRODUCTS**2.1 SHEET VINYL FLOOR COVERINGS**

- A. Sheet Vinyl Floor Coverings: Smooth face, minimum thickness nominal 2 mm (0.08 inch). Sheet flooring shall conform to ASTM F1913 and material requirements specified in ASTM F1303, Type II, Grade 1, backing classification not applicable. Foam backed sheet flooring is not acceptable.
- B. Size: Provide maximum size sheet vinyl material produced by manufacturer to provide minimum number of joints. Minimum size width acceptable - 1200 mm (48 inches).

- C. Each color and pattern of sheet flooring shall be of same production run.
- D. Product: Equal to Mannington Commercial, BioSpec MD, Color: Bedrock, No. 15369.

2.2 WELDING ROD

- A. Product of floor covering manufacturer in color shall match field color of sheet vinyl covering.

2.3 APPLICATION MATERIALS AND ACCESSORIES

- A. Floor and Base Adhesive: Type recommended by sheet flooring material manufacturer for conditions of use.
- B. Mastic Underlayment (for concrete floors): Provide products with latex or polyvinyl acetate resins in mix. Condition to be corrected shall determine type of underlayment selected for use.
- C. Base Accessories:
 - 1. Fillet Strip: 19 mm (3/4 inch) radius fillet strip compatible with resilient sheet material.
 - 2. Cap Strip: Extruded flanged zero edge vinyl reducer strip approximately 25 mm (one inch) exposed height with 13 mm (1/2 inch) flange.

2.4 ADHESIVES

- A. Water resistant type recommended by the sheet flooring manufacturer for the conditions of use. VOC not to exceed 50g/L.

2.5 BASE CAP STRIP AND COVE STRIP

- A. Extruded vinyl compatible with the sheet flooring.
- B. Cap strip "J" shape with feathered edge flange approximately 25 mm (one inch) wide; top designed to receive sheet flooring with 13 mm (1/2 inch) flange lapping top of flooring
- C. Cove strip 70 mm (2-3/4 inch) radius.

2.6 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.

2.7 PRIMER (FOR CONCRETE SUBFLOORS)

- A. As recommended by the adhesive or sheet flooring manufacturer.

2.8 SEALANT

- A. As specified in Section 07 92 00, JOINT SEALANTS.
- B. Compatible with sheet flooring.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Maintain temperature of sheet flooring above 36 degrees C (65 degrees F), for 48 hours before installation.

- B. Maintain temperature of rooms where sheet flooring work occurs above 36 degrees C (65 degrees F), for 48 hours, before installation and during installation.
- C. After installation, maintain temperature at or above 36 degrees C (65 degrees F.)
- D. Building is permanently enclosed.
- E. Wet construction in or near areas to receive sheet flooring is complete, dry and cured.

3.2 SUBFLOOR PREPARATION

- A. Concrete Subfloors: Verify that concrete slabs comply with ASTM F710.
 - 1. Installer shall examine surfaces on which resilient sheet flooring is to be installed, and shall advise Contractor, in writing, of areas which are unacceptable for installation of flooring material. Installer shall advise Contractor which methods are to be used to correct conditions that will impair proper installation. Installation shall not proceed until unsatisfactory conditions have been corrected.
 - 2. Slab substrates dry, free of curing compounds, sealers, hardeners, and other materials which would interfere with bonding of adhesive. Determine adhesion and dryness characteristics by performing bond and moisture tests recommended by Resilient Floor Covering Institute recommendations in manual RFCI-MRP.
- B. Broom or vacuum clean substrates to be covered by sheet vinyl floor coverings immediately before installation. Following cleaning, examine substrates to determine if there is visually any evidence of moisture, alkaline salts, carbonation, or dust.
- C. Primer: If recommended by flooring manufacturer, prior to application of adhesive, apply concrete slab primer in accordance with manufacturer's directions.
- D. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.
- E. Fill cracks, joints, depressions, and other irregularities in concrete with leveling compound.
 - 1. Do not use adhesive for filling or leveling purposes.
 - 2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
 - 3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joint lines.
- F. Clean floor of oil, paint, dust and deleterious substances. Leave floor dry and cured free of residue from existing curing or cleaning agents.

- G. Moisture Testing: Perform moisture and pH test as recommended by the flooring and adhesive manufacturers. Perform test locations starting on the deepest part of the concrete structure. Proceed with installation only after concrete substrates meet or exceed the manufacturer's requirements. In the absence of specific guidance from the flooring or adhesive manufacturer the following requirements are to be met:
1. Perform moisture vapor emission tests in accordance with ASTM F1869. Proceed with installation only after substrates have a maximum moisture-vapor-emission rate of 1.36 kg of water/92.9 sq. m (3lb of water/1000 sq. ft.) in 24 hours.
 2. Perform concrete internal relative humidity testing using situ probes in accordance with ASTM F2170. Proceed with installation only after concrete reaches maximum 75 percent relative humidity level measurement.

3.3 INSTALLATION OF FLOORING

- A. Install work in strict compliance with manufacturer's instructions and approved layout drawings.
- B. Maintain uniformity of sheet vinyl floor covering direction and avoid cross seams.
- C. Arrange for a minimum number of seams and place them in inconspicuous and low traffic areas, but in no case less than 150 mm (6 inches) away from parallel joints in flooring substrates.
- D. Match edges of resilient floor coverings for color shading and pattern at seams.
- E. Where resilient sheet flooring abuts other flooring material floors shall finish level.
- F. Extend sheet vinyl floor coverings into toe spaces, door reveals, closets, and similar openings.
- G. Inform the Project Engineer of conflicts between this section and the manufacturer's instructions or recommendations for auxiliary materials, or installation methods, before proceeding.
- H. Install sheet in full coverage adhesives.
 1. Air pockets or loose edges will not be accepted.
 2. Trim sheet materials to touch in the length of intersection at pipes and vertical projections; seal joints at pipe with waterproof cement or sealant.
- I. Keep joints to a minimum; avoid small filler pieces or strips.
- J. Follow manufacturer's recommendations for seams at butt joints. Do not leave any open joints that would be readily visible from a standing position.

- K. Follow manufacturer's recommendations regarding pattern match, if applicable.
- L. Integral Cove Base Installation:
 - 1. Set preformed fillet strip to receive base.
 - 2. Install the base with adhesive, terminate exposed edge with the cap strip.
 - 3. Form internal and external corners to the geometric shape generated by the cove at either straight or radius corners.
 - 4. Solvent weld joints as specified for the flooring. Seal cap strip to wall with an adhesive type sealant.
 - 5. Unless otherwise specified or shown where sheet flooring is scheduled, provide integral base at intersection of floor and vertical surfaces. Provide sheet flooring and base scheduled for room on floors and walls under and behind areas where casework, furniture and other equipment occurs, except where mounted in wall recesses.

3.4 INSTALLATION OF INTEGRAL COVERED BASE

- A. Set preformed cove to receive base. Install base material with adhesive and terminate exposed edge with cap strip. Integral base shall be 100 mm (4 inches) high.
- B. Internal and external corners shall be formed to geometric shape generated by cove at either square or radius corners.

3.5 WELDING

- A. Heat weld all joints of flooring and base using equipment and procedures recommended by flooring manufacturer.
- B. Welding shall consist of routing joint, inserting a welding rod into routed space, and terminally fusing into a homogeneous joint.
- C. Upon completion of welding, surface across joint shall finish flush, free from voids, and recessed or raised areas.
- D. Fusion of Material: Joint shall be fused a minimum of 65 percent through thickness of material, and after welding shall meet specified characteristics for flooring.

3.6 CLEANING

- A. Clean small adhesive marks during application of sheet flooring and base before adhesive sets, excessive adhesive smearing will not be accepted.
- B. Remove visible adhesive and other surface blemishes using methods and cleaner recommended by floor covering manufacturers.
- C. Clean and polish materials per flooring manufacturer's written recommendations.
- D. Vacuum floor thoroughly.

- E. Do not wash floor until after period recommended by floor covering manufacturer and then prepare in accordance with manufacturer's recommendations.
- F. Upon completion, Project Engineer shall inspect floor and base to ascertain that work was done in accordance with manufacturer's printed instructions.
- G. Perform initial maintenance according to flooring manufacturer's written recommendations.

3.7 PROTECTION

- A. Protect installed flooring as recommended by flooring manufacturer against damage from rolling loads, other trades, or placement of fixtures and furnishings.
- B. Keep traffic off sheet flooring for 24 hours after installation.
- C. Where construction traffic is anticipated, cover sheet flooring with reinforced kraft paper properly secured and maintained until removal is authorized by the Project Engineer.
- D. Where protective materials are removed and immediately prior to acceptance, repair any damage, re-clean sheet flooring, lightly re-apply polish and buff floor.

3.8 OWNER INVENTORY

- A. Provide one (1) roll of each color of resilient sheet flooring and welding rods used to be turned over to VA upon completion of project.
- B. Label with VA Project Title, VA Project Number and VA Contract Number.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies the installation of solid vinyl tile flooring, vinyl composition tile flooring and accessories.

1.2 RELATED WORK

- A. Resilient Base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
1. Description of each product.
 2. Resilient material manufacturer's recommendations for adhesives, underlayment, primers and polish.
 3. Application and installation instructions.
- C. Samples:
1. Tile: 300 mm by 300 mm (12 inches by 12 inches) for each type, pattern and color.
 2. Edge Strips: 150 mm (6 inches) long, each type.
 3. Feature Strips: 150 mm (6 inches) long.
- D. Test Reports:
1. Abrasion resistance: Depth of wear for each tile type and color and volume loss of tile, certified by independent laboratory.
 2. Tested per ASTM F510.

1.4 DELIVERY

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number and date of manufacture.
- B. Materials from containers which have been distorted, damaged or opened prior to installation will be rejected.

1.5 STORAGE

- A. Store materials in weathertight and dry storage facility.
- B. Protect from damage from handling, water, and temperature.

1.6 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
D4078-02 (2008).....Water Emulsion Floor Finish

- E648-10.....Critical Radiant Flux of Floor Covering Systems
Using a Radiant Energy Source
- E662-09.....Specific Optical Density of Smoke Generated by
Solid Materials
- E1155-96 (R2008).....Determining Floor Flatness and Floor Levelness
Numbers
- F510-93 (R 2008).....Resistance to Abrasion of Resilient Floor
Coverings Using an Abrader with a Grit Feed
Method
- F710-08.....Preparing Concrete Floors to Receive Resilient
Flooring
- F1066-04 (R2010).....Vinyl Composition Floor Tile
- F1344-10.....Rubber Floor Tile
- F1700-04 (R2010).....Solid Vinyl Floor Tile
- C. Resilient Floor Covering Institute (RFCI):
- IP #2.....Installation Practice for Vinyl Composition Tile
(VCT)
- D. Federal Specifications (Fed. Spec.):
- SS-T-312.....Tile Floor: Asphalt, Rubber, Vinyl and Vinyl
Composition

PART 2 - PRODUCTS

2.1 GENERAL

- A. Furnish product type, materials of the same production run and meeting following criteria.
- B. Use adhesives, underlayment, primers and polish recommended by the floor resilient material manufacturer.
- C. Critical Radiant Flux: 0.45 watts per sq. cm or more, Class I, per ASTM E 648.
- D. Smoke density: Less than 450 per ASTM E662.

2.2 VINYL COMPOSITION TILE

- A. ASTM F1066, Composition 1, Class I (solid color), 300 mm (12 inches) square, 3 mm (1/8 inch) thick.
- B. Color and pattern uniformly distributed throughout thickness.
- C. Product: Equal to Mannington Commercial, Progressions VCT, Color: Sandrift, No. 55137.

2.3 ADHESIVES

- A. Comply with applicable regulations regarding toxic and hazardous materials Green Seal (GS-36) for commercial adhesive.
- B. Use low-VOC adhesive during installation. Water based is preferred over solvent based adhesives.

2.4 PRIMER (FOR CONCRETE SUBFLOORS)

- A. As recommended by the adhesive and tile manufacturer.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Provide cementitious products with latex or polyvinyl acetate resins in the mix.
- B. Determine the type of underlayment selected for use by the condition to be corrected.

2.6 POLISH AND CLEANERS

- A. Cleaners RFCI CL-1.
- B. Polish: ASTM D4078.

2.7 EDGE STRIPS

- A. 28 mm (1-1/8 inch) wide unless shown otherwise.
- B. Bevel from maximum thickness to minimum thickness for flush joint unless shown otherwise.
- C. Resilient Edge Strip or Reducer Strip: Fed. Specs. SS-T-312, Solid vinyl. Product: Equal to Johnsonite, Color: Fawn, No. 80.

PART 3 - EXECUTION**3.1 PROJECT CONDITIONS**

- A. Maintain temperature of materials a minimum of 22 degrees C (70 degrees F,) for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs between 21 degrees C and 27 degrees C (70 degrees F and 80 degrees F), for at least 48 hours, before, during and after installation.
- C. Do not install flooring until building is permanently enclosed and wet construction in or near areas to receive tile materials is complete, dry and cured.

3.2 SUBFLOOR PREPARATION

- A. Verify that concrete slabs comply with ASTM F710. At existing slabs, determine levelness by F-number method in accordance with ASTM E1155. Overall value shall not exceed as follows:
FF30/FL20
- B. Correct conditions which will impair proper installation.
- C. Fill cracks, joints and other irregularities in concrete with leveling compound:
 - 1. Do not use adhesive for filling or leveling purposes.
 - 2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
 - 3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joints.

- D. Clean floor of oil, paint, dust, and deleterious substances: Leave floor dry and cured free of residue from existing curing or cleaning agents.
- E. Concrete Subfloor Testing:
 - 1. Determine Adhesion and dryness of the floor by bond and moisture tests as recommended by RFCI manual MRP.
- F. Perform additional subfloor preparation to obtain satisfactory adherence of flooring if subfloor test patches allows easy removal of tile.
- G. Prime the concrete subfloor if the primer will seal slab conditions that would inhibit bonding, or if priming is recommended by the tile or adhesive manufacturers.
- H. Preparation of existing installation shall include the removal of existing resilient floor and existing adhesive. Do not use solvents to remove adhesives.

3.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions for application and installation unless specified otherwise.
- B. Mix tile from at least two containers. An apparent line either of shades or pattern variance will not be accepted.
- C. Tile Layout:
 - 1. If layout is not shown on drawings, lay tile symmetrically about center of room or space with joints aligned.
 - 2. No tile shall be less than 150 mm (6 inches) and of equal width at walls.
 - 3. Place tile pattern in the same direction; do not alternate tiles.
- D. Trim tiles to touch for the length of intersections at pipes and vertical projections, seal joints at pipes with waterproof cement.
- E. Application:
 - 1. Apply adhesive uniformly with no bare spots.
 - a. Conform to RFC1-TM-6 for joint tightness and for corner intersection unless layout pattern shows random corner intersection.
 - b. More than 5 percent of the joints not touching will not be accepted.
 - 2. Roll tile floor with a minimum 45 kg (100 pound) roller. No exceptions.
 - 3. The Project Engineer may have test tiles removed to check for non-uniform adhesion, spotty adhesive coverage, and ease of removal. Install new tile for broken removed tile.
- F. Installation of Edge Strips:
 - 1. Locate edge strips under center line of doors unless otherwise shown.
 - 2. Set resilient edge strips in adhesive.

3. Where tile edge is exposed, butt edge strip to touch along tile edge.
4. Where thin set ceramic tile abuts resilient tile, set edge strip against floor file and against the ceramic tile edge.

3.4 CLEANING AND PROTECTION

- A. Clean adhesive marks on exposed surfaces during the application of resilient materials before the adhesive sets. Exposed adhesive is not acceptable.
- B. Keep traffic off resilient material for a minimum 72 hours after installation.
- C. Clean and polish materials in the following order:
 1. For the first two weeks sweep and damp mopped only.
 2. After two weeks, scrub resilient materials with a minimum amount of water and a mild detergent. Leave surface clean and free of detergent residue.
 3. Apply polish to the floors in accordance with the polish manufacturer's instructions.
- D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by Project Engineer. At entrances and where wheeled vehicles or carts are used, cover tile with plywood, hardboard, or particle board over paper, secured and maintained until removal is directed by Project Engineer.
- E. When protective materials are removed and immediately prior to acceptance, replace any damage tile, re-clean resilient materials, lightly re-apply polish and buff floors.

3.5 LOCATION

- A. Unless otherwise specified or shown, install tile flooring, on floor under areas where casework, furniture and other equipment occurs, except where mounted in wall recesses.
- B. Extend tile flooring for room into adjacent closets and alcoves.

3.6 OWNER INVENTORY

- A. Turn over one (1) case minimum of each type of vinyl composition tile used to be turned over to VA upon completion of project.
- B. Label with VA Project Number, VA Project Title, VA Contract Number and VA Color Designation from specification (i.e., VCT-1, VCT-2, etc.).

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SECTION 09 68 00
CARPETING

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section specifies carpet, edge strips, adhesives, and other items required for complete installation.

1.2 RELATED WORK

- A. Resilient wall base: Section 09 65 13, RESILIENT BASE AND ACCESSORIES.

1.3 QUALITY ASSURANCE

- A. Carpet installed by mechanics certified by the Floor Covering Installation Board.
- B. Certify and label the carpet that it has been tested and meets criteria of CRI IAQ Carpet Testing Program for indoor air quality.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product Data:
1. 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.
 2. Manufacturer's printed installation instructions for the carpet, including preparation of installation substrate, seaming techniques and recommended adhesives and tapes.
 3. Manufacturer's certificate verifying carpet containing recycled materials include percentage of recycled materials as specified.
- C. Samples:
1. Carpet: "Production Quality" samples 300 x 300 mm (12 x 12 inches) of carpets, showing quality, pattern and color.
 2. Floor Edge Strip (Molding): 150 mm (6 inches) long of each color and type specified.
- D. Maintenance Data: Carpet manufacturer's maintenance instructions describing recommended type of cleaning equipment and material, spotting and cleaning methods and cleaning cycles.

1.5 DELIVERY AND STORAGE

- A. Deliver carpet in manufacturer's original wrappings and packages clearly labeled with manufacturer's name, brand, name, size, dye lot number and related information.
- B. Deliver adhesives in containers clearly labeled with manufacturer's name, brand name, number, installation instructions, safety instructions and flash points.

- C. Store in a clean, dry, well ventilated area, protected from damage and soiling. Maintain storage space at a temperature above 16 degrees C (60 degrees F) for 2 days prior to installation.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. 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.

1.7 WARRANTY

- A. Carpet and installation subject to terms of "Warranty of Construction" FAR clause 52.246-21, except that warranty period is extended to two years.

1.8 APPLICABLE PUBLICATIONS

- A. Publication listed below form a part of this specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American National Standards Institute (ANSI):
ANSI/NSF 140-10.....Sustainable Carpet Assessment Standard
- C. American Association of Textile Chemists and Colorists (AATCC):
AATCC 16-04.....Colorfastness to Light
AATCC 129-10.....Colorfastness to Ozone in the Atmosphere under High Humidities
AATCC 134-11.....Electric Static Propensity of Carpets
AATCC 165-08.....Colorfastness to Crocking: Textile Floor Conerings-AATCC Crockmeter Method
- D. American Society for Testing and Materials (ASTM):
ASTM D1335-05.....Tuft Bind of Pile Yarn Floor Coverings
ASTM D3278-96 (R2004)...Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D5116-10.....Determinations of Organic Emissions from Indoor Materials/Products
ASTM D5252-05.....Operation of the Hexapod Tumble Drum Tester
ASTM D5417-05.....Operation of the Vettermann Drum Tester
ASTM E648-10.....Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
- E. The Carpet and Rug Institute (CRI):
CRI 104-11.....Installation of Commercial Carpet

PART 2 - PRODUCTS**2.1 CARPET**

A. Physical Characteristics:

1. Carpet free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains and other physical and manufacturing defects.
2. Manufacturers standard construction commercial carpet:
 - a. Modular Tile: 660 mm (24 inches) square tile.
3. Provide static control to permanently control static build up to less than 3.0 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Pile Height: Maximum 3.25 mm (0.10 inch).
5. Pile Fiber: Nylon with recycled content 25 percent minimum branded (federally registered trademark).
6. Pile Type: Level Loop.
7. Backing materials: Manufacturer's unitary backing designed for glue-down installation using recovered materials.
8. Appearance Retention Rating (ARR): Carpet shall be tested and have the minimum 3.0 Severe ARR when tested in accordance with either the ASTM D 5252 (Hexapod) or ASTM D 5417 (Vettermann) test methods using the number of cycles for short and long term tests as specified.
9. Tuft Bind: Minimum force of 15-25 lbs required to pull a tuft or loop free from carpet backing. Test per ASTM D1335.
10. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
11. Colorfastness to Ozone: Comply with AATCC 129, minimum rating of 3 on the AATCC color transfer chart.
12. Delamination Strength: Lifetime Warranty.
13. Flammability and Critical Radiant Flux Requirements:
 - a. Test Carpet in accordance with ASTM E 648.
 - b. Class I: Not less than 0.45 watts per square centimeter.
14. Density: Average Pile Yarn Density (APYD): 5605
15. VOC Limits: Use carpet and carpet adhesive that comply with the following limits for VOC content when tested according to ASTM D 5116: CRI Green Label Plus Certified.

B. Shall meet gold level of ANSI/NSF 140.

C. Color, Texture, and Pattern: Equal to Mannington Commercial, Carthage IV, 26 oz, Color: Mediterranean Manor, No. MEMA.

2.2 ADHESIVE AND CONCRETE PRIMER

- A. Waterproof, resistant to cleaning solutions, steam and water, nonflammable, complies with air-quality standards as specified. Adhesives flashpoint minimum 60 degrees C (140 degrees F), complies with ASTM D 3278.
- B. Seam Adhesives: Waterproof, non-flammable and non-staining.

2.3 SEAMING TAPE

- A. Permanently resistant to carpet cleaning solutions, steam, and water.
- B. Recommended by carpet manufacturer.

2.4 EDGE STRIPS (MOLDING)

- A. Vinyl Edge Strip:
 - 1. Beveled floor flange minimum 50 mm (2 inches) wide.
 - 2. Beveled surface to finish flush with carpet for tight joint and other side to floor finish.
 - 3. Color: Equal to Johnsonite, Color: Fawn, No. 80.

2.5 LEVELING COMPOUND (FOR CONCRETE FLOORS)

- A. Provide Portland cement bases polymer modifier with latex or polyvinyl acetate resin manufactured specifically for resurfacing and leveling concrete floors. Products containing gypsum are not acceptable.
- B. Determine the type of underlayment selected for use by condition to be corrected.

PART 3 - EXECUTION**3.1 SURFACE PREPARATION**

- A. Examine surfaces on which carpeting is to be installed.
- B. Clean floor of oil, waxy films, paint, dust and deleterious substances that prevent adhesion, leave floor dry and cured, free of residue from curing or cleaning agents.
- C. Correct conditions which will impair proper installation, including trowel marks, pits, dents, protrusions, cracks or joints.
- D. Fill cracks, joints depressions, and other irregularities in concrete with leveling compound.
 - 1. Do not use adhesive for filling or leveling purposes.
 - 2. Do not use leveling compound to correct imperfections which can be corrected by spot grinding.
 - 3. Trowel to smooth surface free of trowel marks, pits, dents, protrusions, cracks or joint lines.
- E. Test new concrete subfloor prior to adhesive application for moisture and surface alkalinity per CRI 104 Section 6.3.1 or per ASTM E1907.

3.2 CARPET INSTALLTION

- A. Do not install carpet until work of other trades including painting is complete and dry.
- B. Install in accordance with CRI 104 direct glue down installation.
 - 1. Relax carpet in accordance with Section 6.4.
 - 2. Comply with indoor air quality recommendations noted in Section 6.5.
 - 3. Maintain temperature in accordance with Section 15.3.
- C. Secure carpet to subfloor of spaces with adhesive applied as recommended by carpet manufacturer.
- D. Follow carpet manufacturer's recommendations for matching pattern and texture directions.
- E. Cut openings in carpet where required for installing equipment, pipes, outlets, and penetrations.
 - 1. Bind or seal cut edge of sheet carpet and replace flanges or plates.
 - 2. Use additional adhesive to secure carpets around pipes and other vertical projections.
- F. Broadloom Carpet:
 - 1. Install per CRI 104, Section 8.
 - 2. Lay broadloom carpet lengthwise in longest dimension of space, with minimum seams, uniformly spaced to provide a tight smooth finish, free from movement when subjected to traffic.
 - 3. Use tape-seaming method to join sheet carpet edges. Do not leave visible seams.
- G. Carpet Modules:
 - 1. Install per CRI 104, Section 13, Adhesive Application.
 - 2. Lay carpet modules with pile in same direction unless specified otherwise.
 - 3. Install carpet modules so that cleaning methods and solutions do not cause dislocation of modules.
 - 4. Lay carpet modules uniformly to provide tight flush joints free from movement when subject to traffic.

3.3 EDGE STRIPS INSTALLATION

- A. Install edge strips over exposed carpet edges adjacent to uncarpeted finish flooring.
- B. Anchor vinyl edge strip to floor with adhesive apply adhesive to edge strip and insert carpet into lip and press lip down over carpet.

3.4 PROTECTION AND CLEANING

- A. Remove waste, fasteners and other cuttings from carpet floors.
- B. Vacuum carpet and provide suitable protection. Do not use polyethylene film.

- C. Do not permit traffic on carpeted surfaces for at least 48 hours after installation. Protect the carpet in accordance with CRI 104.
- D. Do not move furniture or equipment on unprotected carpeted surfaces.
- E. Just before final acceptance of work, remove protection and vacuum carpet clean.

3.5 OWNER INVENTORY

- A. Turn over extra carpet to VA upon completion of project, six (6) square yards or six (6) foot wide x ten (10) foot long minimum of each type used.
- B. Label with VA Project Title, VA Project Number, VA Contract Number, and VA Color Designation from the specification (i.e., CPT-1, CPT-2, etc.).

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**SECTION 09 72 16
VINYL-COATED FABRIC WALL COVERINGS**

PART 1 - GENERAL

1.1 DESCRIPTION

A. Section specifies vinyl coated fabric wallcovering and installation.

1.2 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Samples:

- 1. Each type and pattern as specified.
- 2. Size: Full width of mill run.

C. Manufacturer's Certificates:

- 1. Compliance with CFFA W-101D.
- 2. Wallcovering manufacturer's approval of adhesive.

D. Manufacturer's Literature and Data:

- 1. Primer and adhesive.
- 2. Installation instructions.
- 3. Maintenance instructions, including recommended materials and methods for maintaining wallcovering with precautions in use of cleaning material.

1.3 QUALITY ASSURANCE

- A. Finish one complete space with each type (color and pattern) of wallcovering showing specified colors and patterns.
- B. Use approved sample spaces as a standard for work throughout the project.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver in original unopened containers bearing the manufacturer's name, brand name, and product designation.
- B. Store in accordance with manufacturer's instructions.
- C. Handle to prevent damage to material.

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by the basic designation only.
- B. Chemical Fabrics and Film Association, Inc., (CFFA):
2575-96(R2011).....Vinyl Coated Fabric Wallcovering
- C. American Society for Testing and Materials (ASTM)
G21-09.....Determining Resistance of Synthetic Polymeric
Materials to Fungi

PART 2 - PRODUCTS**2.1 VINYL COATED FABRIC WALLCOVERING**

- A. Comply with CFFA-2575.
- B. Fungi Resistance: ASTM G21, rating of 0.
- C. Factory-applied clear delustered polyvinyl-fluoride (PVF) coating:
 - 1. Minimum 0.0125 mm (1/2 mil) thickness.
 - 2. Do not include PVF coating weight in minimum total weight.
 - 3. Fire hazard classification with PVF coating: Class A unless specified otherwise.
- D. Vinyl Wallcovering Schedule:
 - 1. VWC-1: Equal to Koroseal Wallcovering, Chimayo, Color: White Sands, No. C521-06.
 - 2. VWC-2: Equal to Koroseal Wallcovering, Linden, Color: Gray Mist, No. 4821-92.
 - 3. VWC-3: Equal to Vicrtex Wallcovering, Lino, Color: Copper Clad, No. LN21-51.
 - 4. VWC-4: Equal to Vicrtex Wallcovering, Lino, Color: Antique Vellum, No. LN21-19.
 - 5. VWC-5: Equal to Vicrtex Wallcovering, Lino, Color: Lawn, No. LN21-85.
 - 6. VWC-6: Equal to Vicrtex Wallcovering, Lino, Color: Loch Blue, No. LN21-71.
 - 7. VWC-7: Equal to Vicrtex Wallcovering, Lino, Color: Paris Nights, No. LN21-61.

2.2 ADHESIVE

- A. Use only water-based adhesive having volatile organic compounds not more than 50 g/l.
- B. Vermin and mildew resistant.

PART 3 - EXECUTION**3.1 JOB CONDITIONS**

- A. Temperatures:
 - 1. Do not perform work until surfaces and materials have been maintained at minimum of 60 degrees F. for three days before work begins.
 - 2. Maintain minimum temperatures of 60 degrees F. until adhesives are dried or cured.
- B. Lighting:
 - 1. Do not proceed unless a minimum lighting level of 15 candlepower per square foot occurs.
 - 2. Measure light level at mid-height of wall.
- C. Ventilation:
 - 1. Provide uniform continuous ventilation in space.

2. Ventilate for a time for not less than complete drying or curing of adhesive.

D. Protect other surfaces from damage which may be caused by this work.

E. Remove waste from building daily.

3.2 SURFACE CONDITION

A. Inspect surfaces to receive wallcoverings to assure that:

1. Patches and repairs are completed.

2. Surface are clean, smooth and prime painted.

B. Do not proceed until discovered defects have been corrected by other trades and surfaces are ready to receive wallcovering.

C. Carefully remove electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings, prior to starting work.

D. Carefully store items for reinstallation.

3.3 APPLICATION OF ADHESIVE

A. Mix and apply adhesives in accordance with manufacturer's directions.

B. Prevent adhesive from getting on face of wallcovering.

C. Apply adhesive to wallcovering back.

3.4 WALLCOVERING INSTALLATION

A. Use wallcovering of same batch or run in an area. Use fabric rolls in consecutive numerical sequence of manufacture.

B. Install material completely adhered, smooth, clean, without wrinkles, air pockets, gaps or overlaps.

C. Extend wallcovering continuous behind non-built-in casework and other items which are close to but not bolted to or touching the walls.

D. Install wallcovering before installation of resilient base. Extend wallcovering not more than 6 mm (1/4 inch) below top of resilient base.

E. Install panels consecutively in order in which they are cut from the roll including filling spaces above or below windows, doors, or similar penetrations.

F. Do not install horizontal seams.

G. Except on match patterns, hang fabric by reversing alternate strips, except as recommended by the manufacturer.

H. Cutting:

1. Cut on a work table with a straight edge.

2. Joints or seams that are not cut clean are unacceptable.

3. Trim additional selvage to achieve a color and pattern match at seams. Overlapped seams are not allowed.

4. Double cut seams on wall with a double cutter unless specified.

5. When double cutting on the wall, place a three inch strip of Type I wallcovering under pasted edge.

- a. Do not cut into wall surface.
 - b. After cutting, remove strip and excess adhesive from seam before proceeding to next seam.
 - c. Smooth down seam in adhesive for tight bond and joint.
- I. Trim strip-matched patterns, which are not factory pre-trimmed.
- J. Inside Corners:
- 1. Wrap wallcovering around corner.
 - 2. Do not seam within 50 mm (2 inches) of inside corners.
 - 3. Double cut seam.
- K. Outside Corners:
- 1. Wrap wallcovering around corner.
 - 2. Do not seam within 150 mm (6 inches) of outside corners.
 - 3. Double cut seam.

3.5 PATCHING

- A. Replace surface damaged wallcovering in a space as specified for new work:
- 1. Replace full height of surface.
 - 2. Replace from break in plane to break in plane when same batch or run is not used. Double cut seams.
 - 3. Adjoining differential colors from separate batches or runs are not acceptable.
- B. Correct loose or raised seams with adhesives to lay flat with tight bonded joint as specified for new work.

3.6 CLEANING AND INSTALLING TEMPORARY REMOVED ITEMS

- A. Remove adhesive from wallcovering as work proceeds.
- B. Remove adhesives where spilled, splashed or splattered on wallcoverings or adjacent surfaces in a manner not to damage surface from which it is removed.
- C. Reinstall previously removed electrical outlet and switch plates, mechanical diffusers, escutcheons, registers, surface hardware, fittings and fastenings.

3.7 OWNER INVENTORY

- A. Turn over extra wallcovering to VA upon completion of project. Provide minimum one (1) roll for each color used on project.
- B. Label each roll with VA Project Title, VA Project Number, VA Contract Number and designation from specification (i.e., VWC-1, VWC-3, etc.).

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SECTION 09 91 00
PAINTING

PART 1-GENERAL**1.1 DESCRIPTION**

- A. Section specifies field painting.
- B. Section specifies prime coats which may be applied in shop under other sections.
- C. Painting includes shellacs, stains, varnishes, coatings specified, and striping or markers and identity markings.

1.2 RELATED WORK

- A. Shop prime painting of steel and ferrous metals: Division 05 - METALS, Division 08 - OPENINGS, Division 10 - SPECIALTIES, Division 11 - EQUIPMENT, Division 12 - FURNISHINGS, Division 14 - CONVEYING EQUIPMENT, Division 21 - FIRE SUPPRESSION, Division 22 - PLUMBING, Division 23 - HEATING, VENTILATION AND AIR-CONDITIONING, Division 26 - ELECTRICAL, Division 27 - COMMUNICATIONS, and Division 28 - ELECTRONIC SAFETY AND SECURITY sections.
- B. Contractor option: Prefinished flush doors with transparent finishes: Section 08 14 00, WOOD DOORS.
- C. Glazed wall surfacing or tile like coatings: Section 09 96 59, SPECIALTY GLAZED COATING SYSTEM FOR WALLS AND CEILINGS.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
Before work is started, or sample panels are prepared, submit manufacturer's literature, Material Safety and Data Sheets, Product Type, Color, Gloss Level, Coating Composition, Federal Specification Number, VA Project Title, VA Contract Number and VA Paint Designation from specification (i.e., P-1, P-2, etc.).
- C. Sample Panels:
 - 1. After painters' materials have been approved and before work is started submit sample panels showing each type of finish and color specified.
 - 2. Panels to show color: Composition board, 100 by 250 by 3 mm (4 inch by 10 inch by 1/8 inch).
 - 3. Attach labels to panel stating the following:
 - a. Federal Specification Number or manufacturers name and product number of paints used.
 - b. Specification designation number (i.e., P-1, P-2, etc.).
 - c. Product type, color, and gloss level.

- d. VA Project Title, VA Project Number and VA Contract Number.
- 4. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.
- D. Manufacturers' Certificates indicating compliance with specified requirements:
 - 1. Manufacturer's paint substituted for Federal Specification paints meets or exceeds performance of paint specified.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to site in manufacturer's sealed container marked to show following:
 - 1. Name of manufacturer.
 - 2. Product type.
 - 3. Batch number.
 - 4. Instructions for use.
 - 5. Safety precautions.
- B. Maintain space for storage, and handling of painting materials and equipment in a neat and orderly condition to prevent spontaneous combustion from occurring or igniting adjacent items.
- C. Store materials at site at least 24 hours before using, at a temperature between 18 and 30 degrees C (65 and 85 degrees F).

1.5 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to the extent referenced. Publications are referenced in the text by basic designation only.
- B. American Conference of Governmental Industrial Hygienists (ACGIH):
 - ACGIH TLV-BKLT-2012.....Threshold Limit Values (TLV) for Chemical Substances and Physical Agents and Biological Exposure Indices (BEIs)
 - ACGIH TLV-DOC-2012.....Documentation of Threshold Limit Values and Biological Exposure Indices, (Seventh Edition)
- C. American National Standards Institute (ANSI):
 - A13.1-07.....Scheme for the Identification of Piping Systems
- D. Master Painters Institute (MPI):
 - No. 95-12.....Fast Drying Metal Primer
 - No. 145 (xgr).....Latex Interior Institutional Low Odor/VOC, Eggshell, MPI Gloss Level 3 (LL)
 - No. 147 (xgr).....Latex Interior Institutional Low Odor/VOC, Semi-Gloss, MPI Gloss Level 5
 - No. 149 (xgr).....Primer Sealer Interior Institutional Low Odor/VOC
- E. Steel Structures Painting Council (SSPC):

SSPC SP 1-04 (R2004)....Solvent Cleaning
 SSPC SP 2-04 (R2004)....Hand Tool Cleaning
 SSPC SP 3-04 (R2004)....Power Tool Cleaning

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Plastic Tape:
 1. Pigmented vinyl plastic film in colors as specified.
 2. Pressure sensitive adhesive back.
 3. Widths to match existing.
- B. Identity markers options:
 1. Pressure sensitive vinyl markers.
 2. Snap-on coil plastic markers.
- C. Fast Drying Metal Primer: MPI 95.
- D. Latex Interior Institutional Low Odor/VOC, Eggshell, MPI Gloss Level 3: MPI 145 (xgr).
- E. Latex Interior Institutional Low Odor/VOC, Semi-Gloss, MPI Gloss Level 5: MPI 147 (xgr).
- F. Primer Sealer Institutional Low Odor/VOC: MPI 149 (xgr).

2.2 PAINT PROPERTIES

- A. Use ready-mixed (including colors).
- B. Where no requirements are given in the referenced specifications for primers, use primers with pigment and vehicle, compatible with substrate and finish coats specified.

2.3 REGULATORY REQUIREMENTS/QUALITY ASSURANCE

- A. Paint materials shall conform to the restrictions of the local Environmental and Toxic Control jurisdiction.
 1. Volatile Organic Compounds (VOC): VOC content of paint materials shall not exceed 10g/l for interior latex paints/primers and 50g/l for exterior latex paints and primers.
 2. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
 3. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
 4. Use high performance acrylic paints in place of alkyd paints.

PART 3 - EXECUTION

3.1 JOB CONDITIONS

- A. Safety: Observe required safety regulations and manufacturer's warning and instructions for storage, handling and application of painting materials.

1. Take necessary precautions to protect personnel and property from hazards due to falls, injuries, toxic fumes, fire, explosion, or other harm.
2. Deposit soiled cleaning rags and waste materials in metal containers approved for that purpose. Dispose of such items off the site at end of each day's work.

B. Atmospheric and Surface Conditions:

1. Do not apply coating when air or substrate conditions are:
 - a. Less than 3 degrees C (5 degrees F) above dew point.
 - b. Below 10 degrees C (50 degrees F) or over 35 degrees C (95 degrees F), unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.
2. Maintain interior temperatures until paint dries hard.
3. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
4. Apply only on clean, dry and frost free surfaces except as follows:
 - a. Apply water thinned acrylic and cementitious paints to damp (not wet) surfaces where allowed by manufacturer's printed instructions.

3.2 SURFACE PREPARATION

A. Method of surface preparation is optional, provided results of finish painting produce solid even color and texture specified with no overlays.

B. General:

1. Remove prefinished items not to be painted such as lighting fixtures, escutcheon plates, hardware, trim, and similar items for reinstallation after paint is dried.
2. Remove items for reinstallation and complete painting of such items and adjacent areas when item or adjacent surface is not accessible or finish is different.
3. See other sections of specifications for specified surface conditions and prime coat.
4. Clean surfaces for painting with materials and methods compatible with substrate and specified finish. Remove any residue remaining from cleaning agents used. Do not use solvents, acid, or steam on concrete and masonry.

C. Ferrous Metals:

1. Remove oil, grease, soil, drawing and cutting compounds, flux and other detrimental foreign matter in accordance with SSPC-SP 1 (Solvent Cleaning).
2. Remove loose mill scale, rust, and paint, by hand or power tool cleaning, as defined in SSPC-SP 2 (Hand Tool Cleaning) and SSPC-SP 3

(Power Tool Cleaning). Exception: where high temperature aluminum paint is used, prepare surface in accordance with paint manufacturer's instructions.

3. Fill dents, holes and similar voids and depressions in flat exposed surfaces of hollow steel doors and frames, access panels, roll-up steel doors and similar items specified to have semi-gloss or gloss finish with TT-F-322D (Filler, Two-Component Type, For Dents, Small Holes and Blow-Holes). Finish flush with adjacent surfaces.
 - a. This includes flat head countersunk screws used for permanent anchors.
 - b. Do not fill screws of item intended for removal such as glazing beads.
4. Spot prime abraded and damaged areas in shop prime coat which expose bare metal with same type of paint used for prime coat. Feather edge of spot prime to produce smooth finish coat.
5. Spot prime abraded and damaged areas which expose bare metal of factory finished items with paint as recommended by manufacturer of item.

D. Gypsum Board:

1. Remove dust, dirt, and other deterrents to paint adhesion.
2. Fill holes, cracks, and other depressions with CID-A-A-1272A Plaster, Gypsum (Spackling Compound) finished flush with adjacent surface, with texture to match texture of adjacent surface. Patch holes over 25 mm (1-inch) in diameter as specified in Section for plaster or gypsum board.

3.3 PAINT PREPARATION

- A. Thoroughly mix painting materials to ensure uniformity of color, complete dispersion of pigment and uniform composition.
- B. Do not thin unless necessary for application and when finish paint is used for body and prime coats. Use materials and quantities for thinning as specified in manufacturer's printed instructions.
- C. Remove paint skins, then strain paint through commercial paint strainer to remove lumps and other particles.
- D. For tinting required to produce exact shades specified, use color pigment recommended by the paint manufacturer.

3.4 APPLICATION

- A. Start of surface preparation or painting will be construed as acceptance of the surface as satisfactory for the application of materials.
- B. Unless otherwise specified, apply paint in three coats; prime, body, and finish. When two coats applied to prime coat are the same, first coat applied over primer is body coat and second coat is finish coat.
- C. Apply each coat evenly and cover substrate completely.

- D. Allow not less than 48 hours between application of succeeding coats, except as allowed by manufacturer's printed instructions, and approved by Project Engineer.
- E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.
- F. Apply by brush or roller.
- G. Do not spray paint.
- H. Do not paint in closed position operable items such as access doors and panels, window sashes, overhead doors, and similar items except overhead roll-up doors and shutters.

3.5 PRIME PAINTING

- A. After surface preparation prime surfaces before application of body and finish coats, except as otherwise specified.
- B. Spot prime and apply body coat to damaged and abraded painted surfaces before applying succeeding coats.
- C. Additional field applied prime coats over shop or factory applied prime coats are not required except for exterior exposed steel apply an additional prime coat.
- D. Metals except boilers, incinerator stacks, and engine exhaust pipes:
 - 1. Steel and iron: MPI 95 (Fast Drying Metal Primer).
- E. Gypsum Board:
 - 1. Primer: MPI 149 (xgr) Primer Sealer Interior Institutional Low Odor/VOC.

3.6 INTERIOR FINISHES

- A. Apply following finish coats over prime coats in spaces or on surfaces specified.
- B. Metal Work:
 - 1. Apply to exposed surfaces.
 - 2. Omit body and finish coats on surfaces concealed after installation except electrical conduit containing conductors over 600 volts.
 - 3. Ferrous Metal, Galvanized Metal, and Other Metals Scheduled:
 - a. Apply two coats of MPI 147 (xgr) Latex Interior Institutional Low Odor/VOC, Semi-Gloss, Gloss Level 5.
- C. Gypsum Board:
 - 1. Two coats of MPI 145 (xgr) Latex Interior Institutional, Low Odor/VOC, Eggshell, MPI Gloss Level 3.
- D. Cement Board:
 - 1. Two coats of MPI 145 (xgr) Latex Interior Institutional Low Odor/VOC, Eggshell, MPI Gloss Level 3.

3.7 REFINISHING EXISTING PAINTED SURFACES

- A. Clean, patch and repair existing surfaces as specified under surface preparation.
- B. Remove and reinstall items as specified under surface preparation.
- C. Remove existing finishes or apply separation coats to prevent non compatible coatings from having contact.
- D. Patched or Replaced Areas in Surfaces and Components: Apply spot prime and body coats as specified for new work to repaired areas or replaced components.
- E. Except where scheduled for complete painting apply finish coat over plane surface to nearest break in plane, such as corner, reveal, or frame.
- F. Refinish areas as specified for new work to match adjoining work unless specified or scheduled otherwise.
- G. Sand or dull glossy surfaces prior to painting.
- H. Sand existing coatings to a feather edge so that transition between new and existing finish will not show in finished work.

3.8 PAINT COLOR

- A. Coat Colors:
 - 1. Color of priming coat: Lighter than body coat.
 - 2. Color of body coat: Lighter than finish coat.
 - 3. Color prime and body coats to not show through the finish coat and to mask surface imperfections or contrasts.
- B. Painting, Caulking, Closures, and Fillers Adjacent to Casework:
 - 1. Paint to match color of casework where casework has a paint finish.
 - 2. Paint to match color of wall where casework is stainless steel, plastic laminate, or varnished wood.
- C. Paint Schedule:
 - 1. P-1 (Walls): Equal to Sherwin Williams, Color: Anew Gray, No. SW7030.
 - 2. P-2 (H.M. Frames, Soffits, Ceilings): Equal to Sherwin Williams, Color: Pure White, No. SW7005.

3.9 IDENTITY PAINTING SCHEDULE

- A. Identify designated service in accordance with ANSI A13.1, unless specified otherwise, on exposed piping, piping above removable ceilings, piping in accessible pipe spaces, interstitial spaces, and piping behind access panels.
 - 1. Legend may be identified using 2.1 G options or by stencil applications.
 - 2. Apply legends adjacent to changes in direction, on branches, where pipes pass through walls or floors, adjacent to operating accessories such as valves, regulators, strainers and cleanouts a minimum of 12,000

- mm (40 feet) apart on straight runs of piping. Identification next to plumbing fixtures is not required.
3. Locate Legends clearly visible from operating position.
 4. Use arrow to indicate direction of flow.
 5. Identify pipe contents with sufficient additional details such as temperature, pressure, and contents to identify possible hazard. Insert working pressure shown on drawings where asterisk appears for High, Medium, and Low Pressure designations as follows:
 - a. High Pressure - 414 kPa (60 psig) and above.
 - b. Medium Pressure - 104 to 413 kPa (15 to 59 psig).
 - c. Low Pressure - 103 kPa (14 psig) and below.
 - d. Add Fuel oil grade numbers.
 6. Legend name in full or in abbreviated form as follows:

PIPING	COLOR OF EXPOSED PIPING	COLOR OF BACKGROUND	COLOR OF LETTERS	LEGEND BBREVIATIONS
Blow-off		Yellow	Black	Blow-off
Boiler Feedwater		Yellow	Black	Blr Feed
A/C Condenser Water Supply		Green	White	A/C Cond Wtr Sup
A/C Condenser Water Return		Green	White	A/C Cond Wtr Ret
Chilled Water Supply		Green	White	Ch. Wtr Sup
Chilled Water Return		Green	White	Ch. Wtr Ret
Shop Compressed Air		Yellow	Black	Shop Air
Air-Instrument Controls		Green	White	Air-Inst Cont
Drain Line		Green	White	Drain
Emergency Shower		Green	White	Emg Shower
High Pressure Steam		Yellow	Black	H.P. _____*
High Pressure Condensate Return		Yellow	Black	H.P. Ret _____*
Medium Pressure Steam		Yellow	Black	M. P. Stm _____*
Medium Pressure Condensate Return		Yellow	Black	M.P. Ret _____*
Low Pressure Steam		Yellow	Black	L.P. Stm _____*
Low Pressure Condensate Return		Yellow	Black	L.P. Ret _____*
High Temperature Water Supply		Yellow	Black	H. Temp Wtr Sup
High Temperature Water Return		Yellow	Black	H. Temp Wtr Ret
Hot Water Heating Supply		Yellow	Black	H. W. Htg Sup
Hot Water Heating Return		Yellow	Black	H. W. Htg Ret
Gravity Condensate Return		Yellow	Black	Gravity Cond Ret
Pumped Condensate Return		Yellow	Black	Pumped Cond Ret
Vacuum Condensate Return		Yellow	Black	Vac Cond Ret
Fuel Oil - Grade (Diesel Fuel included under Fuel Oil)		Brown	White	Fuel Oil-Grade ____*
Boiler Water Sampling		Yellow	Black	Sample
Chemical Feed		Yellow	Black	Chem Feed

Continuous Blow-Down		Yellow	Black	Cont. B D
Pumped Condensate		Black		Pump Cond
Pump Recirculating		Yellow	Black	Pump-Recirc.
Vent Line		Yellow	Black	Vent
Alkali		Yellow	Black	Alk
Bleach		Yellow	Black	Bleach
Detergent		Yellow	Black	Det
Liquid Supply		Yellow	Black	Liq Sup
Reuse Water		Yellow	Black	Reuse Wtr
Cold Water (Domestic)	White	Green	White	C.W. Dom
Hot Water (Domestic)				
Supply	White	Yellow	Black	H.W. Dom
Return	White	Yellow	Black	H.W. Dom Ret
Tempered Water	White	Yellow	Black	Temp. Wtr
Ice Water				
Supply	White	Green	White	Ice Wtr
Return	White	Green	White	Ice Wtr Ret
Reagent Grade Water		Green	White	RG
Reverse Osmosis		Green	White	RO
Sanitary Waste		Green	White	San Waste
Sanitary Vent		Green	White	San Vent
Storm Drainage		Green	White	St Drain
Pump Drainage		Green	White	Pump Disch
Chemical Resistant Pipe				
Waste		Yellow	Black	Acid Waste
Vent		Yellow	Black	Acid Vent
Atmospheric Vent		Green	White	ATV
Silver Recovery		Green	White	Silver Rec
Oral Evacuation		Green	White	Oral Evac
Fuel Gas		Yellow	Black	Gas
Fire Protection Water				
Sprinkler	Red	Red	White	Auto Spr
Standpipe	Red	Red	White	Stand
Sprinkler	Red	Red	White	Drain

7. Electrical Conduits containing feeders over 600 volts, paint legends using 50 mm (2 inch) high black numbers and letters, showing the voltage class rating. Provide legends where conduits pass through walls and floors and at maximum 6100 mm (20 foot) intervals in between. Use labels with yellow background with black border and words Danger High Voltage Class, 5000, 15000, 25000.

8. See Sections for methods of identification, legends, and abbreviations of the following:
 - a. Medical Gases and vacuum lines: Section 22 62 00, VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES, Section 22 63 00, GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES.
 - b. Conduits containing high voltage feeders over 600 volts: Section 26 05 33, RACEWAY AND BOXES FOR ELECTRICAL SYSTEMS.
 - c. Sprinkler Pipe: paint red to match existing (where exposed).

B. Fire and Smoke Partitions:

1. Identify partitions above ceilings on both sides of partitions except within shafts in letters not less than 64 mm (2 1/2 inches) high.
2. Stenciled message: "SMOKE BARRIER" or, "FIRE BARRIER" as applicable.
3. Locate not more than 6100 mm (20 feet) on center on both sides of partitions, and with a least one message per room on room side of partition.
4. Use semigloss paint of color that contrasts with color of substrate.

3.10 PROTECTION CLEAN UP, AND TOUCH-UP

- A. Protect work from paint droppings and spattering by use of masking, drop cloths, removal of items or by other approved methods.
- B. Upon completion, clean paint from hardware, glass and other surfaces and items not required to be painted of paint drops or smears.
- C. Before final inspection, touch-up or refinished in a manner to produce solid even color and finish texture, free from defects in work which was damaged or discolored.

3.11 OWNER INVENTORY

- A. Upon completion, provide one (1) gallon of each paint color in project.
- B. Label with VA Project Title, VA Project Number, VA Contract Number and VA Paint Designation from Specifications (i.e., P-1, P-2, etc.).
- C. Provide Material Safety Data Sheets (MSDS) with each gallon of paint for that specific color.

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SECTION 09 96 59
SPECIALTY GLAZED COATING SYSTEMS FOR WALLS AND CEILINGS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Section includes surface preparation and application of high-performance seamless glazed wall coating system on new or existing surfaces.
 - 1. Interior substrates: Wall board substrates.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - 1. Description of each product to be provided.
 - 2. Application and installation instructions.
 - 3. Maintenance Instructions: Submit manufacturer's written instructions for recommended maintenance practices.
- C. Qualification Data: For Installer.
- D. Sustainable Submittal:
 - 1. Product data for field applied, interior, paints, coatings, and primers, include printed statement of VOC content indicating compliance with environmental requirements.
- E. Samples:
 - 1. Samples for verification: For each (color and texture) wall/ceiling system required, 6 inches (152 mm) square, applied to a rigid backing by installer for this project.
 - 2. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished resinous coating must match the approved samples in color and texture.
- F. Certification and Approval:
 - 1. Manufacturer's certification of material and substrata compliance.
 - 2. Manufacturer's approval of installers.
 - 3. Contractor's certificate of compliance with Quality Assurance requirements.
- G. Warranty: As specified in this section.

1.3 QUALITY ASSURANCE

- A. Manufacture Certificate: Manufacture shall certify that a particular coating for wall/ceiling system has been in use for a minimum of five years.
- B. Manufacturer Field Technical Service Representatives: manufacture shall retain the services of Field Technical Service Representatives who are trained specifically on installing the system to be used on the project.
 - 1. Field Technical Services Representatives shall be employed by the system manufacture to assist in the quality assurance and quality control process of the installation and shall be available to perform field problem solving issues with the installer.
- C. Installer Qualifications: Engage an installer who is certified in writing by product manufacturer, who is experienced in applying coating for wall/ceiling systems similar in material, design, and extent to those indicated for this project for a minimum period of 5 years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to coating for wall/ceiling manufacturer.
- D. Source Limitations:
 - 1. Obtain coating materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.

1.4 MATERIAL PACKAGING DELIVERY AND STORAGE

- A. Deliver materials to the site in original sealed packages or containers, clearly marked with the manufacturer's name or brand, type and color, production run number, date of manufacture and mixing/thinning instructions.
- B. Protect materials from damage and contamination in storage or delivery, including moisture, heat, cold, direct sunlight, etc.
- C. Maintain temperature of storage area between 60 and 80 degrees F (15 and 26 degrees C).
- D. Keep containers sealed until ready for use.
- E. Do not use materials beyond manufacturer's shelf life limits.
- F. Package materials in factory pre-weighed and in single, easy to manage batches sized for ease of handling and mixing proportions from entire package or packages.

1.5 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with wall/ceiling manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting wall/ceiling applications.
 - 1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during wall/ceiling application and for not less than 24 hours after application.
- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous wall/ceiling application.
- C. Close spaces to traffic during wall/ceiling application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.6 WARRANTY

- A. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly (including substrata) for both material and workmanship for a extended period of (3) full years from date of final inspection, or provide a joint and several warranty signed on a single document by manufacturer and applicator jointly and severally warranting the materials and workmanship for a period of (3) full years from date of final inspection. A sample warranty letter must be included with bid package or bid may be disqualified.

1.7 APPLICABLE PUBLICATIONS

- A. The publication listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C412 (2013).....Vulcanized Rubber and Thermoplastic Elastomers—Tension
 - D2240 (2010).....Rubber Property—Durometer Hardness
 - D4060(2010).....Abrasion Resistance of Organic Coatings by the Taber Abrader
 - E84 (2013).....Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

C. Chemical Resistance in accordance ASTM D1308 - 02(2007) "Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Organic Finishes". ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/D1308-02R07, www.astm.org. No effect to the following exposures:

1. Acetic acid (5%)
2. Ammonium hydroxide (10%)
3. Citric Acid (50%)
4. Fatty Acid
5. Motor Oil, 20W
6. Hydrochloric acid (20%)
7. Sodium Chloride
8. Sodium Hypochlorite (10%)
9. Sodium Hydroxide (30%)
10. Sulfuric acid (25%)
11. Urine, Feces
12. Hydrogen peroxide (10%)

PART 2 - PRODUCTS

2.1 GLAZED COATING

- A. Epoxy Cold Cured Gloss: MPI No. 77.
- B. Color: Match paint P-1, equal to Sherwin Williams, Color: Anew Gray, No. SW7030.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. General: Prepare and clean substrates according to flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for wall coating application.
- B. Clean sub-surface of all contaminants.
- C. Examine surfaces for defects that cannot be corrected by procedures specified herein.
- D. Any wall board application must have a (1) one, (2) two, or (3) three finish level. With an appropriate spackle compound. Finish Level (4) four, or (5) five is not acceptable and result in wall system failures, due to gypsum mud poor cohesive strengths.
- E. Commencement of application implies acceptance of surface conditions.

3.2 PROJECT CONDITIONS

- A. Maintain temperature of materials above 21 degrees C (70 degrees F), for 48 hours before installation.

- B. Maintain temperature of rooms where work occurs, between 21 degrees C and 32 degrees C (70 degrees F and 90 degrees F) for at least 48 hours, before, during, and 24 hours after installation. Maintain temperature at least 21 degrees C (70 degrees F) thereafter.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.
- D. Area free of other trades during and for a period of 24 hours after installation.

3.3 INSTALLATION REQUIREMENTS

- A. The respective manufacturer's instructions for application and installation will be considered for use when approved by the Project Engineer.
- B. Submit proposed installation deviation from this specification to the Project Engineer indicating the differences in the method of installation.

3.4 PREPARATION

- A. General: Prepare and clean substrates according to manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for application.
- B. Substrates: Provide sound surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible.
 - 1. Prepare substrates as follows:
 - a. Comply requirements of manufacturer's written instructions.
 - 2. Verify that substrates are dry.

3.5 APPLICATION

- A. Finish Film Thickness: Apply materials at not less than the manufacturer's recommended spreading rate.
- B. On previously coated surfaces, apply one base coat and one finish coat.
- C. On bare gypsum board apply one primer coat, one base coat and one finish coat.
- D. In rooms or spaces shown or specified to have glazed coating, apply the glazed coating to surfaces behind casework and equipment.
- E. Make edges of glazed coatings sharp and clean without overlapping adjoining other materials or colors.

3.6 CURING, PROTECTION AND CLEANING

- A. During progress of the work and upon completion, promptly clean adjacent surfaces and materials of spills, splatters, drips, and stains

from glazed coatings application. Remove glazed coatings by proper methods exercising care to prevent damage to finished surfaces and materials.

- B. Protect work of other trades against damage resulting from glazed coatings work.
- C. Touch-up damaged coating surfaces before final acceptance.

3.7 OWNER INVENTORY

- A. Upon completion, provide one (1) gallon of each glazed coating color in project.
- B. Label with VA Project Title, VA Project Number and VA Contract Number.
- C. Provide Material Safety Data Sheet (MSDS).

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