

**SECTION 03 30 00
CAST-IN-PLACE CONCRETE**

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies cast-in-place structural concrete and materials and mixes for other concrete.

1.2 TESTING AGENCY FOR CONCRETE MIX DESIGN:

- A. Testing agency for the trial concrete mix design retained and reimbursed by the Contractor and approved by COR.
- B. Testing agency maintaining active participation in Program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.
- C. Testing agency shall furnish equipment and qualified technicians to establish proportions of ingredients for concrete mixes.

1.3 TOLERANCES:

- A. Formwork: ACI 117, except the elevation tolerance of formed surfaces before removal of shores is +0 mm (+0 inch) and -20 mm (-3/4 inch).
- B. Reinforcement Fabricating and Placing: ACI 117, except that fabrication tolerance for bar sizes Nos. 10, 13, and 16 (Nos. 3, 4, and 5) (Tolerance Symbol 1 in Fig. 2.1(a), ACI, 117) used as column ties or stirrups is +0 mm (+0 inch) and -13 mm (-1/2 inch) where gross bar length is less than 3600 mm (12 feet), or +0 mm (+0 inch) and -20 mm (-3/4 inch) where gross bar length is 3600 mm (12 feet) or more.
- C. Cross-Sectional Dimension: ACI 117, except tolerance for thickness of slabs 12 inches or less is +20 mm (+3/4 inch) and -6 mm (-1/4 inch). Tolerance of thickness of beams more than 300 mm (12 inch) but less than 900 mm (3 feet) is +20 mm (+3/4 inch) and -10 mm (-3/8 inch).

1.4 REGULATORY REQUIREMENTS:

- A. ACI SP-66 – ACI Detailing Manual.
- B. ACI 318 - Building Code Requirements for Reinforced Concrete.
- C. ACI 301 – Standard Specifications for Structural Concrete.

1.5 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, and SAMPLES.
- B. Shop Drawings: Reinforcing steel: Complete shop drawings
- C. Mill Test Reports:
 - 1. Reinforcing Steel.
 - 2. Cement.
- D. Manufacturer's Certificates:
 - 1. Abrasive aggregate.

2. Lightweight aggregate for structural concrete.
 3. Air-entraining admixture.
 4. Chemical admixtures, including chloride ion content.
 5. Waterproof paper for curing concrete.
 6. Liquid membrane-forming compounds for curing concrete.
 7. Non-shrinking grout.
 8. Liquid hardener.
 9. Waterstops.
 10. Expansion joint filler.
 11. Adhesive binder.
- E. Testing Agency for Concrete Mix Design: Approval request including qualifications of principals and technicians and evidence of active participation in program of Cement and Concrete Reference Laboratory (CCRL) of National Institute of Standards and Technology.
- F. Test Report for Concrete Mix Designs: Trial mixes including water-cement/fly ash ratio curves, concrete mix ingredients, and admixtures.

1.6 DELIVERY, STORAGE, AND HANDLING:

- A. Conform to ACI 304. Store aggregate separately for each kind or grade, to prevent segregation of sizes and avoid inclusion of dirt and other materials.
- B. Deliver cement in original sealed containers bearing name of brand and manufacturer, and marked with net weight of contents. Store in suitable watertight building in which floor is raised at least 300 mm (1 foot) above ground. Store bulk cement and fly ash in separate suitable bins.
- C. Deliver other packaged materials for use in concrete in original sealed containers, plainly marked with manufacturer's name and brand, and protect from damage until used.

1.7 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 Concrete Institute (ACI):
 - 117-10 Specifications for Tolerances for Concrete Construction and Materials and Commentary
 - 211.1-91(R2009) Standard Practice for Selecting Proportions for Normal, Heavyweight, and Mass Concrete
 - 214R-11 Guide to Evaluation of Strength Test Results of Concrete
 - 301-10 Standard Practice for Structural Concrete
 - 304R-00(R2009) Guide for Measuring, Mixing, Transporting, and Placing Concrete
 - 305.1-06 Specification for Hot Weather Concreting
 - 306.1-90(R2002) Standard Specification for Cold Weather Concreting
 - 308.1-11 Specification for Curing Concrete

- 309R-05..... Guide for Consolidation of Concrete
- 318-11 Building Code Requirements for Structural Concrete and
Commentary
- 347-04 Guide to Formwork for Concrete
- SP-66-04 ACI Detailing Manual
- C. American National Standards Institute and American Hardboard Association (ANSI/AHA):
 - A135.4-2004 Basic Hardboard
- D. American Society for Testing and Materials (ASTM):
 - A82/A82M-07 Standard Specification for Steel Wire, Plain, for Concrete
Reinforcement
 - A185/185M-07 Standard Specification for Steel Welded Wire Reinforcement,
Plain, for Concrete
 - A615/A615M-09 Standard Specification for Deformed and Plain Carbon Steel
Bars for Concrete Reinforcement
 - A653/A653M-11 Standard Specification for Steel Sheet, Zinc Coated (Galvanized)
or Zinc Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - A706/A706M-09 Standard Specification for Low Alloy Steel Deformed and Plain
Bars for Concrete Reinforcement
 - A996/A996M-09 Standard Specification for Rail Steel and Axle Steel Deformed
Bars for Concrete Reinforcement
 - C31/C31M-10 Standard Practice for Making and Curing Concrete Test
Specimens in the field
 - C33/C33M-11A Standard Specification for Concrete Aggregates
 - C39/C39M-12 Standard Test Method for Compressive Strength of Cylindrical
Concrete Specimens
 - C94/C94M-12 Standard Specification for Ready Mixed Concrete
 - C143/C143M-10..... Standard Test Method for Slump of Hydraulic Cement Concrete
 - C150-11 Standard Specification for Portland Cement
 - C171-07 Standard Specification for Sheet Materials for Curing Concrete
 - C172-10..... Standard Practice for Sampling Freshly Mixed Concrete
 - C173-10..... Standard Test Method for Air Content of Freshly Mixed Concrete
by the Volumetric Method
 - C192/C192M-07..... Standard Practice for Making and Curing Concrete Test
Specimens in the Laboratory
 - C231-10..... Standard Test Method for Air Content of Freshly Mixed Concrete
by the Pressure Method
 - C260-10..... Standard Specification for Air Entraining Admixtures for Concrete

- C309-11 Standard Specification for Liquid Membrane Forming
Compounds for Curing Concrete
- C494/C494M-11 Standard Specification for Chemical Admixtures for Concrete
- C618-12 Standard Specification for Coal Fly Ash and Raw or Calcined
Natural Pozzolan for Use in Concrete
- C881/C881M-10 Standard Specification for Epoxy Resin Base Bonding Systems
for Concrete
- C1107/1107M-11 Standard Specification for Packaged Dry, Hydraulic-Cement
Grout (Non-shrink)
- C1315-11 Standard Specification for Liquid Membrane Forming
Compounds Having Special Properties for Curing and Sealing
Concrete
- D6-95(R2011) Standard Test Method for Loss on Heating of Oil and Asphaltic
Compounds
- D297-93(R2006) Standard Methods for Rubber Products Chemical Analysis
- D412—06AE2 Standard Test Methods for Vulcanized Rubber and
Thermoplastic Elastomers - Tension
- D1751-04(R2008) Standard Specification for Preformed Expansion Joint Filler for
Concrete Paving and Structural Construction (Non-extruding and
Resilient Bituminous Types)
- D4263-83(2012) Standard Test Method for Indicating Moisture in Concrete by the
Plastic Sheet Method.
- D4397-10 Standard Specification for Polyethylene Sheeting for
Construction, Industrial and Agricultural Applications
- F1869-11 Standard Test Method for Measuring Moisture Vapor Emission
Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.
- E. American Welding Society (AWS):
D1.4/D1.4M-11 Structural Welding Code - Reinforcing Steel
- F. Concrete Reinforcing Steel Institute (CRSI): Handbook 2008
- G. National Cooperative Highway Research Program (NCHRP):
Report On Concrete Sealers for the Protection of Bridge Structures
- H. U. S. Department of Commerce Product Standard (PS):
PS 1 Construction and Industrial Plywood
PS 20 American Softwood Lumber
- I. U. S. Army Corps of Engineers Handbook for Concrete and Cement:
CRD C513 Rubber Waterstops

CRD C572 Polyvinyl Chloride Waterstops

PART 2 – PRODUCTS:

2.1 FORMS:

- A. Wood: PS 20 free from loose knots and suitable to facilitate finishing concrete surface specified; tongue and grooved.
- B. Plywood: PS-1 Exterior Grade B-B (concrete-form) 16 mm (5/8 inch), or 20 mm (3/4 inch) thick for unlined contact form. B-B High Density Concrete Form Overlay optional.
- C. Permanent Steel Form for Concrete Slabs: Corrugated, ASTM A653, Grade E, and Galvanized, ASTM A653, G90. Provide venting where insulating concrete fill is used.
- D. Form Ties: Develop a minimum working strength of 13.35 kN (3000 pounds) when fully assembled. Ties shall be adjustable in length to permit tightening of forms and not have any lugs, cones, washers to act as spreader within form, nor leave a hole larger than 20 mm (3/4 inch) diameter, or a depression in exposed concrete surface, or leave metal closer than 40 mm (1 1/2 inches) to concrete surface. Wire ties not permitted. Cutting ties back from concrete face not permitted.

2.2 MATERIALS:

- A. Portland Cement: ASTM C150 Type I or II.
- B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition (LOI) not to exceed 5 percent.
- C. Coarse Aggregate: ASTM C33.
 - 1. Size 67 or Size 467 may be used for footings and walls over 300 mm (12 inches) thick.
 - 2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.
 - 3. Maximum size of coarse aggregates not more than one-fifth of narrowest dimension between sides of forms, one-third of depth of slabs, nor three-fourth of minimum clear spacing between reinforcing bars.
- D. Fine Aggregate: ASTM C33. Fine aggregate for applied concrete floor topping shall pass a 4.75 mm (No. 4) sieve, 10 percent maximum shall pass a 150 µm (No. 100) sieve.
- E. Mixing Water: Fresh, clean, and potable.
- F. Admixtures:
 - 1. Water Reducing Admixture: ASTM C494, Type A and not contain more chloride ions than are present in municipal drinking water.
 - 2. Water Reducing, Retarding Admixture: ASTM C494, Type D and not contain more chloride ions than are present in municipal drinking water.
 - 3. High-Range Water-Reducing Admixture (Superplasticizer): ASTM C494, Type F or G, and not contain more chloride ions than are present in municipal drinking water.

4. Non-Corrosive, Non-Chloride Accelerator: ASTM C494, Type C or E, and not contain more chloride ions than are present in municipal drinking water. Admixture manufacturer must have long-term non-corrosive test data from an independent testing laboratory of at least one year duration using an acceptable accelerated corrosion test method such as that using electrical potential measures.
5. Air Entraining Admixture: ASTM C260.
6. Prohibited Admixtures: Calcium chloride, thiocyanate or admixtures containing more than 0.05 percent chloride ions are not permitted.
7. Certification: Written conformance to the requirements above and the chloride ion content of the admixture prior to mix design review.
- G. Vapor Barrier: ASTM D4397, 0.38 mm (15 mil).
- H. Reinforcing Steel: ASTM A615, or ASTM A996, deformed, grade as shown.
- I. Welded Wire Fabric: ASTM A185.
- J. Reinforcing Bars to be Welded: ASTM A706.
- K. Cold Drawn Steel Wire: ASTM A82.
- L. Expansion Joint Filler: ASTM D1751.
- M. Sheet Materials for Curing Concrete: ASTM C171.
- N. Liquid Membrane-forming Compounds for Curing Concrete: ASTM C309, Type I, with fugitive dye, and shall meet the requirements of ASTM C1315. Compound shall be compatible with scheduled surface treatment, such as paint and resilient tile, and shall not discolor concrete surface.
- O. Liquid Hardener and Dustproofers: Fluosilicate solution of magnesium fluosilicate or zinc fluosilicate. Magnesium and zinc may be used separately or in combination as recommended by manufacturer. Use only on exposed slab. Do not use where floor is covered with resilient flooring, paint or other finish coating.
- P. Moisture Vapor Emissions & Alkalinity Control Sealer: 100% active colorless aqueous silicate solution concrete surface.
 1. ASTM C1315 Type 1 Class A, and ASTM C309 Type 1 Class A, penetrating product to have no less than 34% solid content, leaving no sheen, volatile organic compound (VOC) content rating as required to suite regulatory requirements. The product shall have at least a five (5) year documented history in controlling moisture vapor emission from damaging floor covering, compatible with all finish materials.
 2. MVE 15-Year Warranty:
 - a. When a floor covering is installed on a below grade, on grade, or above grade concrete slab treated with Moisture Vapor Emissions & Alkalinity Control Sealer according to manufacturer's instruction, sealer manufacturer shall warrant the floor covering system

against failure due to moisture vapor migration or moisture-born contaminants for a period of fifteen (15) years from the date of original installation. The warranty shall cover all labor and materials needed to replace all floor covering that fails due to moisture vapor emission & moisture born contaminants.

Q. Non-Shrink Grout:

1. ASTM C1107, pre-mixed, produce a compressive strength of at least 18 MPa at three days and 35 MPa (5000 psi) at 28 days. Furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent bearing under a 1200 mm x 1200 mm (4 foot by 4 foot) base plate.
2. Where high fluidity or increased placing time is required, furnish test data from an independent laboratory indicating that the grout when placed at a fluid consistency shall achieve 95 percent under an 450 mm x 900 mm (18 inch by 36 inch) base plate.

R. Adhesive Binder: ASTM C881.

S. Waterstops:

Bentonite Waterstop: Flexible strip of bentonite 25 mm x 20 mm (1 inch by 3/4 inch), weighing 8.7 kg/m (5.85 lbs. per foot) composed of Butyl Rubber Hydrocarbon (ASTM D297), Bentonite (SS-S-210-A) and Volatile Matter (ASTM D6).

T. Porous Backfill: Crushed stone or gravel graded from 25 mm to 20 mm (1 inch to 3/4 inch).

2.3 CONCRETE MIXES:

A. Mix Designs: Proportioned in accordance with Section 5.3, "Proportioning on the Basis of Field Experience and/or Trial Mixtures" of ACI 318.

1. If trial mixes are used, make a set of at least 6 cylinders in accordance with ASTM C192 for test purposes from each trial mix; test three for compressive strength at 7 days and three at 28 days.
2. Submit a report of results of each test series, include a detailed listing of the proportions of trial mix or mixes, including cement, fly ash, admixtures, weight of fine and coarse aggregate per m³ (cubic yard) measured dry rodded and damp loose, specific gravity, fineness modulus, percentage of moisture, air content, water-cement -fly ash ratio, and consistency of each cylinder in terms of slump.
3. Prepare a curve showing relationship between water-cement -fly ash ratio at 7-day and 28-day compressive strengths. Plot each curve using at least three specimens.
4. If the field experience method is used, submit complete standard deviation analysis.

B. Fly Ash Testing: Submit certificate verifying conformance with ASTM 618 initially with mix design and for each truck load of fly ash delivered from source. Submit test results performed within 6 months of submittal date. Notify COR immediately when change in source is anticipated.

1. Testing Laboratory used for fly ash certification/testing shall participate in the Cement and Concrete Reference Laboratory (CCRL) program. Submit most recent CCRL inspection report.
- C. After approval of mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval of COR or as specified. Making and testing of preliminary test cylinders may be carried on pending approval of cement and fly ash, providing Contractor and manufacturer certify that ingredients used in making test cylinders are the same. COR may allow Contractor to proceed with depositing concrete for certain portions of work, pending final approval of cement and fly ash and approval of design mix.
- D. Cement Factor: Maintain minimum cement factors in Table I regardless of compressive strength developed above minimums. Use Fly Ash as an admixture with 20% replacement by weight in all structural work. Increase this replacement to 40% for mass concrete, and reduce it to 10% for drilled piers and caissons.

TABLE I - CEMENT AND WATER FACTORS FOR CONCRETE

Concrete Strength		Non-Air-Entrained	Air-Entrained	
Min. 28 Day Comp. Str. MPa (psi)	Min. Cement kg/m ³ (lbs/c. yd)	Max. Water Cement Ratio	Min. Cement kg/m ³ (lbs/c. yd)	Max. Water Cement Ratio
35 (5000) ^{1,3}	375 (630)	0.45	385 (650)	0.40
30 (4000) ^{1,3}	325 (550)	0.55	340 (570)	0.50
25 (3000) ^{1,3}	280 (470)	0.65	290 (490)	0.55
25 (3000) ^{1,2}	300 (500)	*	310 (520)	*

1. If trial mixes are used, the proposed mix design shall achieve a compressive strength 8.3 MPa (1200 psi) in excess of f'c. For concrete strengths above 35 Mpa (5000 psi), the proposed mix design shall achieve a compressive strength 9.7 MPa (1400 psi) in excess of f'c.
 2. Lightweight Structural Concrete. Pump mixes may require higher cement values.
 3. For concrete exposed to high sulfate content soils maximum water cement ratio is 0.44.
 4. Determined by Laboratory in accordance with ACI 211.1 for normal concrete.
- E. Maximum Slump: Maximum slump, as determined by ASTM C143 with tolerances as established by ASTM C94, for concrete to be vibrated shall be as shown in Table II.

TABLE II - MAXIMUM SLUMP, MM (INCHES)*

Type of Construction	Normal Weight Concrete
Reinforced Footings and Substructure Walls	75mm (3 inches)
Slabs, Beams, Reinforced Walls, and Building Columns	100 mm (4 inches)

- F. Slump may be increased by the use of the approved high-range water-reducing admixture (superplasticizer). Tolerances as established by ASTM C94. Concrete containing the high-range-water-reducing admixture may have a maximum slump of 225 mm (9 inches). The concrete shall arrive at the job site at a slump of 50 mm to 75 mm (2 inches to 3 inches), and 75 mm to 100 mm (3 inches to 4 inches) for lightweight concrete. This should be verified, and then the high-range-water-reducing admixture added to increase the slump to the approved level.
- G. Air-Entrainment: Air-entrainment of normal weight concrete shall conform with Table III. Air-entrainment of lightweight structural concrete shall conform with Table IV. Determine air content by either ASTM C173 or ASTM C231.

**TABLE III - TOTAL AIR CONTENT
FOR VARIOUS SIZES OF COARSE AGGREGATES (NORMAL CONCRETE)**

Nominal Maximum Size of Total Air Content	Coarse Aggregate, mm (Inches) Percentage by Volume
10 mm (3/8 in).6 to 10	13 mm (1/2 in).5 to 9
20 mm (3/4 in).4 to 8	25 mm (1 in).3-1/2 to 6-1/2
40 mm (1 1/2 in).3 to 6	

- H. Concrete slabs placed at air temperatures below 10 degrees C (50 degrees Fahrenheit) use non-corrosive, non-chloride accelerator. Concrete required to be air entrained use approved air entraining admixture. Pumped concrete, synthetic fiber concrete, architectural concrete, concrete required to be watertight, and concrete with a water/cement ratio below 0.50 use high-range water-reducing admixture (superplasticizer).
- I. Durability: Use air entrainment for exterior exposed concrete subjected to freezing and thawing and other concrete shown or specified. For air content requirements see Table III.

2.4 BATCHING AND MIXING:

- A. General: Concrete shall be "Ready-Mixed" and comply with ACI 318 and ASTM C94, except as specified. Batch mixing at the site is permitted. Mixing process and equipment must be approved by COR. With each batch of concrete, furnish certified delivery tickets listing information in Paragraph 16.1 and 16.2 of ASTM C94. Maximum delivery temperature of concrete is 38°C (100 degrees Fahrenheit). Minimum delivery temperature as follows:

Atmospheric Temperature	Minimum Concrete Temperature
-1. degrees to 4.4 degrees C (30 degrees to 40 degrees F)	15.6 degrees C (60 degrees F.)
-17 degrees C to -1.1 degrees C (0 degrees to 30 degrees F.)	21 degrees C (70 degrees F.)

1. Services of aggregate manufacturer's representative shall be furnished during the design of trial mixes and as requested by the COR for consultation during batching, mixing, and placing operations of lightweight structural concrete. Services will be required until field controls indicate that concrete of required quality is being furnished. Representative shall be thoroughly familiar with the structural lightweight aggregate, adjustment and control of mixes to produce concrete of required quality. Representative shall assist and advise COR.

PART 3 – EXECUTION

3.1 FORMWORK:

- A. General: Design in accordance with ACI 347 is the responsibility of the Contractor. The Contractor shall retain a registered Professional Engineer to design the formwork.
 1. Form boards and plywood forms may be reused for contact surfaces of exposed concrete only if thoroughly cleaned, patched, and repaired and COR approves their reuse.
 2. Provide forms for concrete footings unless COR determines forms are not necessary.
 3. Corrugated fiberboard forms: Place forms on a smooth firm bed, set tight, with no buckled cartons to prevent horizontal displacement, and in a dry condition when concrete is placed.
- B. Treating and Wetting: Treat or wet contact forms as follows:
 1. Coat plywood and board forms with non-staining form sealer. In hot weather, cool forms by wetting with cool water just before concrete is placed.
 2. Clean and coat removable metal forms with light form oil before reinforcement is placed. In hot weather, cool metal forms by thoroughly wetting with water just before placing concrete.
 3. Use sealer on reused plywood forms as specified for new material.
- C. Size and Spacing of Studs: Size and space studs, wales and other framing members for wall forms so as not to exceed safe working stress of kind of lumber used nor to develop deflection greater than 1/270 of free span of member.
- D. Unlined Forms: Use plywood forms to obtain a smooth finish for concrete surfaces. Tightly butt edges of sheets to prevent leakage. Back up all vertical joints solidly and nail edges of adjacent sheets to same stud with 6d box nails spaced not over 150 mm (6 inches) apart.
- E. Wall Form Ties: Locate wall form ties in symmetrically level horizontal rows at each line of wales and in plumb vertical tiers. Space ties to maintain true, plumb surfaces. Provide one row of ties

within 150 mm (6 inches) above each construction joint. Space through-ties adjacent to horizontal and vertical construction joints not over 450 mm (18 inches) on center.

1. Tighten row of ties at bottom of form just before placing concrete and, if necessary, during placing of concrete to prevent seepage of concrete and to obtain a clean line. Ties to be entirely removed shall be loosened 24 hours after concrete is placed and shall be pulled from least important face when removed.
2. Coat surfaces of all metal that is to be removed with paraffin, cup grease or a suitable compound to facilitate removal.

F. Construction Tolerances:

1. Set and maintain concrete formwork to assure erection of completed work within tolerances specified and to accommodate installation of other rough and finish materials. Accomplish remedial work necessary for correcting excessive tolerances. Erected work that exceeds specified tolerance limits shall be remedied or removed and replaced, at no additional cost to the Government.
2. Permissible surface irregularities for various classes of materials are defined as "finishes" in specification sections covering individual materials. They are to be distinguished from tolerances specified which are applicable to surface irregularities of structural elements.

3.2 PLACING REINFORCEMENT:

- A. General: Details of concrete reinforcement in accordance with ACI 318 unless otherwise shown.
- B. Placing: Place reinforcement conforming to CRSI DA4, unless otherwise shown.
 1. Place reinforcing bars accurately and tie securely at intersections and splices with 1.6 mm (16 gauge) black annealed wire. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when building is occupied. Type, number, and spacing of supports conform to ACI 318. Where concrete slabs are placed on ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use of brick or stone supports will not be permitted.
 2. Lap welded wire fabric at least 1 1/2 mesh panels plus end extension of wires not less than 300 mm (12 inches) in structural slabs. Lap welded wire fabric at least 1/2 mesh panels plus end extension of wires not less than 150 mm (6 inches) in slabs on grade.
 3. Splice column steel at no points other than at footings and floor levels unless otherwise shown.
- C. Spacing: Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing is 25 mm (1 inch) or 1-1/3 times maximum size of coarse aggregate.

- D. Splicing: Splices of reinforcement made only as required or shown or specified. Accomplish splicing as follows:
 - 1. Lap splices: Do not use lap splices for bars larger than Number 36 (Number 11). Minimum lengths of lap as shown.
- E. Bending: Bend bars cold, unless otherwise approved. Do not field bend bars partially embedded in concrete, except when approved by COR.
- F. Cleaning: Metal reinforcement, at time concrete is placed, shall be free from loose flaky rust, mud, oil, or similar coatings that will reduce bond.
- G. Future Bonding: Protect exposed reinforcement bars intended for bonding with future work by wrapping with felt and coating felt with a bituminous compound unless otherwise shown.

3.3 VAPOR BARRIER:

- A. Except where membrane waterproofing is required, interior concrete slab on grade shall be placed on a continuous vapor barrier.
 - 1. Place 100 mm (4 inches) of fine granular fill over the vapor barrier to act as a blotter for concrete slab.
 - 2. Vapor barrier joints lapped 150 mm (6 inches) and sealed with compatible waterproof pressure-sensitive tape.
 - 3. Patch punctures and tears.

3.4 SLABS RECEIVING RESILIENT COVERING

- A. Slab shall be allowed to cure for 6 weeks minimum prior to placing resilient covering. After curing, slab shall be tested by the Contractor for moisture in accordance with ASTM D4263 or ASTM F1869. Moisture content shall be less than 3 pounds per 1000 sf prior to placing covering.
- B. In lieu of curing for 6 weeks, Contractor has the option, at his own cost, to utilize the Moisture Vapor Emissions & Alkalinity Control Sealer as follows:
 - 1. Sealer is applied on the day of the concrete pour or as soon as harsh weather permits, prior to any other chemical treatments for concrete slabs either on grade, below grade or above grade receiving resilient flooring, such as, sheet vinyl, vinyl composition tile, rubber, wood flooring, epoxy coatings and overlays.
 - 2. Manufacturer's representative will be on the site the day of concrete pour to install or train its application and document. He shall return on every application thereafter to verify that proper procedures are followed.
 - a. Apply Sealer to concrete slabs as soon as final finishing operations are complete and the concrete has hardened sufficiently to sustain floor traffic without damage.
 - b. Spray apply Sealer at the rate of 20 m² (200 square feet) per gallon. Lightly broom product evenly over the substrate and product has completely penetrated the surface.

- c. If within two (2) hours after initial application areas are subjected to heavy rainfall and puddling occurs, reapply Sealer product to these areas as soon as weather condition permits.

3.5 CONSTRUCTION JOINTS:

- A. Unless otherwise shown, location of construction joints to limit individual placement shall not exceed 24,000 mm (80 feet) in any horizontal direction, except slabs on grade which shall have construction joints shown. Allow 48 hours to elapse between pouring adjacent sections unless this requirement is waived by COR.
- B. Locate construction joints in suspended floors near the quarter-point of spans for slabs, beams or girders, unless a beam intersects a girder at center, in which case joint in girder shall be offset a distance equal to twice width of beam. Provide keys and inclined dowels as shown. Provide longitudinal keys as shown.
- C. Place concrete for columns slowly and in one operation between joints. Install joints in concrete columns at underside of deepest beam or girder framing into column.
- D. Allow 2 hours to elapse after column is cast before concrete of supported beam, girder or slab is placed. Place girders, beams, grade beams, column capitals, brackets, and haunches at the same time as slab unless otherwise shown.

3.6 PLACING CONCRETE:

- A. Preparation:
 - 1. Remove hardened concrete, wood chips, shavings and other debris from forms.
 - 2. Remove hardened concrete and foreign materials from interior surfaces of mixing and conveying equipment.
 - 3. Have forms and reinforcement inspected and approved by COR before depositing concrete.
 - 4. Provide runways for wheeling equipment to convey concrete to point of deposit. Keep equipment on runways which are not supported by or bear on reinforcement. Provide similar runways for protection of vapor barrier on coarse fill.
- B. Bonding: Before depositing new concrete on or against concrete which has been set, thoroughly roughen and clean existing surfaces of laitance, foreign matter, and loose particles.
 - 1. Preparing surface for applied topping:
 - a. Remove laitance, mortar, oil, grease, paint, or other foreign material by sand blasting. Clean with vacuum type equipment to remove sand and other loose material.
 - b. Broom clean and keep base slab wet for at least four hours before topping is applied.
 - c. Use a thin coat of one part Portland cement, 1.5 parts fine sand, bonding admixture; and water at a 50: 50 ratio and mix to achieve the consistency of thick paint. Apply to a damp base slab by scrubbing with a stiff fiber brush. New concrete shall be placed while the bonding grout is still tacky.

- C. Conveying Concrete: Convey concrete from mixer to final place of deposit by a method which will prevent segregation. Method of conveying concrete is subject to approval of COR.
- D. Placing: For special requirements see Paragraphs, HOT WEATHER and COLD WEATHER.
 - 1. Do not place concrete when weather conditions prevent proper placement and consolidation, or when concrete has attained its initial set, or has contained its water or cement content more than 1 1/2 hours.
 - 2. Deposit concrete in forms as near as practicable in its final position. Prevent splashing of forms or reinforcement with concrete in advance of placing concrete.
 - 3. Do not drop concrete freely more than 3000 mm (10 feet) for concrete containing the high-range water-reducing admixture (superplasticizer) or 1500 mm (5 feet) for conventional concrete. Where greater drops are required, use a tremie or flexible spout (canvas elephant trunk), attached to a suitable hopper.
 - 4. Discharge contents of tremies or flexible spouts in horizontal layers not exceeding 500 mm (20 inches) in thickness, and space tremies such as to provide a minimum of lateral movement of concrete.
 - 5. Continuously place concrete until an entire unit between construction joints is placed. Rate and method of placing concrete shall be such that no concrete between construction joints will be deposited upon or against partly set concrete, after its initial set has taken place, or after 45 minutes of elapsed time during concrete placement.
 - 6. On bottom of members with severe congestion of reinforcement, deposit 25 mm (1 inch) layer of flowing concrete containing the specified high-range water-reducing admixture (superplasticizer). Successive concrete lifts may be a continuation of this concrete or concrete with a conventional slump.
 - 7. Concrete on metal deck:
 - a. Concrete on metal deck shall be minimum thickness shown. Allow for deflection of steel beams and metal deck under the weight of wet concrete in calculating concrete quantities for slab.
 - 1) The Contractor shall become familiar with deflection characteristics of structural frame to include proper amount of additional concrete due to beam/deck deflection.
- E. Consolidation: Conform to ACI 309. Immediately after depositing, spade concrete next to forms, work around reinforcement and into angles of forms, tamp lightly by hand, and compact with mechanical vibrator applied directly into concrete at approximately 450 mm (18 inch) intervals. Mechanical vibrator shall be power driven, hand operated type with minimum frequency of 5000 cycles per minute having an intensity sufficient to cause flow or settlement of concrete into place. Vibrate concrete to produce thorough compaction, complete embedment of reinforcement and

concrete of uniform and maximum density without segregation of mix. Do not transport concrete in forms by vibration.

1. Use of form vibration shall be approved only when concrete sections are too thin or too inaccessible for use of internal vibration.
2. Carry on vibration continuously with placing of concrete. Do not insert vibrator into concrete that has begun to set.

3.7 HOT WEATHER:

Follow the recommendations of ACI 305 or as specified to prevent problems in the manufacturing, placing, and curing of concrete that can adversely affect the properties and serviceability of the hardened concrete. Methods proposed for cooling materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by COR.

3.8 COLD WEATHER:

Follow the recommendations of ACI 306 or as specified to prevent freezing of concrete and to permit concrete to gain strength properly. Use only the specified non-corrosive, non-chloride accelerator. Do not use calcium chloride, thiocyanates or admixtures containing more than 0.05 percent chloride ions. Methods proposed for heating materials and arrangements for protecting concrete shall be made in advance of concrete placement and approved by COR.

3.9 PROTECTION AND CURING:

- A. Conform to ACI 308: Initial curing shall immediately follow the finishing operation. Protect exposed surfaces of concrete from premature drying, wash by rain and running water, wind, mechanical injury, and excessively hot or cold temperatures. Keep concrete not covered with membrane or other curing material continuously wet for at least 7 days after placing, except wet curing period for high-early-strength concrete shall be not less than 3 days. Keep wood forms continuously wet to prevent moisture loss until forms are removed. Cure exposed concrete surfaces as described below. Other curing methods may be used if approved by COR.
 1. Liquid curing and sealing compounds: Apply by power-driven spray or roller in accordance with the manufacturer's instructions. Apply immediately after finishing. Maximum coverage $10\text{m}^2/\text{L}$ (400 square feet per gallon) on steel troweled surfaces and $7.5\text{m}^2/\text{L}$ (300 square feet per gallon) on floated or broomed surfaces for the curing/sealing compound.
 2. Plastic sheets: Apply as soon as concrete has hardened sufficiently to prevent surface damage. Utilize widest practical width sheet and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with tape.
 3. Paper: Utilize widest practical width paper and overlap adjacent sheets 50 mm (2 inches). Tightly seal joints with sand, wood planks, pressure-sensitive tape, mastic or glue.

3.10 REMOVAL OF FORMS:

- A. Remove in a manner to assure complete safety of structure.

- B. Control Test: Use to determine if the concrete has attained sufficient strength and curing to permit removal of supporting forms. Cylinders required for control tests taken in accordance with ASTM C172, molded in accordance with ASTM C31, and tested in accordance with ASTM C39. Control cylinders cured and protected in the same manner as the structure they represent. Supporting forms or shoring not removed until strength of control test cylinders have attained at least 70 percent of minimum 28-day compressive strength specified.

3.11 CONCRETE SURFACE PREPARATION:

- A. Metal Removal: Unnecessary metal items cut back flush with face of concrete members.
- B. Patching: Maintain curing and start patching as soon as forms are removed. Do not apply curing compounds to concrete surfaces requiring patching until patching is completed. Use cement mortar for patching of same composition as that used in concrete. Use white or gray Portland cement as necessary to obtain finish color matching surrounding concrete. Thoroughly clean areas to be patched. Cut out honeycombed or otherwise defective areas to solid concrete to a depth of not less than 25 mm (1 inch). Cut edge perpendicular to surface of concrete. Saturate with water area to be patched, and at least 150 mm (6 inches) surrounding before placing patching mortar. Give area to be patched a brush coat of cement grout followed immediately by patching mortar. Cement grout composed of one part Portland cement, 1.5 parts fine sand, bonding admixture, and water at a 50:50 ratio, mix to achieve consistency of thick paint. Mix patching mortar approximately 1 hour before placing and remix occasionally during this period without addition of water. Compact mortar into place and screed slightly higher than surrounding surface. After initial shrinkage has occurred, finish to match color and texture of adjoining surfaces. Cure patches as specified for other concrete. Fill form tie holes which extend entirely through walls from unexposed face by means of a pressure gun or other suitable device to force mortar through wall. Wipe excess mortar off exposed face with a cloth.
- C. Upon removal of forms, clean vertical concrete surface that is to receive bonded applied cementitious application with wire brushes or by sand blasting to remove unset material, laitance, and loose particles to expose aggregates to provide a clean, firm, granular surface for bond of applied finish.

3.12 CONCRETE FINISHES:

- A. Slab Finishes:
 - 1. Monitoring and Adjustment: Provide continuous cycle of placement, measurement, evaluation and adjustment of procedures to produce slabs within specified tolerances. Monitor elevations of structural steel in key locations before and after concrete placement to establish typical deflection patterns for the structural steel. Determine elevations of cast-in-place slab soffits prior to removal of shores. Provide information to COR and floor consultant for evaluation and recommendations for subsequent placements.

2. Set perimeter forms to serve as screed using either optical or laser instruments. For slabs on grade, wet screeds may be used to establish initial grade during strike-off, unless COR determines that the method is proving insufficient to meet required finish tolerances and directs use of rigid screed guides. Where wet screeds are allowed, they shall be placed using grade stakes set by optical or laser instruments. Use rigid screed guides, as opposed to wet screeds, to control strike-off elevation for all types of elevated (non slab-on-grade) slabs. Divide bays into halves or thirds by hard screeds. Adjust as necessary where monitoring of previous placements indicates unshored structural steel deflections to other than a level profile.
3. Place slabs monolithically. Once slab placement commences, complete finishing operations within same day. Slope finished slab to floor drains where they occur, whether shown or not.
4. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off. Repeat strike-off as necessary. Complete screeding before any excess moisture or bleeding water is present on surface. Do not sprinkle dry cement on the surface.
5. Immediately following screeding, and before any bleed water appears, use a 3000 mm (10 foot) wide highway straightedge in a cutting and filling operation to achieve surface flatness. Do not use bull floats or darbys, except that darbying may be allowed for narrow slabs and restricted spaces.
6. Wait until water sheen disappears and surface stiffens before proceeding further. Do not perform subsequent operations until concrete will sustain foot pressure with maximum of 6 mm (1/4 inch) indentation.
7. Scratch Finish: Finish base slab to receive a bonded applied cementitious application as indicated above, except that bull floats and darbys may be used. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure a permanent bond between base slab and applied materials.
8. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a built-up roof, and ramps, stair treads, platforms (interior and exterior), and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 3000 mm (10 foot) highway straightedge. Correct high spots by cutting down and correct low spots by filling in with material of same composition as floor finish. Remove any surface projections and re-float to a uniform texture.
9. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings,

and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.

10. Broom Finish: Finish exterior slabs, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Brush in a direction transverse to main traffic. Match texture approved by COR from sample panel.

3.13 SURFACE TREATMENTS:

- A. Use on exposed concrete floors and concrete floors to receive carpeting except those specified to receive non-slip finish.
- B. Liquid Densifier/Sealer: Apply in accordance with manufacturer's directions just prior to completion of construction.
- C. Non-Slip Finish: Except where safety nosing and tread coverings are shown, apply non-slip abrasive aggregate to treads and platforms of concrete steps and stairs, and to surfaces of exterior concrete ramps and platforms. Broadcast aggregate uniformly over concrete surface at rate of application of 8% per 1/10th m² (7.5 percent per square foot) of area. Trowel concrete surface to smooth dense finish. After curing, rub treated surface with abrasive brick and water to slightly expose abrasive aggregate.

3.14 RETAINING WALLS:

- A. Use air-entrained concrete.
- B. Expansion and contraction joints, waterstops, weep holes, reinforcement and railing sleeves installed and constructed as shown.
- C. Exposed surfaces finished to match adjacent concrete surfaces, new or existing.
- D. Place porous backfill as shown.

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**SECTION 04 05 13
MASONRY MORTARING**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section specifies mortar materials and mixes.

1.2 RELATED WORK:

- A. Mortar used in Section:
 - 1. Section 04 20 00, UNIT MASONRY.
- B. Mortar Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 TESTING LABORATORY-CONTRACTOR RETAINED

- A. Engage a commercial testing laboratory approved by COR to perform tests specified below.
- B. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to COR.

1.4 TESTS

- A. Test mortar and materials specified.
- B. Certified test reports.
- C. Identify materials by type, brand name and manufacturer or by origin.
- D. Do not use materials until laboratory test reports are approved by COR.
- E. After tests have been made and materials approved, do not change without additional test and approval of COR.
- F. Testing:
 - 1. Test materials proposed for use for compliance with specifications in accordance with test methods contained in referenced specifications and as follows:
 - 2. Mortar:
 - a. Test for compressive strength and water retention; ASTM C270.
 - b. Mortar compressive strengths 28 days as follows:
 - Type M: Minimum 17230 kPa (2500 psi) at 28 days.
 - Type S: Minimum 12400 kPa (1800 psi) at 28 days.
 - Type N: Minimum 5170 kPa (750 psi) at 28 days.
 - 3. Cement:
 - a. Test for water soluble alkali (nonstaining) when nonstaining cement is specified.
 - b. Nonstaining cement shall contain not more than 0.03 percent water soluble alkali.
 - 4. Sand: Test for deleterious substances, organic impurities, soundness and grading.

1.5 SUBMITTALS

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

- B. Certificates:
 - 1. Indicating that following items meet specifications:
 - a. Portland cement.
 - b. Hydrated lime.
 - c. Fine aggregate (sand).
 - g. Color admixture.
- C. Laboratory Test Reports:
 - 1. Mortar, each type.
 - 2. Admixtures.
- D. Manufacturer's Literature and Data:
 - 1. Cement, each kind.
 - 2. Hydrated lime.
 - 3. Admixtures.

1.6 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver masonry materials in original sealed containers marked with name of manufacturer and identification of contents.
- B. Store masonry materials under waterproof covers on planking clear of ground, and protect damage from handling, dirt, stain, water and wind.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of specification to extent referenced. Publications are referenced in text by basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C40-04.....Organic Impurities in Fine Aggregates for Concrete
 - C91-05.....Masonry Cement
 - C109-08.....Compressive Strength of Hydraulic Cement Mortars (Using 2-in.
or 50-MM Cube Specimens)
 - C144-04.....Aggregate for Masonry Mortar
 - C150-09.....Portland Cement
 - C207-06.....Hydrated Lime for Masonry Purposes
 - C270-10.....Mortar for Unit Masonry
 - C307-03(R2008).....Tensile Strength of Chemical - Resistant Mortar, Grouts, and
Monolithic Surfacing
 - C321-00(R2005).....Bond Strength of Chemical-Resistant Mortars
 - C348-08.....Flexural Strength of Hydraulic Cement Mortars
 - C595-10.....Blended Hydraulic Cement
 - C780-10.....Preconstruction and Construction Evaluation of Mortars for Plain
and Reinforced Unit Masonry

- C979-10.....Pigments for Integrally Colored Concrete
C1329-05.....Mortar Cement

PART 2 - PRODUCTS

2.1 HYDRATED LIME

- A. ASTM C207, Type S.

2.2 AGGREGATE FOR MASONRY MORTAR

- A. ASTM C144 and as follows:
1. Light colored sand for mortar for laying face brick.
- B. Test sand for color value in accordance with ASTM C40. Sand producing color darker than specified standard is unacceptable.

2.3 PORTLAND CEMENT

- A. ASTM C150, Type I.

2.4 WATER

- A. Potable, free of substances that are detrimental to mortar, masonry, and metal.

2.5 COLOR ADMIXTURE

- A. Pigments: ASTM C979.
- B. Use mineral pigments only. Organic pigments are not acceptable.
- C. Pigments inert, stable to atmospheric conditions, nonfading, alkali resistant and water insoluble.

PART 3 - EXECUTION

3.1 MIXING

- A. Mix in a mechanically operated mortar mixer.
1. Mix mortar for at least three minutes but not more than five minutes.
- B. Measure ingredients by volume. Measure by the use of a container of known capacity.
- C. Mix water with dry ingredients in sufficient amount to provide a workable mixture which will adhere to vertical surfaces of masonry units.
- D. Mortar that has stiffened because of loss of water through evaporations:
1. Re-tempered by adding water to restore to proper consistency and workability.
 2. Discard mortar that has reached its initial set or has not been used within two hours.

3.2 MORTAR USE LOCATION

- A. For brick veneer over frame back up walls, use Type N portland cement-lime mortar.
- D. Use Type N mortar for other masonry work, except as otherwise specified.

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SECTION 04 20 00
UNIT MASONRY

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies requirements for construction of masonry unit walls.

1.2 RELATED WORK

- A. Mortar: Section 04 05 13, MASONRY MORTARING.
- B. Steel lintels and shelf angles: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- C. Cavity insulation: Section 07 21 13, THERMAL INSULATION.
- D. Flashing: Section 07 60 00, FLASHING AND SHEET METAL.
- E. Sealants and sealant installation: Section 07 92 00, JOINT SEALANTS.
- F. Color and texture of masonry units: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples:
1. Face brick, sample panel, 200 mm by 400 mm (8 inches by 16 inches,) showing full color range and texture of bricks, bond, and proposed mortar joints.
 2. Anchors, and ties, one each and joint reinforcing 1200 mm (48 inches) long.
- C. Certificates:
1. Certificates signed by manufacturer, including name and address of contractor, project location, and the quantity, and date or dates of shipment of delivery to which certificate applies.
 2. Indicating that the following items meet specification requirements:
 - a. Face brick.
 3. Testing laboratories facilities and qualifications of its principals and key personnel to perform tests specified.
- D. Manufacturer's Literature and Data:
1. Anchors, ties, and reinforcement.

1.4 WARRANTY

- A. Warrant exterior masonry walls against moisture leaks and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be five years.

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. American Society for Testing and Materials (ASTM):

- A951-06..... Steel Wire for Masonry Joint Reinforcement.
- A615/A615M-09 Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.
- A675/A675M-03(R2009) Standard Specification for Steel Bars, Carbon, Hot-Wrought, Special Quality, Mechanical Properties
- C34-03..... Structural Clay Load-Bearing Wall Tile
- C55-09..... Concrete Building Brick
- C56-10..... Structural Clay Non-Load-Bearing Tile
- C62-10..... Building Brick (Solid Masonry Units Made From Clay or Shale)
- C67-09..... Sampling and Testing Brick and Structural Clay Tile
- C90-11..... Load-Bearing Concrete Masonry Units
- C126-10 Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units
- C216-10 Facing Brick (Solid Masonry Units Made From Clay or Shale)
- C476-10 Standard Specification for Grout for Masonry
- C612-10 Mineral Fiber Block and Board Thermal Insulation
- C744-11 Prefaced Concrete and Calcium Silicate Masonry Units.
- D1056-07 Flexible Cellular Materials - Sponge or Expanded Rubber
- D2000-08 Rubber Products in Automotive Applications
- D2240-05(R2010) Rubber Property - Durometer Hardness
- D3574-08 Flexible Cellular Materials-Slab, Bonded, and Molded Urethane Foams
- F1667-11 Fasteners: Nails, Spikes and Staples
- C. Masonry Industry Council:
Hot and Cold Weather Masonry Construction Manual-98 (R2000).
- D. American Welding Society (AWS):
D1.4-11 Structural Welding Code – Reinforcing Steel.
- E. Federal Specifications (FS):
FF-S-107C-00 Screws, Tapping and Drive
- F. Brick Industry Association - Technical Notes on Brick Construction (BIA):
11-2001 Guide Specifications for Brick Masonry, Part I
11A–1988..... Guide Specifications for Brick Masonry, Part II
11B–1988..... Guide Specifications for Brick Masonry, Part III Execution
11C-1998 Guide Specification for Brick Masonry Engineered Brick Masonry, Part IV

11D-1988 Guide Specifications for Brick Masonry Engineered Brick
Masonry, Part IV continued

- G. Masonry Standards Joint Committee; Specifications for Masonry Structures TMS 602-08/ACI 530.1-08/ASCE 6-08 (2008 MSJC Book Version TMS-0402-08).

PART 2 - PRODUCTS

2.1 BRICK

- A. Face Brick:
1. ASTM C216, Grade SW, Type FBS.
 2. Brick when tested in accordance with ASTM C67: Classified slightly efflorescent or better.
 3. Size:
 - a. Modular, match existing adjacent.

2.2 ANCHORS, TIES, AND REINFORCEMENT

- A. Adjustable Veneer Anchor for Frame Walls:
1. Two piece, adjustable anchor and tie.
 2. Anchor and tie may be either type; use only one type throughout.
 3. Loop Type:
 - a. Anchor: Screw-on galvanized steel anchor strap 2.75 mm (0.11 inch) by 19 mm (3/4 inch) wide by 225 mm (9 inches) long, with 9 mm (0.35 inch) offset and 100 mm (4 inch) adjustment. Provide 5 mm (0.20 inch) hole at each end for fasteners.
 - b. Ties: Triangular tie, fabricated of 5 mm (0.20 inch) diameter galvanized cold drawn steel wire. Ties long enough to engage the anchor and be embedded not less than 50 mm (2 inches) into the bed joint of the masonry veneer.

2.3 ACCESSORIES

- A. Weep Hole Wicks: Glass fiber ropes, 10 mm (3/8 inch) minimum diameter, 300 mm (12 inches) long.
- B. Masonry Cleaner:
1. Detergent type cleaner selected for each type masonry used.
 2. Acid cleaners are not acceptable.
 3. Use soapless type specially prepared for cleaning brick or concrete masonry as appropriate.

PART 3 - EXECUTION

3.1 JOB CONDITIONS

- A. Protection:
1. Cover tops of walls with nonstaining waterproof covering, when work is not in progress. Secure to prevent wind blow off.

2. On new work protect base of wall from mud, dirt, mortar droppings, and other materials that will stain face, until final landscaping or other site work is completed.

B. Cold Weather Protection:

1. Masonry may be laid in freezing weather when methods of protection are utilized.
2. Comply with MSJC and "Hot and Cold Weather Masonry Construction Manual".

3.2 CONSTRUCTION TOLERANCES

- A. Lay masonry units plumb, level and true to line within the tolerances as per MSJC requirements and as follows:
- B. Maximum variation from plumb:
 1. In 3000 mm (10 feet) - 6 mm (1/4 inch).
 2. In 6000 mm (20 feet) - 10 mm (3/8 inch).
 3. In 12 000 mm (40 feet) or more - 13 mm (1/2 inch).
- C. Maximum variation from level:
 1. In any bay or up to 6000 mm (20 feet) - 6 mm (1/4 inch).
 2. In 12 000 mm (40 feet) or more - 13 mm (1/2 inch).
- D. Maximum variation from linear building lines:
 1. In any bay or up to 6000 mm (20 feet) - 13 mm (1/2 inch).
 2. In 12 000 mm (40 feet) or more - 19 mm (3/4 inch).
- E. Maximum variation in cross-sectional dimensions of columns and thickness of walls from dimensions shown:
 1. Minus 6 mm (1/4 inch).
 2. Plus 13 mm (1/2 inch).
- F. Maximum variation in prepared opening dimensions:
 1. Accurate to minus 0 mm (0 inch).
 2. Plus 6 mm (1/4 inch).

3.3 INSTALLATION GENERAL

- A. Keep finish work free from mortar smears or spatters, and leave neat and clean.
- B. Anchor masonry as specified in Paragraph, ANCHORAGE.
- C. Tooling Joints:
 1. Do not tool until mortar has stiffened enough to retain thumb print when thumb is pressed against mortar.
 2. Tool while mortar is soft enough to be compressed into joints and not raked out.
 3. Finish joints in exterior face masonry work with a jointing tool, and provide smooth, water-tight concave joint unless specified otherwise.
 4. Tool Exposed interior joints in finish work concave unless specified otherwise.
- D. Wall Units:

1. Lay out field units to provide for running bond of walls and partitions, with vertical joints in second course centering on first course units unless specified otherwise.
 2. Align head joints of alternate vertical courses.
 3. At sides of openings, balance head joints in each course on vertical center lines of openings.
 4. Use no piece shorter than 100 mm (4 inches) long.
- E. Before connecting new masonry with previously laid, remove loosened masonry or mortar, and clean and wet work in place as specified under wetting.
- F. Wetting and Wetting Test:
1. Test and wet brick or clay tile in accordance with BIA 11B.

3.4 ANCHORAGE

- A. Veneer to Frame Walls:
1. Use adjustable veneer anchors.
 2. Fasten anchor to stud through sheathing with self drilling and tapping screw, one at each end of loop type anchor.
 3. Space anchors not more than 400 mm (16 inches) on center vertically at each stud.

3.5 BRICKWORK

- A. Lay clay brick in accordance with BIA Technical Note 11 series.
- B. Laying:
1. Lay brick in running bond with course of masonry bonded at corners unless shown otherwise. Match bond of existing building on alterations and additions.
 2. Maintain bond pattern throughout.
 3. Do not use brick smaller than half-brick at any angle, corner, break or jamb.
 4. Where length of cut brick is greater than one half but less than a whole brick, maintain the vertical joint location of such units.
 5. Lay exposed brickwork joints symmetrical about center lines of openings.
 6. Before starting work, lay facing brick on foundation wall and adjust bond to openings, angles, and corners.
- C. Joints:
1. Exterior and interior joint widths: Lay for three equal joints in 200 mm (eight inches) vertically, unless shown otherwise.
 2. Rake joints for pointing with colored mortar when colored mortar is not full depth.
- D. Weep Holes:
1. Install weep holes at 600 mm (24 inches) on center in bottom of vertical joints of exterior masonry veneer or cavity wall facing over foundations, bond beams, and other water stops in the wall.

2. Form weep holes using wicks made of mineral fiber insulation strips turned up 200 mm (8 inches) in cavity. Anchor top of strip to backup to securely hold in place.
3. Install sand or pea gravel in cavity approximately 75 mm (3 inches) high between weep holes.

E. Veneer Framed Walls:

- a. Build with 100 mm (4 inches) of face brick over sheathed stud wall with air space.
- b. Keep air space clean of mortar accumulations and debris.

3.6 CLEANING AND REPAIR

A. General:

1. Clean exposed masonry surfaces on completion.
2. Protect adjoining construction materials and landscaping during cleaning operations.
3. Cut out defective exposed new joints to depth of approximately 19 mm (3/4 inch) and repoint.
4. Remove mortar droppings and other foreign substances from wall surfaces.

B. Brickwork:

1. First wet surfaces with clean water, then wash down with a solution of soapless detergent. Do not use muriatic acid.
2. Brush with stiff fiber brushes while washing, and immediately thereafter hose down with clean water.
3. Free clean surfaces of traces of detergent, foreign streaks, or stains of any nature.

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SECTION 05 12 00
STRUCTURAL STEEL FRAMING

PART 1 - GENERAL

1.1 DESCRIPTION:

This section specifies structural steel shown and classified by Section 2, Code of Standard Practice for Steel Buildings and Bridges.

1.2 RELATED WORK:

- A. Painting: Section 09 91 00, PAINTING.

1.3 QUALITY ASSURANCE:

- A. Fabricator and erector shall maintain a program of quality assurance in conformance with Section 8, Code of Standard Practice for Steel Buildings and Bridges. Work shall be fabricated in an AISC certified Category Std fabrication plant.
- B. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the written notification required by 29 CFR 1926.752. Provide copy of this notification to the COR.

1.4 TOLERANCES:

Fabrication tolerances for structural steel shall be held within limits established by ASTM A6, by AISC 303, Sections 6 and 7, Code of Standard Practice for Buildings and Bridges, except as follows:

- A. Elevation tolerance for closure plates at the building perimeter and at slab openings prior to concrete placement is 6 mm (1/4 inch).

1.5 DESIGN:

- A. Connections: Design and detail all connections for each member size, steel grade and connection type to resist the loads and reactions indicated on the drawings or specified herein. Use details consistent with the details shown on the Drawings, supplementing where necessary. The details shown on the Drawings are conceptual and do not indicate the required weld sizes or number of bolts unless specifically noted. Use rational engineering design and standard practice in detailing, accounting for all loads and eccentricities in both the connection and the members. Promptly notify the COR of any location where the connection design criteria is not clearly indicated. The design of all connections is subject to the review and acceptance of the COR. Submit structural calculations prepared and sealed by a qualified engineer registered in the state where the project is located. Submit calculations for review before preparation of detail drawings.

1.6 REGULATORY REQUIREMENTS:

- A. AISC 360: Specification for Structural Steel Buildings
- B. AISC 303: Code of Standard Practice for Steel Buildings and Bridges.

1.7 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop and Erection Drawings: Complete
- C. Certificates:
 - 1. Structural steel.
 - 2. Steel for all connections.
 - 3. Welding materials.
 - 4. Shop coat primer paint.
- D. Test Reports:
 - 1. Welders' qualifying tests.
- E. Design Calculations and Drawings:
 - 1. Connection calculations, if required.
- F. Record Surveys.

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 Institute of Steel Construction (AISC):
 - 1. AISC 360-10 Specification for Structural Steel Buildings
 - 3. AISC 303-10 Code of Standard Practice for Steel Buildings and Bridges
- C. American National Standards Institute (ANSI):
 - B18.22.1-65(R2008)..... Plain Washers
 - B18.22M-81(R2000)..... Metric Plain Washers
- D. American Society for Testing and Materials (ASTM):
 - A6/A6M-11..... Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling
 - A36/A36M-08..... Standard Specification for Carbon Structural Steel
 - A53/A53M-10..... Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 - A123/A123M-09..... Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
 - A242/A242M-04(R2009) Standard Specification for High-Strength Low-Alloy Structural Steel
 - A283/A283M-03(R2007) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
 - A307-10..... Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi Tensile Strength

- A325-10 Standard Specification for Structural Bolts, Steel, Heat Treated,
120/105 ksi Minimum Tensile Strength
- A490-12 Standard Specification for Heat-Treated Steel Structural Bolts
150 ksi Minimum Tensile Strength
- A500/A500M-10a Standard Specification for Cold Formed Welded and Seamless
Carbon Steel Structural Tubing in Rounds and Shapes
- A501-07 Standard Specification for Hot-Formed Welded and Seamless
Carbon Steel Structural Tubing
- A572/A572M-07 Standard Specification for High-Strength Low-Alloy
Columbium-Vanadium Structural Steel
- A992/A992M-11 Standard Specification for Structural Steel Shapes
- E. American Welding Society (AWS):
 - D1.1/D1.1M-10 Structural Welding Code-Steel
- F. Research Council on Structural Connections (RCSC) of the Engineering Foundation:
Specification for Structural Joints Using ASTM A325 or A490 Bolts
- G. Military Specifications (Mil. Spec.):
 - MIL-P-21035 Paint, High Zinc Dust Content, Galvanizing, Repair
- H. Occupational Safety and Health Administration (OSHA):
 - 29 CFR Part 1926-2001 Safety Standards for Steel Erection

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Structural Steel: ASTM A992.
- B. Structural Tubing: ASTM A500, Grade B.
- C. Structural Tubing: ASTM A501.
- D. Steel Pipe: ASTM A53, Grade B.
- E. Bolts, Nuts and Washers:
 - 1. High-strength bolts, including nuts and washers: ASTM A325.
 - 2. Bolts and nuts, other than high-strength: ASTM A307, Grade A.
 - 3. Plain washers, other than those in contact with high-strength bolt heads and nuts: ANSI
Standard B18.22.1.
- F. Zinc Coating: ASTM A123.
- G. Galvanizing Repair Paint: Mil. Spec. MIL-P-21035.

PART 3 - EXECUTION

3.1 CONNECTIONS (SHOP AND FIELD):

- A. Welding: Welding in accordance with AWS D1.1. Welds shall be made only by welders and welding operators who have been previously qualified by tests as prescribed in AWS D1.1 to perform type of work required.
- B. High-Strength Bolts: High-strength bolts tightened to a bolt tension not less than 70% of their minimum tensile strength. Tightening done with properly calibrated wrenches, by turn-of-nut method or by use of direct tension indicators (bolts or washers). Tighten bolts in connections identified as slip-critical using Direct Tension Indicators. Twist-off torque bolts are not an acceptable alternate fastener for slip critical connections.

3.2 FABRICATION:

Fabrication in accordance with Chapter M, AISC 360. .

3.3 SHOP PAINTING:

- A. General: Shop paint steel with primer in accordance with AISC 303, Section 6.
- B. Shop paint for steel surfaces is specified in Section 09 91 00, PAINTING.
- C. Do not apply paint to following:
 - 1. Surfaces within 50 mm (2 inches) of joints to be welded in field.
 - 2. Surfaces which will be encased in concrete.
 - 3. Surfaces which will receive sprayed on fireproofing.
 - 4. Top flange of members which will have shear connector studs applied.
- D. Zinc Coated (Hot Dip Galvanized) per ASTM A123 (after fabrication): Touch-up after erection: Clean and wire brush any abraded and other spots worn through zinc coating, including threaded portions of bolts and welds and touch-up with galvanizing repair paint.

3.4 ERECTION:

- A. General: Erection in accordance with AISC 303, Section 7B. Temporary Supports:
Temporary support of structural steel frames during erection in accordance with AISC 303, Section 7

3.5 FIELD PAINTING:

- A. After erection, touch-up steel surfaces specified to be shop painted. After welding is completed, clean and prime areas not painted due to field welding.
- B. Finish painting of steel surfaces is specified in Section 09 91 00, PAINTING.

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**SECTION 05 40 00
COLD-FORMED METAL FRAMING**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies materials and services required for installation of cold-formed steel, including tracks and required accessories as shown and specified. This Section includes the following:

1. Exterior, non-load-bearing steel stud curtain wall.

1.2 RELATED WORK:

- A. Structural steel framing: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Non-load-bearing metal stud framing assemblies: Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- C. Gypsum board assemblies: Section 09 29 00, GYPSUM BOARD.

1.3 DESIGN REQUIREMENTS:

- A. Design steel in accordance with American Iron and Steel Institute Publication "Specification for the Design of Cold-Formed Steel Structural Members", except as otherwise shown or specified.
- B. Structural Performance: Engineer, fabricate, and erect cold-formed metal framing to withstand design loads within limits and under conditions required.
1. Design Loads: Ohio Building Code (OBC)
 2. Calculate structural characteristics of cold-formed steel framing according to AISI "North American Specification for the Design of Cold-Formed Steel Structural Members".
 3. Design framing systems to withstand design loads without deflections greater than the following:
 - a. Exterior Non-load-Bearing Curtain wall: Lateral deflection of 1/360 of the wall height.
 4. Design framing systems to provide for movement of framing members without damage or overstressing, sheathing failure, connection failure, undue strain on fasteners and anchors, or other detrimental effects when subject to a maximum ambient temperature change (range) of 67 degrees C (120 degrees F).
 5. Design framing system to accommodate deflection of primary building structure and construction tolerances, and to maintain clearances at openings.

6. Design exterior non-load-bearing curtain wall framing to accommodate lateral deflection without regard to contribution of sheathing materials.
7. Engineering Responsibility: Engage a fabricator who assumes undivided responsibility for engineering cold-formed metal framing by employing a qualified professional engineer to prepare design calculations, shop drawings, and other structural data.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Shop and erection drawings showing steel unit layout, connections to supporting members, and information necessary to complete installation as shown and specified.
- C. Manufacturer's Literature and Data: Showing steel component sections and specifying structural characteristics.;
- D. Submit structural calculations for cold-formed metal framing; prepared and sealed by a qualified engineer, who was responsible for its preparation, and registered in the state where the project is located.

1.5 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 Iron and Steel Institute (AISI):
Specification and Commentary for the Design of Cold-Formed Steel Structural Members (1996)
- C. American Society of Testing and Materials (ASTM):
A36/A36M-08 Standard Specifications for Carbon Structural Steel
A123/A123M-09 Standard Specifications for Zinc (Hot-Dip Galvanized) Coatings
on Iron and Steel Products
A153/A153M-09 Standard Specifications for Zinc Coating (Hot-Dip) on Iron and
Steel Hardware
A307-10 Standard Specifications for Carbon Steel Bolts and Studs
A653/A653M-10 Standard Specifications for Steel Sheet, Zinc-Coated
(Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the
Hot-Dip Process

C1107/C1107M-08.....Standard Specifications for Packaged Dry, Hydraulic-Cement
Grout (Non-shrink)

E488-96(R2003).....Standard Test Methods for Strength of Anchors in Concrete and
Masonry Elements

E1190-95(R2007).....Standard Test Methods for Strength of Power-Actuated
Fasteners Installed in Structural Members

D. American Welding Society (AWS):

D1.3/D1.3M-08.....Structural Welding Code-Sheet Steel

E. Military Specifications (Mil. Spec.):

MIL-P-21035BPaint, High Zinc Dust Content, Galvanizing Repair

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Sheet Steel for joists, studs and accessories 16 gage and heavier: ASTM A653, structural steel, zinc coated G60, with a yield of 340 MPa (50 ksi) minimum.
- B. Sheet Steel for joists, studs and accessories 18 gage and lighter: ASTM A653, structural steel, zinc coated G60, with a yield of 230 MPa (33 ksi) minimum.
- C. Galvanizing Repair Paint: MIL-P-21035B.
- D. Nonmetallic, Non-shrink Grout: Premixed, nonmetallic, noncorrosive, nonstaining grout containing selected silica sands, Portland cement, shrinkage-compensating agents, plasticizing and water-reducing agents, complying with ASTM C1107, with fluid consistency and a 30 minute working time.

2.2 FRAMING ACCESSORIES:

- A. Fabricate steel framing accessories of the same material and finish used for framing members, with a minimum yield strength of 230 MPa (33 ksi).
- B. Provide accessories of manufacturer's standard thickness and configuration, unless otherwise indicated, as follows:
 - 1. Supplementary framing.
 - 2. Bracing, bridging, and solid blocking.
 - 3. Web stiffeners.

4. Deflection track and vertical slide clips.
5. Stud kickers and girts.
6. Reinforcement plates.

2.3 ANCHORS, CLIPS, AND FASTENERS:

- A. Steel Shapes and Clips: ASTM A36, zinc coated by the hot-dip process according to ASTM A123.
- B. Cast-in-Place Anchor Bolts and Studs: ASTM A307, Grade A, zinc coated by the hot-dip process according to ASTM A153.
- C. Expansion Anchors: Fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 5 times the design load, as determined by testing per ASTM E488 conducted by a qualified independent testing agency.
- D. Power-Actuated Anchors: Fastener system of type suitable for application indicated, fabricated from corrosion-resistant materials, with capability to sustain, without failure, a load equal to 10 times the design load, as determined by testing per ASTM E1190 conducted by a qualified independent testing agency.
- E. Mechanical Fasteners: Corrosion-resistant coated, self-drilling, self-threading steel drill screws. Low-profile head beneath sheathing, manufacturer's standard elsewhere.

2.4 REQUIREMENTS:

- A. Welding in accordance with AWS D1.3
- B. Furnish members and accessories by one manufacturer only.

PART 3 - EXECUTION

3.1 FABRICATION:

- A. Framing components may be preassembled into panels. Panels shall be square with components attached.
- B. Cut framing components squarely or as required for attachment. Cut framing members by sawing or shearing; do not torch cut.
- C. Hold members in place until fastened.
- D. Fasten cold-formed metal framing members by welding or screw fastening, as standard with fabricator. Wire tying of framing members is not permitted.
 1. Comply with AWS requirements and procedures for welding, appearance and quality of welds, and methods used in correcting welding work.

2. Locate mechanical fasteners and install according to cold-formed metal framing manufacturer's instructions with screw penetrating joined members by not less than 3 exposed screw threads.
- E. Where required, provide specified insulation in double header members and double jamb studs which will not be accessible after erection.

3.2 ERECTION:

- A. Handle and lift prefabricated panels in a manner as to not distort any member.
- B. Securely anchor tracks to supports as shown.
- C. At butt joints, securely anchor two pieces of track to same supporting member or butt-weld or splice together.
- D. Plumb, align, and securely attach studs to flanges or webs of both upper and lower tracks.
- E. All axially loaded members shall be aligned vertically to allow for full transfer of the loads down to the foundation. Vertical alignment shall be maintained at floor/wall intersections.
- F. Install jack studs above and below openings and as required to furnish support. Securely attach jack studs to supporting members.
- G. Install headers in all openings that are larger than the stud spacing in that wall.
- H. Attach bridging for studs in a manner to prevent stud rotation. Space bridging rows as shown.
- I. Studs in one piece for their entire length, splices will not be permitted.
- J. Provide a load distribution member at top track where joist is not located directly over bearing stud.
- K. Provide temporary bracing and leave in place until framing is permanently stabilized.
- L. Do not bridge building expansion joints with cold-formed metal framing. Independently frame both sides of joints.
- M. Fasten reinforcement plate over web penetrations that exceed size of manufacturer's standard punched openings.

3.3 TOLERANCES:

- A. Vertical alignment (plumbness) of studs shall be within 1/960th of the span.
- B. Horizontal alignment (levelness) of walls shall be within 1/960th of their respective lengths.
- C. Spacing of studs shall not be more than 3 mm (1/8 inch) +/- from the designed spacing providing that the cumulative error does not exceed the requirements of the finishing materials.

- D. Prefabricated panels shall be not more than 3 mm (1/8 inch) +/- out of square within the length of that panel.

3.4 FIELD REPAIR:

Touch-up damaged galvanizing with galvanizing repair paint.

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**SECTION 05 50 00
METAL FABRICATIONS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies items and assemblies fabricated from structural steel shapes and other materials as shown and specified.
- B. Items specified.
 - 1. Support for Wall and Ceiling Mounted Items: (SD055000-01, SD055000-02, SD102113-01, SD102600-01, SD123100-01 & SD123100-02)
 - 2. Railings

1.2 RELATED WORK

- A. Colors, finishes, and textures: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Prime and finish painting: Section 09 91 00, PAINTING.
- C. Stainless steel corner guards: Section 10 26 00, WALL AND DOOR PROTECTION.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:

Grating, each type	Floor plate
Trap door	Wheel guards
Ceiling hatch	Sidewalk Access door
Manhole Covers	Safety nosing

- C. Shop Drawings:
 - 1. Each item specified, showing complete detail, location in the project, material and size of components, method of joining various components and assemblies, finish, and location, size and type of anchors.
 - 2. Mark items requiring field assembly for erection identification and furnish erection drawings and instructions.
 - 3. Provide templates and rough-in measurements as required.
- D. Manufacturer's Certificates:
 - 1. Anodized finish as specified.
 - 2. Live load designs as specified.
- E. Design Calculations for specified live loads including dead loads.

- F. Furnish setting drawings and instructions for installation of anchors to be preset into concrete and masonry work, and for the positioning of items having anchors to be built into concrete or masonry construction.

1.4 QUALITY ASSURANCE

- A. Each manufactured product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each product type shall be the same and be made by the same manufacturer.
- C. Assembled product to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

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 of Mechanical Engineers (ASME):
- B18.6.1-97..... Wood Screws
- B18.2.2-87(R2005)..... Square and Hex Nuts
- C. American Society for Testing and Materials (ASTM):
- A36/A36M-12 Structural Steel
- A47-99(R2009)..... Malleable Iron Castings
- A48-03(R2012)..... Gray Iron Castings
- A53-12..... Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and
Seamless
- A123-12..... Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
- A240/A240M-14 Standard Specification for Chromium and Chromium-Nickel
Stainless Steel Plate, Sheet and Strip for Pressure Vessels and
for General Applications.
- A269-10..... Seamless and Welded Austenitic Stainless Steel Tubing for
General Service
- A307-12..... Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
- A391/A391M-07(R2012) Grade 80 Alloy Steel Chain
- A786/A786M-09 Rolled Steel Floor Plate
- B221-13..... Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire,
Shapes, and Tubes
- B456-11 Electrodeposited Coatings of Copper Plus Nickel Plus Chromium
and Nickel Plus Chromium

- B632-08.....Aluminum-Alloy Rolled Tread Plate
- C1107-13Packaged Dry, Hydraulic-Cement Grout (Nonshrink)
- D3656-13Insect Screening and Louver Cloth Woven from Vinyl-Coated
Glass Yarns
- F436-11Hardened Steel Washers
- F468-06(R2012).....Nonferrous Bolts, Hex Cap Screws, Socket Head Cap Screws
and Studs for General Use
- F593-13Stainless Steel Bolts, Hex Cap Screws, and Studs
- F1667-11Driven Fasteners: Nails, Spikes and Staples
- D. American Welding Society (AWS):
 - D1.1-10.....Structural Welding Code Steel
 - D1.2-08.....Structural Welding Code Aluminum
 - D1.3-08.....Structural Welding Code Sheet Steel
- E. National Association of Architectural Metal Manufacturers (NAAMM)
 - AMP 521-01Pipe Railing Manual
 - AMP 500-06Metal Finishes Manual
 - MBG 531-09.....Metal Bar Grating Manual
 - MBG 532-09.....Heavy Duty Metal Bar Grating Manual
- F. Structural Steel Painting Council (SSPC)/Society of Protective Coatings:
 - SP 1-04No. 1, Solvent Cleaning
 - SP 2-04No. 2, Hand Tool Cleaning
 - SP 3-04No. 3, Power Tool Cleaning
- G. Federal Specifications (Fed. Spec):
 - RR-T-650ETreads, Metallic and Nonmetallic, Nonskid

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA

- A. In addition to the dead loads, design fabrications to support the following live loads unless otherwise specified.
- B. Railings and Handrails: 900 N (200 pounds) in any direction at any point.

2.2 MATERIALS

- A. Structural Steel: ASTM A36.
- B. Stainless Steel: ASTM A240, Type 302 or 304.
- C. Aluminum, Extruded: ASTM B221, Alloy 6063-T5 unless otherwise specified. For structural shapes use alloy 6061-T6 and alloy 6061-T4511.
- D. Floor Plate:

1. Steel ASTM A786.
2. Aluminum: ASTM B632.
- E. Steel Pipe: ASTM A53.
 1. Galvanized for exterior locations.
 2. Type S, Grade A unless specified otherwise.
 3. NPS (inside diameter) as shown.
- F. Malleable Iron Castings: A47.
- G. Primer Paint: As specified in Section 09 91 00, PAINTING.
- H. Modular Channel Units:
 1. Factory fabricated, channel shaped, cold formed sheet steel shapes, complete with fittings bolts and nuts required for assembly.
 2. Form channel within turned pyramid shaped clamping ridges on each side.
 3. Provide case hardened steel nuts with serrated grooves in the top edges designed to be inserted in the channel at any point and be given a quarter turn so as to engage the channel clamping ridges. Provide each nut with a spring designed to hold the nut in place.
 4. Factory finish channels and parts with oven baked primer when exposed to view. Channels fabricated of ASTM A525, G90 galvanized steel may have primer omitted in concealed locations. Finish screws and nuts with zinc coating.
 5. Fabricate snap-in closure plates to fit and close exposed channel openings of not more than 0.3 mm (0.0125 inch) thick stainless steel.
- I. Grout: ASTM C1107, pourable type.

2.3 HARDWARE

- A. Rough Hardware:
 1. Furnish rough hardware with a standard plating, applied after punching, forming and assembly of parts; galvanized, cadmium plated, or zinc-coated by electro-galvanizing process. Galvanized G-90 where specified.
 2. Use G90 galvanized coating on ferrous metal for exterior work unless non-ferrous metal or stainless is used.
- B. Fasteners:
 1. Bolts with Nuts:
 - a. ASME B18.2.2.
 - b. ASTM A307 for 415 MPa (60,000 psi) tensile strength bolts.
 - c. ASTM F468 for nonferrous bolts.
 - d. ASTM F593 for stainless steel.
 2. Screws: ASME B18.6.1.
 3. Washers: ASTM F436, type to suit material and anchorage.

4. Nails: ASTM F1667, Type I, style 6 or 14 for finish work.

2.4 FABRICATION GENERAL

A. Material

1. Use material as specified. Use material of commercial quality and suitable for intended purpose for material that is not named or its standard of quality not specified.
2. Use material free of defects which could affect the appearance or service ability of the finished product.

B. Size:

1. Size and thickness of members as shown.
2. When size and thickness is not specified or shown for an individual part, use size and thickness not less than that used for the same component on similar standard commercial items or in accordance with established shop methods.

C. Connections

1. Except as otherwise specified, connections may be made by welding, riveting or bolting.
2. Field riveting will not be approved.
3. Design size, number and placement of fasteners, to develop a joint strength of not less than the design value.
4. Holes, for rivets and bolts: Accurately punched or drilled and burrs removed.
5. Size and shape welds to develop the full design strength of the parts connected by welds and to transmit imposed stresses without permanent deformation or failure when subject to service loadings.
6. Use Rivets and bolts of material selected to prevent corrosion (electrolysis) at bimetallic contacts. Plated or coated material will not be approved.
7. Use stainless steel connectors for removable members machine screws or bolts.

D. Fasteners and Anchors

1. Use methods for fastening or anchoring metal fabrications to building construction as shown or specified.
2. Where fasteners and anchors are not shown, design the type, size, location and spacing to resist the loads imposed without deformation of the members or causing failure of the anchor or fastener, and suit the sequence of installation.
3. Use material and finish of the fasteners compatible with the kinds of materials which are fastened together and their location in the finished work.
4. Fasteners for securing metal fabrications to new construction only, may be by use of threaded or wedge type inserts or by anchors for welding to the metal fabrication for installation before the concrete is placed or as masonry is laid.

5. Fasteners for securing metal fabrication to existing construction or new construction may be expansion bolts, toggle bolts, power actuated drive pins, welding, self drilling and tapping screws or bolts.

E. Workmanship

1. General:

- a. Fabricate items to design shown.
- b. Furnish members in longest lengths commercially available within the limits shown and specified.
- c. Fabricate straight, true, free from warp and twist, and where applicable square and in same plane.
- d. Provide holes, sinkages and reinforcement shown and required for fasteners and anchorage items.
- e. Provide openings, cut-outs, and tapped holes for attachment and clearances required for work of other trades.
- f. Prepare members for the installation and fitting of hardware.
- g. Cut openings in gratings and floor plates for the passage of ducts, sumps, pipes, conduits and similar items. Provide reinforcement to support cut edges.
- h. Fabricate surfaces and edges free from sharp edges, burrs and projections which may cause injury.

2. Welding:

- a. Weld in accordance with AWS.
- b. Welds shall show good fusion, be free from cracks and porosity and accomplish secure and rigid joints in proper alignment.
- c. Where exposed in the finished work, continuous weld for the full length of the members joined and have depressed areas filled and protruding welds finished smooth and flush with adjacent surfaces.
- d. Finish welded joints to match finish of adjacent surface.

3. Joining:

- a. Miter or butt members at corners.
- b. Where frames members are butted at corners, cut leg of frame member perpendicular to surface, as required for clearance.

4. Anchors:

- a. Where metal fabrications are shown to be preset in concrete, weld 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 150 mm (6 inches) long with 25 mm (one inch) hooked end, to back of member at 600 mm (2 feet) on center, unless otherwise shown.

- b. Where metal fabrications are shown to be built into masonry use 32 x 3 mm (1-1/4 by 1/8 inch) steel strap anchors, 250 mm (10 inches) long with 50 mm (2 inch) hooked end, welded to back of member at 600 mm (2 feet) on center, unless otherwise shown.
- 5. Cutting and Fitting:
 - a. Accurately cut, machine and fit joints, corners, copes, and miters.
 - b. Fit removable members to be easily removed.
 - c. Design and construct field connections in the most practical place for appearance and ease of installation.
 - d. Fit pieces together as required.
 - e. Fabricate connections for ease of assembly and disassembly without use of special tools.
 - f. Joints firm when assembled.
 - g. Conceal joining, fitting and welding on exposed work as far as practical.
 - h. Do not show rivets and screws prominently on the exposed face.
 - i. The fit of components and the alignment of holes shall eliminate the need to modify component or to use exceptional force in the assembly of item and eliminate the need to use other than common tools.
- F. Finish:
 - 1. Finish exposed surfaces in accordance with NAAMM AMP 500 Metal Finishes Manual.
 - 2. Aluminum: NAAMM AMP 501.
 - a. Mill finish, AA-M10, as fabricated, use unless specified otherwise.
 - b. Clear anodic coating, AA-C22A41, chemically etched medium matte, with Architectural Class 1, 0.7 mils or thicker.
 - c. Colored anodic coating, AA-C22A42, chemically etched medium matte with Architectural Class 1, 0.7 mils or thicker.
 - d. Painted: AA-C22R10.
 - 3. Steel and Iron: NAAMM AMP 504.
 - a. Zinc coated (Galvanized): ASTM A123, G90 unless noted otherwise.
 - b. Surfaces exposed in the finished work:
 - 1) Finish smooth rough surfaces and remove projections.
 - 2) Fill holes, dents and similar voids and depressions with epoxy type patching compound.
 - c. Shop Prime Painting:
 - 1) Surfaces of Ferrous metal:
 - a) Items not specified to have other coatings.
 - b) Galvanized surfaces specified to have prime paint.

- c) Remove all loose mill scale, rust, and paint, by hand or power tool cleaning as defined in SSPC-SP2 and SP3.
 - d) Clean of oil, grease, soil and other detrimental matter by use of solvents or cleaning compounds as defined in SSPC-SP1.
 - e) After cleaning and finishing apply one coat of primer as specified in Section 09 91 00, PAINTING.
- 2) Non ferrous metals: Comply with MAAMM-500 series.
- 4. Stainless Steel: NAAMM AMP-504 Finish No. 4.
 - 5. Chromium Plating: ASTM B456, satin or bright as specified, Service Condition No. SC2.
- G. Protection:
- 1. Insulate aluminum surfaces that will come in contact with concrete, masonry, plaster, or metals other than stainless steel, zinc or white bronze by giving a coat of heavy-bodied alkali resisting bituminous paint or other approved paint in shop.
 - 2. Spot prime all abraded and damaged areas of zinc coating which expose the bare metal, using zinc rich paint on hot-dip zinc coat items and zinc dust primer on all other zinc coated items.

2.5 SUPPORTS

- A. General:
- 1. Fabricate ASTM A36 structural steel shapes as shown.
 - 2. Use clip angles or make provisions for welding hangers and braces to overhead construction.
 - 3. Field connections may be welded or bolted.
- B. For Wall Mounted Items:
- 1. For items supported by metal stud partitions.
 - 2. Steel strip minimum of 1.5 mm (0.0598 inch) thick.
 - 3. Steel strip minimum of 150 mm (6 inches) wide, length extending one stud space beyond end of item supported.
 - 4. Use steel angles for wall hung counters. Drill angle for fasteners at ends and not over 100 mm (4 inches) on center between ends.
- C. For Trapeze Bars:
- 1. Construct assembly above ceilings as shown and design to support not less than a 340 kg (750 pound) working load at any point.
 - 2. Fabricate trapeze supports as shown, with all exposed members, including screws, nuts, bolts and washers, fabricated of stainless steel.
 - 3. Fabricate concealed components of structural steel shapes unless shown otherwise.
 - 4. Stainless steel ceiling plate drilled for eye bolt.
 - 5. Continuously weld connections where welds shown.

6. Use modular channel where shown with manufacturers bolts and fittings.
 - a. Weld ends of steel angle braces to steel plates and secure to modular channel units as shown. Drill plates for anchor bolts.
 - b. Fabricate eye bolt, special clamp bolt, and plate closure full length of modular channel at ceiling line and secure to modular channel unit with manufacturers standard fittings.

PART 3 - EXECUTION

3.1 INSTALLATION, GENERAL

- A. Set work accurately, in alignment and where shown, plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Items set into concrete or masonry.
 1. Provide temporary bracing for such items until concrete or masonry is set.
 2. Place in accordance with setting drawings and instructions.
 3. Build strap anchors, into masonry as work progresses.
- C. Set items flush with finish floor or wall surface and, where applicable, flush with side of opening.
- D. Field weld in accordance with AWS.
 1. Design and finish as specified for shop welding.
 2. Use continuous weld unless specified otherwise.
- E. Install anchoring devices and fasteners as shown and as necessary for securing metal fabrications to building construction as specified. Power actuated drive pins may be used except for removable items and where members would be deformed or substrate damaged by their use.
- F. Spot prime all abraded and damaged areas of zinc coating as specified and all abraded and damaged areas of shop prime coat with same kind of paint used for shop priming.
- G. Isolate aluminum from dissimilar metals and from contact with concrete and masonry materials as required to prevent electrolysis and corrosion.
- H. Secure escutcheon plate with set screw.

3.2 INSTALLATION OF SUPPORTS

- A. Anchorage to structure.
 1. Secure angles or channels and clips to overhead structural steel by continuous welding unless bolting is shown.
 2. Secure supports to concrete inserts by bolting or continuous welding as shown.
 3. Secure supports to mid height of concrete beams when inserts do not exist with expansion bolts and to slabs, with expansion bolts. unless shown otherwise.
 4. Secure steel plate or hat channels to studs as detailed.
- B. Supports for Wall Mounted items:
 1. Locate center of support at anchorage point of supported item.

2. Locate support at top and bottom of wall hung cabinets.
 3. Locate support at top of floor cabinets and shelving installed against walls.
 4. Locate supports where required for items shown.
- C. Support at Ceiling for Patient Lifts and Patient Harness Track:
1. Bolt modular steel channel frames to hangers as shown, anchored to steel structure above.
 2. Fasten frames with modular channel manufacturers fittings, bolts, and nuts. Space modular channel supports and hangers as shown and as required to suit equipment furnished.
 3. Install closure plates in channels at ceiling where channel opening is visible. Coordinate and cut plates to fit tight against equipment anchors after equipment anchors are installed.
- D. Supports for Trapeze Bars:
1. Secure plates to overhead construction with fasteners as shown.
 2. Secure angle brace assembly to overhead construction with fasteners as shown and bolt plate to braces.
 3. Fit modular channel unit flush with finish ceiling, and secure to plate with modular channel unit manufacturer's standard fittings through steel shims or spreaders as shown.
 - a. Install closure plates in channel between eye bolts.
 - b. Install eyebolts in channel.

3.3 STEEL COMPONENTS FOR MILLWORK ITEMS

Coordinate and deliver to Millwork fabricator for assembly where millwork items are secured to metal fabrications.

3.4 CLEAN AND ADJUSTING

- A. Adjust movable parts including hardware to operate as designed without binding or deformation of the members centered in the opening or frame and, where applicable, contact surfaces fit tight and even without forcing or warping the components.
- B. Clean after installation exposed prefinished and plated items and items fabricated from stainless steel, aluminum and copper alloys, as recommended by the metal manufacture and protected from damage until completion of the project.

--- E N D ---

**SECTION 05 51 00
METAL STAIRS**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies steel stairs with railings.
- B. Types:
 - 1. Closed riser stairs with concrete filled treads and platforms.

1.2 RELATED WORK:

- A. Concrete fill for treads and platforms: Section 03 30 00, CAST-IN-PLACE CONCRETE.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Show design, fabrication details, installation, connections, material, and size of members.
- C. Fabrication qualifications.
- D. Installer qualifications.
- E. Calculations.
- F. Welding qualifications.

1.4 QUALITY ASSURANCE:

- A. Fabricator: A firm with a minimum of three (3) years' experience in type of work required by this section. Submit fabricator qualifications.
- B. Installer: A firm with a minimum of three (3) years' experience in type of work required by this section. Submit installer qualifications.
- C. Calculations: Provide professionally prepared calculations and certification of performance of this work, signed and sealed by a Professional Engineer registered in the state where the work is located. Perform structural design of the stair including supports for the metal stair frame. Indicate how Design Criteria as specified have been incorporated into the design.
- D. Welding Qualifications: Qualify procedures and personnel according to AWS D1.1/D1.1M and AWS D1.3/D1.3M.

1.5 APPLICATION PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by basic designation.
- B. American Society of Mechanical Engineers (ASME):
 - B18.2.1-12..... Square, Hex, Heavy Hex, and Askew Head Bolts and Hex,
Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch
Series)

- B18.2.3.8M-81(R2005).....Metric Heavy Lag Screws
B18.6.1-81(R2008).....Wood Screws (Inch Series)
B18.6.3-13.....Machine Screws, Tapping Screws, and Metallic Drive Screws
(Inch Series)
B18.6.5M-10.....Metric Thread Forming and Thread Cutting Tapping Screws
B18.6.7M-10.....Metric Machine Screws
B18.22M-81(R2010).....Metric Plain Washers
B18.21.1-09.....Washers: Helical Spring-Lock, Tooth Lock, and Plain Washer
(Inch Series)
- C. ASTM International (ASTM):
A36/A36M-14Structural Steel
A47/A47M-99 (R2014)Ferritic Malleable Iron Castings
A48/A48M-03(R2012)Gray Iron Castings
A53/A53M-12Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and
Seamless
A123/A123M-13Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A153/A153M-09Zinc Coating (Hot-Dip) on Iron and Steel Hardware
A307-14.....Carbon Steel Bolts, Studs and Threaded Rod 60,000 PSI Tensile
Strength
A653/A653M-13Steel Sheet, Zinc Coated (Galvanized) or Zinc Alloy Coated
(Galvannealed) by the Hot-Dip Process
A786/A786M-05(R2009)Rolled Steel Floor Plates
A1008/A1008M-13Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength,
Low-Alloy
A1011/A1011M-14Steel, Sheet and Strip, Strip, Hot-Rolled Carbon, Structural,
High-Strength, Low-Alloy
- D. American Welding Society (AWS):
D1.1/D1.1M-10.....Structural Welding Code-Steel
D1.3/D1.3M-08.....Structural Welding Code-Sheet Steel
- E. The National Association of Architectural Metal Manufacturers (NAAMM) Manuals:
MBG 531-09.....Metal Bar Gratings
AMP521-01Pipe Railing Manual, Including Round Tube
- F. American Iron and Steel Institute (AISI):
S100-12.....Design of Cold-Formed Steel Structural Members
- G. National Fire Protection Association (NFPA):
101-15Life Safety Code

H. Society for Protective Coatings (SSPC):

Paint 25(1997; E 2004)Zinc Oxide, Alkyd, Linseed Oil Primer for Use Over Hand
Cleaned Steel, Type I and Type II

PART 2 - PRODUCTS

2.1 DESIGN CRITERIA:

- A. Design stairs to support live load of 4.79 kN/sq. m (100 lbf/ sq. ft.) and a concentrated load of 1.33 kN (300 lbf) applied on an area of 2580 sq. mm (4 sq. in.).
 - 1. Uniform and concentrated loads need not be assumed to act concurrently.
 - 2. Provide stair framing capable of withstanding stresses resulting from railing loads in addition to the loads specified above. Limit deflection of treads, platforms, and framing members to L/360 or 6.4 mm (1/4 inch), whichever is less.
- B. Provide structural design, fabrication and assembly in accordance with requirements of NAAMM Metal Stairs Manual, except as otherwise specified or shown. Structural support of new stairs and portion of existing stairs tying into new stairs shall be included in design and fabrication of new stair.
- C. Design handrails and top rails of guards to support uniform load of not 0.73 kN/m (50 lbf/ft.) applied in any direction and a concentrated load of 0.89 kN (200 lbf) applied in any direction. Uniform and concentrated loads need not be assumed to act concurrently.
- D. Infill of guards to support concentrated load of 0.22 kN (50 lbf) applied horizontally on an area of 0.093 sq. m (1 sq. ft.).
- E. Design stairs to conform to NFPA 101.

2.2 MATERIALS:

- A. Steel Pipe: ASTM A53/A53M, Standard Weight, zinc coated.
- B. Sheet Steel: ASTM A1008/A1008M.
- C. Structural Steel: ASTM A36/A36M.
- D. Steel Decking: Form from zinc coated steel conforming to ASTM A653/A653M, with properties conforming to AISI S100 Specification for the Design of Cold-Formed Steel Structural Members.
- E. Steel Plate: ASTM A1011/A1011M.
- F. Iron Castings: ASTM A48/A48M, Class 30.
- G. Malleable Iron Castings: ASTM A47/A47M.
- H. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of preconsumer recycled content not less than 30 percent.

2.3 FABRICATION GENERAL:

- A. Fasteners:
 - 1. Conceal bolts and screws wherever possible.

2. Use countersunk heads on exposed bolts and screws with ends of bolts and screws dressed flush after nuts are set.
 3. Galvanized zinc-coated fasteners in accordance with ASTM A153/A153M and used for exterior applications or where built into exterior walls or floor systems. Select fasteners for the type, grade, and class required for the installation of steel stair items.
 4. Standard/regular hexagon-head bolts and nuts be conforming to ASTM A307, Grade A.
 5. Square-head lag bolts conforming to ASME B18.2.3.8M, ASME B18.2.1.
 6. Machine screws cadmium-plated steel conforming to ASME B18.6.7M, ASME B18.6.3.
 7. Wood screws, flat-head carbon steel conforming to ASME B18.6.5M, ASME B18.6.1.
 8. Plain washers, round, general-assembly-grade, carbon steel conforming to ASME B18.22M, ASME B18.21.1.
 9. Lockwashers helical spring, carbon steel conforming to ASME B18.2.1, ASME B18.2.3.8M.
- B. Welding:
1. Structural steel, AWS D1.1/D1.1M, and sheet steel, AWS D1.3/D1.3M.
 2. Where possible, locate welds on unexposed side.
 3. Grind exposed welds smooth and true to contour of welded member.
 4. Remove welding splatter.
- C. Remove sharp edges and burrs.
- D. Fit stringers to head channel and close ends with steel plates welded in place where shown.
- E. Fit face stringer to post by tenoning into post, or by notching and fitting face stringer to side of newel where shown.
- F. Shop Prime Painting: Shop prime steelwork with red oxide primer in accordance with SSPC Paint 25.
- G. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 0.8 mm (1/32 inch), and bend metal corners to the smallest radius possible without causing grain separation or otherwise impairing the work.
- H. Continuously weld corners and seams in accordance with the recommendations of AWS D1.1/D1.1M. Grind smooth exposed welds and flush to match and blend with adjoining surfaces.
- I. Form exposed connections with hairline joints that are flush and smooth, using concealed fasteners wherever possible. Use exposed fasteners of the type indicated or, if not indicated, use Phillips flathead (countersunk) screws or bolts.
- J. Provide and coordinate anchorage of the type indicated with the supporting structure. Fabricate anchoring devices, space as indicated and required to provide adequate support for the intended use of the work.

- K. Use hot-rolled steel bars for work fabricated for bar stock unless work is indicated or specified as fabricated from cold-finished or cold-rolled stock.

2.4 RAILINGS:

- A. Fabricate railings, including wall handrails, from steel pipe.
 - 1. Connections may be standard fittings designed for welding, or coped or mitered pipe with full welds.
- B. Return ends of handrail to wall and close free end.
- C. Provide standard terminal castings where fastened to newel.
- D. Space intermediate posts not over 1828 mm (6 feet) on center between end post.
- E. Fabricate handrail brackets from cast malleable iron.
- F. Provide standard terminal fittings at ends of post and rails.

2.5 CLOSED RISER STAIRS:

- A. Provide treads, risers, platforms, railings, stringers, headers, posts, columns and other supporting members.
- B. Fabricate pans for treads and platforms, and risers from sheet steel. Fabricate pans for platforms from steel decking where shown.
- C. Form risers with sanitary cove.
- D. Fabricate stringers, headers, and other supporting members from structural steel.
- E. Construct newel posts of steel tubing having wall thickness not less than 5 mm (3/16-inch), with forged steel caps and drops.
- F. Profile to match existing adjacent stairs.

PART 3 - EXECUTION

3.1 STAIR INSTALLATION:

- A. Provide hangers and struts required to support the loads imposed.
- B. Perform job site welding and bolting as specified for shop fabrication.
- C. Set stairs and other members in position and secure to structure as shown.
- D. Install stairs plumb, level and true to line.
- E. Provide steel closure plate to fill gap between the stringer and surrounding wall. Weld and apply primer, ready to accept paint finish.

3.2 RAILING INSTALLATION:

- A. Install standard terminal fittings at ends of posts and rails.
- B. Secure brackets, posts and rails to steel by welds, and to masonry or concrete with expansion sleeves and bolts, except secure posts at concrete by setting in sleeves filled with commercial non-shrink grout.
- C. Set rails horizontal or parallel to rake of stairs to within 3 mm in 3658 mm (1/8-inch in 12 feet).
- D. Set posts plumb and aligned to within 3 mm in 3658 mm (1/8-inch in 12 feet).

3.3 FIELD PRIME PAINTING:

- A. Touch-up abraded areas with same primer paint used for shop priming.

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**SECTION 06 10 00
ROUGH CARPENTRY**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section specifies wood blocking, furring, nailers, and rough hardware.

1.2 RELATED WORK:

- A. Gypsum sheathing: Section 09 29 00, GYPSUM BOARD.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings showing framing connection details, fasteners, connections and dimensions.

1.4 PRODUCT DELIVERY, STORAGE AND HANDLING:

- A. Protect lumber and other products from dampness both during and after delivery at site.
- B. Pile lumber in stacks in such manner as to provide air circulation around surfaces of each piece.
- C. Stack plywood and other board products so as to prevent warping.
- D. Locate stacks on well drained areas, supported at least 150 mm (6 inches) above grade and cover with well ventilated sheds having firmly constructed over hanging roof with sufficient end wall to protect lumber from driving rain.

1.5 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 Forest and Paper Association (AFPA):
National Design Specification for Wood Construction
NDS-05.....Conventional Wood Frame Construction
- C. American Institute of Timber Construction (AITC):
A190.1-07.....Structural Glued Laminated Timber
- D. American Society of Mechanical Engineers (ASME):
B18.2.1-96(R2005).....Square and Hex Bolts and Screws
B18.2.2-87.....Square and Hex Nuts
B18.6.1-97.....Wood Screws
B18.6.4-98(R2005).....Thread Forming and Thread Cutting Tapping Screws and
Metallic Drive Screws
- E. American Plywood Association (APA):
E30-07.....Engineered Wood Construction Guide
- F. American Society for Testing And Materials (ASTM):
A47-99(R2009).....Ferritic Malleable Iron Castings

- A48-03(R2008)..... Gray Iron Castings
- A653/A653M-10 Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated
(Galvannealed) by the Hot Dip Process
- C954-10..... Steel Drill Screws for the Application of Gypsum Board or Metal
Plaster Bases to Steel Studs from 0.033 inch (2.24 mm) to
0.112-inch (2.84 mm) in thickness
- C1002-07..... Steel Self-Piercing Tapping Screws for the Application of
Gypsum Panel Products or Metal Plaster Bases to Wood Studs
or Metal Studs
- D143-09..... Small Clear Specimens of Timber, Method of Testing
- D1760-01..... Pressure Treatment of Timber Products
- D2559-10..... Adhesives for Structural Laminated Wood Products for Use
Under Exterior (Wet Use) Exposure Conditions
- D3498-11..... Adhesives for Field-Gluing Plywood to Lumber Framing for Floor
Systems
- F844-07 Washers, Steel, Plain (Flat) Unhardened for General Use
- F1667-08 Nails, Spikes, and Staples
- G. Federal Specifications (Fed. Spec.):
- MM-L-736C Lumber; Hardwood
- H. Commercial Item Description (CID):
- A-A-55615 Shield, Expansion (Wood Screw and Lag Bolt Self Threading
Anchors)
- I. Military Specification (Mil. Spec.):
- MIL-L-19140E..... Lumber and Plywood, Fire-Retardant Treated
- J. Truss Plate Institute (TPI):
- TPI-85..... Metal Plate Connected Wood Trusses
- K. U.S. Department of Commerce Product Standard (PS)
- PS 1-95 Construction and Industrial Plywood
- PS 20-05 American Softwood Lumber Standard

PART 2 - PRODUCTS

2.1 LUMBER:

- A. Unless otherwise specified, each piece of lumber bear grade mark, stamp, or other identifying marks indicating grades of material, and rules or standards under which produced.

1. Identifying marks in accordance with rule or standard under which material is produced, including requirements for qualifications and authority of the inspection organization, usage of authorized identification, and information included in the identification.
 2. Inspection agency for lumber approved by the Board of Review, American Lumber Standards Committee, to grade species used.
- B. Lumber Other Than Structural:
1. Unless otherwise specified, species graded under the grading rules of an inspection agency approved by Board of Review, American Lumber Standards Committee.
 2. Furring, blocking, nailers and similar items 100 mm (4 inches) and narrower Standard Grade; and, members 150 mm (6 inches) and wider, Number 2 Grade.
- C. Sizes:
1. Conforming to Prod. Std., PS20.
 2. Size references are nominal sizes, unless otherwise specified, actual sizes within manufacturing tolerances allowed by standard under which produced.
- D. Moisture Content:
1. At time of delivery and maintained at the site.
 2. Boards and lumber 50 mm (2 inches) and less in thickness: 19 percent or less.
 3. Lumber over 50 mm (2 inches) thick: 25 percent or less.
- E. Fire Retardant Treatment:
1. Mil Spec. MIL-L-19140 with piece of treated material bearing identification of testing agency and showing performance rating.
 2. Treatment and performance inspection, by an independent and qualified testing agency that establishes performance ratings.
- F. Preservative Treatment:
1. Do not treat Heart Redwood and Western Red Cedar.
 2. Treat wood members and plywood exposed to weather or in contact with plaster, masonry or concrete, including framing of open roofed structures; sills, sole plates, furring, and sleepers that are less than 600 mm (24 inches) from ground; nailers, edge strips, blocking, crickets, curbs, cant, vent strips and other members used in connection with roofing and flashing materials.
 3. Treat other members indicated as preservative treated (PT).
 4. Preservative treat by the pressure method complying with ASTM D1760, except any process involving the use of Chromated Copper arsenate (CCA) for pressure treating wood is not permitted.

2.2 PLYWOOD

- A. Comply with Prod. Std., PS 1.

- B. Bear the mark of a recognized association or independent inspection agency that maintains continuing control over quality of plywood which identifies compliance by veneer grade, group number, span rating where applicable, and glue type.
- C. Backer Boards:
 - 1. APA rated Exposure 1 or Exterior; panel grade CD or better.

2.3 ROUGH HARDWARE AND ADHESIVES:

- A. Anchor Bolts:
 - 1. ASME B18.2.1 and ANSI B18.2.2 galvanized, 13 mm (1/2 inch) unless shown otherwise.
 - 2. Extend at least 200 mm (8 inches) into masonry or concrete with ends bent 50 mm (2 inches).
- B. Miscellaneous Bolts: Expansion Bolts: C1D, A-A-55615; lag bolt, long enough to extend at least 65 mm (2-1/2 inches) into masonry or concrete. Use 13 mm (1/2 inch) bolt unless shown otherwise.
- C. Washers
 - 1. ASTM F844.
 - 2. Use zinc or cadmium coated steel or cast iron for washers exposed to weather.
- D. Screws:
 - 1. Wood to Wood: ANSI B18.6.1 or ASTM C1002.
 - 2. Wood to Steel: ASTM C954, or ASTM C1002.
- E. Nails:
 - 1. Size and type best suited for purpose unless noted otherwise.
 - 2. ASTM F1667:
 - a. Common: Type I, Style 10.

PART 3 - EXECUTION

3.1 INSTALLATION OF FRAMING AND MISCELLANEOUS WOOD MEMBERS:

- A. Conform to applicable requirements of the following:
 - 1. AFPA National Design Specification for Wood Construction for timber connectors.
 - 2. APA for installation of plywood panels.
- B. Fasteners:
 - 1. Nails.
 - a. Nail in accordance with the Recommended Nailing Schedule as specified in AFPA Manual for House Framing where detailed nailing requirements are not specified in nailing schedule. Select nail size and nail spacing sufficient to develop adequate strength for the connection without splitting the members.
 - b. Use special nails with framing connectors.

- c. For sheathing and subflooring, select length of nails sufficient to extend 25 mm (1 inch) into supports.
- d. Use eight penny or larger nails for nailing through 25 mm (1 inch) thick lumber and for toe nailing 50 mm (2 inch) thick lumber.
- e. Use 16 penny or larger nails for nailing through 50 mm (2 inch) thick lumber.
- f. Select the size and number of nails in accordance with the Nailing Schedule except for special nails with framing anchors.
- g. Nailing Schedule; Using Common Nails:
 - 1) Joist bearing on sill or girder, toe nail three-8d or framing anchor
 - 2) Bridging to joist, toe nail each end two-8d
 - 3) Ledger strip to beam or girder three-16d under each joint.
 - 4) Subflooring or Sheathing:
 - a) 150 mm (6 inch) wide or less to each joist face nail two-8d.
 - b) Subflooring, more than 150 mm (6 inches) wide, to each stud or joint, face nail three-8d.
 - c) Plywood or structural use panel to each stud or joist face nail 8d, at supported edges 150 mm (6 inches) on center and at intermediate supports 250 mm (10 inches) on center. When gluing plywood to joint framing increase nail spacing to 300 mm (12 inches) at supported edges and 500 mm (20 inches) o.c. at intermediate supports.
 - 5) Sole plate to joist or blocking, through sub floor face nail 20d nails, 400 mm (16 inches) on center.
 - 6) Top plate to stud, end nail two-16d.
 - 7) Stud to sole plate, toe nail or framing anchor. Four-8d
 - 8) Doubled studs, face nail 16d at 600 mm (24 inches) on center.
 - 9) Built-up corner studs 16d at 600 mm (24 inches) (24 inches) on center.
 - 10) Doubled top plates, face nails 16d at 400 mm (16 inches) on center.
 - 11) Top plates, laps, and intersections, face nail two-16d.
 - 12) Continuous header, two pieces 16d at 400 mm (16 inches) on center along each edge.
 - 13) Ceiling joists to plate, toenail three-8d or framing anchor.
 - 14) Continuous header to stud, four 16d.
 - 15) Ceiling joists, laps over partitions, face nail three-16d or framing anchor.
 - 16) Ceiling joists, to parallel rafters, face nail three-16d.
 - 17) Rafter to plate, toe nail three-8d. or framing anchor. Brace 25 mm (1 inch) thick board to each stud and plate, face nail three-8d.
 - 18) Built-up girders and beams 20d at 800 mm (32 inches) on center along each edge.

2. Bolts:
 - a. Fit bolt heads and nuts bearing on wood with washers.
 - b. Countersink bolt heads flush with the surface of nailers.
 - c. Embed in concrete and solid masonry or use expansion bolts. Special bolts or screws designed for anchor to solid masonry or concrete in drilled holes may be used.
 - d. Use toggle bolts to hollow masonry or sheet metal.
 - e. Use bolts to steel over 2.84 mm (0.112 inch, 11 gage) in thickness. Secure wood nailers to vertical structural steel members with bolts, placed one at ends of nailer and 600 mm (24 inch) intervals between end bolts. Use clips to beam flanges.
3. Drill Screws to steel less than 2.84 mm (0.112 inch) thick.
 - a. ASTM C1002 for steel less than 0.84 mm (0.033 inch) thick.
 - b. ASTM C 954 for steel over 0.84 mm (0.033 inch) thick.
4. Power actuated drive pins may be used where practical to anchor to solid masonry, concrete, or steel.
5. Do not anchor to wood plugs or nailing blocks in masonry or concrete. Use metal plugs, inserts or similar fastening.
6. Screws to Join Wood:
 - a. Where shown or option to nails.
 - b. ASTM C1002, sized to provide not less than 25 mm (1 inch) penetration into anchorage member.
 - c. Spaced same as nails.
- C. Blocking Nailers, and Furring:
 1. Install furring, blocking, nailers, and grounds where shown.
 2. Use longest lengths practicable.
 3. Use fire retardant treated wood blocking where shown at openings and where shown or specified.
 4. Layers of Blocking:
 - a. Stagger end joints between upper and lower pieces.
 - b. Nail at ends and not over 600 mm (24 inches) between ends.
 - c. Stagger nails from side to side of wood member over 125 mm (5 inches) in width.

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SECTION 06 26 14
MINERAL PROFILE PANELING

PART 1 – GENERAL

1.1 SUMMARY

- A. Section Includes: Light weight composite mineral profile paneling and seam finishing materials to create a monolithic sculptured wall surface.
- B. Related Requirements:
 - 1. 09 29 00–Gypsum Board: Substrate and seam finishing.
 - 2. 09 91 23–Interior Painting: Sealing and painting of modular screen wall.
- C. Reference Standards:
 - 1. ASTM D 256 Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics.
 - 2. ASTM D 696 Standard Test Method for Coefficient of Linear Thermal Expansion of Plastics Between -30°C and 30°C With a Vitreous Silica Dilatometer.
 - 3. ASTM E 84 Standard Test Method for Surface Burning Characteristics of Building Materials.
 - 4. GA-214 Recommended Levels of Gypsum Board Finish.

1.2 ACTION SUBMITTALS

- A. Product Data: Each product specified.
- B. Shop Drawings: Show standard and project specific details including termination at adjacent surfaces.
- C. Samples: Minimum 15 by 15 inch panel of specified design(s).

1.3 INFORMATIONAL SUBMITTALS

- A. Manufacturer's installation instructions.
- B. Regulatory agency sustainability submittals:
- C. Qualification Statements: Proof of manufacturer, installer, and finisher qualifications.

1.4 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer: Minimum five years experience in producing mineral profile paneling.
 - 2. Installer: Minimum three years experience in finish carpentry/architectural woodwork installation.
 - 3. Finisher: Minimum three years experience in executing Level 5 finish in accordance with GA-214.
- B. Field Samples:
 - 1. Provide in a location selected by Architect showing representative sample of installed product including finished seam.
 - 2. Minimum Size: 8 by 8 feet.
 - 3. Approved field samples may remain as part of completed Work.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Storage and Handling Requirements:
1. Store panels in fully enclosed space, protected against damage from moisture, direct sunlight, and surface contamination.
 2. Store panels vertically, in shipping crates, until ready to be installed. Loosen crate lids to allow for venting. Do not stack or lean against walls.
 3. Store panels in area of installation minimum 24 hours prior to installation.

1.6 FIELD CONDITIONS

- A. Ambient Conditions:
1. HVAC: Operate HVAC system to maintain occupancy level temperature and relative humidity conditions (35 to 67 percent) in the area of installation from 24 hours prior to delivery of panels to the installation area through remainder of construction period.
 2. Lighting: Permanent project lighting, including any special lighting used to highlight the profiled panels, must be operational prior to seam finishing.

1.7 WARRANTY

- A. Manufacturer Warranty: Provide manufacturer's standard limited warranty.

PART 2 – PRODUCTS

2.1 COMPONENTS

- A. Profile Panel: Smooth surface mineral composite panel with light weight plant-based foam back.
1. Size: 32 by 32 by 1.5 inch maximum profile relief.
 2. Physical Properties:
 - a. Izod Impact Strength: ASTM D 256 16 in*lbs
 - b. Thermal Expansion: ASTM D 696 3.8×10^{-7} in/in °F.
 - c. Compressive Strength: ASTM D 696 2.3 ksi.
 - d. Flame Spread Index: ASTM E 84 0
 - e. Smoke Development Index: ASTM E 84 50
 - f. Weight 1.5 psf

2.3 ACCESSORIES

- A. Anchors: 30 lb self-drilling, drywall anchor.
- B. Screws: Coarse thread, drywall type, length as required by panel design and in accordance with Manufacturer's Installation Instructions.

2.4 SOURCE QUALITY CONTROL

- A. Fabrication Tolerances:
1. Dimensions, length and width: $\pm 1/16$ inch.
 2. Thickness: $\pm 1/16$ inch.
 3. Weight: $\pm 1/2$ lb.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates upon which profile paneling will be installed.
 - 1. Verify that substrate is a material listed as an acceptable substrate by the profile paneling manufacturer.
- B. Verify that permanent project lighting is in place and operational prior to start of seam finishing.
- C. Coordinate with responsible entity to correct unsatisfactory conditions.
- D. Commencement of work by installer is acceptance of substrate conditions.

3.2 INSTALLATION

- A. Install profile paneling in accordance with Manufacturer's Installation Instructions except that seam finishing shall be performed under Section 09 29 00–Gypsum Board, and sealing and painting shall be performed under Section 09 91 23–Interior Painting.

3.3 PROTECTION

- A. Protect finished work from damage during remainder of construction period.

END OF SECTION

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**SECTION 07 21 13
THERMAL INSULATION**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies thermal and acoustical insulation for buildings.
- B. Acoustical insulation is identified by words "Acoustical Insulation".

1.2 RELATED WORK

- A. Safing insulation: Section 07 84 00, FIRESTOPPING.

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. Insulation, each type used
 - 2. Tape
- C. Certificates: Stating the type, thickness and "R" value (thermal resistance) of the insulation to be installed.

1.4 STORAGE AND HANDLING:

- A. Store insulation materials in weathertight enclosure.
- B. Protect insulation from damage from handling, weather and construction operations before, during, and after installation.

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 basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - C270-10 Mortar for Unit Masonry
 - C516-08 Vermiculite Loose Fill Thermal Insulation
 - C549-06 Perlite Loose Fill Insulation
 - C552-07 Cellular Glass Thermal Insulation.
 - C553-08 Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
 - C578-10 Rigid, Cellular Polystyrene Thermal Insulation
 - C591-09 Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
 - C612-10 Mineral Fiber Block and Board Thermal Insulation
 - C665-06 Mineral Fiber Blanket Thermal Insulation for Light Frame Construction and Manufactured Housing
 - C728-05 (R2010) Perlite Thermal Insulation Board

C954-10	Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Base to Steel Studs From 0.033 (0.84 mm) inch to 0.112 inch (2.84 mm) 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
D312-00(R2006)	Asphalt Used in Roofing
E84-10	Surface Burning Characteristics of Building Materials
F1667-11	Driven Fasteners: Nails, Spikes and Staples.

PART 2 - PRODUCTS

2.1 INSULATION – GENERAL:

- A. Where thermal resistance ("R" value) is specified or shown for insulation, the thickness shown on the drawings is nominal. Use only insulation with actual thickness that is not less than that required to provide the thermal resistance specified.
- B. Where "R" value is not specified for insulation, use the thickness shown on the drawings.
- C. Where more than one type of insulation is specified, the type of insulation for each use is optional, except use only one type of insulation in any particular area.

2.2 EXTERIOR FRAMING OR FURRING INSULATION:

- A. Batt or Blanket: Optional.
- B. Mineral Fiber: ASTM C665, Type II, Class C, Category I where framing is faced with gypsum board.
- C. Mineral Fiber: ASTM C665, Type III, Class A where framing is not faced with gypsum board.
- D. Rigid Insulation: Polyisocyanurate Board: ASTM C591, Type I, faced with a vapor retarder having a perm rating of not more than 0.5.

2.3 ACOUSTICAL INSULATION:

- A. Mineral Fiber Batt or Blankets: ASTM C665. Maximum flame spread of 25 and smoke development of 450 when tested in accordance with ASTM E84.
- B. Thickness as required to fill stud cavity, full height and width to fit tight against framing.

2.4 ADHESIVE:

- A. As recommended by the manufacturer of the insulation.

2.5 TAPE:

- A. Pressure sensitive adhesive on one face.
- B. Perm rating of not more than 0.50.

PART 3 - EXECUTION

3.1 INSTALLATION - GENERAL

- A. Install insulation with the vapor barrier facing the heated side, unless specified otherwise.
- B. Install rigid insulating units with joints close and flush, in regular courses and with cross joints broken.
- C. Install batt or blanket insulation with tight joints and filling framing void completely. Seal cuts, tears, and unlapped joints with tape.
- D. Fit insulation tight against adjoining construction and penetrations, unless specified otherwise.

3.2 EXTERIOR FRAMING BLANKET INSULATION:

- A. Pack insulation around door frames and windows and in building expansion joints, door soffits and other voids. Pack behind outlets around pipes, ducts, and services encased in walls. Open voids are not permitted. Hold insulation in place with pressure sensitive tape.
- B. Lap vapor retarder flanges together over face of framing for continuous surface. Seal all penetrations through the insulation.
- C. Fasten blanket insulation between metal studs or framing and exterior wall furring by continuous pressure sensitive tape along flanged edges.
- D. Fasten blanket insulation between wood studs or framing with nails or staples through flanged edges on face of stud. Space fastenings not more than 150 mm (six inches) apart.

3.3 RIGID INSULATION ON SURFACE OF EXTERIOR WALLS, :

- A. Bond to solid vertical surfaces with adhesive as recommended by insulation manufacturer. Fill joints with adhesive cement.

3.4 ACOUSTICAL INSULATION:

- A. Fasten blanket insulation between metal studs and wall furring with continuous pressure sensitive tape along edges or adhesive.
- B. Pack insulation around door frames and windows and in cracks, expansion joints, control joints, door soffits and other voids. Pack behind outlets, around pipes, ducts, and services encased in wall or partition. Hold insulation in place with pressure sensitive tape or adhesive.
- C. Do not compress insulation below required thickness except where embedded items prevent required thickness.

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**SECTION 07 40 00
METAL WALL PANELS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies concealed fastener, lap seam, uninsulated metal wall panels as shown.

1.2 RELATED WORK

- A. Sealant: Section 07 92 00, JOINT SEALANTS.
B. Color and texture of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 MANUFACTURER'S QUALIFICATIONS

- A. Metal wall panels shall be products of a manufacturer regularly engaged in the fabrication and erection of metal panels of the type and design shown and specified.

1.4 PERFORMANCE REQUIREMENTS

- A. General Performance: Metal wall panel assemblies shall comply with performance requirements without failure due to defective manufacture, fabrication, installation, or other defects in construction.
- B. Delegated Design: Design metal wall panel assembly, including comprehensive engineering analysis by a qualified professional engineer, using performance requirements and design criteria indicated.
- C. Air Infiltration: Air leakage through assembly of not more than 0.06 cfm/sq. ft. (0.3 L/s per sq. m) of wall area when tested according to ASTM E 283 at the following test-pressure difference:
1. Test-Pressure Difference: 1.57 lbf/sq. ft. (75 Pa).
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E 331 at the following test-pressure difference:
1. Test-Pressure Difference: 6.24 lbf/sq. ft. (300 Pa).
- E. Water Penetration under Dynamic Pressure: No evidence of water leakage when tested according to AAMA 501.1 under dynamic pressure equal to 20 percent of inward-acting, wind-load design pressure of not less than 6.24 lbf/sq. ft. (300 Pa) and not more than 12 lbf/sq. ft. (575 Pa).
1. Water Leakage: As defined according to AAMA 501.1.
- F. Structural Performance: Provide metal wall panel assemblies capable of withstanding the effects the following loads and stresses within limits and under conditions indicated, based on testing according to ASTM E 1592:
1. Wind Loads: Determine loads based on the following minimum design wind pressures:
 - a. Uniform pressure of 30 lbf/sq. ft. (1436 Pa), acting inward or outward.
 2. Deflection Limits: Metal wall panel assemblies shall withstand wind loads with horizontal deflections no greater than 1/240 of the span.

- G. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
1. Temperature Change (Range): 120 deg F (67 deg C), ambient; material surfaces.
- H. Coordination: Coordinate metal wall panel assemblies with rain drainage work, flashing, trim, and construction of studs, and other adjoining work to provide a leakproof, secure, and noncorrosive installation.

1.5 SUBMITTALS

- A. Product Data: For each type of product indicated. Include construction details, material descriptions, dimensions of individual components and profiles, and finishes for each type of wall panel and accessory.
- B. Shop Drawings: Show fabrication and installation layouts of metal wall panels; details of edge conditions, joints, panel profiles, corners, anchorages, attachment system, trim, flashings, closures, and accessories; and special details. Distinguish between factory-, shop- and field-assembled work.
1. Accessories: Include details of the following items, at a scale of not less than 1-1/2 inches per 12 inches (1:10):
- Flashing and trim.
 - Anchorage systems.
- C. Samples for Initial Selection: For each type of metal wall panel indicated with factory-applied color finishes.
- Include similar Samples of trim and accessories involving color selection.
 - Include manufacturer's color charts consisting of strips of cured sealants showing the full range of colors available for each sealant exposed to view.
- D. Samples for Verification: For each type of exposed finish required, prepared on Samples of size indicated below.
- Metal Wall Panels: 12 inches (305 mm) long by actual panel width. Include fasteners, closures, and other metal wall panel accessories.
 - Trim and Closures: 12 inches (305 mm) long. Include fasteners and other exposed accessories.
 - Accessories: 12-inch- (305-mm-) long Samples for each type of accessory.
- E. Delegated-Design Submittal: For metal wall panel assembly indicated to comply with performance requirements and design criteria, including analysis data signed and sealed by the qualified professional engineer responsible for their preparation.

- F. Coordination Drawings: Exterior elevations drawn to scale and coordinating penetrations and wall-mounted items. Show the following:
 - 1. Wall panels and attachments.
 - 2. Girts.
 - 3. Wall-mounted items including doors, windows, louvers, and lighting fixtures.
 - 4. Penetrations of wall by pipes and utilities.
- G. Qualification Data: For Installer.
- H. Product Test Reports: Based on evaluation of comprehensive tests performed by a qualified testing agency, for each product.
- I. Field quality-control reports.
- J. Maintenance Data: For metal wall panels to include in maintenance manuals.

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):
 - A653/A653M-10..... Steel Sheet, Zinc-Coated (Galvanized), or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - A463-10 Steel Sheet, Cold-Rolled, Aluminum-Coated, by the Hot-Dip Process
 - A924/A924M-10..... Steel Sheet, Metallic Coated by the Hot-Dip Process
 - A1008/A1008M-10..... Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
 - B209/209M-07 Aluminum and Aluminum Alloy Sheet and Plate
 - C1396-11 Standard Specification for Gypsum Board
 - C553-08 Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
 - C591-09..... Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
 - C612-10 Mineral Fiber Block and Board Thermal Insulation
 - E119-10 Fire Test of Building Construction and Materials

1.7 WARRANTY

- A. Special Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal wall panel assemblies that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.

- b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal wall panels that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
 - b. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: 20 years from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PANEL MATERIALS

- A. Aluminum Sheet: Coil-coated sheet, ASTM B 209 (ASTM B 209M), alloy as standard with manufacturer, with temper as required to suit forming operations and structural performance required.
 - 1. Surface: Smooth, flat finish.
 - 2. Exposed Coil-Coated Finish:
 - a. 2-Coat Fluoropolymer: AAMA 620. Fluoropolymer finish containing not less than 70 percent PVDF resin by weight in color coat. Prepare, pretreat, and apply coating to exposed metal surfaces to comply with coating and resin manufacturers' written instructions.
 - 3. Concealed Finish: Apply pretreatment and manufacturer's standard white or light-colored acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of **0.5 mil (0.013 mm)**.
- B. Panel Sealants:
 - 1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape **1/2 inch (13 mm)** wide and **1/8 inch (3 mm)** thick.
 - 2. Joint Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal wall panels and remain weathertight; and as recommended in writing by metal wall panel manufacturer.
 - 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C 1311.

2.2 MISCELLANEOUS METAL FRAMING

- A. Miscellaneous Metal Framing, General: ASTM C 645, cold-formed metallic-coated steel sheet, ASTM A 653/A 653M, G40 (Z120) hot-dip galvanized.

- B. Zee Clips: 0.079-inch (2.01-mm) nominal thickness.
- C. Base or Sill Angles: 0.079-inch (2.01-mm) nominal thickness.
- D. Z-Shaped Furring: With slotted or nonslotted web, face flange of 1-1/4 inches (32 mm), wall attachment flange of 7/8 inch (22 mm), and depth required to fit insulation thickness indicated.
 - 1. Nominal Thickness: As required to meet performance requirements.
- E. Fasteners for Miscellaneous Metal Framing: Of type, material, size, corrosion resistance, holding power, and other properties required to fasten miscellaneous metal framing members to substrates.

2.3 MISCELLANEOUS MATERIALS

- A. Panel Fasteners: Self-tapping screws, bolts, nuts, self-locking rivets and bolts, end-welded studs, and other suitable fasteners designed to withstand design loads. Provide concealed fasteners. Provide EPDM, PVC, or neoprene sealing washers.

2.4 CONCEALED-FASTENER, METAL WALL PANELS

- A. Concealed-Fastener Metal Wall Panels: Formed with vertical panel edges and flat pan between panel edges; with narrow reveal joint between panels.
 - 1. Basis-of-Design Product: Subject to compliance with requirements provide products indicated:
 - a. ATAS International, Inc., Metafor, MFP 120 or equal by this manufacturer.
 - b. Kingspan
 - c. Industrial Building Panels.
 - 2. Material: Aluminum sheet, 0.050 inch (1.27 mm) thick.
 - a. Exterior Finish: 2-coat fluoropolymer
 - b. Color: Match Architect's samples.

2.5 ACCESSORIES

- A. Wall Panel Accessories: Provide components required for a complete metal wall panel assembly including trim, copings, fasciae, mullions, sills, corner units, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal wall panels, unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and rakes, fabricated of same metal as metal wall panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
 - 3. Closure Strips: Closed-cell, expanded, cellular, rubber or crosslinked, polyolefin-foam or closed-cell laminated polyethylene; minimum 1-inch- (25-mm-) thick, flexible closure strips; cut or premolded to match metal wall panel profile. Provide closure strips where indicated or necessary to ensure weathertight construction.

2.6 FABRICATION

- A. General: Fabricate and finish metal wall panels and accessories at the factory to greatest extent possible, by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance requirements demonstrated by laboratory testing. Comply with indicated profiles and with dimensional and structural requirements.
- B. Fabricate metal wall panels in a manner that eliminates condensation on interior side of panel and with joints between panels designed to form weathertight seals.
- C. Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel.
- D. Fabricate metal wall panel joints with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, and that will minimize noise from movements within panel assembly.
- E. Sheet Metal Accessories: Fabricate flashing and trim to comply with recommendations in SMACNA's "Architectural Sheet Metal Manual" that apply to the design, dimensions, metal, and other characteristics of item indicated.
 - 1. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.
 - 2. Seams for Aluminum: Fabricate nonmoving seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.
 - 3. Seams for Other Than Aluminum: Fabricate nonmoving seams in accessories with flat-lock seams. Tin edges to be seamed, form seams, and solder.
 - 4. Sealed Joints: Form nonexpansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA standards.
 - 5. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.
 - 6. Fabricate cleats and attachment devices from same material as accessory being anchored or from compatible, noncorrosive metal recommended by metal wall panel manufacturer.
 - a. Size: As recommended by SMACNA's "Architectural Sheet Metal Manual" or metal wall panel manufacturer for application but not less than thickness of metal being secured.

2.7 GENERAL FINISH REQUIREMENTS

- A. Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes.
- B. Protect mechanical and painted finishes on exposed surfaces from damage by applying a strippable, temporary protective covering before shipping.

APPEARANCE OF FINISHED WORK: VARIATIONS IN APPEARANCE OF ABUTTING OR ADJACENT PIECES ARE ACCEPTABLE IF THEY ARE WITHIN ONE-HALF OF THE RANGE OF APPROVED SAMPLES. NOTICEABLE VARIATIONS IN THE SAME PIECE ARE NOT ACCEPTABLE. VARIATIONS IN APPEARANCE OF OTHER COMPONENTS ARE ACCEPTABLE IF THEY ARE WITHIN THE RANGE OF APPROVED SAMPLES AND ARE ASSEMBLED OR INSTALLED TO MINIMIZE CONTRAST..

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General: Install panels in accordance with the manufacturer's approved erection instructions and diagrams, except as specified otherwise. Panels shall be in full and firm contact with supports and with each other at side and end laps. Where panels are cut in the field, or where any of the factory applied coverings or coatings are abraded or damaged in handling or installation, they shall, after the necessary repairs have been made with material of the same type and color as the weather coating, be approved before being installed. All cut ends and edges, including those at openings through the sheets shall be sealed completely. Correct defects or errors in the materials in an approved manner. Replace materials which cannot be corrected in an approved manner with nondefective material. Provide molded closure strips where indicated and whenever sheets terminate with open ends after installation.
- B. Wall Panels: Apply panels with the configuration in a horizontal position. Provide panels in the longest obtainable lengths, with end laps occurring only at structural members. Seal side and end laps with joint sealing material. Flash and seal walls at the base, at the top, around windows, door frames, framed louvers, and other similar openings. Install closure strips, flashings, and sealing material in an approved manner that will assure complete weather tightness. Flashing will not be required where approved "self-flashing" panels are used.
- C. Flashing: All flashing and related closures and accessories in connection with the preformed metal panels shall be provided as indicated and as necessary to provide a watertight installation. Details of installation, which are not indicated, shall be in accordance with the panel manufacturer's printed instruction and details, or the approved shop drawings. Installation shall allow for expansion and contraction of flashing.
- D. Fasteners: Fastener spacings shall be in accordance with the manufacturer's recommendations, and as necessary to withstand the design loads indicated. Install fasteners in valleys or crowns as recommended by the manufacturer of the sheet being used. Install fasteners in straight lines within a tolerance of 13 mm (1/2-inch) in the length of a bay. Drive exposed penetrating type fasteners normal to the surface, and to a uniform depth to seat gasketed washers properly, and drive so as not to damage factory applied coating. Exercise extreme care in drilling pilot holes

for fastenings to keep drills perpendicular and centered in valleys, or crowns, as applicable. After drilling, remove metal filings and burrs from holes prior to installing fasteners and washers.

Torque used in applying fasteners shall not exceed that recommended by the manufacturer.

Remove panels deformed or otherwise damaged by over-torqued fastenings, and provide new panels.

3.2 ISOLATION OF ALUMINUM

- A. Isolate aluminum in contact with or fastened to dissimilar metals other than stainless steel, white bronze, or other metal compatible with aluminum by one of the following:
 - 1. Painting the dissimilar metal with a prime coat of Zinc-Molybdate followed by two coats of aluminum paint.
 - 2. Placing a non-abrasive tape or gasket between the aluminum and the dissimilar metal.
- B. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of alkali-resistant bituminous paint.
- C. Paint aluminum in contact with wood or other absorptive materials, that may become repeatedly wet, with two coats of bituminous paint, or two coats of aluminum paint. Seal joints with caulking material.

3.3 PROTECTION AND CLEANING

- A. Protect panels and other components from damage during and after erection, and until project is accepted by the Government.
- B. After completion of work, all exposed finished surfaces of panels shall be cleaned of soil, discoloration and disfiguration. Touch-up abraded surfaces of panels.

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SECTION 07 60 00
FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Formed sheet metal work for copings, are specified in this section.

1.2 RELATED WORK

- A. Flashing components of factory finished metal wall systems: Division 07 wall system sections.
- B. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- C. Color of factory coated exterior architectural metal and anodized aluminum items: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 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. Editions of applicable publications current on date of issue of bidding documents apply unless otherwise indicated.
- B. Aluminum Association (AA):
- AA-C22A41 Aluminum Chemically etched medium matte, with clear anodic coating, Class I Architectural, 0.7-mil thick
- AA-C22A42 Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 0.7 mils thick
- AA-C22A44 Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class I Architectural, 0.7-mil thick finish
- C. American National Standards Institute/Single-Ply Roofing Institute (ANSI/SPRI):
- ANSI/SPRI ES-1-03 Wind Design Standard for Edge Systems Used with Low Slope Roofing Systems
- D. American Architectural Manufacturers Association (AAMA):
- AAMA 620 Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Aluminum
- AAMA 621 Voluntary Specification for High Performance Organic Coatings on Coil Coated Architectural Hot Dipped Galvanized (HDG) and Zinc-Aluminum Coated Steel Substrates
- E. ASTM International (ASTM):

- 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-11 Steel Sheet Zinc-Coated (Galvanized) or Zinc Alloy Coated
(Galvanized) by the Hot- Dip Process
- B32-08..... Solder Metal
- B209-10..... Aluminum and Aluminum-Alloy Sheet and Plate
- B370-12..... Copper Sheet and Strip for Building Construction
- D173-03(R2011) Bitumen-Saturated Cotton Fabrics Used in Roofing and
Waterproofing
- D412-06(R2013) Vulcanized Rubber and Thermoplastic Elastomers-Tension
- D1187-97(R2011) Asphalt Base Emulsions for Use as Protective Coatings for Metal
- D1784-11 Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated
Poly (Vinyl Chloride) (CPVC) Compounds
- D3656-07 Insect Screening and Louver Cloth Woven from Vinyl-Coated
Glass Yarns
- D4586-07 Asphalt Roof Cement, Asbestos Free
- F. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural
Sheet Metal Manual.
- G. National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06 Metal Finishes Manual
- H. Federal Specification (Fed. Spec):
A-A-1925A..... Shield, Expansion; (Nail Anchors)
UU-B-790A..... Building Paper, Vegetable Fiber
- I. International Code Commission (ICC): International Building Code, Current Edition

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND
SAMPLES.
- B. Shop Drawings: For all specified items, including:
1. Copings
- C. Manufacturer's Literature and Data: For all specified items, including:
1. Copings
- D. Certificates: Indicating compliance with specified finishing requirements, from applicator and
contractor.

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

- A. Aluminum Sheet: ASTM B209, alloy 3003-H14.

2.2 FLASHING ACCESSORIES

- A. Fasteners:
 - 1. Use stainless steel for aluminum alloy.
 - 2. Nails:
 - a. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
 - b. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
- B. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

2.3 FABRICATION, GENERAL

- A. Expansion and Contraction Joints:
 - 1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
 - 2. Space joints as shown or as specified.
 - 3. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet).
 - 4. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
 - 5. Fabricate joint covers of same thickness material as sheet metal served.
- B. Continuous Cleats:
 - 1. Fabricate continuous cleats where shown and specified to secure loose edges of the sheet metal work.
 - 2. Use same material as sheet metal to be secured by the edge strip.
 - 3. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.

2.4 FINISHES

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual AMP 500, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
 - 1. Aluminum:
 - a. Fluorocarbon Finish: AAMA 620, high performance organic coating.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
5. Install bolts, rivets, and screws where indicated, specified, or required in accordance with the SMACNA Sheet Metal Manual. Space rivets at 75 mm (3 inch) on centers in two rows in a staggered position. Use neoprene washers under fastener heads when fastener head is exposed.
6. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
7. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
8. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
9. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.
10. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.
11. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.

3.2 COPINGS

A. General:

1. On walls topped with a wood blocking, install a continuous dcleat on the front and rear dge of the blocking. Lock the coping to the edge strip with a 19 mm (3/4 inch) loose lock seam.

2. Where shown turn down roof side of coping and extend down over base flashing as specified for counter-flashing. Secure counter-flashing to lock strip in coping at continuous cleat.
 3. Install ends adjoining existing construction so as to form space for installation of sealants.
- B. Aluminum Coping:
1. Install with 6 mm (1/4 inch) joint between ends of coping sections.
 2. Install joint covers, centered at each joint, and securely lock in place.

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**SECTION 07 84 00
FIRESTOPPING**

PART 1 GENERAL

1.1 DESCRIPTION

- A. Closures of openings in walls, floors, and roof decks against penetration of flame, heat, and smoke or gases in fire resistant rated construction.
- B. Closure of openings in walls against penetration of gases or smoke in smoke partitions.

1.2 RELATED WORK

- A. Sealants and application: Section 07 92 00, JOINT SEALANTS.
- B. Fire and smoke damper assemblies in ductwork: Section 23 31 00, HVAC DUCTS AND CASINGS and Section 23 37 00, AIR OUTLETS AND INLETS.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturers literature, data, and installation instructions for types of firestopping and smoke stopping used.
- C. List of FM, UL, or WH classification number of systems installed.
- D. Certified laboratory test reports for ASTM E814 tests for systems not listed by FM, UL, or WH proposed for use.

1.4 DELIVERY AND STORAGE

- A. Deliver materials in their original unopened containers with manufacturer's name and product identification.
- B. Store in a location providing protection from damage and exposure to the elements.

1.5 WARRANTY

- A. Firestopping work subject to the terms of the Article "Warranty of Construction", FAR clause 52.246-21, except extend the warranty period to five years.

1.6 QUALITY ASSURANCE

- A. FM, UL, or WH or other approved laboratory tested products will be acceptable.

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. American Society for Testing and Materials (ASTM):
 - E84-10..... Surface Burning Characteristics of Building Materials
 - E814-11..... Fire Tests of Through-Penetration Fire Stops
- C. Factory Mutual Engineering and Research Corporation (FM):
 - Annual Issue Approval Guide Building Materials
- D. Underwriters Laboratories, Inc. (UL):

Annual Issue Building Materials Directory

Annual Issue Fire Resistance Directory

1479-10 Fire Tests of Through-Penetration Firestops

E. Warnock Hersey (WH):

Annual Issue Certification Listings

PART 2 - PRODUCTS

2.1 FIRESTOP SYSTEMS

- A. Use either factory built (Firestop Devices) or field erected (through-Penetration Firestop Systems) to form a specific building system maintaining required integrity of the fire barrier and stop the passage of gases or smoke.
- B. Through-penetration firestop systems and firestop devices tested in accordance with ASTM E814 or UL 1479 using the "F" or "T" rating to maintain the same rating and integrity as the fire barrier being sealed. "T" ratings are not required for penetrations smaller than or equal to 100 mm (4 in) nominal pipe or 0.01 m² (16 sq. in.) in overall cross sectional area.
- C. Products requiring heat activation to seal an opening by its intumescence shall exhibit a demonstrated ability to function as designed to maintain the fire barrier.
- D. Firestop sealants used for firestopping or smoke sealing shall have following properties:
 - 1. Contain no flammable or toxic solvents.
 - 2. Have no dangerous or flammable out gassing during the drying or curing of products.
 - 3. Water-resistant after drying or curing and unaffected by high humidity, condensation or transient water exposure.
 - 4. When used in exposed areas, shall be capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.
- E. Firestopping system or devices used for penetrations by glass pipe, plastic pipe or conduits, unenclosed cables, or other non-metallic materials shall have following properties:
 - 1. Classified for use with the particular type of penetrating material used.
 - 2. Penetrations containing loose electrical cables, computer data cables, and communications cables protected using firestopping systems that allow unrestricted cable changes without damage to the seal.
 - 3. Intumescent products which would expand to seal the opening and act as fire, smoke, toxic fumes, and, water sealant.
- F. Maximum flame spread of 25 and smoke development of 50 when tested in accordance with ASTM E84.
- G. FM, UL, or WH rated or tested by an approved laboratory in accordance with ASTM E814.
- H. Materials to be asbestos free.

2.2 SMOKE STOPPING IN SMOKE PARTITIONS

- A. Use silicone sealant in smoke partitions as specified in Section 07 92 00, JOINT SEALANTS.
- B. Use mineral fiber filler and bond breaker behind sealant.
- C. Sealants shall have a maximum flame spread of 25 and smoke developed of 50 when tested in accordance with E84.
- D. When used in exposed areas capable of being sanded and finished with similar surface treatments as used on the surrounding wall or floor surface.

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Submit product data and installation instructions, as required by article, submittals, after an on site examination of areas to receive firestopping.

3.2 PREPARATION

- A. Remove dirt, grease, oil, loose materials, or other substances that prevent adherence and bonding or application of the firestopping or smoke stopping materials.
- B. Remove insulation on insulated pipe for a distance of 150 mm (six inches) on either side of the fire rated assembly prior to applying the firestopping materials unless the firestopping materials are tested and approved for use on insulated pipes.

3.3 INSTALLATION

- A. Do not begin work until the specified material data and installation instructions of the proposed firestopping systems have been submitted and approved.
- B. Install firestopping systems with smoke stopping in accordance with FM, UL, WH, or other approved system details and installation instructions.
- C. Install smoke stopping seals in smoke partitions.

3.4 CLEAN-UP AND ACCEPTANCE OF WORK

- A. As work on each floor is completed, remove materials, litter, and debris.
- B. Do not move materials and equipment to the next-scheduled work area until completed work is inspected and accepted by the COR
- C. Clean up spills of liquid type materials.

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**SECTION 07 92 00
JOINT SEALANTS**

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section covers all sealant and caulking materials and their application, wherever required for complete installation of building materials or systems.

1.2 RELATED WORK:

- A. Sealing of site work concrete paving: Section 32 05 23, CEMENT AND CONCRETE FOR EXTERIOR IMPROVEMENTS.
- B. Firestopping penetrations: Section 07 84 00, FIRESTOPPING.
- C. Glazing: Section 08 80 00, GLAZING.
- D. Glazed aluminum storefront: Section 08 41 13, ALUMINUM FRAMED ENTRANCES AND STOREFRONTS.
- E. Sound rated gypsum partitions/sound sealants: Section 09 29 00, GYPSUM BOARD.
- F. Mechanical Work: Section 22 05 11, COMMON WORK RESULTS FOR PLUMBING, Section 23 05 11, COMMON WORK RESULTS FOR HVAC AND STEAM GENERATION.

1.3 QUALITY CONTROL:

- A. Installer Qualifications: An experienced installer who has specialized in installing joint sealants similar in material, design, and extent to those indicated for this Project and whose work has resulted in joint-sealant installations with a record of successful in-service performance.
- B. Source Limitations: Obtain each type of joint sealant through one source from a single manufacturer.
- C. Product Testing: Obtain test results from a qualified testing agency based on testing current sealant formulations within a 12-month period.
 - 1. Testing Agency Qualifications: An independent testing agency qualified according to ASTM C1021.
 - 2. Test elastomeric joint sealants for compliance with requirements specified by reference to ASTM C920, and where applicable, to other standard test methods.
 - 3. Test other joint sealants for compliance with requirements indicated by referencing standard specifications and test methods.
- D. VOC: Acrylic latex and Silicon sealants shall have less than 50g/l VOC content.

1.4 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's installation instructions for each product used.

- C. Cured samples of exposed sealants for each color where required to match adjacent material.
- D. Manufacturer's Literature and Data:
 - 1. Caulking compound
 - 2. Primers
 - 3. Sealing compound, each type, including compatibility when different sealants are in contact with each other.

1.5 PROJECT CONDITIONS:

- A. Environmental Limitations:
 - 1. Do not proceed with installation of joint sealants under following conditions:
 - a. When ambient and substrate temperature conditions are outside limits permitted by joint sealant manufacturer or are below 4.4 °C (40 °F).
 - b. When joint substrates are wet.
- B. Joint-Width Conditions:
 - 1. Do not proceed with installation of joint sealants where joint widths are less than those allowed by joint sealant manufacturer for applications indicated.
- C. Joint-Substrate Conditions:
 - 1. Do not proceed with installation of joint sealants until contaminants capable of interfering with adhesion are removed from joint substrates.

1.6 DELIVERY, HANDLING, AND STORAGE:

- A. Deliver materials in manufacturers' original unopened containers, with brand names, date of manufacture, shelf life, and material designation clearly marked thereon.
- B. Carefully handle and store to prevent inclusion of foreign materials.
- C. Do not subject to sustained temperatures exceeding 32° C (90° F) or less than 5° C (40° F).

1.7 DEFINITIONS:

- A. Definitions of terms in accordance with ASTM C717 and as specified.
- B. Back-up Rod: A type of sealant backing.
- C. Bond Breakers: A type of sealant backing.
- D. Filler: A sealant backing used behind a back-up rod.

1.8 WARRANTY:

- A. Warranty exterior sealing against leaks, adhesion, and cohesive failure, and subject to terms of "Warranty of Construction", FAR clause 52.246-21, except that warranty period shall be extended to two years.

- B. General Warranty: Special warranty specified in this Article shall not deprive Government of other rights Government may have under other provisions of Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of Contract Documents.

1.9 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 and Materials (ASTM):
- C509-06Elastomeric Cellular Preformed Gasket and Sealing Material.
 - C612-10Mineral Fiber Block and Board Thermal Insulation.
 - C717-10Standard Terminology of Building Seals and Sealants.
 - C834-10Latex Sealants.
 - C919-08.Use of Sealants in Acoustical Applications.
 - C920-10Elastomeric Joint Sealants.
 - C1021-08Laboratories Engaged in Testing of Building Sealants.
 - C1193-09Standard Guide for Use of Joint Sealants.
 - C1330-02 (R2007)Cylindrical Sealant Backing for Use with Cold Liquid Applied Sealants.
 - D1056-07Specification for Flexible Cellular Materials—Sponge or Expanded Rubber.
 - E84-09.....Surface Burning Characteristics of Building Materials.
- C. Sealant, Waterproofing and Restoration Institute (SWRI).
The Professionals' Guide

PART 2 - PRODUCTS

2.1 SEALANTS:

- A. S-1:
1. ASTM C920, polyurethane.
 2. Type M.
 3. Class 25.
 4. Grade NS.
 5. Shore A hardness of 20-40
- B. S-4:
1. ASTM C920 polyurethane or polysulfide.
 2. Type S.
 3. Class 25.

4. Grade NS.
5. Shore A hardness of 25-40.
- C. S-9:
 1. ASTM C920 silicone.
 2. Type S.
 3. Class 25.
 4. Grade NS.
 5. Shore A hardness of 25-30.
 6. Non-yellowing, mildew resistant.

2.2 CAULKING COMPOUND:

- A. C-1: ASTM C834, acrylic latex.
- B. C-2: One component acoustical caulking, non drying, non hardening, synthetic rubber.

2.3 COLOR:

- A. Sealants used with unpainted concrete shall match color of adjacent concrete.
- B. Color of sealants shall match color of adjacent surfaces.
- C. Caulking shall be light gray or white, unless specified otherwise.

2.4 JOINT SEALANT BACKING:

- A. General: Provide sealant backings of material and type that are nonstaining; are compatible with joint substrates, sealants, primers, and other joint fillers; and are approved for applications indicated by sealant manufacturer based on field experience and laboratory testing.
- B. Cylindrical Sealant Backings: ASTM C1330, of type indicated below and of size and density to control sealant depth and otherwise contribute to producing optimum sealant performance:
 1. Type C: Closed-cell material with a surface skin.
- C. Bond-Breaker Tape: Polyethylene tape or other plastic tape recommended by sealant manufacturer for preventing sealant from adhering to rigid, inflexible joint-filler materials or joint surfaces at back of joint where such adhesion would result in sealant failure. Provide self-adhesive tape where applicable.

2.5 FILLER:

- A. Mineral fiber board: ASTM C612, Class 1.
- B. Thickness same as joint width.
- C. Depth to fill void completely behind back-up rod.

2.6 PRIMER:

- A. As recommended by manufacturer of caulking or sealant material.
- B. Stain free type.

2.7 CLEANERS-NON POUROUS SURFACES:

- A. Chemical cleaners acceptable to manufacturer of sealants and sealant backing material, free of oily residues and other substances capable of staining or harming joint substrates and adjacent non-porous surfaces and formulated to promote adhesion of sealant and substrates.

PART 3 - EXECUTION

3.1 INSPECTION:

- A. Inspect substrate surface for bond breaker contamination and unsound materials at adherent faces of sealant.
- B. Coordinate for repair and resolution of unsound substrate materials.
- C. Inspect for uniform joint widths and that dimensions are within tolerance established by sealant manufacturer.

3.2 PREPARATIONS:

- A. Prepare joints in accordance with manufacturer's instructions and SWRI.
- B. Clean surfaces of joint to receive caulking or sealants leaving joint dry to the touch, free from frost, moisture, grease, oil, wax, lacquer paint, or other foreign matter that would tend to destroy or impair adhesion.
 - 1. Clean porous joint substrate surfaces by brushing, grinding, blast cleaning, mechanical abrading, or a combination of these methods to produce a clean, sound substrate capable of developing optimum bond with joint sealants.
 - 2. Remove loose particles remaining from above cleaning operations by vacuuming or blowing out joints with oil-free compressed air. Porous joint surfaces include the following:
 - a. Concrete.
 - b. Masonry.
 - c. Unglazed surfaces of ceramic tile.
 - 3. Remove laitance and form-release agents from concrete.
 - 4. Clean nonporous surfaces with chemical cleaners or other means that do not stain, harm substrates, or leave residues capable of interfering with adhesion of joint sealants.
 - a. Metal.
 - b. Glass.
 - c. Porcelain enamel.
 - d. Glazed surfaces of ceramic tile.
- C. Do not cut or damage joint edges.
- D. Apply masking tape to face of surfaces adjacent to joints before applying primers, caulking, or sealing compounds.
 - 1. Do not leave gaps between ends of sealant backings.
 - 2. Do not stretch, twist, puncture, or tear sealant backings.

3. Remove absorbent sealant backings that have become wet before sealant application and replace them with dry materials.
- E. Apply primer to sides of joints wherever required by compound manufacturer's printed instructions.
 1. Apply primer prior to installation of back-up rod or bond breaker tape.
 2. Use brush or other approved means that will reach all parts of joints.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

3.3 BACKING INSTALLATION:

- A. Install back-up material, to form joints enclosed on three sides as required for specified depth of sealant.
- B. Where deep joints occur, install filler to fill space behind the back-up rod and position the rod at proper depth.
- C. Cut fillers installed by others to proper depth for installation of back-up rod and sealants.
- D. Install back-up rod, without puncturing the material, to a uniform depth, within plus or minus 3 mm (1/8 inch) for sealant depths specified.
- E. Where space for back-up rod does not exist, install bond breaker tape strip at bottom (or back) of joint so sealant bonds only to two opposing surfaces.
- F. Take all necessary steps to prevent three sided adhesion of sealants.

3.4 SEALANT DEPTHS AND GEOMETRY:

- A. At widths up to 6 mm (1/4 inch), sealant depth equal to width.
- B. At widths over 6 mm (1/4 inch), sealant depth 1/2 of width up to 13 mm (1/2 inch) maximum depth at center of joint with sealant thickness at center of joint approximately 1/2 of depth at adhesion surface.

3.5 INSTALLATION:

- A. General:
 1. Apply sealants and caulking only when ambient temperature is between 5° C and 38° C (40° and 100° F).
 2. Do not use sealant type listed by manufacture as not suitable for use in locations specified.
 3. Apply caulking and sealing compound in accordance with manufacturer's printed instructions.
 4. Avoid dropping or smearing compound on adjacent surfaces.
 5. Fill joints solidly with compound and finish compound smooth.
 6. Tool joints to concave surface unless shown or specified otherwise.
 7. Apply compounds with nozzle size to fit joint width.
 8. Test sealants for compatibility with each other and substrate. Use only compatible sealant.
- B. For application of sealants, follow requirements of ASTM C1193 unless specified otherwise.

- C. Where gypsum board partitions are of sound rated, fire rated, or smoke barrier construction, follow requirements of ASTM C919 only to seal all cut-outs and intersections with the adjoining construction unless specified otherwise.
 - 1. Apply a 6 mm (1/4 inch) minimum bead of sealant each side of runners (tracks), including those used at partition intersections with dissimilar wall construction.
 - 2. Coordinate with application of gypsum board to install sealant immediately prior to application of gypsum board.
 - 3. Partition intersections: Seal edges of face layer of gypsum board abutting intersecting partitions, before taping and finishing or application of veneer plaster-joint reinforcing.
 - 4. Openings: Apply a 6 mm (1/4 inch) bead of sealant around all cut-outs to seal openings of electrical boxes, ducts, pipes and similar penetrations. To seal electrical boxes, seal sides and backs.
 - 5. Control Joints: Before control joints are installed, apply sealant in back of control joint to reduce flanking path for sound through control joint.

3.6 CLEANING:

- A. Fresh compound accidentally smeared on adjoining surfaces: Scrape off immediately and rub clean with a solvent as recommended by the caulking or sealant manufacturer.
- B. After filling and finishing joints, remove masking tape.
- C. Leave adjacent surfaces in a clean and unstained condition.

3.7 LOCATIONS:

- A. Exterior Building Joints, Horizontal and Vertical:
 - 1. Metal to Metal: Type S-1
 - 2. Metal to Masonry or Stone: Type S-1
- B. Sanitary Joints:
 - 1. Walls to Plumbing Fixtures: Type S-9
 - 2. Counter Tops to Walls: Type S-9
 - 3. Pipe Penetrations: Type S-9
- C. Interior Caulking:
 - 1. Typical Narrow Joint 6 mm, (1/4 inch) or less at Walls and Adjacent Components: Types C-1 and C-2.
 - 2. Perimeter of Doors, Windows, Access Panels which Adjoin Concrete or Masonry Surfaces: Types C-1 and C-2.
 - 3. Joints at Masonry Walls and Columns, Piers, Concrete Walls or Exterior Walls: Types C-1 and C-2.
 - 4. Exposed Acoustical Joint at Sound Rated Partitions Type C-2.
 - 5. Concealed Acoustic Sealant Types S-4, C-1 and C-2.

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

JOINT SEALANTS

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SECTION 08 11 13
HOLLOW METAL DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK

- A. Aluminum frames entrance work: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- B. Door Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Glazing: Section 08 80 00, GLAZING.
- D. Card readers and biometric devices: Section 28 13 00, PHYSICAL 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 and temperature rise rating for stairwell doors. Submit proof of temperature rating.

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. Federal Specifications (Fed. Spec.):
 - L-S-125B Screening, Insect, Nonmetallic

- C. Door and Hardware Institute (DHI):
 - A115 Series.....Steel Door and Frame Preparation for Hardware, Series A115.1 through A115.17 (Dates Vary)
- D. Steel Door Institute (SDI):
 - 113-01 (R2006).....Thermal Transmittance of Steel Door and Frame Assemblies
 - 128-09Acoustical Performance for Steel Door and Frame Assemblies
- E. American National Standard Institute:
 - A250.8-2003 (R2008).....Specifications for Standard Steel Doors and Frames
- F. American Society for Testing and Materials (ASTM):
 - A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
 - A568/568-M-11Steel, 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
 - D1621-10Compressive Properties of Rigid Cellular Plastics
 - D3656-07Insect Screening and Louver Cloth Woven from Vinyl Coated Glass Yarns
 - E90-09.....Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions
- G. The National Association Architectural Metal Manufacturers (NAAMM):
 - Metal Finishes Manual (AMP 500-06)
- H. National Fire Protection Association (NFPA):
 - 80-13Fire Doors and Fire Windows
- I. Underwriters Laboratories, Inc. (UL):
 - Fire Resistance Directory
- J. Intertek Testing Services (ITS):
 - Certifications Listings...Latest Edition
- K. Factory Mutual System (FM):
 - Approval Guide

PART 2 - PRODUCTS

2.1 MATERIALS

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

2.2 FABRICATION GENERAL

- A. GENERAL:
 - 1. Follow ANSI A250.8 for fabrication of standard steel doors, except as specified otherwise. Doors to receive hardware specified in Section 08 71 00, DOOR HARDWARE. Tolerances as per ANSI A250.8. Thickness, 44 mm (1-3/4 inches), unless otherwise shown.
 - 2. Close top edge of exterior doors flush and seal to prevent water intrusion.
 - 3. When vertical steel stiffeners are used for core construction, fill spaces between stiffeners with mineral fiber insulation.
- B. Heavy Duty Doors: ANSI A250.8, Level 2, Full flush seamless design of size and design shown for interior doors. Core construction types a, d, or f, for interior doors.
- C. Extra Heavy Duty Doors: ANSI A250.8, Level 3, Full flush seamless design of size and design shown for exterior doors. Core construction Types b, c, e, or f, for exterior doors.

Core Construction Type	Door Core Description
a	Kraft honeycomb
b	Polyurethane
c	Polystyrene
d	Unitized steel grid
e	Mineral fiberboard
f	Vertical steel stiffeners

- D. Smoke Doors:
 - 1. Close top and vertical edges flush.
 - 2. Provide seamless vertical edges.
 - 3. Apply Steel astragal to the meeting style at the active leaf of pair of doors or double egress doors.
 - 4. Provide clearance at head, jamb and sill as specified in NFPA 80.
- E. Fire Rated Doors (Labeled):

1. Conform to NFPA 80 when tested by Underwriters Laboratories, Inc., Inchcape Testing Services, or Factory Mutual for the class of door or door opening shown.
2. Fire rated labels of metal, with raised or incised markings of approving laboratory shall be permanently attached to doors.
3. Close top and vertical edges of doors flush. Vertical edges shall be seamless. Apply steel astragal to the meeting stile of the active leaf of pairs of fire rated doors, except where vertical rod exit devices are specified for both leaves swinging in the same direction.
4. Construct fire rated doors in stairwell enclosures for maximum transmitted temperature rise of 230 °C (450 °F) above ambient temperature at end of 30 minutes of fire exposure when tested in accordance with ASTM E152.

2.3 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 exterior doors: Fabricate from 1.7 mm (0.067 inch) thick galvanized steel conforming to ASTM A525.
3. 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.
4. Frames for doors specified to have automatic door operators; Security doors (Type 36); service window: minimum 1.7 mm (0.067 inch) thick.
5. Knocked-down frames are not 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 Stops: ANSI A250.8.

D. Glazed Openings:

- a. Integral stop on exterior, 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. Use 50 mm x 50 mm (2 inch by 2 inch) 9 mm by (3/8 inch) clip angle for lead lined frames, drilled for 9 mm (3/8 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 set in masonry: Use adjustable anchors designed for friction fit against the frame and for extension into the masonry not less than 250 mm (10 inches). Use one of following type:
 - 1) Wire loop type of 5 mm (3/16 inch) diameter wire.
 - 2) T-shape or strap and stirrup type of corrugated or perforated sheet steel.
 - d. 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.
 - e. 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.

2.4 TRANSOM PANELS

- A. Fabricate panels as specified for flush doors.
- B. Fabricate bottom edge with rabbet stop to fit top of door where no transom bar occurs.

2.5 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. Use 9 mm (3/8 inch) bolts on lead lined frames.
2. Power actuated drive pins may be used to secure frame anchors to concrete floors.

C. Jamb Anchors:

1. Anchors in masonry walls: Embed anchors in mortar. Fill space between frame and masonry wall with grout or mortar as walls are built.
2. Coat frame back with a bituminous coating prior to lining of grout filling in masonry walls.
3. Secure anchors to sides of studs with two fasteners through anchor tabs. Use steel drill screws to steel studs.
4. Frames set in prepared openings of masonry or concrete: Expansion bolt to wall with 6 mm (1/4 inch) expansion bolts through spacers. Where sub-frames or rough bucks are used, 6 mm (1/4 inch) expansion bolts on 600 mm (24 inch) centers or power activated drive pins 600 mm (24 inches) on centers. Secure two piece frames to sub-frame or rough buck with machine screws on both faces.

- 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 prefinished interior flush doors.
- B. Section includes fire rated doors, and transoms.

1.2 RELATED WORK

- A. Metal door frames: Section 08 11 13, HOLLOW METAL DOORS AND FRAMES.
- B. Door hardware including hardware location (height): Section 08 71 00, DOOR HARDWARE.
- C. 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.
- D. Finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- E. Card readers and biometric devices: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEM.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Corner section of flush veneered door 300 mm (12 inches) square, showing details of construction, labeled to show grade and type number and conformance to specified standard.
 - 2. Veneer sample 200 mm (8 inch) by 275 mm (11 inch) by 6 mm (1/4 inch) showing specified wood species with factory finish. Submit one for each color to be matched.
- C. Shop Drawings:
 - 1. Show every door in project and schedule location in building.
 - 2. Indicate type, grade, finish and size; include detail of glazing and pertinent details.
 - 3. Provide information concerning specific requirements not included in the manufacturer's literature and data submittal.
- D. Manufacturer's Literature and Data:
 - 1. Labeled fire rated doors showing conformance with NFPA 80.
- E. 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-13Architectural Wood Flush Doors
 - I.S.4-13.....Water-Repellent Preservative Non-Pressure Treatment for
Millwork
 - I.S.6A-13Architectural Wood Stile and Rail Doors
 - T.M.6-14Adhesive (Glue Bond) Durability Test Method
 - T.M.7-14Cycle-Slam Test Method
 - T.M.8-14Hinge Loading Test Method
 - T.M.10-14Screw holding Test Method
- C. National Fire Protection Association (NFPA):
 - 80-13Fire Doors and Other Opening Protectives
 - 252-12Fire Tests of Door Assemblies
- D. ASTM International (ASTM):
 - E90-09.....Laboratory Measurements of Airborne Sound Transmission Loss

PART 2 - PRODUCTS

2.1 FLUSH DOORS AND TRANSOMS

- 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. Face Veneer:
 - 1. In accordance with WDMA I.S.1-A.
 - 2. One species throughout the project unless scheduled or otherwise shown.
 - 3. For transparent finishes: Premium Grade, quarter sawn, white Birch .

- a. AA grade face veneer
 - b. Match face veneers for doors for uniform effect of color and grain at joints.
 - 1. Book match door veneers.
 - 2. Pair match double doors.
 - 3. Continuous match transoms.
 - c. Door edges shall be same species as door face veneer except maple may be used for stile face veneer on birch doors.
 - d. In existing buildings, where doors are required to have transparent finish, use wood species and grade of face veneers to match adjacent existing doors.
- C. Wood for stops, louvers, muntins and moldings of flush doors required to have transparent finish:
- 1. Solid Wood of same species as face veneer, except maple may be used on birch doors.
 - 2. Glazing:
 - a. 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. For glazed openings use steel frames approved for use in labeled doors.
 - 2. Provide a steel astragal on one leaf of pairs of doors, including double egress doors.

2.2 PREFINISHING

- 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.
- C. Flush doors to receive transparent finish (in addition to being prefit) shall be factory finished as follows:
 - 1. WDMA I.S.1-A Section F-3 specification for System TR-4, Conversion Varnish or System TR-5, Catalyzed Vinyl.
 - 2. Use stain when required to produce the finish specified in Section 09 06 00 SCHEDULE FOR FINISHES to match existing doors.

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.
 - 4. Identification of preservative treatment for stile and rail doors.

2.4 SEALING:

Give top and bottom edge of doors two coats of catalyzed polyurethane or water resistant sealer before sealing in shipping containers.

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.
 - 2. Maximum clearance at bottom of sound rated doors, light-proofed doors, doors to operating rooms, and doors designated to be fitted with mechanical seal: 10 mm (3/8 inch).
- 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.
- 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 COR.

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SECTION 08 31 13
ACCESS DOORS AND FRAMES

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. Section specifies access doors or panels.

1.2 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Access doors, each type, showing construction, location and installation details.
- C. Manufacturer's Literature and Data: Access doors, each type.

1.3 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):
 - A167-99(R-2009) Stainless and Heat-Resisting Chromium-Nickel Steel Plate,
Sheet and Strip
 - A1008-10 Steel Sheet, Cold-Rolled, Carbon, Structural, High Strength Low-
Alloy
- C. American Welding Society (AWS):
 - D1.3-08 Structural Welding Code Sheet Steel
- D. National Fire Protection Association (NFPA):
 - 80-10 Fire Doors and Windows
- E. The National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500 Series Metal Finishes Manual
- F. Underwriters Laboratories, Inc. (UL):
 - Fire Resistance Directory

PART 2 - PRODUCTS

2.1 FABRICATION, GENERAL

- A. Fabricate components to be straight, square, flat and in same plane where required.
 - 1. Slightly round exposed edges and without burrs, snags and sharp edges.
 - 2. Exposed welds continuous and ground smooth.
 - 3. Weld in accordance with AWS D1.3.
- B. Number of locks and non-continuous hinges as required to maintain alignment of panel with frame. For fire rated doors, use hinges and locks as required by fire test.

- C. Provide anchors or make provisions in frame for anchoring to adjacent construction. Provide size, number and location of anchors on four sides to secure access door in opening. Provide anchors as required by fire test.

2.2 ACCESS DOORS, FIRE RATED:

- A. Shall meet requirements for "B" label 1-1/2 hours with maximum temperature rise of 120 degree C (250 degrees F).
- B. Comply with NFPA 80 and have Underwriters Laboratories Inc., or other nationally recognized laboratory label for Class B opening.
- C. Door Panel: Form of 0.9 mm (0.0359 inch) thick steel , insulated sandwich type construction.
- D. Frame: Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed. Provide frame flange at perimeter where installed in concrete masonry or gypsum board openings.
 - 1. Weld exposed joints in flange and grind smooth.
 - 2. Provide frame flange at perimeter where installed in concrete masonry or gypsum board.
- E. Automatic Closing Device: Provide automatic closing device for door.
- F. Hinge: Continuous steel hinge with stainless steel pin.
- G. Lock:
 - 1. Self-latching, with provision for fitting flush a standard screw-in type lock cylinder.

2.3 ACCESS DOORS, FLUSH PANEL:

- A. Door Panel:
 - 1. Form of 1.9 mm (0.0747 inch) thick steel sheet.
 - 2. Reinforce to maintain flat surface.
- B. Frame:
 - 1. Form of 1.5 mm (0.0598 inch) thick steel sheet of depth and configuration to suit material and type of construction where installed.
 - 2. Provide surface mounted units having frame flange at perimeter where installed in concrete, masonry, or gypsum board construction.
 - 3. Weld exposed joints in flange and grind smooth.
- C. Hinge:
 - 1. Concealed spring hinge to allow panel to open 175 degrees.
 - 2. Provide removable hinge pin to allow removal of panel from frame.
- D. Lock:
 - 1. Flush, screwdriver operated cam lock.

2.4 FINISH:

- A. Provide in accordance with NAAMM AMP 500 series on exposed surfaces.
- B. Steel Surfaces: Baked-on prime coat over a protective phosphate coating.

2.5 SIZE:

Minimum 355 mm (14 inches) square door unless otherwise shown./

PART 3 - EXECUTION

3.1 LOCATION:

- A. Provide access panels or doors wherever any valves, traps, dampers, cleanouts, and other control items of mechanical, electrical and conveyor work are concealed in wall or partition, or are above ceiling of gypsum board or plaster.
- B. Use fire rated doors in fire rated partitions and ceilings.
- C. Use flush panels in partitions and gypsum board or plaster ceilings, except lay-in acoustical panel ceilings or upward access acoustical tile ceilings.

3.2 INSTALLATION, GENERAL:

- A. Install access doors in openings to have sides vertical in wall installations, and parallel to ceiling suspension grid or side walls when installed in ceiling.
- B. Set frames so that edge of frames without flanges will finish flush with surrounding finish surfaces.
- C. Set frames with flanges to overlap opening and so that face will be uniformly spaced from the finish surface.

3.3 ANCHORAGE:

- A. Secure frames to adjacent construction using anchors attached to frames or by use of bolts or screws through the frame members.
- B. Type, size and number of anchoring device suitable for the material surrounding the opening, maintain alignment, and resist displacement during normal use of access door.
- C. Anchors for fire rated access doors shall meet requirements of applicable fire test.

3.4 ADJUSTMENT:

- A. Adjust hardware so that door panel will open freely.
- B. Adjust door when closed so door panel is centered in the frame.

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SECTION 08 33 13
COILING COUNTER DOORS

PART 1 -GENERAL

1.1 DESCRIPTION

- A. Section specifies smoke rated overhead roll up coiling shutters over counter in walls, including frame and counter.
- B. Manual push up operation.

1.2 RELATED WORK

- A. Color of shutter; Section 09 06 00, SCHEDULE FOR FINISHES.

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. Shutter, each type.
- C. Installation procedures and instructions.
- D. Shop Drawings:
 - 1. Shutter, each type, showing details of construction and installation.

1.4 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 and Materials (ASTM):
 - A47-99(R2009).....Malleable Iron Castings
 - A48-03(R2008).....Gray Iron Castings
 - A53-10.....Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
 - A240/A240M-14Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet and Strip for Pressure Vessels and for General Applications.
 - A653-10.....Steel Sheet Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process
 - B209-07Aluminum and Aluminum-Alloy Sheet and Plate
 - B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - F468-10Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
 - F593-02(R2008).....Stainless Steel Bolts, Hex Cap Screws, and Studs
- C. American Welding Society (AWS):

- D1.1-10..... Structural Welding Code Steel
- D1.2-08..... Structural Welding Code Aluminum
- D1.3-08..... Structural Welding Code Sheet Steel
- D. National Association of Architectural Metal Manufacturers (NAAMM)
AMP 500 Series-2006 Metal Finishes Manual
- E. American Architectural Manufacturers Association (AAMA):
2605-11 Voluntary Specification for High Performance Organic Coatings
on Architectural Extrusions and Panels
- F. Federal Specifications (Fed. Spec):
TT-P-645B..... Primer, Paint, Zinc-Molybdates, Alkyd Type
- G. National Fire Protection Association (NFPA):
80-10 Fire Doors and Fire Windows

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Aluminum:
 - 1. Extruded: ASTM B221, alloy 6063-T5.
 - 2. Sheet: ASTM B209.
- B. Stainless Steel: ASTM A240, Type 302 or 304.
- C. Casting: ASTM A47 or A48.

2.2 FABRICATION

- A. Weld in accordance with AWS applicable code.
- B. Smoke Rated Shutter:
 - 1. Shutter and frame type unit for installation with hood and fascia and related accessories and components required for a complete working installation.
 - 2. Construct for surface mounted installation.
 - 3. Exposed to view components of same metal except as specified.
 - 4. Frame: Minimum 1.5 mm (0.0598-inch) thick steel jamb sections formed to include guide slots for curtain with receiver for bolts and locks and continuous closure angles.
 - a. Provide perimeter seals to control the passage of smoke.
 - 5. Counterbalance Assembly:
 - a. Spring barrel or shaft of steel pipe of sufficient strength to ensure deflection not exceeding 1 mm (0.03 inch) per 300 mm (1-foot) of span.
 - b. Barrel or shaft house oil-tempered, helically wound steel spring, and rotate on grease-sealed ball or roller bearings.
 - c. Springs adjustable from outside.

6. Brackets: 3 mm (1/8-inch) thick steel plate designed to form end closure support for hood.
7. Operation:
 - a. Manual Push-up type for curtains less than 2130 mm (7-feet) wide.
 - b. Coiling doors to include release mechanism to interface with smoke detection system to close door upon signal from smoke detection system or by loss of power to smoke detector. Door shall include automatic reset feature. Resetting of spring tension or mechanical dropouts shall not be required.
8. Curtain:
 - a. Flat type slats approximately 32 mm (1-1/4-inches) wide.
 - b. Bottom bar, equipped with recessed flush handles, recessed slide bolts for locking on one end and a continuous flexible seal to make tight contact with counter.
9. Hoods: Formed with beads or flanges to prevent deflection. Fastened to hood with sheet metal screws as recommended by manufacturer.
10. Aluminum Shutter:
 - a. Curtain: Extruded aluminum, minimum 1.3 mm (0.050-inch) thick, with extruded aluminum bottom angle or bars.
 - b. Hood and Fascia: Minimum 1 mm (0.040-inch) thick, sheet aluminum or 0.6 mm (0.0239-inch) thick stainless steel.
 - c. Frames: Stainless steel.
 - d. Counter: Stainless steel.

2.3 FINISH

- A. Aluminum:
 1. Finish in accordance with NAAMM AMP 500 and 501 or 504.
 2. Chemically etched medium matte, with clear anodic coating, AA-C-22A41. Class II Architectural, 0.06 mm (0.4 mils) thick (AMP 501). Class II Architectural, 0.06 mm (0.4 mils) thick. (AMP 501).

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install in accordance with approved shop drawings and manufacturer's instructions.
- B. Locate anchors and inserts for guides, brackets, supports, hardware, and other accessories and components accurately.
- C. Securely attach guides to adjoining construction with not less than 10 mm (3/8-inch) diameter bolts, spaced near each end and not over 600 mm (24 inches) apart.
 1. Use fasteners conforming to ASTM F468 and F593.

2. Use stainless steel bolts with aluminum or stainless steel.
3. Use toggle bolts to frame walls or hollow masonry.

3.2 ADJUSTING AND CLEANING

- A. Lubricate properly, adjust and demonstrate, to operate freely and as specified.
- B. Clean upon completion.

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SECTION 08 41 13
ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies aluminum entrance work including storefront construction, hung doors, and other components to make a complete assembly.

1.2 RELATED WORK:

- A. Glass and Glazing: Section 08 80 00, GLAZING.
- B. Hardware: Section 08 71 00, DOOR HARDWARE.
- C. Texture and color of finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: (1/2 full scale) showing construction, anchorage, reinforcement, and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Doors, each type.
 - 2. Entrance and Storefront construction.
- D. Samples:
 - 1. Door corner section, 450 mm x 450 mm (18 x 18 inches), of each door type specified, showing vertical and top hinge edges.
 - 2. Two samples of anodized aluminum of each color showing finish and maximum shade range.
- E. Manufacturer's Certificates:
 - 1. Stating that aluminum has been given specified thickness of anodizing.
 - 2. Indicating manufacturer's qualifications specified.

1.4 QUALITY ASSURANCE:

- A. Approval by Contracting Officer is required of products of proposed manufacturer, or supplier, and will be based upon submission by Contractor certification.
- B. Certify manufacturer regularly and presently manufactures aluminum entrances and storefronts as one of their principal products.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Deliver aluminum entrance and storefront material to the site in packages or containers; labeled for identification with the manufacturer's name, brand and contents.
- B. Store aluminum entrance and storefront material in weather-tight and dry storage facility.
- C. Protect from damage from handling, weather and construction operations before, during and after installation.

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):
 - B209-07 Aluminum and Aluminum-Alloy Sheet and Plate
 - B221-08 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - E283-04 Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
 - E331-00(R2009) Water Penetration of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
 - F468-10 Nonferrous Bolts, Hex Cap Screws, and Studs for General Use
 - F593-02(R2008) Stainless Steel Bolts, Hex Cap Screws, and Studs
- C. National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500 Series Metal Finishes Manual
- D. American Architectural Manufacturer's Association (AAMA):
 - 2604-10 High Performance Organic Coatings on Architectural Aluminum Extrusions and Panels
- E. American Welding Society (AWS):
 - D1.2-08 Structural Welding Code Aluminum

1.7 PERFORMANCE REQUIREMENTS:

- A. Shapes and thickness of framing members shall be sufficient to withstand a design wind load of not less than 5 pounds per square foot) of supported area with a deflection of not more than 1/175 times the length of the member and a safety factor of not less than 1.65 (applied to overall load failure of the unit). Provide glazing beads, moldings, and trim of not less than 1.25 mm (0.050 inch) nominal thickness.

PART 2 - PRODUCTS

2.1 MATERIALS:

- A. Aluminum, ASTM B209 and B221:
 - 1. Alloy 6063 temper T5 for doors, door frames, fixed glass sidelights, storefronts and transoms.
 - 2. For color anodized finish, use aluminum alloy as required to produce specified color.
- B. Fasteners:
 - 1. Aluminum: ASTM F468, Alloy 2024.
 - 2. Stainless Steel: ASTM F593, Alloy Groups 1, 2 and 3.

2.2 FABRICATION:

- A. Fabricate doors, of extruded aluminum sections not less than 3 mm (0.125 inch) thick. Fabricate glazing beads of aluminum not less than 1.0 mm (0.050 inch) thick.
- B. Accurately form metal parts and accurately fit and rigidly assemble joints, except those joints designed to accommodate movement. Seal joints to prevent leakage of both air and water.
- C. Make welds in aluminum in accordance with the recommended practice AWA D1.2. Use electrodes and methods recommended by the manufacturers of the metals and alloys being welded. Make welds behind finished surfaces so as to cause no distortion or discoloration of the exposed side. Clean welded joints of welding flux and dress exposed and contact surfaces.
- D. Make provisions in doors and frames to receive the specified hardware and accessories. Coordinate schedule and template for hardware specified under Section 08 71 00, DOOR HARDWARE. Where concealed closers or other mechanisms are required, provide the necessary space, cutouts, and reinforcement for secure fastening.
- E. Fit and assemble the work at the manufacturer's plant. Mark work that cannot be permanently plant-assembled to assure proper assembly in the field.

2.3 PROTECTION OF ALUMINUM:

- A. Isolate aluminum from contact with dissimilar metals other than stainless steel, white bronze, or zinc by any of the following:
 - 1. Coat the dissimilar metal with two coats of heavy-bodied alkali resistant bituminous paint.
 - 2. Place caulking compound, or non-absorptive tape, or gasket between the aluminum and the dissimilar metal.
 - 3. Paint aluminum in contact with mortar, concrete and plaster, with a coat of aluminum paint primer.

2.4 FRAMES:

- A. Fabricate doors, frames, mullions, transoms, frames for fixed glass and similar members from extruded aluminum not less than 3 mm (0.125 inch) thick.
- B. Provide integral stops and glass rebates and applied snap-on type trim.
- C. Use concealed screws, bolts and other fasteners. Secure cover boxes to frames in back of all lock strike cutouts.
- D. Fabricate framework with thermal breaks in frames where insulating glass is scheduled and specified under Section 08 80 00, GLAZING.

2.5 STILE AND RAIL DOORS:

- A. Nominal 45 mm (1-3/4 inch) thick, with stile and head rail 90 mm (3-1/2 inches) wide, and bottom rail 250 mm (10 inches) wide.
- B. Bevel single-acting doors 3 mm (1/8 inch) at lock, hinge and meeting stile edges. Provide clearances of 2 mm (1/16 inch) at hinge stiles, 3 mm (1/8 inch) at lock stiles and top rails, and 5

mm (3/16 inch) at floors and thresholds. Form glass rebates integrally with stiles and rails. Glazing beads may be formed integrally with stiles and rails or applied type secured with fasteners at 150 mm (six inches) on centers.

- C. Construct doors with a system of welded joints or interlocking dovetail joints between stiles and rails. Clamp door together through top and bottom rails with 9 mm (3/8 inch) primed steel rod extending into the stiles, and having a self-locking nut and washer at each end. Reinforce stiles and rails to prevent door distortion when tie rods are tightened. Provide a compensating spring-type washer under each nut to take up any stresses that may develop. Construct joints between rails and stiles to remain rigid and tight when door is operated.
- D. Weather-stripping: Provide removable, woven pile type (silicone-treated) weather-stripping attached to aluminum or vinyl holder. Make slots for applying weather-stripping integral with doors and door frame stops. Apply continuous weather-stripping to heads, jambs, bottom, and meeting stiles of doors and frames. Install weather-stripping so doors can swing freely and close positively.

2.6 REINFORCEMENT FOR BUILDERS HARDWARE:

- A. Fabricate from stainless steel plates.
- B. Hinge and pivot reinforcing: 4.55 mm (0.1793 inch) thick.
- C. Reinforcing for lock face, flush bolts, concealed holders, concealed or surface mounted closers: 2.66 mm (0.1046 inch) thick.
- D. Reinforcing for all other surface mounted hardware: 1.5 mm (0.0598 inch) thick.

2.7 FINISH

- A. In accordance with NAAMM AMP 500 series.
- B. Anodized Aluminum:
 - 1. Color Finish: Chemically etched medium matte, with integrally colored anodic coating, Class I Architectural, 7 mils thick. More than 50 percent variation of the maximum shade range approved will not be accepted in a single component or in adjacent components, stiles, and rails on a continuous series.

PART 3 - EXECUTION

3.1 INSTALLATION:

- A. Allowable Installation Tolerances: Install work plumb and true, in alignment and in relation to lines and grades shown. Variation of 3 mm (1/8 inch) in 2400 mm (eight feet), non-accumulative, is maximum permissible for plumb, level, warp, bow and alignment.
- B. Anchor aluminum frames to adjoining construction at heads, jambs and bottom and to steel supports, and bracing. Anchor frames with stainless steel or aluminum countersunk flathead,

expansion bolts or machine screws, as applicable. Use aluminum clips for internal connections of adjoining frame sections.

- C. Where work is installed within masonry or concrete openings, place no parts other than built-in anchors and provision for operating devices located in the floor, until after the masonry or concrete work is completed.
- D. Install hardware specified under Section 08 71 00, DOOR HARDWARE.

3.2 ADJUSTING:

- A. After installation of entrance and storefront work is completed, adjust and lubricate operating mechanisms to insure proper performance.

3.3 PROTECTION, CLEANING AND REPAIRING:

- A. Remove all mastic smears and other unsightly marks, and repair any damaged or disfiguration of the work. Protect the installed work against damage or abuse.

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SECTION 08 44 13
GLAZED ALUMINUM CURTAIN WALLS

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies glazed aluminum curtain wall system.
 - 1. Thermally isolated, pressure equalized on interior.
 - 2. Type: Stick system to include following:
 - a. Insulated Glass Units and Glass Spandrel Panels.
 - b. Integral reinforcing.
 - c. Closures, trim, sub-sills and flashings.
 - d. Column covers.
 - e. Fasteners, anchors, and related reinforcement.

1.2 RELATED WORK:

- A. Structural Steel: Section 05 12 00, STRUCTURAL STEEL FRAMING.
- B. Miscellaneous Metal Members: Section 05 50 00, METAL FABRICATIONS.
- C. Fire stopping between Curtain Wall and Structure: Section 07 84 00, FIRESTOPPING.
- D. Joint Sealants: Section 07 92 00, JOINT SEALANTS.
- E. Aluminum and Glass Hinged Entry Doors and Storefront Construction: Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS.
- F. Glazing: Section 08 80 00, GLAZING.
- G. Finish Color: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY ASSURANCE:

- A. Qualifications:
 - 1. Approval by Contracting Officer Representative (COR) is required of products or service of proposed manufacturer, suppliers and installers, and will be based upon submission by Contractor of certification that:
 - a. Manufacturers Qualifications: Manufacturer with five (5) years continuous documented experience in design, fabrication, and installation of glazed aluminum curtain wall systems of similar type and for projects of equivalent size.
 - b. Installer: Manufacturer approved in writing who has continuously installed glazed aluminum curtain walls systems of similar type and for projects of equivalent size for previous five (5) years.
 - c. Manufacturer is to provide technical field representation at project site, as a minimum, at start of project, during middle, towards end of project, and during field testing of field mockup panel.

- d. Manufacturers Professional Engineer Qualifications: A Professional Engineer who is legally qualified to practice in state where Project is located and who is experienced in providing engineering services of kind indicated. Engineering services are defined as those performed for installations of glazed aluminum curtain walls that are similar to those indicated for this Project in material, design, and extent.
- e. Testing Laboratory: Contractor is to retain AAMA accredited commercial testing laboratory to perform tests specified. Submit information regarding testing laboratory's facilities and qualifications of technical personnel to perform testing specified in this section.
- f. Product Options: Information on construction documents establishes requirements for aesthetic effects and performance characteristics of glazed aluminum curtain wall system. Aesthetic effects are indicated by dimensions, arrangements, alignment, and profiles of components and assemblies as they relate to sightlines, one another, and adjoining construction. Performance characteristics are indicated by criteria subject to verification by one (1) or more methods including preconstruction testing, field testing, or in-service performance.
 - 1) Do not modify intended aesthetic effects. If modifications are proposed, submit comprehensive explanatory data for review.
- g. Qualification of Welders:
 - 1) Welding is to be performed by certified welders qualified in accordance with AWS D1.2/D1.2M, using procedures, materials, and equipment of the type required for this work.

1.4 SUBMITTALS:

- A. In accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Product Data:
 - 1. Manufacturer's standard details and fabrication methods.
 - 2. Data on finishing, components, and accessories.
 - 3. Instructions: Submit descriptive literature, detail specifications, performance test data and instructions for installation, and adjustments.
 - 4. Recommendations for maintenance and cleaning of exterior surfaces.
- C. Shop Drawings:
 - 1. Show elevations of glazed curtain wall system at 1:48 (1/4 inch) scale, metal gages, details of construction, methods of anchorage, flashing and coping details, glazing details, firestopping assemblies at edge of slabs and details of installation. Show interfaces and relationships to work of other trades and continuity with adjacent thermal, weather, air and vapor barriers.

2. Submit for curtain wall system and accessories.
3. Operation and Maintenance Manuals
 - a. Submit cleaning and maintenance instructions.

D. Samples:

1. Submit pairs of samples of each specified color and finish on 305 mm (12-inch) long section by width of each tubular, or extruded shape section or 305 mm by 305 mm (12-inch by 12-inch) wide sections of sheet shapes.
2. Submit corner section of framing members showing fasteners, panels, glazing methods, glazing materials, and weather-stripping. Submit one (1) sample minimum 305 mm by 305 mm (12 inches by 12 inches). In lieu of submitting separate samples for corner section, intermediate section, and panel, one (1) composite sample incorporating all components and features listed may be submitted.
3. Where normal color variations are anticipated, include two (2) or more units of each sample indicating extreme limits of color variations.

E. Glass:

1. Specified in Section 08 80 00, GLAZING.

F. Quality Assurance Submittals:

1. Design Data:
 - a. Submit structural and thermal calculations for complete wall assembly. Structural calculations and design shop drawings signed and sealed by a Professional Engineer (PE).
2. Factory Test Reports:
 - a. Test Reports: Submit certified test reports, for each of following listed tests, from a qualified independent testing laboratory showing that glazed aluminum curtain wall system assembly has been tested in accordance with specified test procedures and complies with performance characteristics as indicated by manufacturer's testing procedures. Submit factory tests required except that where a curtain wall system or component of similar type, size, and design as specified for this project has been previously tested within last year, under conditions specified herein, resulting test reports may be submitted in lieu of listed testing. Submit appropriate testing reports for specific tests indicated below:
 - 1) Deflection and structural tests.
 - 2) Water penetration tests.
 - 3) Air infiltration tests.
 - 4) Delamination tests.
 - 5) Thermal conductance tests.

G. Manufacturer's Certificates:

1. Submit Certificates of Compliance, with specification requirements, for the following:
 - a. Metal extrusions.
 - b. Metal accessories.
 - c. Statement(s) that aluminum has been given specified thickness of anodizing or organic coating finish.
 - d. Statement(s) indicating manufacturers and installers conform with qualifications as specified.
 - e. Submit list (minimum of five (5)) of equivalent project size installations for both manufacturer and installer.

H. Manufacturer's Field Reports:

1. Submit field reports of manufacturer's field representative observations of curtain wall installation indicating observations made during inspection at beginning of project, during middle of installation and at conclusion of project.

I. Welders: Submit welders qualifications as specified.

J. Testing Laboratory: Submit Testing Laboratory qualifications.

1.5 DELIVERY, STORAGE AND HANDLING:

- A. Refer to AAMA CW 10 for care and handling of architectural aluminum from shop to site.
- B. Prior to packaging for shipment from factory, mark wall components to correspond with shop and erection drawings and their placement location and erection sequence.
- C. Prior to shipment from factory, place knocked-down lineal curtain wall members in cardboard containers and cover finished surfaces of members with protective covering of adhesive paper, waterproof tape, or strippable plastic. Do not cover metal surfaces that will be in contact with sealants after installation.
- D. Inspect materials delivered to site for damage; unload and store with ventilation, free from heavy dust, not subject to combustion products or sources of water, and to permit easy access for inspection and handling. Sealing and caulking compounds, including handling, is to be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.

1.6 PROJECT CONDITIONS:

- A. Field Measurements: Where glazed aluminum curtain wall systems are indicated to fit to other construction, verify dimensions of other construction by field measurements before fabrication and indicate measurements on shop drawings. Coordinate fabrication schedule with construction progress to avoid delaying Work.

1.7 APPLICABLE PUBLICATIONS:

- A. Publications listed below form a part of this specification to extent referenced. Publications are referred to in text by basic designation only.

B. American Architectural Manufacturers Association (AAMA):

501.8-13	Test Method for Determination of Resistance of Human Impact of Window Systems Intended for Use in Psychiatric Applications
MCWM-1-89	Metal Curtain Wall Manual
CW 10-12	Care and Handling of Architectural Aluminum from Shop to Site
CW 11-85	Design Windloads for Buildings and Boundary Layer Wind Tunnel Testing
CW 13-85	Structural Sealant Glazing Systems (A Design Guide)
TIR A11-04	Maximum Allowable Deflection of Framing Systems for Building Cladding Components of Design Wind Loads
501-05	Methods of Test for Exterior Walls
503-08	Field Testing of Metal Storefronts, Curtain walls and Sloped Glazing Systems
2605-13	High Performance Organic Coatings on Architectural Extrusions and Panels

C. American Society of Civil Engineers (ASCE):

ASCE 7-10.....	Minimum Design Loads for Buildings and Other Structures
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D. ASTM International (ASTM):

A36/A36M-12.....	Structural Steel
A123/A123M-13.....	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
A193/A193M-14a.....	Alloy-Steel and Stainless Steel Bolting Materials for High Temperature Service
A307-14	Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength
B209-14	Aluminum and Aluminum Alloy Sheet and Plate
B209M-14	Aluminum and Aluminum Alloy Sheet and Plate (Metric)
B211-12	Aluminum and Aluminum Alloy Bar, Rod, Wire
B211M-12	Aluminum and Aluminum Alloy Bar, Rod, Wire (Metric)
B221-14	Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes
B221M-13	Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Shapes and Tubes (Metric)
B316/B316M-10.....	Aluminum and Aluminum Alloy Rivet and Cold-Heading, Wire, and Rods
C578-14a.....	Rigid Cellular Polystyrene Thermal Insulation
C612-14.....	Mineral Fiber Block and Board Thermal Insulation
C920-14a.....	Elastomeric Joint Sealants

- C794-10 Standard Test Method for Adhesion-In-Peel of Elastomeric Joint Sealants.
- C1193-13 Guide for Use of Joint Sealants
- C1363-11 Thermal Performance of Building Materials and Envelope Assemblies by Means of a Hot Box Apparatus
- C1521-13 Practice for Evaluating Adhesion of Installed Weatherproofing
- D1037-12 Evaluating the Properties of Wood-Base Fibers and Particle Panel Materials
- E84-14 Surface Burning Characteristics of Building Materials
- E330/E330M-14 Structural Performance of Exterior Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
- E331-00(R2009) Water Penetration of Exterior Windows, Curtain Walls, and Doors By Uniform Static Air Pressure Difference
- E413-10 Classification for Rating Sound Insulation
- E783-02(R2010) Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors
- E1105-00(R2008) Field Determination of Water Penetration of Installed Exterior Windows, Curtain Walls, and Doors By Uniform or Cyclic Static Air Pressure Differences
- E. American Welding Society, Inc. (AWS):
- D1.2/D.1.2M-06(R2014) Structural Welding Code-Aluminum
- F. Military Specifications (MIL):
- MIL-C-18480 (Rev. B) Coating Compound, Bituminous Solvent, Coal Tar Base
- G. National Association of Architectural Metal Manufacturers (NAAMM):
- 500 Series (2006) Metal Finishes Manual
- H. Steel Structures Painting Council (SSPC)
- Paint 25-97 (2004) Red Iron Oxide Raw Linseed Oil and Alkyd Primer (Without Lead and Chromate Pigments)
- I. 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)
- J. Environmental Protection Agency (EPA):
- 40 CFR 59(2014) National Volatile Organic Compound Emission Standards for Consumer and Commercial Products

1.8 WARRANTY:

- A. Construction Warranty: Comply with FAR clause 52.246-21, "Warranty of Construction".
- B. Manufacturer Warranty: Manufacturer shall warranty their glazed aluminum curtain wall system for a minimum of five (5) years from date of installation and final acceptance by the Government.
Submit manufacturer warranty.

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION:

- A. Design Requirements:
 - 1. Curtain Wall System: Tubular aluminum sections with thermal break condition, self-supporting framing, factory prefinished, vision glass, spandrel infill, related flashings, anchorage and attachment devices.
 - 2. System Assembly: Site assembled.
 - 3. Maximum wall framing member deflection, in a direction normal to plane of wall: 1/175 of its clear span or 20 mm (3/4 inch), whichever is less, when designed in accordance with requirements of AAMA TIR A11 and tested in accordance with ASTM E330/E330M.
 - 4. Maximum Framing Member Permanent Deformation: 0.2 percent of its clear span when tested in accordance with ASTM E330/E330M for a minimum test period of 10 seconds at 1.5 times design wind pressures indicated as part of structural drawing wind load requirements.
- B. No glass breakage, or damage to fasteners, hardware or accessories is permitted due to deformation design requirements indicated.
 - 1. Provide system complete with framing, mullions, trim, fasteners, anchors, accessories, concealed auxiliary members, and attachment devices for securing wall to structure as specified or indicated. Unless noted otherwise, comply with AAMA MCWM-1.
 - 2. Obtain all components of curtain wall system, including framing and entrances from single manufacturer.
 - 3. Fully coordinate system accessories directly incorporated and adjacent to contiguous related work and ensure materials compatibility, deflection limitations, thermal movements, and clearances and tolerances as indicated or specified. Coordinate continuity with adjacent thermal, weather, air and vapor barriers.
 - 4. Provide system with adequate allowances for expansion and contraction of components and fastenings to prevent buckling damage, joint seal failure, glass breakage, undue stress on fastenings or other detrimental effects. For design purposes, base provisions for thermal movement on assumed ambient temperature range of from -18 degrees C to 49 degrees C (0 degrees F to 120 degrees F).

5. Provide wall system to accommodate tolerances in building frame and other contiguous work as indicated or specified.
- C. Calculations: Submit professionally prepared calculations to indicate how design requirements for structural loading, thermal, and other performance criteria have been satisfied.

2.2 PERFORMANCE REQUIREMENTS:

- A. Delegated Design: Engage a qualified Professional Engineer, to design glazed aluminum curtain walls.
- B. Conform with system performance requirements specified.
- C. Provide curtain wall components tested in accordance with requirements below and meeting performance requirements specified:
 1. System Design: Design and size components to withstand dead loads and live loads caused by positive and negative wind loads acting normal to plane of wall as calculated in accordance with ASCE 7. Seismic Loads: Design and size components to withstand seismic loads and sway displacement as calculated in accordance with ASCE.
 2. Water Penetration:
 - a. No water penetration is to occur when wall is tested in accordance with ASTM E331 at a differential static test pressure of 20 percent of inward acting design wind pressure as indicated on structural drawings, but not less than 479 Pa (10 psf).
 - b. Make provision in wall construction for adequate drainage to outside of water leakage or condensation that occurs within outer face of wall. Leave drainage and weep openings in members and wall open during test.
 3. Air Infiltration: Test glazed aluminum curtain wall system according to AAMA 503, which requires testing according to ASTM E783.
 - a. Static-Air-Differential: 75 Pa (1.57 lbf/sq. ft.) minimum.
 - b. Air Leakage: 0.03 L/s per sq. m (0.06 cfm/sq. ft.) of surface maximum.
 4. Deflections Test: ASTM E330/E330M, Procedure B:
 - a. No member is to deflect in a direction parallel to plane of wall, when carrying its full design load, more than an amount which will reduce edge cover or glass bite below 75 percent of design dimension. No member after deflection under full design load, is to have a clearance between itself and top of panel, glass, sash, or other part immediately below it less than 3 mm (1/8 inch); clearance between member and an operable window or door is to be minimum 1.5 mm (1/16 inch).

2.3 MATERIALS:

- A. Extruded Aluminum Framing Members: ASTM B221M (B221); 6063-T5 extruded aluminum for non-structural components or 6063-T6 extruded aluminum for structural members; temper and alloy as recommended by manufacturer.

- B. Sheet Aluminum: ASTM B209M (B209); 6065-T5 temper and alloy as recommended by manufacturer.
 - 1. Formed flashing and closures: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
 - 2. Extruded sill members: Minimum 1.58 mm (0.062 inch) thick aluminum, in finish as selected.
- C. Steel Sections: ASTM A36/A36M.
- D. Primer: TS TT-P-645; red, for shop application and field touch-up.
- E. Fasteners:
 - 1. For Exterior Cap Retainers: ASTM A193/A193M B8 300 series, stainless steel screws.
 - 2. For Framework Connections: ASTM B211M (B211) 2024-T4 aluminum, ASTM A193/A193M B8 300 series, stainless steel, and ASTM B316 aluminum rivets, as required by connection.
 - 3. For Anchoring Glazed Aluminum Curtain Wall to Support Structure: ASTM A307 zinc plated steel fasteners.
- F. Shims: Metal or plastic.
- G. Joint Sealants and Accessories:
 - 1. In accordance with requirements specified in Section 07 92 00, JOINT SEALANTS.
 - 2. Structural Flush Glazed Joints: High performance silicone sealant applied in accordance with manufacturer's recommendations.
 - 3. Non-structural Flush Glazed Joints and Weather Seal Joints: Silicone sealants applied in accordance with manufacturer's recommendations.
 - 4. Sealants used inside the weatherproofing system are to have a VOC content of 250g/L or less when calculated according to 40 CFR 59, (EPA Method 24).
 - 5. Structural silicone sealant performance requirements: ASTM C920.
 - a. Hardness: Type A, 30 durometer.
 - b. Ultimate Tensile Strength: 1172 kPa (170 psi).
 - c. Tensile at 150% Elongation (of original bench mark distance): 55 kPa (80 psi).
 - d. Joint Movement Capability after 14 Day Cure: +/- 50%.
 - e. Peel Strength Aluminum, After 21 Day Cure: 599 g/mm (34 pounds per inch).
 - 6. Structural silicone is not be used to support dead weight of vertical glass or panels.
 - 7. Comply with recommendations of sealant manufacturer for specific sealant selections.
 - 8. Provide only sealants that have been tested per ASTM C794 to exhibit adequate adhesion to samples of glass and metal equivalent to those required for project.
 - 9. Exposed Metal to Metal Joints: Silicone sealant selected from manufacturer's standard colors.
- H. Glazing Materials:
 - 1. As specified under Section 08 80 00, GLAZING.

2. Glazing Gaskets:

- a. Exterior: Continuous EPDM gaskets at each glass and spandrel panel.
- b. Interior: Continuous, closed cell PVC foam sealant tape, sealed at corners.

3. Glass Sizes and Clearances:

- a. Accommodate up to 25 mm (1 inch) glazing.
- b. Sizes indicated are nominal. Verify actual sizes required by measuring frames.
Coordinate dimensions for glass and glass holding members to meet applicable minimum clearances as recommended by glass manufacturer. Do not nip glass to remove flares or to reduce oversized dimensions. All cutting is to occur in factory.

4. Glass Setting Materials:

- a. Provide head bead and drive wedge required for glass installation to suit curtain wall system in accordance with manufacture's recommendations.

2.4 FABRICATION:

- A. Curtain wall components are to be of materials and thickness indicated in construction documents. Details indicated are representative of required design and profiles. Maintain sightlines. Unless specifically indicated or specified otherwise, methods of fabrication and assembly are to be at discretion of curtain wall manufacturer. Perform fitting and assembling of components in shop to maximum extent practicable. Anchorage devices are to permit adjustment in three directions. No exposed fasteners are permitted.
- B. Joints: Joints exceeding +1.5 mm (+1/16") are to be mechanically fastened.
- C. Ventilation and Drainage: Direct water leakage to exterior by means of concealed drainage system and weeps. Flashings and other materials used internally are to be nonstaining, noncorrosive, and nonbleeding.
- D. Protection and Treatment of Metals:
 - 1. Remove from metal surfaces lubricants used in fabrication and clean off other extraneous material before leaving shop.
 - 2. Provide protection against galvanic action wherever dissimilar metals are in contact, except in case of aluminum in permanent contact with galvanized steel, zinc, stainless steel, or relatively small areas of white bronze. Paint contact surfaces with one coat bituminous paint conforming to MIL-C-18480 or apply appropriate caulking material or nonabsorptive, noncorrosive, and nonstaining tape or gasket between contact surfaces.
- E. Metal sills and Closures: Fabricate accessories, spandrel panels, trim closures of sizes and shapes indicated from similar materials and finish as specified for wall system.
- F. Concealed Interior Mullion Reinforcing: ASTM A36/A36M steel shapes as required for strength and mullion size limitations, hot dip galvanized after fabrication in accordance with ASTM A123/A123M.

2.5 METAL FINISHES:

- A. In accordance with NAAMM AMP500 series.
- B. Anodized Aluminum:
 - 1. AA-C22A44 Chemically etched medium matte with electrolytically deposited metallic compound, integrally colored coating Class 1 Architectural, 0.7-mil thick finish. Dyes will not be accepted.
 - a. Dark / bronze.
- C. Shop and Touch-Up Primer for Steel Components: SSPC Paint 25 red oxide.
- D. Touch-Up Primer for galvanized Steel Surfaces: SSPC Paint 20 zinc rich.
- E. Concealed Steel Items: Galvanized in accordance with ASTM A123/A123M to 610 gm/sq. m (2.0 oz./sq. ft. Primed with iron oxide paint.
- F. Apply one (1) coat of bituminous paint to concealed aluminum and steel surfaces one (1) coat(s) in contact with cementitious or dissimilar materials.

PART 3 - EXECUTION

3.1 EXAMINATION:

- A. Prior to installation of glazed curtain wall system, arrange for representative(s) of manufacturer to examine structure and substrate to determine that they are properly prepared, and ready to receive glazed curtain wall work included herein.
- B. Verifying Conditions and Adjacent Surfaces: After establishment of lines and grades and prior to system installation examine supporting structural elements. Verify governing dimensions, including floor elevations, floor to floor heights, minimum clearances between curtain wall and structural frames, and other permissible dimensional tolerances in building frame.

3.2 PREPARATION:

- A. Take field dimensions and examine condition of substrates, supports, and other conditions under which work of this section is to be performed to verify that work may properly commence. Do not proceed with installation until unsatisfactory conditions have been corrected.
- B. Contact between aluminum and dissimilar metals are to receive a protective coating of bituminous paint for prevention of electrolytic action and corrosion.

3.3 INSTALLATION:

- A. Install and erect glazed curtain wall system and all components in accordance with written directions of curtain wall manufacturer. Match profiles, sizes, and spacing indicated on approved shop drawings.
- B. Bench Marks and Reference Points: Establish and permanently mark bench marks for elevations and building line offsets for alignment at convenient points on each floor level. Should any error

or discrepancy be discovered in location of marks, stop erection work in that area until discrepancies have been corrected.

- C. Ensure that drainage system operates properly in accord with AAMA 501 procedures.
- D. Do not proceed with structural silicone work when metal temperature is below 0 degrees C (32 degrees F).
- E. Isolate between aluminum and dissimilar metals with protective coating or plastic strip to prevent electrolytic corrosion.
- F. Install glazed aluminum curtain wall system so as to maintain a virtually flat face cap, with no visible bowing.
- G. Install entire system so that fasteners are not visible.
- H. Tolerances:
 - 1. Maximum variation from plane or location shown on approved shop drawings: 3 mm per 3657 mm (1/8 inch per 12 feet) of length up to not more than 13 mm (1/2 inch) in any total length.
 - 2. Maximum offset from true alignment between two (2) identical members abutting end to end in line: 0.8 mm (1/32 inch).
 - 3. Sealant Space Between Curtain Wall Mullion and Adjacent Construction: Maximum of 19 mm (3/4 inch) and minimum of 6 mm (1/4 inch).
- I. Joint Sealants:
 - 1. Joint Sealants: Are to be in accordance with requirements of Section 07 92 00, JOINT SEALANTS.
 - 2. Surfaces to be primed and sealed are to be clean, dry to touch, free from frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter. Enclose joints on three sides. Clean out grooves to proper depth. Joint dimensions are to conform to approved detail drawings with a tolerance of plus 3 mm (1/8 inch). Do not apply compound unless ambient temperature is between 5 and 35 degrees C (40 and 90 degrees F). Clean out loose particles and mortar just before sealing. Remove protective coatings or coverings from surfaces in contact with sealants before applying sealants or tapes. Solvents used to remove coatings are to be of type that leave no residue on metals.
 - 3. Match approved sample. Force compound into grooves with sufficient pressure to fill grooves solidly. Sealing compound is to be uniformly smooth and free of wrinkles and, unless indicated otherwise, is to be tooled and left sufficiently convex to result in a flush joint when dry. Do not trim edges of sealing material after joints are tooled. Mix only amount of multi-component sealant which can be installed within four (4) hours, but at no time is this amount exceed 19 liters (5 gallons).

4. Apply primer to masonry, concrete, wood, and other surfaces as recommended by sealant manufacturer. Do not apply primer to surfaces which will be exposed after sealant work is completed.
5. Tightly pack backing in bottom of joints which are over 13 mm (1/2 inch) in depth with specified backing material to depth indicated in construction documents. Roll backing material of hose or rod stock into joints to prevent lengthwise stretching.
6. Install bond preventive material at back or bottom of joint cavities in which no backstop material is required, covering full width and length of joint cavities.
7. Remove compound smears from surfaces of materials adjacent to sealed joints as work progresses. Use masking tape on each side of joint where texture of adjacent material will be difficult to clean. Remove masking tape immediately after filling joint. Scrape off fresh compound from adjacent surfaces immediately and rub clean with solvent approved by sealant and curtain wall manufacturers. Upon completion of sealing, remove remaining smears, stains, and other soiling, and leave work in clean neat condition.

J. Glass:

1. Refer to Section 08 80 00, GLAZING, and drawings for glass types. Install in accordance with manufacturer's recommendations as modified herein.
2. Before installing glass, inspect sash and frames to receive glass for defects such as dimensional variations, glass clearances, open joints, or other conditions that will prevent satisfactory glass installation. Do not proceed with installation until defects have been corrected.
3. Clean sealing surfaces at perimeter of glass and sealing surfaces of rebates and stop beads before applying glazing compound, sealing compound, glazing tape, or gaskets.
4. Use only approved solvents and cleaning agents recommended by compound or gasket manufacturer and by curtain wall manufacturer.
5. Provide sashes designed for outside glazing.
6. Provide continuous snap in glazing beads to suit glass as specified.
7. Insulating and tempered glass, and glass of other types that exceed 2540 mm (100 united inches) in size: Provide void space at head and jamb to allow glass to expand or move without exuding sealant. Provide perimeter frames and ventilator sections with glazing rebates for unobstructed glazing surface 19 mm (3/4 inch) in height. Glazing rebate surfaces must be sloped to shed water.
8. Provide adequate means to weep incidental water and condensation away from sealed edges of insulated glass units and out of wall system. Provide weeping of lock-strip gaskets in accordance with recommendation of glass manufacturer.

3.4 ADJUSTING:

- A. Adjust doors to provide a tight fit at contact points and operate easily.
- B. Adjust weather-stripping to make even contact with surfaces.
- C. Adjust operating hardware and moving parts.

3.5 CLEANING:

- A. Install curtain wall frame and associated metal to avoid soiling or smudging finish.
- B. Clean metal surfaces promptly after installation, exercising care to avoid damage to coatings.
- C. Remove excess glazing and sealant compounds, dirt, and other substances.
- D. Follow recommendations of manufacturer in selection of cleaning agents. Do not use cleaning agents containing ammonia or other compounds that might damage finished metal surfaces.
- E. Replace cracked, broken, and defective glass with new glass at no additional cost to Government. Just prior to final acceptance of curtain wall system clean glass surfaces on both sides, remove labels, paint spots, compounds, and other defacements, and clean metal fixed panels. Remove and replace components that cannot be cleaned successfully.

3.6 PROTECTION:

- A. After installation, protect windows, and other exposed surfaces from disfiguration, contamination, contact with harmful materials, and from other construction hazards that will interfere with their operation, or damage their appearance or finish. Protection methods are to be in accordance with recommendations of product manufacturers or of respective trade association. Remove paper or tape factory applied protection immediately after installation. Clean surfaces of mortar, plaster, paint, smears of sealants, and other foreign matter to present neat appearance and prevent fouling of operation. In addition, wash with a stiff fiber brush, soap and water, and thoroughly rinse. Where surfaces become stained or discolored, clean or restore finish in accordance with recommendations of product manufacturer or respective trade association.

- - - END - - -

**SECTION 08 71 00
DOOR HARDWARE**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Door hardware and related items necessary for complete installation and operation of doors.

1.2 RELATED WORK

- A. Caulking: Section 07 92 00 JOINT SEALANTS.
- B. Application of Hardware: Section 08 14 00, INTERIOR WOOD DOORS, Section 08 11 13, HOLLOW METAL DOORS AND FRAMES, Section 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS, Section 08 33 13, COILING COUNTER DOORS,
- C. Finishes: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Card Readers: Section 28 13 00, PHYSICAL ACCESS CONTROL SYSTEMS.
- E. Electrical: Division 26, ELECTRICAL.

1.3 GENERAL

- A. All hardware shall comply with UFAS, (Uniform Federal Accessible Standards) unless specified otherwise.
- B. Provide rated door hardware assemblies where required by most current version of the International Building Code (IBC).
- C. 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.
- D. 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.
- E. 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 WARRANTY

- A. Automatic door operators shall be subject to the terms of FAR Clause 52.246-21, except that the Warranty period shall be two years in lieu of one year for all items except as noted below:

1. Locks, latch sets, and panic hardware: 5 years.
2. Door closers and continuous hinges: 10 years.

1.5 MAINTENANCE MANUALS

- A. In accordance with Section 01 00 00, GENERAL REQUIREMENTS Article titled "INSTRUCTIONS", furnish maintenance manuals and instructions on all door hardware. Provide installation instructions with the submittal documentation.

1.6 SUBMITTALS

- A. Submittals shall be in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES. Submit 6 copies of the schedule per Section 01 33 23. Submit 2 final copies of the final approved schedules to VAMC Locksmith as record copies (VISN Locksmith if the VAMC does not have a locksmith).
- 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

- C. 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.
- D. Certificate of Compliance and Test Reports: Submit certificates that hardware conforms to the requirements specified herein. Certificates shall be accompanied by copies of reports as referenced. The testing shall have been conducted either in the manufacturer's plant and certified by an independent testing laboratory or conducted in an independent laboratory, within four years of submittal of reports for approval.

1.7 DELIVERY AND MARKING

- A. 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 COR for reference purposes. Tag shall identify items by Project Specification number and manufacturer's catalog number. These items shall remain on file in

COR's office until all other similar items have been installed in project, at which time the COR will deliver items on file to Contractor for installation in predetermined locations on the project.

1.8 PREINSTALLATION MEETING

- A. Convene a preinstallation meeting not less than 30 days before start of installation of door hardware. Require attendance of parties directly affecting work of this section, including Contractor and Installer, Architect, COR and VA Locksmith, Hardware Consultant, and Hardware Manufacturer's Representative. Review the following:
 - 1. Inspection of door hardware.
 - 2. Job and surface readiness.
 - 3. Coordination with other work.
 - 4. Protection of hardware surfaces.
 - 5. Substrate surface protection.
 - 6. Installation.
 - 7. Adjusting.
 - 8. Repair.
 - 9. Field quality control.
 - 10. Cleaning.

1.9 INSTRUCTIONS

- A. Hardware Set Symbols on Drawings: Except for protective plates, door stops, mutes, thresholds and the like specified herein, hardware requirements for each door are indicated on drawings by symbols. Symbols for hardware sets consist of letters (e.g., "HW") followed by a number. Each number designates a set of hardware items applicable to a door type.
- B. Cylinders: Government shall provide cylinder to be keyed into existing 7 pin Corbin Russwin Grand Master Key System. Contractor shall provide locksets with cylinder housings to accommodate 7 pin Corbin Russwin, large format, cylinders provided by Government.

1.10 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):
 - F883-04Padlocks
 - 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)
A156.5-14.....	Cylinders and Input Devices for Locks.
A156.6-05.....	Architectural Door Trim
A156.8-05.....	Door Controls-Overhead Stops and Holders
A156.11-14.....	Cabinet Locks
A156.12-05.....	Interconnected Locks and Latches
A156.13-05.....	Mortise Locks and Latches Series 1000
A156.14-07.....	Sliding and Folding Door Hardware
A156.15-06.....	Release Devices-Closer Holder, Electromagnetic and Electromechanical
A156.16-08.....	Auxiliary Hardware
A156.17-04.....	Self-Closing Hinges and Pivots
A156.18-06.....	Materials and Finishes
A156.20-06.....	Strap 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
A156.25-07.....	Electrified Locking Devices
A156.26-06.....	Continuous Hinges
A156.28-07.....	Master Keying Systems
A156.29-07.....	Exit Locks and Alarms
A156.30-03.....	High Security Cylinders
A156.31-07.....	Electric Strikes and Frame Mounted Actuators
A156.36-10.....	Auxiliary Locks
A250.8-03.....	Standard Steel Doors and Frames

D. National Fire Protection Association (NFPA):

80-10.....	Fire Doors and Other Opening Protectives
101-09.....	Life Safety Code

E. Underwriters Laboratories, Inc. (UL):

Building Materials Directory (2008)

PART 2 - PRODUCTS

2.1 BUTT HINGES

- A. ANSI A156.1. Provide only three-knuckle hinges, The following types of butt hinges shall be used for the types of doors listed, except where otherwise specified:
 - 1. Exterior Doors: Type A2112/A5112 for doors 900 mm (3 feet) wide or less and Type A2111/A5111 for doors over 900 mm (3 feet) wide. Hinges for exterior outswing doors shall have non-removable pins. Hinges for exterior fire-rated doors shall be of stainless steel material.
 - 2. Interior Doors: Type A8112/A5112 for doors 900 mm (3 feet) wide or less and Type A8111/A5111 for doors over 900 mm (3 feet) wide. Hinges for doors exposed to high humidity areas (shower rooms, toilet rooms, kitchens, janitor rooms, etc. shall be of stainless steel material.
- B. Provide quantity and size of hinges per door leaf as follows:
 - 1. Doors up to 1210 mm (4 feet) high: 2 hinges.
 - 2. Doors 1210 mm (4 feet) to 2260 mm (7 feet 5 inches) high: 3 hinges minimum.
 - 3. Doors greater than 2260 mm (7 feet 5 inches) high: 4 hinges.
 - 4. Doors up to 900 mm (3 feet) wide, standard weight: 114 mm x 114 mm (4-1/2 inches x 4-1/2 inches) hinges.
 - 5. Doors over 900 mm (3 feet) to 1065 mm (3 feet 6 inches) wide, standard weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 - 6. Doors over 1065 mm (3 feet 6 inches) to 1210 mm (4 feet), heavy weight: 127 mm x 114 mm (5 inches x 4-1/2 inches).
 - 7. Provide heavy-weight hinges where specified.
 - 8. At doors weighing 330 kg (150 lbs.) or more, furnish 127 mm (5 inch) high hinges.

2.2 DOOR CLOSING DEVICES

- A. Closing devices shall be products of one manufacturer.

2.3 OVERHEAD CLOSERS

- A. Conform to ANSI A156.4, Grade 1.
- B. Closers shall conform to the following:
 - 1. The closer shall have minimum 50 percent adjustable closing force over minimum value for that closer and have adjustable hydraulic back check effective between 60 degrees and 85 degrees of door opening.
 - 2. Where specified, closer shall have hold-open feature.
 - 3. Size Requirements: Provide multi-size closers, sizes 1 through 6, except where multi-size closer is not available for the required application.

4. Material of closer body shall be forged or cast.
5. Arm and brackets for closers shall be steel, malleable iron or high strength ductile cast iron.
6. Where closers are exposed to the exterior or are mounted in rooms that experience high humidity, provide closer body and arm assembly of stainless steel material.
7. Closers shall have full size metal cover; plastic covers will not be accepted.
8. Closers shall have adjustable hydraulic back-check, separate valves for closing and latching speed, adjustable back-check positioning valve, and adjustable delayed action valve.
9. Provide closers with any accessories required for the mounting application, including (but not limited to) drop plates, special soffit plates, spacers for heavy-duty parallel arm fifth screws, bull-nose or other regular arm brackets, longer or shorter arm assemblies, and special factory templating. Provide special arms, drop plates, and templating as needed to allow mounting at doors with overhead stops and/or holders.
10. Closer arms or backcheck valve shall not be used to stop the door from overswing, except in applications where a separate wall, floor, or overhead stop cannot be used.
11. Provide parallel arm closers with heavy duty rigid arm.
12. Where closers are to be installed on the push side of the door, provide parallel arm type except where conditions require use of top jamb arm.
13. Provide all surface closers with the same body attachment screw pattern for ease of replacement and maintenance.
14. All closers shall have a 1 1/2" (38mm) minimum piston diameter.

2.4 DOOR STOPS

- A. Conform to ANSI A156.16.
- B. Provide door stops wherever an opened door or any item of hardware thereon would strike a wall, column, equipment or other parts of building construction. For concrete, masonry or quarry tile construction, use lead expansion shields for mounting door stops.
- C. Where cylindrical locks with turn pieces or pushbuttons occur, equip wall bumpers Type L02251 (rubber pads having concave face) to receive turn piece or button.
- D. Provide floor stops (Type L02141 or L02161 in office areas; Type L02121 x 3 screws into floor elsewhere. Wall bumpers, where used, must be installed to impact the trim or the door within the leading half of its width. Floor stops, where used, must be installed within 4-inches of the wall face and impact the door within the leading half of its width.
- E. Where drywall partitions occur, use floor stops, Type L02141 or L02161 in office areas, Type L02121 elsewhere.
- F. Provide stop Type L02011, as applicable for exterior doors. At outswing doors where stop can be installed in concrete, provide stop mated to concrete anchor set in 76mm (3-inch) core-drilled hole and filled with quick-setting cement.

- G. Omit stops where floor mounted door holders are required and where automatic operated doors occur.
- H. Provide appropriate roller bumper for each set of doors (except where closet doors occur) where two doors would interfere with each other in swinging.
- I. Provide appropriate door mounted stop on doors in individual toilets where floor or wall mounted stops cannot be used.
- J. Provide overhead surface applied stop Type C02541, ANSI A156.8 on patient toilet doors in bedrooms where toilet door could come in contact with the bedroom door.
- K. Provide door stops on doors where combination closer magnetic holders are specified, except where wall stops cannot be used or where floor stops cannot be installed within 4-inches of the wall.
- L. Where the specified wall or floor stop cannot be used, provide concealed overhead stops (surface-mounted where concealed cannot be used).

2.5 OVERHEAD DOOR STOPS AND HOLDERS

- A. Conform to ANSI Standard A156.8. Overhead holders shall be of sizes recommended by holder manufacturer for each width of door. Set overhead holders for 110 degree opening, unless limited by building construction or equipment. Provide Grade 1 overhead concealed slide type: stop-only at rated doors and security doors, hold-open type with exposed hold-open on/off control at all other doors requiring overhead door stops.

2.6 LOCKS AND LATCHES

- A. Conform to ANSI A156.2. Locks and latches for doors 45 mm (1-3/4 inch) thick or over shall have beveled fronts. Cylinders: Government shall provide cylinder to be keyed into existing 7 pin Corbin Russwin Grand Master Key System. Contractor shall provide locksets with cylinder housings to accommodate 7 pin, Corbin Russwin, large format cylinders provided by Government.
- B. In addition to above requirements, locks and latches shall comply with following requirements:
 - 1. Mortise Lock and Latch Sets: Conform to ANSI/BHMA A156.13. Mortise locksets shall be series 1000, minimum Grade 2. All locksets and latchsets shall have lever handles fabricated from cast stainless steel. Provide sectional (lever x rose) lever design with smooth curved return. No substitute lever material shall be accepted. All locks and latchsets shall be furnished with 122.55 mm (4-7/8-inch) curved lip strike and wrought box. At outswing pairs with overlapping astragals, provide flat lip strip with 21mm (7/8-inch) lip-to-center dimension. Where mortise locks are installed in high-humidity locations or where exposed to the exterior on both sides of the opening, provide non-ferrous mortise lock case.

2.7 ELECTROMAGNETIC LOCKS

- A. ANSI/BHMA A156.23; electrically powered, of strength and configuration indicated; with electromagnet attached to frame and armature plate attached to door. Listed under Category E in BHMA's "Certified Product Directory."
 - 1. Type: Full exterior or full interior, as required by application indicated.
 - 2. Strength Ranking: 1500 lbf (6672 N).

2.8 ELECTRIC STRIKES

- A. ANSI/ BHMA A156.31 Grade 1.
- B. General: Use fail-secure electric strikes at fire-rated doors.

2.9 ARMOR PLATES, KICK PLATES, MOP PLATES AND DOOR EDGING

- A. Conform to ANSI Standard A156.6.
- B. Provide protective plates and door edging as specified below:
 - 1. Kick plates, mop plates and armor plates of metal, Type J100 series.
 - 2. Provide kick plates and mop plates where specified. Kick plates shall be 254 mm (10 inches) or 305 mm (12 inches) high. Mop plates shall be 152 mm (6 inches) high. Both kick and mop plates shall be minimum 1.27 mm (0.050 inches) thick. Provide kick and mop plates beveled on all 4 edges (B4E). On push side of doors where jamb stop extends to floor, make kick plates 38 mm (1-1/2 inches) less than width of door, except pairs of metal doors which shall have plates 25 mm (1 inch) less than width of each door. Extend all other kick and mop plates to within 6 mm (1/4 inch) of each edge of doors. Kick and mop plates shall butt astragals. For jamb stop requirements, see specification sections pertaining to door frames.
 - 3. Kick plates and/or mop plates are not required on following door sides:
 - a. Armor plate side of doors;
 - b. Exterior side of exterior doors;
 - c. Closet side of closet doors;
 - d. Both sides of aluminum entrance doors.
 - 4. Armor plates for doors are listed under Article "Hardware Sets". Armor plates shall be thickness as noted in the hardware set, 875 mm (35 inches) high and 38 mm (1-1/2 inches) less than width of doors, except on pairs of metal doors. Provide armor plates beveled on all 4 edges (B4E). Plates on pairs of metal doors shall be 25 mm (1 inch) less than width of each door. Where top of intermediate rail of door is less than 875 mm (35 inches) from door bottom, extend armor plates to within 13 mm (1/2 inch) of top of intermediate rail. On doors equipped with panic devices, extend armor plates to within 13 mm (1/2 inch) of panic bolt push bar.

2.10 EXIT DEVICES

- A. Conform to ANSI Standard A156.3. Exit devices shall be Grade 1; type and function are specified in hardware sets. Provide flush with finished floor strikes for vertical rod exit devices in interior of building. Trim shall have cast satin stainless steel lever handles of design similar to locksets, unless otherwise specified. Provide key cylinders for keyed operating trim and, where specified, cylinder dogging.
- B. Concealed vertical rod panics shall be provided less bottom rod at interior doors, unless lockable or otherwise specified; provide fire pins as required by exit device and door fire labels. Where concealed vertical rod panics are specified at exterior doors, provide with both top and bottom rods.
- C. At non-rated openings with panic hardware, provide panic hardware with key cylinder dogging feature.
- D. Exit devices for fire doors shall comply with Underwriters Laboratories, Inc., requirements for Fire Exit Hardware. Submit proof of compliance.

2.11 FLUSH BOLTS (LEVER EXTENSION)

- A. Conform to ANSI A156.16. Flush bolts shall be Type L24081 unless otherwise specified. Furnish proper dustproof strikes conforming to ANSI A156.16, for flush bolts required on lower part of doors.
- B. Lever extension manual flush bolts shall only be used at non-fire-rated pairs for rooms only accessed by maintenance personnel.
- C. Face plates for cylindrical strikes shall be rectangular and not less than 25 mm by 63 mm (1 inch by 2-1/2 inches).
- D. Friction-fit cylindrical dustproof strikes with circular face plate may be used only where metal thresholds occur.
- E. Provide extension rods for top bolt where door height exceeds 2184 mm (7 feet 2 inches).

2.12 FLUSH BOLTS (AUTOMATIC)

- A. Conform to ANSI A156.3. Dimension of flush bolts shall conform to ANSI A115. Bolts shall conform to Underwriters Laboratories, Inc., requirements for fire door hardware. Flush bolts shall automatically latch and unlatch. Furnish dustproof strikes conforming to ANSI A156.16 for bottom flushbolt. Face plates for dustproof strike shall be rectangular and not less than 38 mm by 90 mm (1-1/2 by 3-1/2 inches).
- B. At interior doors, provide auto flush bolts less bottom bolt, unless otherwise specified, except at wood pairs with fire-rating greater than 20 minutes; provide fire pins as required by auto flush bolt and door fire labels.

2.13 DOOR PULLS WITH PLATES

- A. Conform to ANSI A156.6. Pull Type J401, 152 mm (6 inches) high by 19 mm (3/4 inches) diameter with plate Type J302, 90 mm by 350 mm (3-1/2 inches by 14 inches), unless otherwise specified. Provide pull with projection of 70 mm (2 3/4 inches) and a clearance of 51 mm (2 inches). Cut plates of door pull plate for cylinders, or turn pieces where required.

2.14 PUSH PLATES

- A. Conform to ANSI A156.6. Metal, Type J302, 200 mm (8 inches) wide by 350 mm (14 inches) high. Provide metal Type J302 plates 100 mm (4 inches wide by 350 mm (14 inches) high) where push plates are specified for doors with stiles less than 200 mm (8 inches) wide. Cut plates for cylinders, and turn pieces where required.

2.15 COORDINATORS

- A. Conform to ANSI A156.16. Coordinators, when specified for fire doors, shall comply with Underwriters Laboratories, Inc., requirements for fire door hardware. Coordinator may be omitted on exterior pairs of doors where either door will close independently regardless of the position of the other door. Coordinator may be omitted on interior pairs of non-labeled open where open back strike is used. Open back strike shall not be used on labeled doors. Paint coordinators to match door frames, unless coordinators are plated. Provide bar type coordinators, except where gravity coordinators are required at acoustic pairs. For bar type coordinators, provide filler bars for full width and, as required, brackets for push-side surface mounted closers, overhead stops, and vertical rod panic strikes.

2.16 THRESHOLDS

- A. Conform to ANSI A156.21, mill finish extruded aluminum, except as otherwise specified. In existing construction, thresholds shall be installed in a bed of sealant with 1/4-20 stainless steel machine screws and expansion shields. In new construction, embed aluminum anchors coated with epoxy in concrete to secure thresholds. Furnish thresholds for the full width of the openings.
- B. For thresholds at elevators entrances see other sections of specifications.
- C. At exterior doors and any interior doors exposed to moisture, provide threshold with non-slip abrasive finish.
- D. Provide with miter returns where threshold extends more than 12 mm (0.5 inch) beyond face of frame.

2.17 AUTOMATIC DOOR BOTTOM SEAL AND RUBBER GASKET FOR LIGHT PROOF OR SOUND CONTROL DOORS

- A. Conform to ANSI A156.22. Provide mortise or under-door type, except where not practical. For mortise automatic door bottoms, provide type specific for door construction (wood or metal).

2.18 MISCELLANEOUS HARDWARE

- A. Mutes: Conform to ANSI A156.16. Provide door mutes or door silencers Type L03011 or L03021, depending on frame material, of white or light gray color, on each steel or wood door frame,

except at fire-rated frames, lead-lined frames and frames for sound-resistant, lightproof and electromagnetically shielded doors. Furnish 3 mutes for single doors and 2 mutes for each pair of doors, except double-acting doors. Provide 4 mutes or silencers for frames for each Dutch type door. Provide 2 mutes for each edge of sliding door which would contact door frame.

2.19 FINISHES

- A. Exposed surfaces of hardware shall have ANSI A156.18, finishes as specified below. Finishes on all hinges, pivots, closers, thresholds, etc., shall be as specified below under "Miscellaneous Finishes." For field painting (final coat) of ferrous hardware, see Section 09 91 00, PAINTING.
- B. 626 or 630: All surfaces on exterior and interior of buildings, except where other finishes are specified.
- C. Miscellaneous Finishes:
 - 1. Hinges --exterior doors: 626 or 630.
 - 2. Hinges --interior doors: 652 or 630.
 - 3. Door Closers: Factory applied paint finish. Dull or Satin Aluminum color.
 - 4. Thresholds: Mill finish aluminum.
 - 5. Cover plates for floor hinges and pivots: 630.
 - 6. Other primed steel hardware: 600.
- D. Hardware Finishes for Existing Buildings: U.S. Standard finishes shall match finishes of hardware in (similar) existing spaces except where otherwise specified.
- E. Anti-microbial Coating: All hand-operated hardware (levers, pulls, push bars, push plates, paddles, and panic bars) shall be provided with an anti-microbial/anti-fungal coating that has passed ASTM E2180 tests. Coating to consist of ionic silver (Ag+). Silver ions surround bacterial cells, inhibiting growth of bacteria, mold, and mildew by blockading food and respiration supplies.

2.17 BASE METALS

- A. Apply specified U.S. Standard finishes on different base metals as following:

Finish	Base Metal
652	Steel
626	Brass or bronze
630	Stainless steel

PART 3 - EXECUTION

3.1 HARDWARE HEIGHTS

- 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 VA COR for approval.
- B. Hardware Heights from Finished Floor:

1. Exit devices centerline of strike (where applicable) 1024 mm (40-5/16 inches).
2. Locksets and latch sets centerline of strike 1024 mm (40-5/16 inches).
3. Deadlocks centerline of strike 1219 mm (48 inches).
4. Hospital arm pull 1168 mm (46 inches) to centerline of bottom supporting bracket.
5. Centerline of door pulls to be 1016 mm (40 inches).
6. Push plates and push-pull shall be 1270 mm (50 inches) to top of plate.
7. Push-pull latch to be 1024 mm (40-5/16 inches) to centerline of strike.
8. Locate other hardware at standard commercial heights. Locate push and pull plates to prevent conflict with other hardware.

3.2 INSTALLATION

- A. Closer devices, including those with hold-open features, shall be equipped and mounted to provide maximum door opening permitted by building construction or equipment. Closers shall be mounted on side of door inside rooms, inside stairs, and away from corridors. At exterior doors, closers shall be mounted on interior side. Where closers are mounted on doors they shall be mounted with sex nuts and bolts; foot shall be fastened to frame with machine screws.

- B. Hinge Size Requirements:

Door Thickness	Door Width	Hinge Height
45 mm (1-3/4 inch)	900 mm (3 feet) and less	113 mm (4-1/2 inches)
45 mm (1-3/4 inch)	Over 900 mm (3 feet) but not more than 1200 mm (4 feet)	125 mm (5 inches)
35 mm (1-3/8 inch) (hollow core wood doors)	Not over 1200 mm (4 feet)	113 mm (4-1/2 inches)

- C. Hinge leaves shall be sufficiently wide to allow doors to swing clear of door frame trim and surrounding conditions.
- D. Where new hinges are specified for new doors in existing frames or existing doors in new frames, sizes of new hinges shall match sizes of existing hinges; or, contractor may reuse existing hinges provided hinges are restored to satisfactory operating condition as approved by COR. Existing hinges shall not be reused on door openings having new doors and new frames. Coordinate preparation for hinge cut-outs and screw-hole locations on doors and frames.
- E. Hinges Required Per Door:

Doors 1500 mm (5 ft) or less in height	2 butts
Doors over 1500 mm (5 ft) high and not over 2280 mm (7 ft 6 in) high	3 butts
Doors over 2280 mm (7 feet 6 inches) high	4 butts
Dutch type doors	4 butts

Doors with spring hinges 1370 mm (4 feet 6 inches) high or less	2 butts
Doors with spring hinges over 1370 mm (4 feet 6 inches)	3 butts

- F. Fastenings: Suitable size and type and shall harmonize with hardware as to material and finish. Provide machine screws and lead expansion shields to secure hardware to concrete, ceramic or quarry floor tile, or solid masonry. Fiber or rawl plugs and adhesives are not permitted. All fastenings exposed to weather shall be of nonferrous metal.
- G. After locks have been installed; show in presence of COR that keys operate their respective locks in accordance with keying requirements. (All keys, Master Key level and above shall be sent Registered Mail to the Medical Center Director along with the bitting list. Also a copy of the invoice shall be sent to the COR for his records.) 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.

3.3 FINAL INSPECTION

- A. Installer to provide letter to COR that upon completion, installer has visited the Project and has accomplished the following:
1. Re-adjust hardware.
 2. Evaluate maintenance procedures and recommend changes or additions, and instruct VA personnel.
 3. Identify items that have deteriorated or failed.
 4. Submit written report identifying problems.

3.4 DEMONSTRATION

- A. Demonstrate efficacy of mechanical hardware and electrical, and electronic hardware systems, including adjustment and maintenance procedures, to satisfaction of COR and VA Locksmith.

3.5 HARDWARE SETS

- A. Following sets of hardware correspond to hardware symbols shown on drawings. Only those hardware sets that are shown on drawings will be required. Disregard hardware sets listed in specifications but not shown on drawings.
- B. Hardware Consultant working on a project will be responsible for providing additional information regarding these hardware sets. The numbers shown in the following sets come from BHMA standards.
- C. ELECTRIC HARDWARE ABBREVIATIONS LEGEND:
- ADO = Automatic Door Operator
- AC = Access Control Device (Card reader, biometric reader, keypad etc.)
- DPS = Door Position Switch (Door or Alarm Contact)
- EL = Electric Lock or Electric Lever Exit Device

EMCH = Electro-Mechanical Closer-Holder

MHO = Magnetic Hold-Open (wall- or floor-mounted)

RR = Remote Release Button

REX = Request-to-Exit Switch in Latching Device Inside Trim

--- E N D ---

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 01

For use on mark/door#(s):

105

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	PRIVACY W/COIN TURN	L9044 17A L583-363 L283-722 (F22 X ADA THUMBTURN X INDICATOR)	626AM
1	EA	SURFACE CLOSER	4111 SCUSH MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 02

For use on mark/door#(s):

106

111A

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 SHCUSH MC (C02061 PT-4A, PT- 4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 03

For use on mark/door#(s):

109

110

111

113

131

138

139

140

141

142

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	PASSAGE SET	L9010 17A (F01)	626AM
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 04

For use on mark/door#(s):
108

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 05

For use on mark/door#(s):
112

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	PRIVACY W/COIN TURN	L9044 17A L583-363 L283-722 (F22 X ADA THUMBTURN X INDICATOR)	626AM
1	EA	MOP PLATE	8400 6" X 1 1/2" LDW B4E (J103)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 06

For use on mark/door#(s):
130 134

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	PRIVACY W/COIN TURN	L9044 17A L583-363 L283-722 (F22 X ADA THUMBTURN X INDICATOR)	626AM
1	EA	MOP PLATE	8400 6" X 1 1/2" LDW B4E (J103)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 07

For use on mark/door#(s):
115

Each To Have:

Qty		Description	Catalog Number	Finish
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP & HOLDER	410H (C04511)	630
1	EA	SURFACE CLOSER	4011 MC ST-1544 (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	MOUNTING PLATE	4020-18 (DROP PLATE)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
			HINGES AND SOUND SEALS BY SECTION 083473	

Hardware Group No. 08

For use on mark/door#(s):
121

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP & HOLDER	410H (C04511)	630
1	EA	SURFACE CLOSER	4011 MC ST-1544 (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	MOUNTING PLATE	4020-18 (DROP PLATE)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
3	EA	SILENCER	SR64 (L03011)	GRY

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 09

For use on mark/door#(s):

115A 121A

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	PASSAGE SET	L9010 17A (F01)	626AM
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 10

For use on mark/door#(s):

117 C-2-7

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	CLASSROOM LOCK	L9070L 17A (F32)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP & HOLDER	410H (C04511)	630
1	EA	SURFACE CLOSER	4011 MC ST-1544 (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	MOUNTING PLATE	4020-18 (DROP PLATE)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	GASKETING	488S (ROE154)	S-Bk

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 11

For use on mark/door#(s):

114	116	118	119	120	126
135	136	137	214A	214B	214C
217	219	220A	220B	220C	220D
220E	220F				

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 11A

For use on mark/door#(s):

214D

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP	410S (C04541)	630
3	EA	SILENCER	SR64 (L03011)	GRY

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 12

For use on mark/door#(s):

133 220H

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 13

For use on mark/door#(s):

127

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 14

For use on mark/door#(s):
132

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP & HOLDER	410H (C04511)	630
1	EA	SURFACE CLOSER	4011 MC ST-1544 (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	MOUNTING PLATE	4020-18 (DROP PLATE)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	GASKETING	488S (ROE154)	S-Bk

Hardware Group No. 15

For use on mark/door#(s):
143

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	AUTO FLUSH BOLT	FB41T (Type 25)	630
1	EA	ROLLER LATCH	RL30 (E19091)	626
			(INSTALL AT TOP OF INACTIVE DOOR)	
1	EA	PASSAGE SET	L9010 17A (F01)	626AM
1	EA	OH STOP	410S (C04541)	630
			(INSTALL ON INACTIVE DOOR)	
1	EA	WALL STOP	WS407CVX (L52101)	630
2	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 16

For use on mark/door#(s):

128 129

Each To Have:

Qty		Description	Catalog Number	Finish
2	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	ELECTRIC HINGE	3CB1 4.5 X 4.5 TW4 (A8112)	652
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
1	EA	DOOR CONTACT	679-05 (CONCEALED)	WHT
1	EA	POWER SUPPLY	PS902 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Door to remain locked upon loss of power. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 17

For use on mark/door#(s):

43 47

Each To Have:

Qty		Description	Catalog Number	Finish
2	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	ELECTRIC HINGE	3CB1 4.5 X 4.5 TW4 (A8112)	652
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
1	EA	DOOR CONTACT	679-05 (CONCEALED)	WHT
1	EA	POWER SUPPLY	PS902 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 18

For use on mark/door#(s):

45A

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	ELECTRIC HINGE	3CB1 5 X 4.5 TW4 (A8112)	652
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
1	EA	DOOR CONTACT	679-05 (CONCEALED)	WHT
1	EA	DESK MOUNT BUTTON	PUSH BUTTON BY OTHERS	628
1	EA	POWER SUPPLY	PS902 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS	
1	EA	INTERCOM	INTERCOM BY OTHERS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Visitors can contact nurse station by intercom. By pressing the push buttons at the nurse's station the the lock will momentarily unlock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 19

For use on mark/door#(s):

44A

Each To Have:

Qty		Description	Catalog Number	Finish
2	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	ELECTRIC HINGE	3CB1 4.5 X 4.5 TW4 (A8112)	652
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
1	EA	DOOR CONTACT	679-05 (CONCEALED)	WHT
1	EA	DESK MOUNT BUTTON	PUSH BUTTON BY OTHERS	628
1	EA	POWER SUPPLY	PS902 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS	
1	EA	INTERCOM	INTERCOM BY OTHERS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Visitors can contact nurse station by intercom. By pressing the push buttons at the nurse's station the the lock will momentarily unlock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 20

For use on mark/door#(s):
44B

Each To Have:

Qty		Description	Catalog Number	Finish
2	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	ELECTRIC HINGE	3CB1 4.5 X 4.5 TW4 (A8112)	652
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
1	EA	DOOR CONTACT	679-05 (CONCEALED)	WHT
1	EA	DESK MOUNT BUTTON	PUSH BUTTON BY OTHERS	628
1	EA	POWER SUPPLY	PS902 FA900 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS	
1	EA	INTERCOM	INTERCOM BY OTHERS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Visitors can contact nurse station by intercom. By pressing the push buttons at the nurse's station the the lock will momentarily unlock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 21

For use on mark/door#(s):

45B

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	ELECTRIC HINGE	3CB1 5 X 4.5 TW4 (A8112)	652
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 SCUSH MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
3	EA	SILENCER	SR64 (L03011)	GRY
1	EA	DOOR CONTACT	679-05 (CONCEALED)	WHT
1	EA	DESK MOUNT BUTTON	PUSH BUTTON BY OTHERS	628
1	EA	POWER SUPPLY	PS902 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS	
1	EA	INTERCOM	INTERCOM BY OTHERS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Visitors can contact nurse station by intercom. By pressing the push buttons at the nurse's station the the lock will momentarily unlock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 23

For use on mark/door#(s):

201 228

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	PASSAGE SET	L9010 17A (F01)	626AM
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	MOP PLATE	8400 6" X 1 1/2" LDW B4E (J103)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk

FIELD VERIFY EXISTING CONDITIONS
MODIFY EXISTING DOOR & FRAME
FOR NEW HARDWARE

Hardware Group No. 24

For use on mark/door#(s):

S-2-1

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HW HINGE	3CB1HW 4.5 X 4.5 (A8111)	652
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-17-SNB (Grade 1, Type 1, Function 14)	626AM
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	FLOOR STOP	FS436 (L12141)	626
1	EA	GASKETING	488S (ROE154)	S-Bk

Hardware Group No. 24A

For use on mark/door#(s):

S-2-2

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HW HINGE	3CB1HW 4.5 X 4.5 (A8111)	652
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-17-SNB (Grade 1, Type 1, Function 14)	626AM
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk

Hardware Group No. 24B

For use on mark/door#(s):

C18

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HW HINGE	3CB1HW 4.5 X 4.5 (A8111)	652
1	EA	FIRE EXIT HARDWARE	99-L-BE-F-17-SNB (Grade 1, Type 1, Function 14)	626AM
1	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S-BK (ROE154)	S-Bk

Hardware Group No. 25

For use on mark/door#(s):

207

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	DOOR CORD	788-12 (DOOR CHORD)	626
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	ARMOR PLATE	8402 35" X 1 1/2" LDW B4E (J101)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
1	EA	CARD READER	CARD READER BY OTHERS	
1	EA	DOOR CONTACT	7766 (SURFACE)	628
1	EA	POWER SUPPLY	PS902 FA900 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
			FIELD VERIFY EXISTING CONDITIONS	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 26

For use on mark/door#(s):
204B

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	CLASSROOM LOCK	L9070L 17A (F32)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

Hardware Group No. 27

For use on mark/door#(s):
204A

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	CLASSROOM LOCK	L9070L 17A (F32)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 CUSH MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	PA FLUSHTRANSOM BRKT	4110-419 (ANGLE BRACKET)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 28

For use on mark/door#(s):

205 205A

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP	410S (C04541)	630
1	EA	SURFACE CLOSER	4011 MC ST-1544 (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	MOUNTING PLATE	4020-18 (DROP PLATE)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

Hardware Group No. 29

For use on mark/door#(s):

214E

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	SET	CONST LATCHING BOLT	FB61T (Type 27)	630
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 HEDA MC (C02061 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	PA FLUSHTRANSOM BRKT	4110-419 (ANGLE BRACKET)	689
2	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
2	EA	WALL STOP	WS407CVX (L52101)	630
2	EA	SILENCER	SR64 (L03011)	GRY
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

Hardware Group No. 30

For use on mark/door#(s):
206

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	DOOR CORD	788-12 (DOOR CHORD)	626
1	SET	AUTO FLUSH BOLT	FB41P (Type 25)	630
1	EA	DUST PROOF STRIKE	DP2 (L14011)	626
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	COORDINATOR	COR X FL (Type 21A)	628
1	EA	OH STOP	410S (C04541) (INACTIVE LEAF)	630
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	SURFACE CLOSER	4011 MC ST-1544 (C02011 PT-4A, PT- 4C, PT-4D, PT-4F, PT-4H) (INACTIVE LEAF)	689
1	EA	MOUNTING PLATE	4020-18 (DROP PLATE)	689
2	EA	KICK PLATE	8400 12" X 1" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	139A (ASTRAGAL)	A
1	EA	GASKETING	488S (ROE154)	S-Bk
1	EA	CARD READER	CARD READER BY OTHERS	
2	EA	DOOR CONTACT	7766 (SURFACE)	628
1	EA	POWER SUPPLY	PS902 FA900 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED) FIELD VERIFY EXISTING CONDITIONS	LGR

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 31

For use on mark/door#(s):

202 203

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

Hardware Group No. 31A

For use on mark/door#(s):

225

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 32

For use on mark/door#(s):

208 210 226B

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 HEDA MC (C02061 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	PA FLUSHTRANSOM BRKT	4110-419 (ANGLE BRACKET)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

Hardware Group No. 33

For use on mark/door#(s):

211

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 34

For use on mark/door#(s):
226A

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 HEDA MC (C02061 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	PA FLUSHTRANSOM BRKT	4110-419 (ANGLE BRACKET)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
			FIELD VERIFY EXISTING CONDITIONS	
			MODIFY EXISTING DOOR & FRAME	
			FOR NEW HARDWARE	

Hardware Group No. 35

For use on mark/door#(s):

212 213

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	DOOR CORD	788-12 (DOOR CHORD)	626
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
1	EA	DOOR CONTACT	7766 (SURFACE)	628
1	EA	POWER SUPPLY	PS902 FA900 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
1		CARD READER	CARD READER BY OTHERS FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE	

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 36

For use on mark/door#(s):
214

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 H MC (C02Unknown1 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
			FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE	

Hardware Group No. 37

For use on mark/door#(s):
218

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	OFFICE/ENTRY LOCK	L9050L 17A L583-363 (F04 X ADA THUMBTURN)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY
			FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE	

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 38

For use on mark/door#(s):
216

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
1	EA	GASKETING	488S (ROE154)	S-Bk
		FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE		

Hardware Group No. 39

For use on mark/door#(s):
220

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	CLASSROOM LOCK	L9070L 17A (F32)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 40

For use on mark/door#(s):

215 220G 221A 221B

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	CLASSROOM LOCK	L9070L 17A (F32)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	WALL STOP	WS407CVX (L52101)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 41

For use on mark/door#(s):

222

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	CLASSROOM LOCK	L9070L 17A (F32)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 CUSH MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
3	EA	SILENCER	SR64 (L03011)	GRY

Hardware Group No. 42

For use on mark/door#(s):
224

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 5 X 4.5 (A8112)	652
1	EA	DOOR CORD	788-18 (DOOR CHORD)	626
2	EA	MANUAL FLUSH BOLT	FB358 (L04261)	613
1	EA	DUST PROOF STRIKE	DP2 (L14011)	626
1	EA	ELECTRIFIED LOCKSET	L9092LEU 17A RX (F86 WITH REQUEST-TO-EXIT SWITCH)	626AM
1	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	OH STOP & HOLDER	410H (C04511)	630
1	EA	SURFACE CLOSER	4111 SHCUSH MC (C02061 PT-4A, PT- 4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	PA FLUSHTRANSOM BRKT	4110-419 (ANGLE BRACKET)	689
2	EA	SILENCER	SR64 (L03011)	GRY
1	EA	CARD READER	CARD READER BY OTHERS	
2	EA	DOOR CONTACT	7766 (SURFACE)	628
1	EA	POWER SUPPLY	PS902 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED) FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE	LGR

Door normally closed and locked. Presenting a valid credential to the reader will momentarily unlock the lock allowing access. Door to remain locked upon loss of power or activation of the fire alarm. The request to exit feature of the lock to shunt the alarm output of the door contact. Door contact monitors whether the door is open or closed. Free egress at all times by depressing lock lever.

Hardware Group No. 43

For use on mark/door#(s):
229

Each To Have:

Qty		Description	Catalog Number	Finish
3	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	STOREROOM LOCK	L9080L 17A (F07)	626AM
	EA	PERMANENT CYLINDER	OWNER SUPPLIED	626
1	EA	SURFACE CLOSER	4111 CUSH MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
1	EA	PA FLUSHTRANSOM BRKT	4110-419 (ANGLE BRACKET)	689
1	EA	KICK PLATE	8400 12" X 1 1/2" LDW B4E (J102)	630
3	EA	SILENCER	SR64 (L03011)	GRY
FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE				

Hardware Group No. 44

For use on mark/door#(s):
700A 700B

Each To Have:

Qty		Description	Catalog Number	Finish
1	EA	MAGNETIC LOCK	M490P (E18501)	628
1	EA	CARD READER	CARD READER BY OTHERS	
1	EA	PUSH-TO-EXIT BUTTON	PUSH-TO-EXIT BUTTON BY OTHERS	
1	EA	POWER SUPPLY	PS902 FA900 (REGULATED, FILTERED, 24VDC, AMPERAGE AS REQUIRED)	LGR
	EA		BALANCE OF HARDWARE EXISTING	

Notes:

1. The magnetic lock shall be connected to the fire alarm system through a set of normally closed, dry contacts (supplied by the fire alarm contractor).

2. The push button shall be mounted on the wall adjacent to the opening.

Operational Description:

1. The magnetic locks shall be wired to the card reader and shall control the locking and unlocking of the door.

2. When the card reader goes into an unlock mode, the magnetic locks will be de-energized and unlock the door.

3. Push-To-Exit Button from egress side. Push-To-Exit Button will de-energize and unlock the door.

02-01-15

Hardware Group No. 45

For use on mark/door#(s):

C-2-3

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
1	EA	PANIC HARDWARE	CD-9949-EO-LBL (Grade 1, Type 8, Function 01)	626AM
1	EA	PANIC HARDWARE	CD-9949-NL-OP-110MD-LBL (Grade 1, Type 8, Function 03)	626AM
2	EA	MORTISE CYLINDER	OWNER SUPPLIED	626
1	EA	RIM CYLINDER	OWNER SUPPLIED	626
2	EA	DOOR PULL, 1" ROUND	8103EZHD 10" O	630
2	EA	OH STOP	410S (C04541)	630
2	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
2	EA	MOUNTING PLATE	4110-18 (DROP PLATE)	689
2	EA	BLADE STOP SPACER	4110-61 (BLADE STOP SPACER)	689

Hardware Group No. 45A

For use on mark/door#(s):
C-G-2

Each To Have:

Qty		Description	Catalog Number	Finish
8	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
2	EA	PANIC HARDWARE	CD-9949-L-17-LBL (Grade 1, Type 8, Function 08)	626AM
2	EA	MORTISE CYLINDER	OWNER SUPPLIED	626
2	EA	RIM CYLINDER	OWNER SUPPLIED	626
2	EA	OH STOP	100H ADJ (C01511)	630
2	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
2	EA	MOUNTING PLATE	4110-18 (DROP PLATE)	689
2	EA	BLADE STOP SPACER	4110-61 (BLADE STOP SPACER)	689

Hardware Group No. 46

For use on mark/door#(s):
C-2-4

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
2	EA	PUSH PLATE	8200 8" X 16"	630AM
2	EA	SURFACE CLOSER	4011 MC (C02011 PT-4A, PT-4C, PT-4D, PT-4F, PT-4H)	689
2	EA	FIRE/LIFE WALL MAG	SEM7850 (MAGNETIC HOLD-OPEN) FIELD VERIFY EXISTING CONDITIONS MODIFY EXISTING DOOR & FRAME FOR NEW HARDWARE	689

The wall magnets shall be wired to the fire alarm panel through a set of normally-closed, dry contacts (supplied by the fire alarm contractor).

Magnetic Hold Open is continuously energized allowing the doors to be held open under normal building conditions. When the Fire Alarm is activated, power to the Magnetic Hold Open is disconnected causing the door closer to close the door.

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

DOOR HARDWARE

02-01-15

Hardware Group No. 47

For use on mark/door#(s):

C9-10 C9-13

Each To Have:

Qty		Description	Catalog Number	Finish
6	EA	HINGE	3CB1 4.5 X 4.5 (A8112)	652
2	SET	LONG DOOR PULL	PR 9266 36" 20" P	630
2	EA	SURFACE CLOSER	4111 EDA MC (C02021 PT-4A, PT-4C, PT-4D, PT-4F, PT-4G, PT-4H, PT-4J)	689
2	EA	KICK PLATE	8400 12" X 1" LDW B4E (J102)	630
2	EA	WALL STOP	WS407CVX (L52101)	630
2	EA	SILENCER	SR64 (L03011)	GRY
			FIELD VERIFY EXISTING CONDITIONS	

--- E N D ---

**SECTION 08 80 00
GLAZING**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies glass, 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:
- B. Mirrors: Section 10 28 00, TOILET, BATH, AND LAUNDRY 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 COR.
- 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.

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. Elastic compound for metal sash glazing.
 - 3. Glazing cushion.
 - 4. Sealing compound.

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.

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 National Standards Institute (ANSI):
 - Z97.1-09 Safety Glazing Material Used in Building - Safety Performance Specifications and Methods of Test.
- C. 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
 - D4802-10 Poly (Methyl Methacrylate) Acrylic Plastic Sheet
 - E84-10 Surface Burning Characteristics of Building Materials
 - E119-10 Standard Test Methods for Fire Test of Building Construction and Material
 - E2190-10 Insulating Glass Unit
- D. Commercial Item Description (CID):
 - A-A-59502 Plastic Sheet, Polycarbonate

- E. Code of Federal Regulations (CFR):
 - 16 CFR 1201 - Safety Standard for Architectural Glazing Materials; 2010
- F. 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
- G. National Fenestration Rating Council (NFRC)
- H. Safety Glazing Certification Council (SGCC) 2012:
 - Certified Products Directory (Issued Semi-Annually).
- I. Underwriters Laboratories, Inc. (UL):
 - 752-11 Bullet-Resisting Equipment.
- J. Unified Facilities Criteria (UFC):
 - 4-010-01-2012..... DOD Minimum Antiterrorism Standards for Buildings
- K. Glass Association of North America (GANA):
 - Glazing Manual (Latest Edition)
 - Sealant Manual (2009)
- L. American Society of Civil Engineers (ASCE):
 - ASCE 7-10 Wind Load Provisions

PART 2 - PRODUCT

2.1 GLASS

- A. Use thickness stated unless specified otherwise in assemblies.
- B. Clear Glass:
 - 1. ASTM C1036, Type I, Class 1, Quality q4.
 - 2. Thickness, 6 mm (1/4 inch) unless otherwise indicated.
- C. Patterned Glass:
 - 1. ASTM C1036, Type II, Class 1, Form 1, Pattern PI, Finish F1, Quality Q6, Mesh m1.
 - 2. Thickness, 6 mm (1/4 inch) unless otherwise indicated.

2.2 HEAT-TREATED GLASS

- A. Clear Tempered Glass:
 - 1. ASTM C1048, Kind FT, Condition A, Type I, Class 1, Quality q3.
 - 2. Thickness, 6 mm (1/4 inch) unless otherwise indicated.
- B. Tinted Tempered Glass.
 - 1. ASTM C1048, Kind FT, Condition A, Type I, Class 2, Quality q3.
 - 2. Color: Solar bronze to match existing.
 - 3. Thickness, 6 mm (1/4 inch).

2.3 COATED GLASS

A. Low-E Tempered Glass:

1. ASTM C1048, Kind FT, Condition C, Type I, Class 1, Quality q3 with low emissivity pyrolytic coating having an E of 0.15.
2. Thickness, 6 mm (1/4 inch) unless otherwise indicated or required for structural performance.
3. Low E coating color to match Solarban 60

B. Spandrel Glass:

1. ASTM C1048, Kind HS, Condition B, Type I.
2. Thickness, 6 mm (1/4 inch).
3. Color: Solar bronze to match existing.

2.4 INSULATING GLASS UNITS

A. Provide factory fabricated, hermetically sealed glass unit consisting of two panes of glass separated by a dehydrated air space and comply with ASTM E2190.

B. Assemble units using glass types specified:

C. Sealed Edge Units (SEU): IG-1 (Vision Glass)

1. Insulating Glass Unit Makeup

a. Outboard Lite

1. Glass type: Tinted
2. Glass Tint: Solar bronze to match existing
3. Nominal Thickness: 1/4"
4. Glass Strength: Annealed, Heat-Strengthened, Tempered
5. Coating Orientation: No. 2 surface

b. Spacer

1. Nominal Thickness: 1/2"
2. Gas Fill: Air

c. Inboard Lite

1. Glass Type: Clear
2. Glass Tint: None
3. Nominal Thickness: 1/4"
4. Glass Strength: Annealed, Heat-Strengthened, Tempered

2. Performance Characteristics (Center of Glass)

- a. Visible Transmittance: 42%
- b. Visible Reflectance (inside / outside): 11% / 7%
- c. Winter U-factor (U-value): 0.29
- d. Shading Coefficient (SC): 0.31

- e. Solar heat Gain Coefficient (SHGC): 0.27
- 3. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
- 4. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.
- D. Sealed Edge Units (SEU): IG-2 (Spandrel glass)
 - 1. Insulating Glass Unit Makeup
 - a. Outboard Lite
 - 1. Glass type: Tinted
 - 2. Glass Tint: Solar bronze to match existing
 - 3. Nominal Thickness: 1/4"
 - 4. Glass Strength: Annealed, Heat-Strengthened, Tempered
 - 5. Coating Orientation: No. 2 surface
 - b. Spacer
 - 1. Nominal Thickness: 1/2"
 - 2. Gas Fill: Air
 - c. Inboard Lite
 - 1. Glass Type: Clear
 - 2. Glass Tint: None
 - 3. Nominal Thickness: 1/4"
 - 4. Glass Strength: Annealed, Heat-Strengthened, Tempered
 - 5. Coating Orientation: Ceramic Frit spandrel on No. 4 surface
 - 2. Performance Characteristics (Center of Glass)
 - a. Visible Transmittance: N/A
 - b. Visible Reflectance: N/A
 - c. Winter U-factor (U-value): 0.29
 - d. Shading Coefficient (SC): N/A
 - e. Solar heat Gain Coefficient (SHGC): N/A
 - 3. Glass shall be annealed, heat strengthened or tempered as required by codes, or as required to meet thermal stress and wind loads.
 - 4. Glass heat-treated by horizontal (roller hearth) process with inherent roller wave distortion parallel to the bottom edge of the glass as installed when specified.

2.5 FIRE RESISTANT GLASS WITHOUT WIRE MESH

- A. Type 1 (Transparent float glass), Class 1 (Clear).
- B. Fire-protective glass products used to protect against smoke and flames only shall be rated as indicated on drawings and as required by local building code and shall be tested in accordance

with NFPA 252 (Standard Methods of Fire Tests of Door Assemblies) and NFPA 257 (Standard on Fire Test for Window and Glass Block Assemblies)

- C. Fire-resistive products used to protect against smoke, flame, and the transmission of radiant heat shall be rated as indicated on drawings and shall be tested in accordance with NFPA 252, NFPA 257, and ASTM E119 (Standard Test Methods for Fire Tests of Building Construction and Materials).
- D. Fire-rated glass or glass assembly shall be classified by Underwriters Laboratory (UL), Intertek Testing Services- Warnock Hersey (ITS-WHI) or any other OSHA certified testing laboratory. All glass shall bear a permanent mark of classification in accordance with local building code.
- E. Maximum size is per the manufacturer's test agency listing for doors, transoms, side lights, borrowed lights, and windows.
- F. Where safety glazing is required by local building code, fire-rated glass shall be tested in accordance with CPSC 16 CFR 1201 Category I or II and bear a permanent mark of classification.
 - 1. Category I products are limited to 0.84 m² – 9 ft² and tested to no less than 203 Nm-150 ft-lbs impact loading.
 - 2. Category II products are greater than 0.84 m² – 9 ft² and tested to no less than 542 Nm-400 ft-lbs impact loading. Category II products can be used in lieu of Category I products.

2.6 DECORATIVE GLAZING

- A. Acrylic Resin Decorative Panels (obscure):
 - 1. Material: Acrylic Resin.
 - 2. Thickness, 6 mm (1/4 inch).
 - 3. Pattern, Color and Finish: See Section 09 06 00, Schedule For Finishes.

2.7 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.
- B. Setting Blocks: ASTM C864:
 - 1. Channel shape; having 6 mm (1/4 inch) internal depth.
 - 2. Shore a hardness of 80 to 90 Durometer.
 - 3. Block lengths: 50 mm (two inches) except 100 to 150 mm (four to six inches) for insulating glass.
 - 4. Block width: Approximately 1.6 mm (1/16 inch) less than the full width of the rabbet.
 - 5. Block thickness: Minimum 4.8 mm (3/16 inch). Thickness sized for rabbet depth as required.
- C. Spacers: ASTM C864:
 - 1. Channel shape having a 6 mm (1/4 inch) internal depth.

2. Flanges not less 2.4 mm (3/32 inch) thick and web 3 mm (1/8 inch) thick.
 3. Lengths: One to 25 to 76 mm (one to three inches).
 4. Shore a hardness of 40 to 50 Durometer.
- D. Sealing Tapes:
1. Semi-solid polymeric based material exhibiting pressure-sensitive adhesion and withstanding exposure to sunlight, moisture, heat, cold, and aging.
 2. Shape, size and degree of softness and strength suitable for use in glazing application to prevent water infiltration.
- E. Spring Steel Spacer: Galvanized steel wire or strip designed to position glazing in channel or rabbeted sash with stops.
- F. Glazing Gaskets: ASTM C864:
1. Firm dense wedge shape for locking in sash.
 2. Soft, closed cell with locking key for sash key.
 3. Flanges may terminate above the glazing-beads or terminate flush with top of beads.
- G. Lock-Strip Glazing Gaskets: ASTM C542, shape, size, and mounting as indicated.
- H. Glazing Sealants: ASTM C920, silicone neutral cure:
1. Type S.
 2. Class 25
 3. Grade NS.
 4. Shore A hardness of 25 to 30 Durometer.
- I. Color:
1. Color of glazing compounds, gaskets, and sealants used for aluminum color frames shall match color of the finished aluminum and be non-staining.
 2. Color of other glazing compounds, gaskets, and sealants which will be exposed in the finished work and unpainted shall be gray or neutral color.

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.
- C. Verify that wash down of adjacent masonry is completed prior to erection of glass and glazing units to prevent damage to glass and glazing units by cleaning materials.

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. Patterned Glass:
 - 1. Install units with one patterned surface with smooth surface on the weather side.
 - 2. Install units in interior partitions with pattern in same direction in all openings.
- G. Tempered Glass: Install with roller distortions in horizontal position unless otherwise directed.
- H. Fire Resistant Glass:
 - 1. Fire resistant glass: Glaze in accordance with UL design requirements.

3.4 INSTALLATION - DRY METHOD (TAPE AND GASKET SPLINE GLAZING)

- A. Cut glazing tape to length; install on glazing pane. Seal corners by butting and sealing junctions with butyl sealant.
- B. Place setting blocks at 1/4 points with edge block no more than 150 mm (6 inches) from corners.

- C. Rest glazing on setting blocks and push against fixed stop with sufficient pressure to attain full contact.
- D. Install removable stops without displacing glazing. Exert pressure for full continuous contact.
- E. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- F. Trim protruding tape edge.

3.5 REPLACEMENT AND CLEANING

- A. Clean new glass surfaces removing temporary labels, paint spots, and defacement after approval by COR.
- 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.

3.6 PROTECTION

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 and resinous 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, floor leveling and repair as required.

1.2 RELATED WORK

- A. Section 07 92 00, JOINT SEALANTS.

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 resinous products, VCT, tile 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.

2.2 CEMENTITIOUS SELF-LEVELING UNDERLAYMENT

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	1.9×10^5 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

- A. System Descriptions:
1. 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:
1. Wearing Surface: smooth
 2. 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, and resinous flooring in 3-7 days.
- 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 1inch, 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.
- 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 Section 07 92 00, JOINT SEALANTS and 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 as or detailed on drawings, address non-moving cracks or joints, provide a smooth surface for the installation of floor covering, or meet elevation requirements detailed on drawings.
- 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.

--- E N D ---

**SECTION 09 06 00
SCHEDULE FOR FINISHES**

PART I – GENERAL

1.1 DESCRIPTION

This section contains a coordinated system in which requirements for materials specified in other sections shown are identified by abbreviated material names and finish codes in the room finish schedule or shown for other locations.

1.2 MANUFACTURERS

Manufacturer's trade names and numbers used herein are only to identify colors, finishes, textures and patterns. Products of other manufacturer's equivalent to colors, finishes, textures and patterns of manufacturers listed that meet requirements of technical specifications will be acceptable upon approval in writing by contracting officer for finish requirements.

1.3 SUBMITALS

Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES-provide quadruplicate samples for color approval of materials and finishes specified in this section.

1.4 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. MASTER PAINTING INSTITUTE: (MPI)
2013Architectural Painting Specification Manual

PART 2- PRODUCTS

2.1 DIVISION 06 WOOD, PLASTICS, AND COMPOSITES

- A. SECTION 06 26 14, MINERAL PROFILE PANELING

Finish code	Manufacturer	Mfg. Color Name/No.
SP-1	Modular Arts	Crush Panel Paint: P-3

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO
2.2 DIVISION 08 - OPENINGS

SCHEDULE FOR FINISHES

10-11

A. SECTION 08 14 00, WOOD DOORS

Component	Finish/Color
Doors	Match Architects Sample
Frames	P-10 (unless noted otherwise)

B. SECTION 08 41 13, ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS

Material	Finish	Manufacturer	Manufacturer Color Name/No.
Aluminum	Clear Anodized	-	-

C. SECTION 08 80 00, GLAZING

Glazing Type	Manufacturer	Mfg. Color Name/No.
Specialty	3Form	Varia Ecoresin Pattern: Hint Flow Tint: Tide Front Texture: Hint Flow Emboss Back Texture: Patent

2.3 DIVISION 09 - FINISHES

A. SECTION 09 30 13, CERAMIC TILING

4. SECTION 09 30 13, CERAMIC TILE					
Finish Code	Size	Shape	Pattern	Manufacturer	Mfg. Color Name/No.
CT-1	12" x 12"	Square	Salerno	Daltile	Marrone Chiaro SL83
CT-2	12" x 12"	Square	Salerno	Daltile	Cremona Caffè SL82
CT-3	3" x 12"	Rectangle	Salerno	Daltile	Universal Wall Accent SL87

CT-4	3" x 12"	Bullnose	Salerno	Daltile	Marrone Chiaro SL83
GT-1	12" x 12"	Mosaic	Trifecta Blend	Florida Tile	Slate 14601

8. SECTION 09 30 13, CERAMIC TILE GROUT

Finish Code	Manufacturer	Mfg. Color Name/No.
G-1 (Use w/ CT-1,2,3,4 and GT-1)	Laticrete	Epoxy Natural Gray 24

B. SECTION 09 51 00, ACOUSTICAL CEILINGS

Finish Code	Component	Color Pattern	Manufacturer	Mfg Name/No.
AT-1	Type XII	White	Armstrong	Health Zone Optima 3114
AT-2	Type IV	White	Armstrong	Clean Room VL 868

C. SECTION 09 65 19, RESILIENT TILE FLOORING

Finish Code	Size	Material/Component	Manufacturer	Mfg Name/No.
SVT-1	18" x 36"	Solid Vinyl	Mannington	Dissolve Recede 12326
SVT-2	3" x 36"	Solid Vinyl	Mannington	Heritage Cherry Natural 12105
SVT-3	3" x 36"	Solid Vinyl	Mannington	Herritage Cherry Select 12103
SVT-4	18" x 18"	Solid Vinyl	Mannington	Fresco Burnished Nickel 12171
SVT-5	18" x 18"	Solid Vinyl	Spacia	Linen Weave SS5A3800
SVT-6	18" x 18"	Solid Vinyl	Spacia	Satin Weave SS5A3805

D. SECTION 09 65 13, RESILIENT BASE STAIR TREADS AND ACCESSORIES

Finish Code	Item	Size	Manufacturer	Mfg Name/No.
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RB-1	Rubber Base	4"	Johnsonite	05 Stone
PRB-1	Profile Rubber Base	4"	Johnsonite	Silhouette MX-05-J Stone
RST-1	Resilient Stair Treads	-	Johnsonite	Raised Square w/ Integrated Riser VIRTR- SQ, 05 Stone, 807 Prima Marbelized Insert
RT-1	Rubber Tile	24" x 24"	Johnsonite	Raised Square, 05 Stone

E. SECTION 09 68 00, CARPET MODULES

Finish Code	Size	Pattern direction	Manufacturer	Mfg. Color Name/No.
CPT-1	50CM x 50CM	Monolithic	Milliken	Cinch Muscadine 416
CPT-2	24" x 24"	Ashlar	Interface	Prairie Grass Delta 9306

F. SECTION 09 67 23.30 EPOXY RESINOUS FLOORING

Finish code	Manufacturer	Mfg. Color Name/No.
ERF-1	Stonhard	Stonblend GSI-G Luna

G. SECTION 09 91 00, PAINT AND COATINGS

1. MPI Gloss and Sheen Standards

		Gloss @60	Sheen @85
Gloss Level 1	a traditional matte finish-flat	max 5 units, and	max 10 units
Gloss Level 2	a high side sheen flat-"a velvet-like" finish	max 10 units, and	10-35 units
Gloss Level 3	a traditional "egg-shell like" finish	10-25 units, and	10-35 units
Gloss Level 4	a "satin-like" finish	20-35 units, and	min. 35 units
Gloss Level 5	a traditional semi-gloss	35-70 units	
Gloss Level 6	a traditional gloss	70-85 units	
Gloss level 7	a high gloss	more than 85 units	

2. Paint code	Gloss	Manufacturer	Mfg. Color Name/No.
P-1	3	Sherwin Williams	SW6098 Pacer White
P-2	3	Sherwin Williams	SW6106 Kilim Beige
P-3	3	Sherwin Williams	SW7015 Repose Gray
P-4	3	Sherwin Williams	SW6219 Rain
P-5	3	Sherwin Williams	SW6212 Quietude
P-6	3	Sherwin Williams	SW6262 Mysterious Mauve
P-7	3	Sherwin Williams	SW6654 Surprise Amber
P-8	3	Sherwin Williams	SW6240 Windy Blue
P-9	3	Sherwin Williams	SW6270 Soulmate
P-10	5	Sherwin Williams	SW6098 Pacer White
P-11	5	Sherwin Williams	SW7015 Repose Gray
P-12	3	Sherwin Williams	SW6214 Underseas
EP-1	3	Sherwin Williams	SW6098 Pacer White
EP-2	3	Sherwin Williams	SW6240 Windy Blue

2.4 DIVISION 10 - SPECIALTIES

A. SECTION 10 26 00, WALL GUARDS AND CORNER GUARDS

Code	Item	Manufacturer	Mfg. Color Name/No.
CG-1	Corner Guard	C-S Acrovyn	SM-20M 929 Oyster Gray, Full Height
CG-2	Corner Guard	C-S Acrovyn-	CO-8 Stainless Steel #4 Finish, Full Height
CR-1	Crash Rail	C-S Acrovyn	BG-10N 929 Oyster Gray
DFP-1	Door Frame Protector	C-S Acrovyn	B-1 929 Oyster Gray, Full Height
EG-1	End Guard	C-S Acrovyn	SSM25N Oyster Gray 929

HR-1	Hand Rail	C-S Acrovyn	HRB-20N, Rail: 373 Amber Cherry, Guard: 929 Oyster Gray
WP-1	Rigid Wall Covering	C-S Acrovyn	.060" Oyster Gray, Suede Texture
WP-2	High Impact Wall Panel System	C-S Acrovyn	Saratoga, Beadboard, 933 Mission White

2.5 DIVISION 12- FURNISHINGS

A. SECTION 12 24 00, WINDOW SHADES

Item/ Type	Metal Finish	Manufacturer	Mfg. Color Name/No.
Roller Window Shade	Gray	Phifer	Sheerweave 1% 2500, Oyster/Pearl Gray

A. SECTION 12 31 00, METAL CASEWORK

Item/ Type	Finish	Manufacturer	Mfg. Color Name/No.
Wall Cabinet	Powdercoat PS-1	Kewaunee	95 Stormy Blue

A. SECTION 12 32 00, WOOD CASEWORK

Item Type	Item Code	Manufacturer	Finish/Color
Base and Wall Cabinets	PL-1	Wilsonart	Wild Cherry 7054-60
Exposed Metal Brackets			Black

B. SECTION 12 36 00, COUNTERTOPS AND ACCESSORIES

Item Type	Item Code	Manufacturer	Finish/Color
Solid Surface	SS-1	Formica	Copper Quartz 772
Solid Surface	SS-2	Formica	Spanish Paprika Mist 307
Compact Laminate	CL-1	Wilsonart	Pewter Brushed 4779-60
Epoxy Resin	ER-1	Kemresin	Black

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. Load bearing framing: Section 05 40 00, COLD-FORMED METAL FRAMING.
- B. Support for wall mounted items: Section 05 50 00, METAL FABRICATIONS.
- C. Ceiling suspension systems for acoustical tile or panels and lay in gypsum board panels: Section 09 51 00, ACOUSTICAL CEILINGS and 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. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by beams, trusses, or bar joists. In interstitial spaces with walk-on floors the underside of the walk-on floor is the underside of structure overhead.
- C. 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. Shop Drawings:
 - 1. Typical ceiling suspension system.
 - 2. Typical metal stud and furring construction system including details around openings and corner details.
 - 3. Typical shaft wall assembly
 - 4. Typical fire rated assembly and column fireproofing showing details of construction same as that used in fire rating test.

D. 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

C635-07Manufacture, Performance, and Testing of Metal Suspension System for Acoustical Tile and Lay-in Panel Ceilings

C636-08Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels

C645-09Non-Structural Steel Framing Members

C754-11Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products

C841-03(R2008)Installation of Interior Lathing and Furring

C954-10Steel 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.
- E. Shaft Wall Framing:
 - 1. Conform to rated wall construction.
 - 2. C-H Studs.
 - 3. E Studs.
 - 4. J Runners.
 - 5. Steel Jamb-Strut.

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.

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.

2.5 SUSPENDED CEILING SYSTEM FOR GYPSUM BOARD (OPTION)

- A. Conform to ASTM C635, heavy duty, with not less than 35 mm (1-3/8 inch) wide knurled capped flange face designed for screw attachment of gypsum board.
- B. Wall track channel with 35 mm (1-3/8 inch) wide flange.

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.

3.2 INSTALLING STUDS

- A. Install studs in accordance with ASTM C754, except as otherwise shown or specified.
- B. Space studs not more than 406 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. Where studs are shown to terminate above suspended ceilings, provide bracing as shown or extend studs to underside of structure overhead.
- E. Extend studs to underside of structure overhead for fire, rated partitions, smoke partitions, shafts, and sound rated.
- F. Openings:
 - 1. Frame jambs of openings in stud partitions and furring with two studs placed back to back or as shown.
 - 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.
- G. 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.

H. 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).

I. Form building seismic or expansion joints with double studs back to back spaced 75 mm (three inches) apart plus the width of the seismic or expansion joint.

J. 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, 600 mm (24 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 at 600 mm (24 inches) on center, horizontally or vertically.
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.

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 SHAFT WALL SYSTEM

- A. Conform to UL Design No. U438 for two-hour fire rating. Provide one hour fire rating Shaft wall where indicated.
- B. Position J runners at floor and ceiling with the short leg toward finish side of wall. Securely attach runners to structural supports with power driven fasteners at both ends and 600 mm (24 inches) on center.
- C. After liner panels have been erected, cut C-H studs and E studs, from 9 mm (3/8-inch) to not more than 13 mm (1/2-inch) less than floor-to-ceiling height. Install C-H studs between liner panels with liner panels inserted in the groove.
- D. Install full-length steel E studs over shaft wall line at intersections, corners, hinged door jambs, columns, and both sides of closure panels.
- E. Suitably frame all openings to maintain structural support for wall:
 - 1. Provide necessary liner fillers and shims to conform to label frame requirements.
 - 2. Frame openings cut within a liner panel with E studs around perimeter.
 - 3. Frame openings with vertical E studs at jambs, horizontal J runner at head and sill.

3.6 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 metal lath anchorage.
 - 2. Space framing at 600 mm (24-inch) centers for gypsum board anchorage.
- B. 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.
- C. 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.
- D. Installing suspended ceiling system for gypsum board (ASTM C635 Option):
 - 1. Install only for ceilings to receive screw attached gypsum board.
 - 2. Install in accordance with ASTM C636.
 - a. Install main runners spaced 1200 mm (48 inches) on center.

- b. Install 1200 mm (four foot) tees not over 600 mm (24 inches) on center; locate for edge support of gypsum board.
 - c. Install wall track channel at perimeter.
- E. Installing Ceiling Bracing System:
- 1. Construct bracing of 38 mm (1-1/2 inch) channels for lengths up to 2400 mm (8 feet) and 50 mm (2 inch) channels for lengths over 2400 mm (8 feet) with ends bent to form surfaces for anchorage to carrying channels and overhead construction. Lap channels not less than 600 mm (2 feet) at midpoint back to back. Screw or bolt lap together with two fasteners.
 - 2. Install bracing at an approximate 45 degree angle to carrying channels and structure overhead; secure as specified to structure overhead with two fasteners and to carrying channels with two fasteners or wire ties.
 - 3. Brace suspended ceiling or soffit framing in seismic areas in accordance with ASTM E580.

3.7 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

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 05 40 00, COLD-FORMED METAL FRAMING, and Section 09 22 16, NON-STRUCTURAL METAL FRAMING.
- B. Cementitious Backer Board: Section 09 30 13 CERAMIC PORCELAIN TILING.
- C. Acoustical Sealants: Section 07 92 00, JOINT SEALANTS.
- D. Lay in gypsum board ceiling panels: Section 09 51 00, ACOUSTICAL CEILING.

1.3 TERMINOLOGY

- A. Definitions and description of terms shall be in accordance with ASTM C11, C840, and as specified.
- B. Underside of Structure Overhead: In spaces where steel trusses or bar joists are shown, the underside of structure overhead shall be the underside of the floor or roof construction supported by the trusses or bar joists.
- C. "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. Corner bead and edge trim.
 - 2. Finishing materials.
 - 3. Gypsum board, each type.
- C. Shop Drawings:
 - 1. Typical gypsum board installation, showing corner details, edge trim details and the like.
 - 2. Typical sound rated assembly, showing treatment at perimeter of partitions and penetrations at gypsum board.
 - 3. Typical shaft wall assembly.
 - 4. Typical fire rated assembly and column fireproofing, indicating details of construction same as that used in fire rating test.
- D. Samples:

1. Cornerbead.
2. Edge trim.
3. Control joints.

E. Test Results:

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

- F. Certificates: Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos material.

1.5 DELIVERY, IDENTIFICATION, HANDLING AND STORAGE

In accordance with the requirements of ASTM C840.

1.6 ENVIRONMENTAL CONDITIONS

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, 16 mm (5/8 inch) thick unless shown otherwise. Shall contain a minimum of 20 percent recycled gypsum.
- B. Coreboard or Shaft Wall Liner Panels.
 - 1. ASTM C1396, Type X.
 - 2. ASTM C1658: Glass Mat Gypsum Panels,
 - 3. Coreboard for shaft walls 300, 400, 600 mm (12, 16, or 24 inches) wide by required lengths 25 mm (one inch) thick with paper faces treated to resist moisture.
- C. Water Resistant Gypsum Backing Board: ASTM C620, Type X, 16 mm (5/8 inch) thick.
- D. 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 GYPSUM SHEATHING BOARD

- A. ASTM C1396, Type X, water-resistant core, 16 mm (5/8 inch) thick.
- B. ASTM C1177, Type X.

2.3 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.

2.4 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.

2.5 FINISHING MATERIALS AND LAMINATING ADHESIVE

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 on following partitions and furring:
 - 1. Two sides of partitions:

- a. Fire rated partitions.
 - b. Smoke partitions.
 - c. Sound rated partitions.
 - d. Full height partitions shown (FHP).
 - e. Corridor partitions.
 2. One side of partitions or furring:
 - a. Inside of exterior wall furring or stud construction.
 - b. Room side of room without suspended ceilings.
 - c. Furring for pipes and duct shafts, except where fire rated shaft wall construction is shown.
 3. Extend all layers of gypsum board construction used for fireproofing of columns from floor to underside of structure overhead, unless shown otherwise.
- B. In locations other than those specified, extend gypsum board from floor to heights as follows:
1. Not less than 100 mm (4 inches) above suspended acoustical ceilings.
 2. At ceiling of suspended gypsum board ceilings.
 3. At existing ceilings.

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.
- G. Walls (Except Shaft Walls):
 1. 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.
 2. When gypsum board is installed perpendicular to framing members, space fasteners 300 mm (12 inches) on center in field and along edges.
 3. Stagger screws on abutting edges or ends.
 4. 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.

5. 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.
6. No offset in exposed face of walls and partitions will be permitted because of single-ply and two-ply application requirements.
7. Control Joints ASTM C840 and as follows:
 - a. Locate at both side jambs of door frames and openings. 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. Acoustical or Sound Rated Partitions, 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. For sound rated partitions, 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. STC minimum values as shown.
- 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 INSTALLING GYPSUM SHEATHING

- A. Install in accordance with ASTM C840, except as otherwise specified or shown.

- B. Use screws of sufficient length to secure sheathing to framing.
- C. Space screws 9 mm (3/8 inch) from ends and edges of sheathing and 200 mm (8 inches) on center. Space screws a maximum of 200 mm (8 inches) on center on intermediate framing members.
- D. Apply 1200 mm by 2400 mm (4 ft. by 8 ft.) gypsum sheathing boards vertically with edges over framing.

3.4 CAVITY SHAFT WALL

- A. Coordinate assembly with Section 09 22 16, NON-STRUCTURAL METAL FRAMING, for erection of framing and gypsum board.
- B. Conform to UL Design No. U438 or FM WALL CONSTRUCTION 12-2/HR (Nonbearing for two-hour fire rating. Conform to FM WALL CONSTRUCTION 25-1/HR (Non-loadbearing) for one-hour fire rating where shown.
- C. Cut coreboard (liner) panels 25 mm (one inch) less than floor-to-ceiling height, and erect vertically between J-runners on shaft side.
 - 1. Where shaft walls exceed 4300 mm (14 feet) in height, position panel end joints within upper and lower third points of wall.
 - 2. Stagger joints top and bottom in adjacent panels.
 - 3. After erection of J-struts of opening frames, fasten panels to J-struts with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
- D. Gypsum Board:
 - 1. Two hour wall:
 - a. Erect base layer (backing board) vertically on finish side of wall with end joints staggered. Fasten base layer panels to studs with 25 mm (one inch) long screws, spaced 600 mm (24 inches) on center.
 - b. Use laminating adhesive between plies in accordance with UL or FM if required by fire test.
 - c. Apply face layer of gypsum board required by fire test vertically over base layer with joints staggered and attach with screws of sufficient length to secure to framing staggered from those in base, spaced 300 mm (12 inches) on center.
 - 2. One hour wall with one layer on finish side of wall: Apply face layer of gypsum board vertically. Attach to studs with screws of sufficient length to secure to framing, spaced 300 mm (12 inches) on center in field and along edges.
 - 3. Where coreboard is covered with face layer of gypsum board, stagger joints of face layer from those in the coreboard base.
- E. Treat joints, corners, and fasteners in face layer as specified for finishing of gypsum board.

3.5 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 non-decorated smoke barrier, fire rated and sound rated gypsum board 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 smoke barrier, fire rated and sound rated construction. Sanding is not required of non-decorated surfaces.

3.6 REPAIRS

- A. After taping and finishing has been completed, and before decoration, repair all damaged and defective work, including non-decorated 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 smoke tight construction fire protection equivalent to the fire rated construction and STC equivalent to the sound rated construction.

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**SECTION 09 30 13
CERAMIC TILING**

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies ceramic tile and tile backer board.

1.2 RELATED WORK

- A. Sealing of joints where specified: Section 07 92 00, JOINT SEALANTS.
- B. Color, texture and pattern of field tile and trim shapes, size of field tile, trim shapes, and color of grout specified: Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Metal and resilient edge strips at joints with new resilient flooring.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Base tile, each type, each color, each size.
 - 2. Ceramic tile, each type, color, patterns and size.
 - 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. Chemical resistant grout.
 - 3. Cementitious backer unit.
 - 4. Divider strip.
 - 5. Elastomeric Waterproof isolation membrane.
 - 6. Reinforcing tape.
 - 7. Leveling compound.
 - 8. Latex-Portland cement mortar.
 - 9. Slip resistant tile.
 - 10. Fasteners.
- D. Certification:
 - 1. Master grade, ANSI A137.1.
 - 2. Manufacturer's certificates indicating that the following materials comply with specification requirements:
 - a. Chemical resistant grout.
 - d. Cementitious backer unit.
 - c. Reinforcing tape.
 - d. Latex-Portland cement mortar and grout.

- e. Leveling compound.

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):
 - A108.1B-11 Installation of Ceramic Tile on a Cured Portland Cement Mortar
Setting Bed with dry-Set or latex-Portland Cement Mortar
 - A137.1-08..... 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)
 - C241-09..... Abrasion Resistance of Stone Subjected to Foot Traffic
 - 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
 - C979-10..... Pigments for Integrally Colored Concrete
 - C1002-07..... Steel Self-Piercing Tapping Screws for the Application of Panel
Products
 - C1027-09..... Determining "Visible Abrasion Resistance on Glazed Ceramic
Tile"
 - C1028-07..... Determining the Static Coefficient of Friction of Ceramic Tile and
Other Like Surfaces by the Horizontal Dynamometer Pull Meter
Method
 - C1127-09..... Standard Guide for Use of High Solids Content, Cold Liquid-
Applied Elastomeric Waterproofing Membrane with an Integral
Wearing Surface
 - C1178/C1178M-11 Standard Specification for Coated Glass Mat Water-Resistant
Gypsum Backing Panel
 - C1325-08..... Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units
 - D4397-10..... Standard Specification for Polyethylene Sheeting for
Construction, Industrial and Agricultural Applications

D5109-99(R2004).....Standard Test Methods for Copper-Clad Thermosetting
Laminates for Printed Wiring Boards

D. Marble Institute of America (MIA): Design Manual III-2007

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

2013Handbook 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 ASTM C1028, required for level of performance:
 - 1) Not less than 0.7 (wet condition) for bathing areas.
 - 2) Not less than 0.8 on ramps for wet and dry conditions.
 - 3) Not less than 0.6, except 0.8 on ramps as stated above, for wet and dry conditions for other areas.
 - b. Tile Having Abrasive Grains:
 1. Quarry Tile: Abrasive grains uniformly embedded in face at rate of approximately 7.5 percent of surface area.
4. Mosaic tile may be mounted or joined together by a resinous bonding material along tile edges.
5. 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.
6. 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. Ceramic Tile: Nominal 8 mm (5/16 inch) thick, with cushion edges. Ceramic tile produced by the dust pressed method shall be made of approximately 50% feldspar; the remaining 50% shall be made up of various high-quality light firing ball clays yielding a tile with a water absorption rate of 0.5% or less and a breaking strength of between 390 to 400 pounds.

C. 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 unless detailed or specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
3. Internal and External Corners:
 - a. External corners including edges: Use bullnose shapes.
 - b. Internal corners: Square.
 - c. Wall top edge: Use special shapes providing bullnose top edge.

2.2 CEMENTITIOUS BACKER UNITS

- A. Use in all areas with new wall tile.
- 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 A118.4.
 1. For wall applications, provide non-sagging, latex-Portland cement mortar complying with ANSI A118.4.
 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 Isolation Membrane:
 1. TCA F122-13.
 2. ANSI A118.10

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.
- B. Water-Cleanable Epoxy Grout: ANSI A118.3, with a VOC content of 65 g/L or less when calculated according to 40 CFR 59 (EPA Method 24).
 1. Provide product capable of withstanding continuous and intermittent exposure to temperatures of up to 60 and 100 degrees C (140 and 212 degrees F), respectively, and certified by manufacturer for intended use.

2.7 PATCHING AND SELF LEVELING UNDERLAYMENT

- 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 METAL DIVIDER STRIPS

- A. Terrazzo type divider strips.
- B. Heavy top type strip with 5 mm (3/16 inch) wide top and 38 mm (1-1/2 inch) long leg.
- C. Embedded leg perforated and deformed for keying to mortar.
- D. Aluminum or stainless steel.

2.9 WATER

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

2.10 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.

2.11 POLYETHYLENE SHEET

- A. Polyethylene sheet conforming to ASTM D4397.
- B. Nominal thickness: 0.15 mm (six mils).
- C. Use sheet width to minimize joints.

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 1000 (1/8 inch in 10 feet) where dry-set Portland cement, and latex-Portland cement mortar setting beds are used.
- B. Variation in Plane of Wall Surfaces:
 - 1. Not more than 1 in 800 (1/8 inch in eight feet) where dry-set or latex-Portland cement mortar materials is used.

3.3 SURFACE PREPARATION

- A. Cleaning New Concrete or Masonry:
 - 1. Chip out loose material, clean off all oil, grease dirt, adhesives, curing compounds, and other deterrents to bonding by mechanical method, or by using products specifically designed for cleaning concrete and masonry.

2. Use self-contained power blast cleaning systems to remove curing compounds and steel trowel finish from concrete slabs where ceramic tile will be installed directly on concrete surface with thin-set materials.
 3. Steam cleaning or the use of acids and solvents for cleaning will not be permitted.
- B. 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.
 - c. At substrate expansion, isolation, and other moving joints, allow joint of same width to continue through underlayment.
 3. Apply patching and leveling compound to concrete and masonry wall surfaces that are out of required plane.
 4. 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. Mortar Bed for Slopes to Drains:
1. Slope compound to drain where drains are shown.
 2. Screed for slope to drain and float finish.
 3. Cure mortar bed for not less than seven days. Do not use curing compounds or coatings.
- D. Walls:
1. In showers or other wet areas cover studs with polyethylene sheet.
 2. Apply patching and leveling compound to concrete and masonry surfaces that are out of required plane.
 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.
- E. 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 A108.11 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 METAL DIVIDER STRIPS

- A. Install metal divider strips in floor joints between tile floors and adjacent flooring of other materials where the finish floors are flush unless shown otherwise.
- B. Set divider strip in mortar bed to line and level centered under doors or in openings.

3.6 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. Installing Mortar Beds for Floors:
 - 1. Install mortar bed to not damage cleavage or waterproof membrane; 32 mm (1-1/2 inch) minimum thickness.
 - 2. Screed finish to level plane or slope to drains where shown, float finish.
 - 3. For thin set systems cure mortar bed not less than seven days. Do not use curing compounds or coatings.
- D. Setting Beds or Bond Coats:
 - 1. Use quarry tile in latex-Portland cement over cured mortar bed and self-leveling underlayment. ANSI A118.4, TCA System F205A-13.
 - 2. Set floor tile in latex-Portland cement mortar over elastomeric waterproofing isolation membrane. ANSI 118.10. 13, TCA System F122A-13.

3. Set wall tile installed over concrete backer board in latex-Portland cement mortar, ANSI A108.5, TCA System 244C-13.
4. Set trim shapes in same material specified for setting adjoining tile.

E. 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, except those units mounted in wall recesses.
 - 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, except those units mounted in wall recesses, with same tile as scheduled for room proper.
10. Joints:
 - a. Keep all joints in line, straight, level, perpendicular and of even width unless shown otherwise.

- b. Make joints 1/16 inch wide for glazed wall tile.
 - c. Make joints 3/16 inch wide for ceramic floor and wall tile.
 - c. Make joints in quarry tile work 3/8 inch wide. Finish joints flush with surface of 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 in wet areas, including showers, tub enclosures, laundries and swimming pools.
 - b. Tile wall installations composed of tiles 200 by 200 mm (8 by 8 inches) or larger.

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

- A. Installation of Tile: ANSI A118.4, except as specified otherwise.
- B. Where indicated, slope tile work to drains not less than 1 in 100 (1/8 inch per foot).

3.8 ELASTOMERIC WATERPROOFING AND CRACK ISOLATION MEMBRANE

- A. Surface Preparation: Prepare surfaces as specified in paragraph 3.3G
- B. Installation of Elastomeric Membrane: ANSI A108.13 and TCA F122A-13.
 - 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.

3.9 GROUTING

- A. Grout Type and Location:
 - 1. Grout for glazed wall and base tile, ceramic floor and wall tile, and quarry tile: Epoxy grout.
- B. Workmanship:
 - 1. Install and cure grout in accordance with the applicable standard.
 - 2. Epoxy Grout: ANSI A108.6
 - 3. Water-Cleanable Epoxy Grout: ANSI A118.3.

3.10 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 171-13.
- 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. Provide sealant at all perimeter joints.

3.11 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.

3.12 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.

3.13 TESTING FINISH FLOOR

- A. Test floors in accordance with ASTM C627 to show compliance with codes 1 through 10.
- B. Test kitchen and storage rooms.

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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 RELATED WORK

- A. Color, pattern, and location of each type of acoustical unit:
Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTAL

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - 1. Acoustical units, each type, with label indicating conformance to specification requirements.
 - 2. Colored markers for units providing access.
- C. Manufacturer's Literature and Data:
 - 1. Ceiling suspension system, each type, showing complete details of installation.
 - 2. Acoustical units, each type
- D. Manufacturer's Certificates: Acoustical units, each type, in accordance with specification requirements.

1.4 DEFINITIONS

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

1.5 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-09Zinc-coated (Galvanized) Carbon Steel Wire
 - A653/A653M-11Steel 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 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 in Section 09 06 00, SCHEDULE FOR FINISHES.

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. Hanger Inserts:

1. Fabricate inserts from steel, zinc-coated (galvanized after fabrication).
2. Nailing type option for wood forms:
 - a. Upper portion designed for anchorage in concrete and positioning lower portion below surface of concrete approximately 25 mm (one inch).
 - b. Lower portion provided with not less than 8 mm (5/16 inch) hole to permit attachment of hangers.
3. Flush ceiling insert type:
 - a. Designed to provide a shell covered opening over a wire loop to permit attachment of hangers and keep concrete out of insert recess.
 - b. Insert opening inside shell approximately 16 mm (5/8 inch) wide by 9 mm (3/8 inch) high over top of wire.
 - c. Wire 5 mm (3/16 inch) diameter with length to provide positive hooked anchorage in concrete.

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

B. Type XII Units (AT-1).

1. Glass fiber base with membrane-faced overlay, Form 2 – Water felted, minimum 16 mm (5/8 inch) thick. Apply over the paint coat on the face of the unit a poly (vinyl) chloride overspray having a flame spread index of 25 or less when tested in accordance with ASTM E84.
 2. Minimum NRC (Noise Reduction Coefficient): 0.95 unless specified otherwise: ASTM C423.
 3. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.86 on the exposed surfaces, except as specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
- C. Type IV Units (AT-2).
1. Mineral base with membrane-faced overlay, Form 2 – Water felted, minimum 16 mm (5/8 inch) thick. Apply over the paint coat on the face of the unit a poly (vinyl) chloride overspray having a flame spread index of 25 or less when tested in accordance with ASTM E84.
 2. Minimum CAC (Ceiling Attenuation Class): 40 unless specified otherwise: ASTM E413.
 3. Manufacturers standard finish, minimum Light Reflectance (LR) coefficient of 0.80 on the exposed surfaces, except as specified otherwise in Section 09 06 00, SCHEDULE FOR FINISHES.
 4. Special faced acoustical tile units shall be used for clean areas, and wet areas. Special faced acoustical tile units shall provide anti-microbial coated surfaces suitable for use in Class 5 Clean Rooms per ISO 14644-1. Special faced acoustical tile units shall meet all general requirements stated in this specification.

2.7 PERIMETER TRIM MOLDINGS

- A. Components: Edge trim system for suspended ceiling system, extruded aluminum alloy 6063 trim channel, curved inside and outside radii for acoustical applications.
1. Trim Channel: 6 inch wide face with 3/4 inch horizontal legs, curved sections for attachment to the tee-bar connection clip or hanging clip; commercial quality, extruded aluminum, factory finished in factory-applied baked polyester paint.

2.8 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 |
| Orange | Ductwork: Fire Dampers |
| Blue | Ductwork: Dampers and Controls |

Black..... Gas: Laboratory, Medical, Air and Vacuum

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.

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, minimum of one hanger at each corner of each item of mechanical, electrical and miscellaneous equipment supported by ceiling suspension system not having separate support or hangers.
 - 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. Install hanger inserts and wire loops required for support of hanger wire in concrete forms before concrete is placed. Install hanger wires with looped ends through steel deck if steel deck does not have attachment device.
- b. Use eye pins or threaded studs with screw-on eyes in existing or already placed concrete structures to support hanger 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. Attach hangers to bottom chord of bar joists or to carrying channels installed between the bar joists when hanger spacing prevents anchorage to joist. Rest carrying channels on top of the bottom chord of the bar joists, and securely wire tie or clip to joist.
- 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. Tile in concealed grid upward access suspension system:
 1. Install acoustical tile with joints close, straight and true to line, and with exposed surfaces level and flush at joints.
 2. Make corners and arises full, and without worn or broken places.
 3. Locate acoustical units providing access as specified under Article, ACCESS.
- D. 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.

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SECTION 09 65 13
RESILIENT BASE AND ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the installation of rubber base and resilient stair treads.

1.2 RELATED WORK

- A. Color and texture: Section 09 06 00, SCHEDULE FOR FINISHESS.

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. Resilient Stair Treads: 150 mm (6 inches) long.
 - 3. 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):
 - F1344-10Rubber Floor Tile
 - F1861-08Resilient Wall Base
- C. Federal Specifications (Fed. Spec.):
 - RR-T-650E Treads, Metallic and Non-Metallic, Nonskid

PART 2 - PRODUCTS

2.1 GENERAL

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.

2.3 PROFILE RESILIENT BASE

- A. ASTM F1861, Type TP, Group 1.
- B. Formed to profile indicated by manufacturer's designations in 09 06 00 SCHEDULE FOR FINISHES.

2.4 RESILIENT TREADS

- A. Fed. Spec. RR-T-650, Composition A, Type 2, 5 mm (3/16 inch) thick on wear surface tapering to 3 mm (1/8 inch) thick at riser end.
- B. Nosing shape to conform to sub-tread nosing shape.

2.5 PRIMER (FOR CONCRETE FLOORS)

As recommended by the adhesive and tile manufacturer.

2.6 LEVELING COMPOUND (FOR CONCRETE FLOORS)

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

2.7 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° C (70 °F), for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs, between 21° C and 27° C (70°F and 80°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 COR.
- B. Submit proposed installation deviation from this specification to the COR indicating the differences in the method of installation.

- C. The COR 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 and stair treads 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, 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. For resilient cove base, form corners and end stops as follows:
 - 1. Score back of outside corner.
 - 2. Score face of inside corner and notch cove.
- D. For profile resilient base, form corners and end stops as follows:
 - 1. Outside corners: Miter to fit.
 - 2. Inside corners: Butt one piece to corner then scribe next piece to fit.
- E. Roll base for complete adhesion.

3.5 STAIR TREAD INSTALLATION

- A. Prepare surfaces to receive the treads in accordance with applicable portions of paragraph, preparation.

- B. Layout of Treads.
 - 1. No joints will be accepted in treads.,
 - 2. Set full treads on intermediate and floor landings.
- C. Application:
 - 1. Apply adhesive uniformly with no bare spots.
 - 2. Roll and pound treads to assure adhesion.

3.6 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, sheet rubber and treads 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 tread and sheet rubber materials.
- D. When construction traffic is anticipated, cover tread materials with reinforced kraft paper and plywood or hardboard properly secured and maintained until removal is directed by the COR.
- 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.

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SECTION 09 65 19
RESILIENT TILE FLOORING

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies the installation of solid vinyl tile flooring, rubber tile flooring, and accessories.

1.2 RELATED WORK

- A. Color and pattern and location in room finish schedule: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. 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 manufacturers recommendations for adhesives, underlayment, primers and polish.
 - 3. Application and installation instructions.
- C. Samples:
 - 1. Tile: For each type, pattern and color.
 - 2. Edge Strips: 150 mm (6 inches) long, each type.
- D. Shop Drawings:
 - 1. Layout of patterns shown on the drawings and in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 2. Edge strip locations showing types and detail cross sections.
- E. 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
- F1344-10 Rubber Floor Tile
- F1700-04 (R2010) Solid Vinyl Floor Tile
- C. 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 SOLID VINYL-TILE

- A. ASTM F1700, 3 mm (1/8 inch) thick, homogenous throughout.
- B. 0.50 mm (0.20 inch) urethane aluminum oxide wear layer cured by UV process.
- C. Color and Pattern uniformly distributed throughout thickness.
- D. Where solid vinyl tiles are specified, seek products with recycled content.

2.3 RUBBER TILE

- A. ASTM F1344, Class 1, homogenous rubber tile, B, through mottled, 300 mm (12 inches) square, 3 mm (1/8 inch) thick.
- B. Color and pattern uniformly distributed throughout tile.
- C. Molded pattern wearing surface base thickness 3 mm (1/8 inch) thick.
- D. Where rubber tile is used provide tiles with a minimum of 90% post consumer rubber.

2.4 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.

2.5 PRIMER (FOR CONCRETE SUBFLOORS)

As recommended by the adhesive and tile manufacturer.

2.6 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.

2.7 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.

PART 3 - EXECUTION

3.1 PROJECT CONDITIONS

- A. Maintain temperature of materials a minimum of 22 °C (70 °F,) for 48 hours before installation.
- B. Maintain temperature of rooms where work occurs between 21 °C and 27 °C (70 °F and 80 °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:
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 COR 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. Anchor metal edge strips with anchors and screws specified.
 - 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 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.
- D. When construction traffic occurs over tile, cover resilient materials with reinforced kraft paper properly secured and maintained until removal is directed by COR. 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 COR.
- E. When protective materials are removed and immediately prior to acceptance, replace any damage tile, re-clean resilient materials, and buff floors.

3.5 LOCATION

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

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SECTION 09 67 23.30
RESINOUS (EPOXY BASE) HIGH PERFORMANCE DECORATIVE MORTAR FLOORING (RES-3)

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies a seamless resinous (epoxy resin composition) and aliphatic poly urethane sealer, flooring systems with integral cove base.

1.2 RELATED WORK

- A. Concrete and Moisture Vapor Barrier: Section 03 30 00, CAST-IN-PLACE CONCRETE.
- B. Substrate Preparation for Floor Finishes: Section 09 05 16.
- C. Color and location of each type of resinous (epoxy resin composition) flooring: Section 09 06 00, SCHEDULE FOR FINISHES.
- D. Floor Drains: Division 22, PLUMBING.

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 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 products having recycled content, submit documentation indicating percentages by weight of postconsumer and pre consumer recycled content.
 - a. Include statements indicating costs for each product having recycled content, and low emitting materials.
 - 2. Product data for Environmental Quality Credit EQ 4.2 low emitting materials, include printed statement of VOC content indicating compliance with environmental requirements.
 - 3. Product data for Material Resource Credit MR 4.1, 12%-35% post-consumer recycled glass content.
- E. Samples:
 - 1. Each color and texture specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 2. Samples for verification: For each (color and texture) resinous flooring system required, 6 inches (152 mm) square, applied to a rigid backing by installer for this project.

3. Sample showing construction from substrate to finish surface in thickness specified and color and texture of finished surfaces. Finished flooring must match the approved samples in color and texture.
- F. Shop Drawings: Include plans, sections, component details, and attachment to other trades. Indicate layout of the following:
 1. Patterns.
 2. Edge configuration.
- G. Certifications and Approvals:
 1. Manufacturer's certification of material and substrate compliance with specification.
 2. Manufacturer's approval of installer.
 3. Contractor's certificate of compliance with Quality Assurance requirements.
- H. Warranty: As specified in this section.

1.4 QUALITY ASSURANCE

- A. Manufacture Certificate: Manufacture shall certify that a particular resinous flooring system has been in use for a minimum of (5) five years.
- B. Installer Qualifications: Engage an experienced installer (applicator) who is experienced in applying resinous flooring systems similar in material, design, and extent to those indicated for this project for a minimum period of (5) five years, whose work has resulted in applications with a record of successful in-service performance, and who is acceptable to resinous flooring manufacturer.
 1. Engage an installer who is certified in writing by resinous flooring manufacturer as qualified to apply resinous flooring systems indicated.
 2. Contractor shall have completed at least (5) five projects of similar size and complexity. Include list of at least (5) five projects. List must include owner (purchaser); address of installation, contact information at installation project site; and date of installation.
 3. Installer's Personnel: Employ persons trained for application of specified product.
- C. Source Limitations:
 1. Obtain primary resinous flooring materials including primers, resins, hardening agents, grouting coats and finish or sealing coats from a single manufacturer.
 2. Provide secondary materials, including patching and fill material, joint sealant, and repair material of type and from source recommended by manufacturer of primary materials.
- D. Mockups: Apply mockups to verify selections made under sample submittals and to demonstrate aesthetic effects and set quality standards for materials and execution.
 1. Apply full-thickness mockups on 48 inch (1200 mm) square floor area selected by COR.
 - a. Include 48 inch (1200 mm) length of integral cove base.
 2. Test mock-up with anticipated chemicals to be used in the designated area.

3. Approved mockups not damaged during the testing may become part of the completed work if undisturbed at time of Substantial Completion.
 4. Sign off from COR on texture for slip resistance and clean ability must be complete before installation of flooring system.
- E. Pre-Installation Conference:
1. Convene a meeting not less than thirty days prior to starting work.
 2. Attendance:
 - a. Contractor
 - b. COR
 - c. Manufacturer and Installer's Representative
 3. Review the following:
 - a. Environmental requirements
 - 1) Air and surface temperature
 - 2) Relative humidity
 - 3) Ventilation
 - 4) Dust and contaminants
 - b. Protection of surfaces not scheduled to be coated
 - c. Inspect and discuss condition of substrate and other preparatory work performed
 - d. Review and verify availability of material; installer's personnel, equipment needed
 - e. Design and edge conditions.
 - f. Performance of the coating with chemicals anticipated in the area receiving the resinous (epoxy resin composition) flooring system
 - g. Application and repair
 - h. Field quality control
 - i. Cleaning
 - j. Protection of coating systems
 - k. One-year inspection and maintenance
 - l. Coordination with other work
- F. Manufacturer's Field Services: Manufacturer's representative shall provide technical assistance and guidance for surface preparation and application of resinous flooring systems.
- G. Contractor Job Site Log: Contractor shall document daily; the work accomplished environmental conditions and any other condition event significant to the long term performance of the resinous flooring systems installation. The Contractor shall maintain these records for one year after Substantial Completion.

1.5 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 and date of manufacture.

- 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. No On site weighing or volumetric measurements are allowed

1.6 PROJECT CONDITIONS

- A. Environmental Limitations: Comply with resinous flooring manufacturer's written instructions for substrate temperature, ambient temperature, moisture, ventilation, and other conditions affecting resinous flooring application.
 - 1. Maintain material and substrate temperature between 65 and 85 degrees F (18 and 30 degrees C) during resinous flooring application and for not less than 24 hours after application.
 - 2. Concrete substrate shall be properly cured per referenced section 03 30 00, CAST-IN-PLACE CONCRETE. Standard cure time a minimum of 30 days. A vapor barrier must be present for concrete subfloors on or below grade.
 - a. Resinous flooring applications where moisture testing resulting in readings exceeding limits as defined in this specification under part 3, section 3.4, paragraph B, shall employ an multiple component 15 mil thick system designed to suppress excess moisture in concrete.
 - b. Application at a minimum thickness of 15 mils, over properly prepared concrete substrate as defined in section 3.4.
 - c. Moisture suppression system must meet the design standards as follows:

Property	Test	Value
Tensile Strength	ASTM D638	4,400 psi
Volatile Organic Compound Limits (V.O.C.)	EPA & LEED	25 grams per liter
Permeance	ASTM E96 @ 16mils/ 0.4mm on concrete	0.1 perms
Tensile Modulus	ASTM D638	1.9X10 ⁵ psi
Percent Elongation	ASTM D638	12%
Cure Rate	Per manufactures Data	4 hours Tack free with 24hr recoat window
Bond Strength	ASTM D7234	100% bond to concrete failure

- B. Lighting: Provide permanent lighting or, if permanent lighting is not in place, simulate permanent lighting conditions during resinous flooring application.
- C. Close spaces to traffic during resinous flooring application and for not less than 24 hours after application, unless manufacturer recommends a longer period.

1.7 WARRANTY

- A. Work subject to the terms of the Article "Warranty of Construction" FAR clause 52.246-21.
- B. Warranty: Manufacture shall furnish a single, written warranty covering the full assembly for both material and workmanship for a extended period of (3) full years from date of installation, 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 installation. A sample warranty letter must be included with bid package or bid may be disqualified.

1.8 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. ASTM Standard C722-04 (2012), "Standard Specification for Chemical-Resistant Monolithic Floor Surfacing," ASTM International, West Conshohocken, PA, 2006, DOI: 10.1520/C0722-04R12, www.astm.org.
 - 1. Specification covers the requirements for aggregate-filled, resin-based, monolithic surfacings for use over concrete.
- C. American Society for Testing and Materials (ASTM):
 - C307 (2012) Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacing
 - C531 (2012) Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - C579 (2012) Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - C580 (2012) Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes
 - D638 (2010) Tensile Properties of Plastics
 - D1308 (2013) Effect of Household Chemicals on Clear and Pigmented Organic Finishes
 - D2240 (2010) Rubber Property—Durometer Hardness
 - D2794 (2010) Resistance of Organic Coatings to the Effects of Rapid Deformation Impact

D4060(2010)	Abrasion Resistance of Organic Coatings by the Taber Abraser
D4259 (2012)	Abrading Concrete to alter the surface profile of the concrete and to remove foreign materials and weak surface laitance
D7234 (2012)	Pull-Off Adhesion Strength of Coatings on Concrete Using Portable Pull-Off Adhesion Testers
E96/E96M (2013)	Water Vapor Transmission of Materials
F1679	Variable Incidence Tribometer for determining the slip resistance
F1869 (2011).....	Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
F2170 (2011).....	Determining Relative Humidity in Concrete Floor Slabs Using in situ Probes

PART 2 - PRODUCTS

2.1 SYSTEM DESCRIPTION FOR RESINOUS FLOORING

A. System Descriptions:

1. Monolithic, multi-component epoxy chemistry, steel trowel applied resinous flooring mortar system, nominal 3/16"/5mm thick system comprised of a penetrating primer, multi component 100% solids epoxy mortar, grout coat sealer and clear VOC compliant, aliphatic polyurethane non-reflective finish.
2. Broadcast systems will not be accepted. Steel trowel finish mortars only

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 mortar base product, build up layers of broadcast systems will not be accepted. Verify compatibility with substrate. Use manufacturer's standard components, compatible with each other and as follows:

1. Primer (Bond) Coat: Verify inclusion of primer in manufacturer's system.
 - a. Resin: Epoxy.
 - b. Formulation Description: 2 component, 100% solids.
 - c. Type: Non-pigmented.
 - d. Finish: Standard.
 - e. Number of coats: One.
2. Mortar (Base) Coat: Verify mortar composition.
 - a. Resin: Epoxy.
 - b. Formulation Description: 4 component, 100% solids, UV stable.
 - c. Application Method: Flat metal or plastic blade trowel.
 - 1) Thickness of coat: Verify thickness as systems vary by manufacturer; approximately from 3/16 to 1/4 inch (4.76 to 6.35 mm).

- 2) Number of coats: One.
- d. Aggregate: Pigmented color quartz silica, and a minimum of 12% recycled glass aggregates integral component to mortar.
- 3. Grout Coat: Verify inclusion of base coat in manufacturer's system.
 - a. Resin: Epoxy.
 - b. Formulation Description: 2 component, 100% solids, UV stable.
 - c. Type: Clear.
 - d. Finish: Matte.
 - e. Number of coats: One.
- 4. Top (Seal) Coat: Verify inclusion of water based aliphatic polyurethane sealer coat as systems vary by manufacturer.
 - a. Resin: multi-component waterborne aliphatic polyurethane.
 - b. Formulation Description: 2 component, 100% high solids, UV stable, stain and mar resistant.
 - c. Type: Clear.
 - d. Finish: Matte.
 - e. Number of coats: One.
- D. System Characteristics:
 - 1. Color and Pattern: As indicated in Section 09 06 00, SCHEDULE OF FINISHES.
 - 2. Integral cove base: 1 inch (25.4 mm) radius epoxy mortar cove keyed into concrete substrate. Verify cove base installation with manufacturer's system.
 - 3. Overall System Thickness: Verify thickness as systems vary by manufacturer; between 3/16 inch (4.76 mm) and 1/4 inch (6.35 mm)
 - 4. Finish: Standard anti-slip resistant to meet or exceed 0.06 dry; 0.08 wet.
- E. Physical Properties:
 - 1. Physical Properties of flooring system when tested as follows:

Property	Test	Value
Compressive Strength	ASTM C579	6,000 psi after 7 days
Volatile Organic Compound Limits (V.O.C.)	EPA & LEED	Below 50 g/l
Tensile Strength	ASTM C307	1,500 psi
Flexural Modulus of Elasticity	ASTM C580	5.0×10^5 psi
Water Absorption	ASTM C413	0.1%
Slip Resistance Index	ASTM F1679	0.81 dry and 0.56 wet. Minimal levels
Impact Resistance	ASTM D2794	> 160 in. lbs
Abrasion Resistance	ASTM D4060 Cs-17 wheel, 1000 cycles	0.06 gm maximum weight loss
Thermal Coefficient of Linear Expansion	ASTM C531	1.8×10^{-5} mm/ °C mm
Hardness Shore D	ASTM D2240	85 to 90
Bond Strength	ASTM D7234	100% Bond to concrete failure

F. 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%)

2.2 SUPPLEMENTAL MATERIALS

- A. Joint Sealant: Type recommended or produced by resinous flooring manufacturer for type of service or joint conditioned indicated.
- B. Waterproof Membrane: Type recommended or produced by manufacturer of resinous floor coatings for type of service and conditions as specified .

- C. Provide a chemical resistant epoxy novolac top coat capable of resisting sustained temperatures up to 120°C (250°F).
- D. Crack Isolation Membrane: Type recommended or produced by manufacturer of resinous flooring for conditions as specified .
- E. Anti-Microbial Additive: Incorporate anti-microbial chemical additive to prevent growth of most bacteria, algae, fungi, mold, mildew, yeast, etc..
- F. Patching and Fill Material: Resinous product of or approved by resinous coating manufacturer for application indicated. Resinous based materials only. Cementitious or single component product are not expectable.

2.3 BASE CAP STRIP

- A. Zinc cove strip
- B. Shape for 2mm depth of base material, "J" or "L" configuration.
- C. Finish:
 - 1. Finish exposed surfaces in accordance with NAAMM Metal Finishes Manual.

PART 3 - EXECUTION

3.1 INSPECTION

- A. Examine the areas and conditions where monolithic resinous flooring system with integral base is to be installed with the COR.
- B. Moisture Vapor Emission Testing: Perform moisture vapor transmission testing in accordance with ASTM F1869 to determine the MVER of the substrate prior to commencement of the work.
See section 3.4, 3.

3.2 PROJECT CONDITIONS

- A. Maintain temperature of rooms (air and surface) where work occurs, between 70 and 90 degrees F (21 and 32 degrees C) for at least 48 hours, before, during, and 24 hours after installation.
Maintain temperature at least 70 degrees F (21 degrees C) during cure period.
- B. Maintain relative humidity less than 75 percent.
- C. Do not install materials until building is permanently enclosed and wet construction is complete, dry, and cured.
- D. Maintain proper ventilation of the area during application and curing time period.
 - 1. Comply with infection control measures of the VA Medical Center.

3.3 INSTALLATION REQUIREMENTS

- A. The manufacturer's instructions for application and installation shall be reviewed with the COR for the seamless resinous flooring system with integral cove base and trench liner.
- B. Substrate shall be approved by manufacture technical representative.

3.4 PREPARATION

- A. General: Prepare and clean substrates according to resinous flooring manufacturer's written instructions for substrate indicated. Provide clean, dry, and neutral Ph substrate for resinous flooring application.
- B. Concrete Substrates: Provide sound concrete surfaces free of laitance, glaze, efflorescence, curing compounds, form-release agents, dust, dirt, grease, oil, and other contaminants incompatible with resinous flooring.
 - 1. Prepare concrete substrates as follows:
 - a. Comply with ASTM D4259 requirements, unless manufacturer's written instructions are more stringent.
 - 2. Repair damaged and deteriorated concrete according to resinous flooring manufacturer's written recommendations.
 - 3. Verify that concrete substrates are dry.
 - a. Perform anhydrous calcium chloride test, ASTM F 1869. Proceed with application only after substrates have maximum moisture-vapor-emission rate of 5 lb of water/1000 sq. ft. (1.36 kg of water/92.9 sq. m) in 24 hours.
 - b. MVT threshold for monolithic resinous Non - climatic flooring shall not exceed 5 lbs/1000 square feet (0.0001437 kPa) in a 24 hour period. MVT threshold for monolithic resinous climatic flooring shall not exceed 6 lbs/1000 square feet (0.0002155 kPa) over a 24 hour period.
 - c. When MVT emission exceeds this limit, apply manufacturer's recommended vapor control primer or other corrective measures as recommended by manufacturer prior to application of flooring or membrane systems.
 - d. Perform in situ probe test, ASTM F2170. Proceed with application only after substrates do not exceed a maximum potential equilibrium relative humidity of 85 percent.
 - e. Provide a written report showing test placement and results.
 - 4. Verify that concrete substrates have neutral Ph and that resinous flooring will adhere to them. Perform tests recommended by manufacturer. Proceed with application only after substrates pass testing.
- C. Resinous Materials: Mix components and prepare materials according to resinous flooring manufacturer's written instructions.
- D. Use patching and fill material to fill holes and depressions in substrates according to manufacturer's written instructions.
- E. Treat control joints and other nonmoving substrate cracks to prevent cracks from reflecting through resinous flooring according to manufacturer's written recommendations. Allowances should be included for flooring manufacturer recommended joint fill material, and concrete crack treatment.

- F. Prepare wall to receive integral cove base :
1. Verify wall material is acceptable for resinous flooring application, if not, install material (e.g. cement board) to receive base.
 2. Fill voids in wall surface to receive base, install undercoats (e.g. water proofing membrane, and/or crack isolation membrane) as recommended by resinous flooring manufacturer.
 3. Install base prior to flooring if required by resinous flooring manufacturer.
 4. Grind, cut or sand protrusions to receive base application.

3.5 APPLICATION

- A. General: Apply components of resinous flooring system according to manufacturer's written instructions to produce a uniform, monolithic wearing surface of thickness indicated.
1. Coordinate application of components to provide optimum adhesion of resinous flooring system to substrate, and optimum intercoat adhesion.
 2. Cure resinous flooring components according to manufacturer's written instructions. Prevent contamination during application and curing processes.
 3. At substrate expansion and isolation joints, provide joint in resinous flooring to comply with resinous flooring manufacturer's written recommendations.
 - a. Apply joint sealant to comply with manufacturer's written recommendations.
- B. Apply Primer: over prepared substrate at manufacturer's recommended spreading rate.
- C. Apply cove base: Trowel to wall surfaces at a 1 inch radius, before applying flooring. Apply according to manufacturer's written instructions and details including those for taping, mixing, priming, and troweling, sanding, and top coating of cove base. Round internal and external corners.
- D. Trowel mortar base: Mix mortar material according to manufacturer's recommended procedures. Uniformly spread mortar over substrate using a specially designed screed box adjusted to manufacturer's recommended height. Metal trowel hand or plastic blade power trowel, single mortar coat in thickness indicated for flooring system, Pre fill or grout to fill substrate voids. When cured, scrape or lightly stone mortar base to remove left unbounded material.
- E. Grout coat: Mix and roller apply the grout coats with strict adherence to manufacturer's installation procedures and coverage rates. (2) Two grout coatings to insure uniform coverage with wet on wet application.
- F. Topcoat: Mix and roller apply the topcoat(s) with strict adherence to manufacturer's installation procedures and coverage rates.

3.6 TOLERANCE

- A. From line of plane: Maximum 1/8 inch (3.18 mm) in total distance of flooring and base.
- B. From radius of cove: Maximum of 1/8 inch (3.18 mm) plus or 1/16-inch (1.59 mm) minus.

3.7 ENGINEERING DETAILS

- A. Chase edges to "lock" the flooring system into the concrete substrate along lines of termination.

- B. Penetration Treatment: Lap and seal resinous system onto the perimeter of the penetrating item by bridging over compatible elastomer at the interface to compensate for possible movement.
- C. Treat floor drains by chasing the flooring system to lock in place at point of termination.
- D. Treat control joints to bridge potential cracks and to maintain monolithic protection. Treat cold joints and construction joints to bridge potential cracks and to maintain monolithic protection on horizontal and vertical surfaces as well as horizontal and vertical interfaces.
- E. Discontinue Resinous floor system at vertical and horizontal contraction and expansion joints by installing backer rod and compatible sealant after coating installation is completed. Provide sealant type recommended by manufacturer for traffic conditions and chemical exposures to be encountered.

3.8 CURING, PROTECTION AND CLEANING

- A. Cure resinous flooring materials in compliance with manufacturer's directions, taking care to prevent contamination during stages of application and prior to completion of curing process.
- B. Close area of application for a minimum of 24 hours.
- C. Protect resinous flooring materials from damage and wear during construction operation.
 - 1. Cover flooring with kraft type paper.
 - 2. Optional 6 mm (1/4 inch) thick hardboard, plywood, or particle board where area is in foot or vehicle traffic pattern, rolling or fixed scaffolding and overhead work occurs.
- D. Remove temporary covering and clean resinous flooring just prior to final inspection. Use cleaning materials and procedures recommended by resinous flooring manufacturer.

--- E N D ---

**SECTION 09 68 00
CARPETING**

PART 1 - GENERAL

1.1 DESCRIPTION

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

1.2 RELATED WORK

- A. Color and texture of carpet and edge strip: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. 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" full size samples of carpets, showing quality, pattern and color specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 - 2. Floor Edge Strip (Molding): 150 mm (6 inches) long of each color and type specified.
- D. Shop Drawings: Installers layout plan showing seams and cuts for sheet carpet and carpet module.
- E. 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

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

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 Coverings-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: Square tile, sizes indicated in 09 06 00 SCHEDULE FOR FINISHES.
3. Provide static control to permanently control static build up to less than 2.0 kV when tested at 20 percent relative humidity and 21 degrees C (70 degrees F) in accordance with AATCC 134.
4. Pile Type: Level Loop.
5. Backing materials: Manufacturer's unitary backing designed for glue-down installation using recovered materials.
6. Appearance Retention Rating (ARR): Carpet shall be tested and have the minimum 3.5-4.0 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.
7. Tuft Bind: Minimum force of 40 N (10 lb) required to pull a tuft or loop free from carpet backing. Test per ASTM D1335.
8. Colorfastness to Crocking: Dry and wet crocking and water bleed, comply with AATCC 165 Color Transference Chart for colors, minimum class 4 rating.
9. Colorfastness to Ozone: Comply with AATCC 129, minimum rating of 4 on the AATCC color transfer chart.
10. Delamination Strength: Minimum of 440 N/m (2.5 lb/inch) between secondary backing.
11. 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.
 - c. Class II: Not less than 0.22 watts per square centimeter.
 - d. Carpet in corridors, exits and Medical Facilities: Class I.
12. Density: Average Pile Yarn Density (APYD):
 - a. Minimum APYD 6000.
13. VOC Limits: Use carpet and carpet adhesive that comply with the following limits for VOC content when tested according to ASTM D 5116:
 - a. Carpet, Total VOCs: 0.5 mg/sq.m x hr.
 - b. Carpet, 4-PC (4-Phenylcyclohexene): 0.05 mg/sq.m x hr.

- c. Carpet, Formaldehyde: 0.05 mg/sq.m x hr.
 - d. Carpet, Styrene: 0.4 mg/sq.m x hr.
 - e. Adhesive, Total VOCs: 10.00 mg/sq.m x hr.
 - f. Adhesive, Formaldehyde: 0.05 mg/sq.m x hr.
 - g. Adhesive, 2-Ethyl-1-Hexanol: 3.00 mg/sq.m x hr.
- B. Shall meet platinum level of ANSI/NSF 140.
- C. Color, Texture, and Pattern: As specified in Section 09 06 00, SCHEDULE FOR FINISHES.

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 as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

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 and existing carpet materials.
- 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. Carpet Modules:
1. Install per CRI 104, Section 13, Adhesive Application.
 2. Lay carpet modules with pile in specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 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.

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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. Type of Finish, Color, and Gloss Level of Finish Coat: Section 09 06 00, SCHEDULE FOR FINISHES.

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, the current Master Painters Institute (MPI) "Approved Product List" indicating brand label, product name and product code as of the date of contract award, will be used to determine compliance with the submittal requirements of this specification. The Contractor may choose to use subsequent MPI "Approved Product List", however, only one list may be used for the entire contract and each coating system is to be from a single manufacturer. All coats on a particular substrate must be from a single manufacturer. No variation from the MPI "Approved Product List" where applicable is acceptable.
- 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. Panel to show transparent finishes: Wood of same species and grain pattern as wood approved for use, 100 by 250 by 3 mm (4 inch by 10 inch face by 1/4 inch) thick minimum, and where both flat and edge grain will be exposed, 250 mm (10 inches) long by sufficient size, 50 by 50 mm (2 by 2 inch) minimum or actual wood member to show complete finish.
 - 4. Attach labels to panel stating the following:
 - a. Federal Specification Number or manufacturers name and product number of paints used.
 - b. Specification code number specified in Section 09 06 00, SCHEDULE FOR FINISHES.
 - c. Product type and color.
 - d. Name of project.

5. Strips showing not less than 50 mm (2 inch) wide strips of undercoats and 100 mm (4 inch) wide strip of finish coat.

D. Sample of identity markers if used.

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. In addition to manufacturer's label, provide a label legibly printed as following:
 1. Federal Specification Number, where applicable, and name of material.
 2. Surface upon which material is to be applied.
 3. If paint or other coating, state coat types; prime, body or finish.
- C. 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.
- D. 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. American Society for Testing and Materials (ASTM):
D260-86..... Boiled Linseed Oil
- E. Commercial Item Description (CID):
A-A-1555 Water Paint, Powder (Cementitious, White and Colors) (WPC)
(cancelled)
A-A-3120 Paint, For Swimming Pools (RF) (cancelled)
- F. Federal Specifications (Fed Spec):
TT-P-1411A..... Paint, Copolymer-Resin, Cementitious (For Waterproofing Concrete
and Masonry Walls) (CEP)

G. Master Painters Institute (MPI):

- No. 4-12.....Interior/ Exterior Latex Block Filler
- No. 50-12.....Interior Latex Primer Sealer
- No. 52-12.....Interior Latex, MPI Gloss Level 3 (LE)
- No. 107-12.....Primer, Rust-Inhibitive, Water Based
- No. 153-12.....Light Industrial Coating, Interior, Water Based, MPI Gloss Level 5
- No. 254-12.....High Performance Institutional, Two-Component Epoxy, Water
Based Coating, MPI Gloss Level 3.

H. 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. Cementitious Paint (CEP): TT-P-1411A [Paint, Copolymer-Resin, Cementitious (CEP)], Type 1 for exterior use, Type II for interior use.
- B. Interior/Exterior Latex Block Filler: MPI 4.
- C. Interior Latex Primer Sealer: MPI 50.
- D. Interior Latex, MPI Gloss Level 3 (LE): MPI 52.
- E. Primer, Rust-Inhibitive, Water Based: MPI 107.
- F. Light Industrial Coating, Interior, Water Based, MPI Gloss Level 5: MPI 153.
- G. High Performance Institutional, Two-Component Epoxy, Water Based Coating, MPI Gloss Level 3: MPI 254.

2.2 PAINT PROPERTIES

- A. Use ready-mixed (including colors), except two component epoxies, polyurethanes, polyesters, paints having metallic powders packaged separately and paints requiring specified additives.
- 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. Lead-Base Paint:

- a. Comply with Section 410 of the Lead-Based Paint Poisoning Prevention Act, as amended, and with implementing regulations promulgated by Secretary of Housing and Urban Development.
 - b. Regulations concerning prohibition against use of lead-based paint in federal and federally assisted construction, or rehabilitation of residential structures are set forth in Subpart F, Title 24, Code of Federal Regulations, Department of Housing and Urban Development.
 - c. For lead-paint removal, see Section 02 83 33.13, LEAD-BASED PAINT REMOVAL AND DISPOSAL.
3. Asbestos: Materials shall not contain asbestos.
 4. Chromate, Cadmium, Mercury, and Silica: Materials shall not contain zinc-chromate, strontium-chromate, Cadmium, mercury or mercury compounds or free crystalline silica.
 5. Human Carcinogens: Materials shall not contain any of the ACGIH-BKLT and ACGHI-DOC confirmed or suspected human carcinogens.
 6. Use high performance acrylic paints in place of alkyd paints, where possible.
 7. VOC content for solvent-based paints shall not exceed 250g/l and shall not be formulated with more than one percent aromatic hydro carbons by weight.

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 days 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 no exterior painting when it is windy and dusty.
 4. Do not paint in direct sunlight or on surfaces that the sun will soon warm.
 5. 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.

- b. Dampened with a fine mist of water on hot dry days concrete and masonry surfaces to which water thinned acrylic and cementitious paints are applied to prevent excessive suction and to cool surface.

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. Concrete Masonry Units:
 - 1. Clean and remove dust, dirt, oil, grease efflorescence, form release agents, laitance, and other deterrents to paint adhesion.

2. Use emulsion type cleaning agents to remove oil, grease, paint and similar products. Use of solvents, acid, or steam is not permitted.
 3. Remove loose mortar in masonry work.
 4. Replace mortar and fill open joints, holes, cracks and depressions with new mortar. Do not fill weep holes. Finish to match adjacent surfaces.
 5. Repair broken and spalled concrete edges with concrete patching compound to match adjacent surfaces as specified in CONCRETE Sections. Remove projections to level of adjacent surface by grinding or similar methods.
- E. Gypsum Board:
1. Remove efflorescence, loose and chalking plaster or finishing materials.
 2. Remove dust, dirt, and other deterrents to paint adhesion.
 3. 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. Mix two component and two part paint and those requiring additives in such a manner as to uniformly blend as specified in manufacturer's printed instructions unless specified otherwise.
- E. 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 COR.
- E. Finish surfaces to show solid even color, free from runs, lumps, brushmarks, laps, holidays, or other defects.

- F. Apply by brush, roller or spray, except as otherwise specified.
- G. Do not spray paint in existing occupied spaces unless approved by COR, except in spaces sealed from existing occupied spaces.
 - 1. Apply painting materials specifically required by manufacturer to be applied by spraying.
 - 2. In areas, where paint is applied by spray, mask or enclose with polyethylene, or similar air tight material with edges and seams continuously sealed including items specified in WORK NOT PAINTED, motors, controls, telephone, and electrical equipment, fronts of sterilizes and other recessed equipment and similar prefinished items.
- 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. Prime rebates for stop and face glazing of wood, and for face glazing of steel.
- E. Metals:
 - 1. Steel and iron: MPI 107 (Primer, Rust-Inhibitive, Water Based).
- F. Gypsum Board:
 - 1. Primer: MPI 50(Interior Latex Primer Sealer).
- G. Concrete Masonry Units except glazed or integrally colored and decorative units:
 - 1. MPI 4 (Block Filler) on interior surfaces.

3.6 INTERIOR FINISHES

- A. Apply following finish coats over prime coats in spaces or on surfaces specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- 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. Two coats of MPI 153 (Light Industrial Coating, Interior, Water Based (Gloss Level 5)).
- C. Gypsum Board:

1. Two coats of MPI 52 (Latex, Interior, Gloss Level 3)).
 2. Where epoxy wall coating is specified: Two coats of MPI 151 (Light Industrial Coating, Interior, Water Based (MPI Gloss Level 3)).
- D. Concrete Masonry Units:
1. Two coats of MPI 52 (Latex, Interior, Gloss Level 3)).
 2. Where epoxy wall coating is specified: Two coats of MPI 254 (High Performance Institutional, Two-Component Epoxy, Water Based (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. Color and gloss of finish coats is specified in Section 09 06 00, SCHEDULE FOR FINISHES.
- B. 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.
- C. 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.

3.9 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.

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**SECTION 10 14 00
SIGNAGE**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies interior signage for room numbers, directional signs, code required signs, and temporary interior signs.

1.2 RELATED WORK

- A. Color Finish: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 MANUFACTURER'S QUALIFICATIONS

Sign manufacturer shall provide evidence that they regularly and presently manufactures signs similar to those specified in this section as one of their principal products.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 00, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Samples: Sign panels and frames, with letters and symbols, each type. Submit 2 sets. One set of samples will be retained by COR, other returned to Contractor.
1. Sign Panel, 200 mm x 250 mm (8 inches x 10 inches), with letters.
 2. Color samples of each color, 150 mm x 150 mm (6 inches x 6 inches). Show anticipated range of color and texture.
 3. Sample of typeface, arrow and symbols in a typical full size layout.
- C. Manufacturer's Literature:
1. Showing the methods and procedures proposed for the concealed anchorage of the signage system to each surface type.
 2. Manufacturer's printed specifications, anchorage details, installation and maintenance instructions.
- D. Samples: Sign location plan, showing location, type and total number of signs required.
- E. Shop Drawings: Scaled for manufacture and fabrication of sign types. Identify materials, show joints, welds, anchorage, accessory items, mounting and finishes.
- F. Full size layout patterns for dimensional letters.

1.5 DELIVERY AND STORAGE

- A. Deliver materials to job in manufacturer's original sealed containers with brand name marked thereon. Protect materials from damage.
- B. Package to prevent damage or deterioration during shipment, handling, storage and installation. Maintain protective covering in place and in good repair until removal is necessary.
- C. Deliver signs only when the site and mounting services are ready for installation work to proceed.
- D. Store products in dry condition inside enclosed facilities.

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):
 - B209-07 Aluminum and Aluminum-Alloy Sheet and Plate
 - B221-08 Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and tubes.
- C. Federal Specifications (Fed Spec):
 - MIL-PRF-8184F Plastic Sheet, Acrylic, Modified.
 - MIL-P-46144C Plastic Sheet, Polycarbonate

1.7 MINIMUM SIGN REQUIREMENTS

- A. Permanent Rooms and Spaces:
 - 1. Tactile and Braille Characters, raised minimum 0.793 mm (1/32 in). Characters shall be accompanied by Grade 2 Braille.
 - 2. Type Styles: Characters shall be uppercase, Helvetica Medium, Helvetica Medium Condensed and Helvetica Regular.
 - 3. Character Height: Minimum 16 mm (5/8 in) high, Maximum 50 mm (2 in).
 - 4. Symbols (Pictograms): Equivalent written description shall be placed directly below symbol, outside of symbol's background field. Border dimensions of symbol background shall be minimum 150 mm (6 in) high.
 - 5. Finish and Contrast: Characters and background shall be eggshell, matte or other non-glare finish with adequate contrast with background.
 - 6. Mounting Location and Height: As shown. Mounted on wall adjacent to the latch side of the door and to avoid door swing and protruding objects.
- B. Overhead Signs:
 - 1. Type Styles: As shown. Characters shall have a width-to-height ratio between 3:5 and 1:1. Characters shall have a stroke width-to-height ratio of between 1:5 and 1:10.
 - 2. Character Height: minimum 75 mm (3 in) high for overhead signs. As shown, for directional signs.
 - 3. Finish and Contrast: Same as for signs of permanent rooms and spaces.
 - 4. Mounting Location and Height: As shown.

1.8 COLORS AND FINISHES:

Section 09 06 00, SCHEDULE FOR FINISHES.

PART 2 - PRODUCTS

2.1 GENERAL

- A. Signs of type, size and design shown on the drawings and as specified.
- B. Signs complete with lettering, framing and related components for a complete installation.

- C. Provide graphics items as completed units produced by a single manufacturer, including necessary mounting accessories, fittings and fastenings.
- D. Do not scale drawings for dimensions. Contractor to verify and be responsible for all dimensions and conditions shown by these drawings. COR to be notified of any discrepancy in drawing, in field directions or conditions, and/or of any changes required for all such construction details.
- E. The Sign Contractor, by commencing work of this section, assumes overall responsibility, as part of his warranty of work, to assure that assemblies, components and parts shown or required within the work of the section, comply with the Contract Documents. The Contractor shall further warrant: That all components, specified or required to satisfactorily complete the installation are compatible with each other and with conditions of installations.

2.2 PRODUCTS

- A. Aluminum:
 - 1. Sheet and Plate: ASTM B209.
 - 2. Extrusions and Tubing: ASTM B221.
- B. Cast Acrylic Sheet: MIL-PRF-8184F; Type II, class 1, Water white non-glare optically clear. Matt finish water white clear acrylic shall not be acceptable.
- C. Polycarbonate: MIL-P-46144C; Type I, class 1.
- D. Vinyl: 0.1 mm thick machine cut, having a pressure sensitive adhesive and integral colors.

2.3 SIGN STANDARDS

- A. Topography:
 - 1. Type Style: Helvetica Medium and Helvetica Medium Condensed. Initial caps or all caps as indicated in Sign Message Schedule.
 - 2. Arrow: See graphic standards in drawings.
 - 3. Letter spacing: See graphic standards on drawings.
 - 4. Letter spacing: See graphic standards on drawings.
 - 5. All text, arrows, and symbols to be provided in size, colors, typefaces and letter spacing shown. Text shall be a true, clean, accurate reproduction of typeface(s) shown. Text shown in drawings are for layout purposes only; final text for signs is listed in Sign Message Schedule.
- B. Project Colors and Finishes: See Section 09 06 00, SCHEDULE FOR FINISHES.

2.4 SIGN TYPES

- A. Interchangeable Component System:
 - 1. Interior sign system capable of being arranged in a variety of configurations with a minimum of attachments, devices and connectors.
 - a. Interchangeable nature of the system shall allow for changes of graphic components of the installed sign, without changing sign in its entirety.
- B. Sign Type Families:

1. Tactile sign is to be made from a material that provides for letters, numbers and Braille to be integral with sign plaque material such as: photosensitive polyamide resin, etched metal, sandblasted phenolic or embossed material. Do not apply letters, numbers and Braille with adhesive.
2. Numbers, letters and Braille to be raised 0.793 mm (.0312 inches) from the background surface. The draft of the letters, numbers and Braille to be tapered, vertical and clean.
3. Braille dots are to conform with standard dimensions for literary Braille; (a) Dot base diameter: 1.5 mm (.059 inches) (b) Inter-dot spacing: 2.3 mm (.090 inches) (c) Horizontal separation between cells: 6.0 mm (.241 inches) (d) Vertical separation between cells: 10.0 mm (.395 inches)
4. Entire assembly is painted in specified color. After painting, apply white or other specified color to surface of the numbers and letters. Entire sign is to have a protective clear coat sealant applied.
5. Complete sign is to have an eggshell finish (11 to 19 degree on a 60 degree glossmeter).
6. All text and graphics are to be first surface applied vinyl letters.

C. Temporary Interior Signs:

1. Fabricated from 50 kg (110 pound) matte finished white paper cut to 100 mm (4 inch) wide by 300 mm (12 inch) long. Punched 3 mm (.125 inch) hole with edge of hole spaced 13 mm (.5 inch) in from edge and centered on 100 mm (4 inch) side. Reinforce hole on both sides with suitable material that prevents tie from pulling through hole. Ties are steel wire 0.3 mm (0.120 inch) thick attached to tag with twist leaving 150 mm (6 inch) long free ends.
2. Mark architectural room number on sign, with broad felt marker in clearly legible numbers or letters that identify room, corridor or space as shown on floor plans.
3. Install temporary signs to all rooms that have a room, corridor or space number. Attach to door frame, door knob or door pull.
 - a. Doors that do not require signs are: corridor doors in corridor with same number, folding doors or partitions, toilet doors, bathroom doors within and between rooms, closet doors within rooms, communicating doors in partitions between rooms with corridor entrance doors.
 - b. Replace and missing damaged or illegible signs.

2.5 FABRICATION

- A. Design components to allow for expansion and contraction for a minimum material temperature range of 56 °C (100 °F), without causing buckling, excessive opening of joints or over stressing of adhesives, welds and fasteners.
- B. Form work to required shapes and sizes, with true curve lines and angles. Provide necessary rebates, lugs and brackets for assembly of units. Use concealed fasteners whenever and wherever possible.

- C. Shop fabricate so far as practicable. Joints fastened flush to conceal reinforcement, or welded where thickness or section permits.
- D. Contact surfaces of connected members be true. Assembled so joints will be tight and practically unnoticeable, without use of filling compound.
- E. Signs shall have fine, even texture and be flat and sound. Lines and miters sharp, arises unbroken, profiles accurate and ornament true to pattern. Plane surfaces be smooth flat and without oil-canning, free of rack and twist. Maximum variation from plane of surface plus or minus 0.3 mm (0.015 inches). Restore texture to filed or cut areas.
- F. Level or straighten wrought work. Members shall have sharp lines and angles and smooth surfaces.
- G. Extruded members to be free from extrusion marks. Square turns and corners sharp, curves true.
- H. Drill holes for bolts and screws. Conceal fastenings where possible. Exposed ends and edges mill smooth, with corners slightly rounded. Form joints exposed to weather to exclude water.
- I. Finish hollow signs with matching material on all faces, tops, bottoms and ends. Edge joints tightly mitered to give appearance of solid material.
- J. All painted surfaces properly primed. Finish coating of paint to have complete coverage with no light or thin applications allowing substrate or primer to show. Finished surface smooth, free of scratches, gouges, drips, bubbles, thickness variations, foreign matter and other imperfections.
- K. Movable parts, including hardware, are to be cleaned and adjusted to operate as designed without binding or deformation of members. Doors and covers centered in opening or frame. All contact surfaces fit tight and even without forcing or warping components.
- L. Pre-assemble items in shop to greatest extent possible to minimize field splicing and assembly. Disassemble units only as necessary for shipping and handling limitations. Clearly mark units for re-assembly and coordinated installation.
- M. No signs are to be manufactured until final sign message schedule and location review has been completed by the COR & forwarded to contractor.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Protect products against damage during field handling and installation. Protect adjacent existing and newly placed construction, landscaping and finishes as necessary to prevent damage during installation. Paint and touch up any exposed fasteners and connecting hardware to match color and finish of surrounding surface.
- B. Mount signs in proper alignment, level and plumb according to the sign location plan and the dimensions given on elevation and sign location drawings. Where otherwise not dimensioned, signs shall be installed where best suited to provide a consistent appearance throughout the project. When exact position, angle, height or location is in doubt, contact COR for clarification.
- C. Contractor shall be responsible for all signs that are damaged, lost or stolen while materials are on the job site and up until the completion and final acceptance of the job.

- D. Remove or correct signs or installation work COR determines as unsafe or as an unsafe condition.
- E. At completion of sign installation, clean exposed sign surfaces. Clean and repair any adjoining surfaces and landscaping that became soiled or damaged as a result of installation of signs.
- F. Locate signs as shown on the Sign Location Plans.
- G. Certain signs may be installed on glass. A blank glass back up is required to be placed on opposite side of glass exactly behind sign being installed. This blank glass back up is to be the same size as sign being installed.
- H. Contractor will be responsible for verifying that behind each sign location there are no utility lines that will be affected by installation of signs. Any damage during installation of signs to utilities will be the sole responsibility of the Contractor to correct and repair.
- I. Furnish inserts and anchoring devices which must be set in concrete or other material for installation of signs. Provide setting drawings, templates, instructions and directions for installation of anchorage devices which may involve other trades.

- - - END - - -

**SECTION 10 21 13
TOILET COMPARTMENTS**

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies metal toilet partitions and urinal screens.

1.2 RELATED WORK

- A. Color of baked enamel finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Grab bars and toilet tissue holders: Section 10 28 00, TOILET, BATH, AND LAUNDRY ACCESSORIES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples: Prime coat of paint on 150 mm (six-inch) square of metal panel with baked enamel finish coat over half of panel.
- C. Manufacturer's Literature and Data: Specified items indicating all hardware and fittings, material, finish, and latching.
- D. Shop Drawings: Construction details at 1/2 scale, showing installation details, anchoring and leveling devices.
- E. Manufacturer's certificate, attesting that zinc-coatings conform to specified requirements.

1.4 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. Federal Specifications (Fed. Spec.):
FF-B-575C..... Bolt, Hexagon and Square
- C. Code of Federal Regulations (CFR):
40 CFR 247 Comprehensive Procurement Guidelines for Products Containing
Recovered Materials
- D. Commercial Item Descriptions (CID):
A-A-1925 Shield, Expansion (Nail Anchors)
A-A-60003 Partitions, Toilet, Complete

PART 2 - PRODUCTS

2.1 TOILET PARTITIONS:

- A. Conform to Fed. CID A-A-60003, except as modified herein.
- B. Fabricate to dimensions shown or specified. Partitions to be hung from existing support steel.
- C. Toilet Enclosures:
 - 1. Type 1, Style B (Ceiling hung).

2. Reinforce panels shown to receive toilet tissue holders, grab bars and other toilet accessories indicated to be mounted on partition.
 3. Upper pivots and lower hinges adjustable to hold doors open 30 degrees.
 4. Latching devices and hinges for handicap compartments shall comply with ADA requirements.
 5. Keeper:
 - a. U-slot to engage bar of throw latch.
 - b. Combined with rubber bumper stop.
 6. Wheelchair Toilets:
 - a. Upper pivots and lower hinges to hold out swinging doors in closed position.
 - b. Provide U-type doors pulls, approximately 100 mm (four inches) long on pull side.
 7. Finish:
 - a. Finish 1 (baked enamel) on steel doors, pilasters, and enclosure panels except those adjacent to urinals and as specified.
- D. Urinal Screens:
1. Type III, Style E (wall hung), finish 2 or 3.
 - a. With integral flanges and continuous, full height wall anchor plate.
 - b. Wall anchor plate drilled for 4 anchors on both sides of screen.
 2. Screen 600 mm (24 inches) wide and 1060 mm (42 inches high).

2.2 FASTENERS

- A. Partition Fasteners: CID A-A-60003.
- B. Use expansion bolts, CID A-A-60003, for anchoring to solid masonry or concrete.
- C. Use toggle bolts, CID A-A-60003, for anchoring to hollow masonry or stud framed walls.
- D. Use steel bolts FS-B-575, for anchoring pilasters to overhead steel supports.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. General:
 1. Install in rigid manner, straight, plumb and with all horizontal lines level.
 2. Conceal evidence of drilling, cutting and fitting in finish work.
 3. Use hex-bolts for through-bolting.
 4. Adjust hardware and leave in freely working order.
 5. Clean finished surfaces and leave free of imperfections.
- B. Panels and Pilasters:
 1. Support panels, except urinal screens, and pilaster abutting building walls near top and bottom by stirrup supports secured to partitions with through-bolts.
 2. Secure stirrups to walls with two suitable anchoring devices for each stirrup.
 3. Secure panels to faces of pilaster near top and bottom with stirrup supports, through-bolted to panels and machine screwed to each pilaster.

4. Secure edges of panels to edges of pilasters near top and bottom with "U" shaped brackets.
- C. Urinal Screens:
1. Anchor urinal screen flange to walls with minimum of four bolts both side of panel.
 2. Space anchors at top and bottom and equally in between.

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SECTION 10 21 23
CUBICLE CURTAIN TRACKS

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies cubicle curtain track (C.C.T.)

1.2 RELATED WORK

Steel shapes for suspending track assembly: Section 09 51 00, ACOUSTICAL CEILINGS.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
 - One 300 mm (12 inch) long piece of cubicle curtain track with carrier access and end stop./
 - One clip anchor for fastening track to grid system of acoustical ceilings.
- C. Shop Drawings: Showing layout of tracks and method of anchorage.
- D. Manufacturer's Literature and Data:
 - Cubicle curtain track.

1.4 DELIVERY, STORAGE AND HANDLING

- A. Deliver material in original package marked to identify the contents, brand name, and the name of the manufacturer or supplier.
- B. Store in dry and protected location. Store so as to not bend or warp the tracks.
- C. Do not open packages until contents are needed for installation, unless verification inspection is required.

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):
 - B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes.
 - B456-03(R2009).....Electrodeposited Coatings for Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
- C. The National Association of Architectural Metal Manufacturers (NAAMM):
 - AMP 500 SeriesMetal Finishes Manual

PART 2 - PRODUCTS

2.1 CUBICLE CURTAIN TRACKS

- A. Surface mounted:
 - 1. Channel Tracks (Surface Mounted Type): Extruded aluminum, ASTM B221, alloy 6063, temper T5 or T6, channel shaped, with smooth inside raceway for curtain carriers.
- B. Curtain Carriers: Nylon or delrin carriers, with either nylon or delrin wheels on metal, delrin, or nylon axles. Equip each carrier with either stainless steel, chromium plated brass or steel hooks with swivel, or nickel chromium plated brass or stainless steel bead chain and hook assembly, or delrin carriers may have moulded on delrin hooks. Hook for bead chain may be the same material and finish as the bead chain or may be chromium plated steel. Provide 2.2 carriers for every 300 mm (onefoot) of each section of each track length, plus one additional carrier.
- C. End Stop Connectors, Ceiling Flanges and Other Accessories: Fabricate from the same material with the same finish as the tracks or from nylon.
- D. Hangers and Fittings: Fabricate from the same material with the same finish as the tracks. Hangers may be round or square for channel tracks and round for tubular tracks. Design fittings to be compatible with design of tracks and to safely transmit the track load to the hangers.
- E. At end of each section of track, make provision for insertion and removal of carriers. Design to prevent accidental removal of carrier. Any operating mechanism shall be removable with common tools.

2.3 FASTENERS

- A. Exposed Fasteners, Screws and Bolts: Stainless steel or chromium/nickel plated brass.
- B. Concealed Fasteners, Screws and Bolts: Hot-dip galvanized (except in high moisture areas use stainless steel).
- C. Metal Clips: Anchor curtain tracks to exposed grid of lay-in acoustical tile ceilings, with concealed metal (butterfly) type or two piece snap locking type ceiling clip of high strength spring steel. When it is not possible to install the metal ceiling clip, the cubicle curtain track may be screwed to the ceiling grid.

2.5 FABRICATION

- A. Weld and grind smooth joints of fabricated components.
- B. Form tracks and bends of lengths that will produce the minimum number of joints. Make track sections up to 4800 mm (16 feet) without joints. Form corner bend on a 300 mm (12 inch) radius.
- C. Provide steel anchor plates, supports, and anchors for securing components to building construction.
- D. Form flat surface without distortion.
- E. Shop assemble components and package complete with anchors and fittings.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install tracks after finish painting and ceiling finishing operations are complete.
- B. Install track level and hangers plumb and securely anchor to the ceiling to form a rigid installation.

- C. Anchor surface mounted curtain tracks directly to exposed grid of lay-in acoustical tile ceilings with suitable fasteners, spaced approximately 600 mm (24 inches) on center.
- D. Securely fasten end stop caps to prevent their being forced out by the striking weight of carriers.
- E. Remove damaged or defective components and replace with new components or repair to the original condition.

3.2 ACCEPTANCE

- A. Track shall be installed neat, rigid, plumb, level and true, and securely anchored to the overhead construction.
- B. Carrier units shall operate smoothly and easily over the full range of travel.

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SECTION 10 26 00
WALL AND DOOR PROTECTION

PART 1 - GENERAL

1.1 DESCRIPTION

This section specifies wall guards (crash rails or bumper guards), handrail/wall guard combinations, corner guards and high impact wall covering .

1.2 RELATED WORK

- A. Color and texture of aluminum and resilient material: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings: Show design and installation details.
- C. Manufacturer's Literature and Data:
 - 1. Handrail/Wall Guard Combinations.
 - 2. Wall Guards.
 - 3. Corner Guards.
 - 4. Door/Door Frame Protectors.
 - 5. High Impact Wall covering.
 - 6. High Impact Modular Wall System.
- D. Test Report: Showing that resilient material complies with specified fire and safety code requirements.

1.4 DELIVERY AND STORAGE

- A. Deliver materials to the site in original sealed packages or containers marked with the name and brand, or trademark of the manufacturer.
- B. Protect from damage from handling and construction operations before, during and after installation.
- C. Store in a dry environment of approximately 21° C (70 degrees F) for at least 48 hours prior to installation.

1.5 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 and Materials (ASTM):
 - A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

- B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire,
Shapes, and Tubes
- D256-06.....Impact Resistance of Plastics
- D635-06.....Rate of Burning and/or Extent and Time of Burning of Self-
Supporting Plastics in a Horizontal Position
- E84-09.....Surface Burning Characteristics of Building Materials
- C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500-06Metal Finishes Manual
- D. National Fire Protection Association (NFPA):
80-10Standard for Fire Doors and Windows
- E. Society of American Automotive Engineers (SAE):
J 1545-05Instrumental Color Difference Measurement for Exterior Finishes.
- F. Underwriters Laboratories Inc. (UL):
Annual Issue.....Building Materials Directory

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel: ASTM A167, Type 302B.
- B. Aluminum Extruded: ASTM B221, Alloy 6063, Temper T5 or T6. Aluminum alloy used for colored anodizing coating shall be as required to produce specified color.
- C. Resilient Material:
 - 1. Extruded and injection molded acrylic vinyl or extruded polyvinyl chloride meeting following requirements:
 - a. Minimum impact resistance of 1197 ps (25 ft lbs per sq.ft) when tested in accordance with ASTM D256 (Izod impact, ft.lbs. per inch notch).
 - b. Class 1 fire rating when tested in accordance with ASTM E84, having a maximum flame spread of 25 and a smoke developed rating of 450 or less.
 - c. Rated self extinguishing when tested in accordance with ASTM D635.
 - d. Material shall be labeled and tested by Underwriters Laboratories or other approved independent testing laboratory.
 - e. Integral color with all colored components matched in accordance with SAE J 1545 to within plus or minus 1.0 on the CIE-LCH scales.
 - f. Same finish on exposed surfaces.

2.2 CORNER GUARDS

- A. Resilient, Shock-Absorbing Corner Guards: Surface mounted type of 6 mm 1/4-inch corner) formed to profile shown.

1. Snap-on corner guard formed from resilient material, minimum 2 mm (0.078-inch) thick, free floating on a continuous 1.6 mm (0.063-inch) thick extruded aluminum retainer. Provide appropriate mounting hardware, cushions and base plates as required.
 2. Provide factory fabricated end closure caps at top and bottom of surface mounted corner guards.
- B. Stainless Steel Corner Guards: Fabricate of 1.6 mm (0.0625-inch) thick stainless steel. Form guards of dimensions and to contour shown.

2.3 WALL GUARDS AND HANDRAILS

- A. Resilient Wall Guards and Handrails:
1. Handrail/Wall Guard Combination: Snap-on covers of resilient material, minimum 2 mm (0.078-inch) thick, shall be free-floated on a continuous, extruded aluminum retainer, minimum 1.8 mm (0.072-inch) thick, anchored to wall at maximum 760 mm (30 inches) on center.
 2. Wall Guards (Crash Rails): Snap-on covers of resilient material, minimum 2.8 mm (0.110-inch) thick, shall be free-floated over 50 mm (two-inch) wide aluminum retainer clips, minimum 2.3 mm (0.090-inch) thick, anchored to wall at maximum 600 mm (24 inches) on center, supporting a continuous aluminum retainer, minimum 1.6 mm (0.062-inch) thick; or, shall be free-floated over a continuous extruded aluminum retainer, minimum 2.3 (0.090-inch) thick anchored to wall at maximum 600 mm (24 inches) on center.
 3. Provide handrails and wall guards (crash rails) with prefabricated and closure caps, inside and outside corners, concealed splices, cushions, mounting hardware and other accessories as required. End caps and corners shall be field adjustable to assure close alignment with handrails and wall guards (crash rails). Screw or bolt closure caps to aluminum retainer.

2.4 DOOR AND DOOR FRAME PROTECTION

- A. Fabricate door and door frame protection items from vinyl acrylic or polyvinyl chloride resilient material, minimum 0.9 mm (0.035-inch) thick for door frames..
- B. Coordinate door frame protection material requirements with door and frame to insure fit for all components, and color as specified.
- C. Provide adhesive as recommended by resilient material manufacturer.

2.5 HIGH IMPACT WALL COVERING

- A. Fabricate from vinyl acrylic or polyvinyl chloride resilient material minimum 6mm (0.06 inch) thick designed specially for interior use.
- B. Provide adhesive as recommended by the wall covering manufacturer.

2.6 HIGH IMPACT WALL SYSTEM

- A. Fabricate from vinyl acrylic or polyvinyl chloride resilient material minimum 1.02mm (0.04 inch) thick designed specially for interior use, with beadboard texture.
- B. Provide adhesive as recommended by the wall covering manufacturer.

- C. Vinyl/Acrylic Moldings: Vertical and horizontal moldings fabricated of minimum 1.02mm (0.04 inch) vinyl acrylic or polyvinyl chloride resilient material factory bonded to a particle board core.
 - 1. Vertical moldings to be 10mm (3/8 inch) thick, in widths indicated on drawings.
 - 2. Horizontal moldings, including wainscot and base molding, to be 13mm (1/2 inch) thick, in widths indicated on drawings.
 - 3. Provide on all inside and outside corners where wall system is installed. Corner pieces shall be 10 mm (3/8 inch) thick, in widths indicated on drawings.

2.7 FASTENERS AND ANCHORS

- A. Provide fasteners and anchors as required for each specific type of installation.
- B. Where type, size, spacing or method of fastening is not shown or specified, submit shop drawings showing proposed installation details.

2.8 FINISH

- A. In accordance with NAAMM AMP 500 series.
- B. Aluminum:
 - 1. Exposed aluminum: AAC22A31 chemically etched medium matte, with clear anodic coating, Class II Architectural, 0.4 mil thick.
 - 2. Concealed aluminum: Mill finish as fabricated, uniform in color and free from surface blemishes.
- C. Stainless Steel: NAAMM finish Number 4.
- D. Resilient Material: Embossed texture and color in accordance with SAE J 1545 and as specified in Section 09 06 00, SCHEDULE FOR FINISHES.

PART 3 - INSTALLATION

3.1 RESILIENT CORNER GUARDS

Install corner guards on walls in accordance with manufacturer's instructions.

3.2 STAINLESS STEEL CORNER GUARDS

- A. Mount guards on external corners of interior walls, partitions and columns as shown.
- B. Where corner guards are installed on gypsum board, clean surface and anchor guards with mechanical fasteners according to manufacturer's recommendations.

3.3 RESILIENT HANDRAIL WALL GUARD COMBINATIONS AND RESILIENT WALL GUARDS (CRASH RAIL)

Secure guards to walls with mounting cushions brackets and fasteners in accordance with manufacturer's details and instructions.

3.4 DOOR, DOOR FRAME PROTECTION

- A. Surfaces to receive protection shall be clean, smooth and free of obstructions.
- B. Install protectors after frames are in place but preceding installation of doors in accordance with approved shop drawings and manufacturers specific instructions.

- C. Apply with adhesive in controlled environment according to manufacturer's recommendations.
- D. Protection installed on fire rated doors and frames shall be installed according to NFPA 80 and installation procedures listed in UL Building Materials Directory; or, equal listing by other approved independent testing laboratory establishing the procedures.

3.5 HIGH IMPACT WALL COVERING AND HIGH IMPACT WALL SYSTEM

- A. Surfaces to receive protection shall be clean, smooth and free of obstructions.
- B. Apply with adhesive in controlled environment according to manufacturer's recommendations.
- C. Fabricate high impact wall system to comply with requirements indicated for design, dimensions, detail and sizes as indicated on drawings.
- D. Exposed edges of particle board trim will not be accepted. Provide corner trim pieces as required.
- E. Caulk all joints and fill all voids with color matching caulk.
- E. Install according to manufacturer's written recommendations.

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SECTION 10 28 00
TOILET, BATH, AND LAUNDRY ACCESSORIES

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies manufactured items usually used in dressing rooms, toilets, baths, locker rooms and at sinks in related spaces.
- B. Items Specified:
 - 1. Combination paper towel dispenser and disposal unit.
 - 2. Waste receptacles.
 - 3. Sanitary napkin disposals.
 - 4. Grab Bars: (10800-1.DWG).
 - 5. Metal framed mirror: (10800-7.DWG).
 - 6. Mop racks.

1.2 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings:
 - 1. Each product specified.
 - 2. Metal framed mirrors, showing shelf where required, fillers, and design and installation of units when installed on ceramic tile wainscots and offset surfaces.
 - 3. Grab bars, showing design and each different type of anchorage.
 - 4. Show material and finish, size of members, and details of construction, installation and anchorage of mop racks.
- C. Manufacturer's Literature and Data:
 - 1. All accessories specified.
 - 2. Show type of material, gages or metal thickness in inches, finishes, and when required, capacity of accessories.
 - 3. Mop racks.

1.3 QUALITY ASSURANCE

- A. Each product shall meet, as a minimum, the requirements specified, and shall be a standard commercial product of a manufacturer regularly presently manufacturing items of type specified.
- B. Each accessory type shall be the same and be made by the same manufacturer.
- C. Each accessory shall be assembled to the greatest extent possible before delivery to the site.
- D. Include additional features, which are not specifically prohibited by this specification, but which are a part of the manufacturer's standard commercial product.

1.4 PACKAGING AND DELIVERY

- A. Pack accessories individually to protect finish.
- B. Deliver accessories to the project only when installation work in rooms is ready to receive them.
- C. Deliver inserts and rough-in frames to site at appropriate time for building-in.
- D. Deliver products to site in sealed packages of containers; labeled for identification with manufacturer's name, brand, and contents.

1.5 STORAGE

- A. Store products in weathertight and dry storage facility.
- B. Protect from damage from handling, weather and construction operations before, during and after installation in accordance with manufacturer's instructions.

1.6 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. American Society for Testing and Materials (ASTM):
 - A167-99(R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet and Strip.
 - A176-99(R2009).....Stainless and Heat-Resisting Chromium Steel Plate, Sheet, and Strip
 - A269-10.....Seamless and Welded Austenitic Stainless Steel Tubing for General Service
 - A312/A312M-09Seamless and Welded Austenitic Stainless Steel Pipes
 - A653/A653M-10Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
 - B221-08.....Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Shapes, and Tubes
 - B456-03(R2009).....Electrodeposited Coatings of Copper Plus Nickel Plus Chromium and Nickel Plus Chromium
 - C1036-06.....Flat Glass
 - C1048-04.....Heat-Treated Flat Glass-Kind HS, Kind FT Coated and Uncoated Glass
 - D635-10.....Rate of Burning and/or Extent and Time of Burning of Self Supporting Plastics in a Horizontal Position
 - F446-85(R2009).....Consumer Safety Specification for Grab Bars and Accessories Installed in the Bathing Area.
 - D3453-07.....Flexible Cellular Materials - Urethane for Furniture and Automotive Cushioning, Bedding, and Similar Applications
 - D3690-02(R2009).....Vinyl-Coated and Urethane-Coated Upholstery Fabrics

- C. The National Association of Architectural Metal Manufacturers (NAAMM):
AMP 500 Series Metal Finishes Manual
- D. American Welding Society (AWS):
D10.4-86 (R2000)..... Welding Austenitic Chromium-Nickel Stainless Steel Piping and
Tubing
- E. Federal Specifications (Fed. Specs.):
A-A-3002 Mirrors, Glass
FF-S-107C (2) Screw, Tapping and Drive
FF-S-107C..... Screw, Tapping and Drive.
WW-P-541E(1)..... Plumbing Fixtures (Accessories, Land Use) Detail Specification

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Stainless Steel:
 - 1. Plate or sheet: ASTM A167, Type 302, 304, or 304L, except ASTM A176 where Type 430 is specified, 0.0299-inch thick unless otherwise specified.
 - 2. Tube: ASTM A269, Alloy Type 302, 304, or 304L.
- B. Glass:
 - 1. ASTM C1036, Type 1, Class 1, Quality q2, for mirrors.

2.2 FASTENERS

- A. Exposed Fasteners: Stainless steel or chromium plated brass, finish to match adjacent surface.
- B. Concealed Fasteners: Steel, hot-dip galvanized (except in high moisture areas such as showers or bath tubs use stainless steel).
- C. Toggle Bolts: For use in hollow masonry or frame construction.
- D. Hex bolts: For through bolting on thin panels.
- E. Expansion Shields: Lead or plastic as recommended by accessory manufacturer for component and substrate for use in solid masonry or concrete.
- F. Screws:
 - 1. ASME B18.6.4.
 - 2. Fed Spec. FF-S-107, Stainless steel Type A.
- G. Adhesive: As recommended by manufacturer for products to be joined.

2.3 FINISH

- A. In accordance with NAAMM AMP 500 series.
- B. AA-M32 Mechanical finish, medium satin.
 - 1. Stainless Steel: NAAMM AMP 503, finish number 4.

2.4 FABRICATION - GENERAL

- A. Welding, AWS D10.4.

- B. Grind dress, and finish welded joints to match finish of adjacent surface.
- C. Form exposed surfaces from one sheet of stock, free of joints.
- D. Provide steel anchors and components required for secure installation.
- E. Form flat surfaces without distortion. Keep exposed surfaces free from scratches and dents.
Reinforce doors to prevent warp or twist.
- F. Isolate aluminum from dissimilar metals and from contact with building materials as required to prevent electrolysis and corrosion.
- G. Hot-dip galvanized steel, except stainless steel, anchors and fastening devices.
- H. Shop assemble accessories and package with all components, anchors, fittings, fasteners and keys.
- I. Provide templates and rough-in measurements as required.
- J. Round and deburr edges of sheets to remove sharp edges.

2.5 WASTE RECEPTACLES

- A. Semi-recessed type, without doors. Fed. Spec WW-P-541, Type II.
- B. Fabricate of stainless steel.
- C. Form face frame from one piece.
- D. Provide removable waste receptacle of approximately (12 gallon) capacity, fabricated of stainless steel.
- E. Waste receptacle key locked in place.

2.6 SANITARY NAPKIN DISPOSALS

- A. Surface mounted type, with one piece construction cover secured to container with a full-length stainless steel piano hinge.
- B. Fabricate of stainless steel.

2.7 GRAB BARS

- A. Fed. Spec WW-P-541/8B, Type IV, bars, surface mounted, Class 2, grab bars and ASTM F446.
- B. Fabricate of stainless steel:
 - 1. Stainless steel: Grab bars, flanges, mounting plates, supports, screws, bolts, and exposed nuts and washers.
- C. Concealed mount.
- D. Bars:
 - 1. Fabricate from 38 mm (1-1/2 inch) outside diameter tubing.
 - a. Stainless steel, minimum 1.2 mm (0.0478 inch) thick.
 - 2. Fabricate in one continuous piece with ends turned toward walls, except swing up and where grab bars are shown continuous around three sides of showers, bars may be fabricated in two sections, with concealed slip joint between.
 - 3. Continuous weld intermediate support to the grab bar.
- E. Flange for Concealed Mounting:

1. Minimum of 2.65 mm (0.1046 inch) thick, approximately 75 mm (3 inch) diameter by 13 mm (1/2 inch) deep, with provisions for not less than three set screws for securing flange to back plate.
2. Insert grab bar through center of the flange and continuously weld perimeter of grab bar flush to back side of flange.

2.8 METAL FRAMED MIRRORS

- A. Fed. Spec. A-A-3002 metal frame; stainless steel, type 302 or 304.
- B. Mirror Glass:
 1. Minimum 6 mm (1/4 inch) thick.
 2. Set mirror in a protective vinyl glazing tape.
- C. Frames:
 1. Channel or angle shaped section with face of frame not less than 9 mm (3/8 inch) wide. Fabricate with square corners.
 2. Use either 0.9 mm (0.0359 inch) thick stainless steel.
 3. Filler:
 - a. Where mirrors are mounted on walls having ceramic tile wainscots not flush with wall above, provide fillers at void between back of mirror and wall surface.
 - b. Fabricate fillers from same material and finish as the mirror frame, contoured to conceal the void behind the mirror at sides and top.
- D. Back Plate:
 1. Fabricate backplate for concealed wall hanging of either zinc-coated, or cadmium plated 0.9 mm (0.036 inch) thick sheet steel, die cut to fit face of mirror frame, and furnish with theft resistant concealed wall fastenings.
 2. Use set screw type theft resistant concealed fastening system for mounting mirrors.
- E. Mounting Bracket:
 1. Designed to support mirror tight to wall.
 2. Designed to retain mirror with concealed set screw fastenings.

2.9 MOP RACKS

- A. Minimum 1.0M (40 inches) long with five holders.
- B. Clamps:
 1. Minimum of 1.3 mm (0.050-inch) thick stainless steel bracket retaining channel with a hard rubber serrated cam; pivot mounted to channel.
 2. Clamps to hold handles from 13 mm (1/2-inch) minimum to 32 mm (1-1/4 inch) maximum diameter.
- C. Support:

1. Minimum of 1 mm (0.0375 inch) thick stainless steel hat shape channel to hold clamps away from wall as shown.
2. Drill wall flange for 3 mm (1/8 inch) fasteners above and below clamp locations.
- D. Secure clamps to support with oval head machine screws or rivets into continuous reinforcing back of clamps.
- E. Finish on stainless Steel: AMP 503-No. 4.

PART 3 - EXECUTION

3.1 PREPARATION

- A. Before starting work notify COR in writing of any conflicts detrimental to installation or operation of units.
- B. Verify with the COR the exact location of accessories.

3.2 INSTALLATION

- A. Set work accurately, in alignment and where shown. Items shall be plumb, level, free of rack and twist, and set parallel or perpendicular as required to line and plane of surface.
- B. Toggle bolt to steel anchorage plates in frame partitions or hollow masonry.
- C. Install accessories in accordance with the manufacturer's printed instructions and ASTM F446.
- D. Install accessories plumb and level and securely anchor to substrate.
- E. Install accessories in a manner that will permit the accessory to function as designed and allow for servicing as required without hampering or hindering the performance of other devices.
- F. Align mirrors, dispensers and other accessories even and level, when installed in battery.
- G. Install accessories to prevent striking by other moving, items or interference with accessibility.

3.3 CLEANING

After installation, clean as recommended by the manufacturer and protect from damage until completion of the project.

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SECTION 10 44 13
FIRE EXTINGUISHER CABINETS

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section covers recessed fire extinguisher cabinets.

1.2 RELATED WORK

- A. SECTION 09 06 00 SCHEDULE FOR FINISHES.

1.3 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data: Fire extinguisher cabinet including installation instruction and rough opening required.

1.4 APPLICATION 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 of Testing and Materials (ASTM):
D4802-10 Poly (Methyl Methacrylate) Acrylic Plastic Sheet

PART 2 - PRODUCTS

2.1 FIRE EXTINGUISHER CABINET

Recessed type with flat trim of size and design shown.

2.2 FABRICATION

- A. Form body of cabinet from 0.9 mm (0.0359 inch) thick sheet steel.
- B. Fabricate door and trim from 1.2 mm (0.0478 inch) thick sheet steel with all face joints fully welded and ground smooth.
1. Glaze doors with 6 mm (1/4 inch) thick ASTM D4802, clear acrylic sheet, Category B-1, Finish 1.
 2. Design doors to open 180 degrees.
 3. Provide continuous hinge, pull handle, and adjustable roller catch.

2.3 FINISH

- A. Finish interior of cabinet body with baked-on semi-gloss white enamel.
- B. Finish door, frame with manufacturer's baked-on prime enamel. See Section 09 06 00 SCHEDULE FOR FINISHES.

PART 3 - EXECUTION

- A. Install fire extinguisher cabinets in prepared openings and secure in accordance with manufacturer's instructions.

RELOCATE PROSTHETICS
AND PODIATRY CLINICS
VAMC DAYTON, OHIO

FIRE EXTINGUISHER CABINETS

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- B. Install cabinet so that bottom of cabinet is 914 mm (36 inches) above finished floor unless otherwise indicated.

--- E N D ---

SECTION 11 52 13
PROJECTION SCREEN

PART 1 - GENERAL

1.1 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.

1.2 SUMMARY

- A. Section Includes:
 - 1. Electrically operated projection screens and controls.
- B. Related Sections:
 - 1. Division 05 Section "Metal Fabrications" for metal support framing for projection screens.
 - 2. Division 06 Section "Rough Carpentry" for wood backing for screen installation.
 - 3. Division 26 Sections for electrical service and connections including device boxes for switch and conduit, where required, for low-voltage control wiring.

1.3 DEFINITIONS

- A. Gain of Front-Projection Screens: Ratio of light reflected from screen material to that reflected perpendicularly from a magnesium carbonate surface as determined per SMPTE RP 94.
- B. Half-Gain Angle: The angle, measured from the axis of the screen surface to the most central position on a perpendicular plane through the horizontal centerline of the screen where the gain is half of the peak gain.

1.4 SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Shop Drawings: For projection screens. Show layouts and types of projection screens. Include the following:
 - 1. For electrically operated projection screens and controls:
 - a. Location of screen centerline relative to ends of screen case.
 - b. Location of wiring connections for electrically operated units.
 - c. Drop lengths.
 - d. Anchorage details, including connection to supporting structure for suspended units.
 - e. Details of juncture of exposed surfaces with adjacent finishes.
 - f. Accessories.
 - g. Wiring diagrams.
- C. Samples for Initial Selection: For finishes of surface-mounted screen cases.

- D. Maintenance Data: For projection screens to include in maintenance manuals.

1.5 QUALITY ASSURANCE

- A. Source Limitations for Projection Screens: Obtain projection screens from single manufacturer. Obtain accessories, including necessary mounting hardware, from screen manufacturer.
- B. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, by a qualified testing agency, and marked for intended location and application.

1.6 DELIVERY, STORAGE, AND HANDLING

- A. Environmental Limitations: Do not deliver or install projection screens until spaces are enclosed and weathertight, wet work in spaces is complete and dry, and temporary HVAC system is operating and maintaining ambient temperature and humidity conditions at occupancy levels during the remainder of the construction period.

1.7 COORDINATION

- A. Coordinate layout and installation of projection screens with adjacent construction, including ceiling suspension systems, light fixtures, HVAC equipment, fire-suppression system, and partitions.

PART 2 - PRODUCTS

2.1 ELECTRICALLY OPERATED PROJECTION SCREENS

- A. General: Manufacturer's standard units consisting of case, screen, motor, controls, mounting accessories, and other components necessary for a complete installation. Provide units that are listed and labeled as an assembly by UL or another testing and inspecting agency acceptable to authorities having jurisdiction.
1. Controls: Remote, three-position control switch installed in recessed device box with flush cover plate matching other electrical device cover plates in room where switch is installed.
 - a. Provide two control switches for each screen.
 - b. Provide power supply for low-voltage systems if required.
 2. Motor in Roller: Instant-reversing motor of size and capacity recommended by screen manufacturer; with permanently lubricated ball bearings, automatic thermal-overload protection, preset limit switches to automatically stop screen in up and down positions, and positive-stop action to prevent coasting. Mount motor inside roller with vibration isolators to reduce noise transmission.
 3. Screen Mounting: Top edge securely anchored to rigid metal roller and bottom edge formed into a pocket holding a ~~3/8-inch-~~ (9.5-mm-) diameter metal rod with ends of rod protected by plastic caps.
 - a. Roller for motor in roller supported by vibration- and noise-absorbing supports.

4. Tab Tensioning: Provide units that have a durable low-stretch cord, such as braided polyester, on each side of screen connected to edge of screen by tabs to pull screen flat horizontally.
- B. Suspended, Electrically Operated Screens with Automatic Ceiling Closure: Motor-in-roller units designed and fabricated for suspended mounting; with bottom of case composed of two panels, fully enclosing screen, motor, and wiring; one panel hinged and designed to open and close automatically when screen is lowered and fully raised, the other removable or openable for access to interior of case.
 1. Products: Subject to compliance with requirements, provide one of the following
 - a. Motor in Roller Type
 2. Provide metal or metal-lined wiring compartment on units with motor in roller.
 3. Screen Case: Made from metal.
 4. Provide screen case with trim flange to receive ceiling finish.
 5. Finish on Exposed Surfaces: Prime painted.

2.2 FRONT-PROJECTION SCREEN MATERIAL

- A. Matte-White Viewing Surface: Peak gain not less than 0.9, and gain not less than 0.8 at an angle of 50 degrees from the axis of the screen surface.
- B. Material: vinyl sheet.
- C. Mildew-Resistance Rating: 0 or 1 when tested according to ASTM G 21.
- D. Flame Resistance: Passes NFPA 701.
- E. Flame-Spread Index: Not greater than 75 when tested according to ASTM E 84.
- F. Seamless Construction: Provide screen, in sizes indicated, without seams.
- G. Edge Treatment: Black masking borders.
- H. Size of Viewing Surface: 52 by 92 inches (1219 by 1651 mm).
- I. Provide one foot of extra drop length at top of shade.
 1. Color: Black.

PART 3 - EXECUTION

3.1 FRONT-PROJECTION SCREEN INSTALLATION

- A. Install front-projection screens at locations indicated to comply with screen manufacturer's written instructions.
- B. Install front-projection screens with screen cases in position and in relation to adjoining construction indicated. Securely anchor to supporting substrate in a manner that produces a smoothly operating screen with vertical edges plumb and viewing surface flat when screen is lowered.
 1. Install low-voltage controls according to NFPA 70 and complying with manufacturer's written instructions.

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- a. Wiring Method: Install wiring in raceway except in accessible ceiling spaces and in gypsum board partitions where unenclosed wiring method may be used. Use UL-listed plenum cable in environmental air spaces, including plenum ceilings. Conceal raceway and cables except in unfinished spaces.
2. Test electrically operated units to verify that screen controls, limit switches, closures, and other operating components are in optimum functioning condition.
3. Test manually operated units to verify that screen-operating components are in optimum functioning condition.

---END---

SECTION 11 73 00
CEILING MOUNTED PATIENT LIFT SYSTEM

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Ceiling Mounted Patient Lift Systems for the transfer of physically challenged patients are specified in this section.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.
- B. Section 26 05 11, REQUIREMENTS FOR ELECTRICAL INSTALLATIONS: General Electrical Requirements and items, which are common to sections of Division 26.

1.3 QUALITY ASSURANCE

- A. Certification for compliance is required for Ceiling Mounted Patient Lift Systems. Certifications shall be provided by an independent third party who will conduct testing to ensure that the ceiling lift and charging system are safe and in compliance with ISO 10535 & UL 60601-1
- B. Inspection of equipment after installation is required prior to use for patient movement. Inspection shall be in accordance with manufacturer's installation checklist and the facilities installation checklist (Patient Safety Alert AL14-07).

1.4 SUBMITTALS

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Certificates of Compliance
- C. Manufacturer's Literature and Data:
 - 1. Lifting Capacity
 - 2. Lifting Speed
 - 3. Horizontal Displacement Speeds
 - 4. Horizontal Axis Motor
 - 5. Vertical Axis Motor
 - 6. Emergency Brake
 - 7. Emergency Lowering Device
 - 8. Emergency Stopping Device
 - 9. Electronic Soft-Start and Soft-Stop Motor Control
 - 10. Current Limiter for Circuit Protection
 - 11. Low Battery Disconnect System
 - 12. Strap Length
 - 13. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g.,

- vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.
- D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.
- E. Manufacturer's Checklist for after installation inspection.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are listed in the text by the basic designation only.
- B. International Organization for Standardization (IOS):
10535-06 Hoist for the Transfer of Disabled Persons-Requirements and Test Methods
- C. Underwriters Laboratories (UL):
60601-1(2003)..... Medical Electrical Equipment: General Requirements for Safety
94-2013 UL Standards for Safety Test for Flammability of Plastic Materials for Parts in Devices and Appliances-Fifth Edition
- D. International Electromagnetic Commission (IEC):
801-2(1991)..... Electromagnetic Compatibility for Industrial-Process Measurement and Control Equipment-Part 2: Electromagnetic Discharge Requirements
- E. Patient Safety Alert AL14-07

PART 2 - PRODUCTS

2.1 GENERAL

- A. Ceiling lift unit, track systems and support hangers shall be as Manufactured by Guldmann.

2.2 CEILING TRACK SYSTEM

- A. The Ceiling Track shall be made from high strength extruded aluminum T66081-T5 at a thickness of 3/16" (4.8mm). The ceiling track shall be finished with baked enamel paint.
1. Ceiling track fixed rails shall be overhead supported GH# series rails of depth as required for indicated span and lift rating. Lift supplier to design and provide hangers to support lift and tracks from structure above.
- a. Anchors are to have an ultimate safety factor of at least 4.0.
- b. Loads supported by steel beams are to be applied in a manner which does not cause torsion about the longitudinal axis of the beam.
- c. Loads greater than 200 lb are not to be hung from slab on metal deck.

2. Fixed rails shall be recessed into ceiling system and include trim pieces to receive ceiling panels.
3. The ceiling track shall be finished with baked enamel paint.

2.3 LIFT UNIT

- A. The Lift Unit shall be constructed of a steel frame system (2205lbs / 1000kg tested) driven by a gear reduced high torque motor
- B. The Lift system shall have the following features.
 1. Lifting capacity: 550 (GH3 Module)
 2. Electronic soft-start and soft-stop motor control
 3. Emergency lowering device
 4. Emergency stopping device
 5. Current limiter for circuit protection in case of overload.
 6. Safety device that stops the motor to lift when batteries are low.
 7. Lifting speed: 2.3in/s (6 cm/s), 1.6in/s (3.5cm) in full capacity
 8. Horizontal displacement speed: 5.9in/s (150mm/s)
 9. Horizontal axis motor: 24VDC at 62 watts and vertical axis motor at 110 watts
 10. Emergency brake (in case of mechanical failure)
 11. Strap length up to 90in (2.3m) tested for 2998lbs (1360kg)
 12. Cab: VO plastic–fire retardant, UL 94
 13. Wireless remote control (optional)

2.4 MOTORS

- A. Vertical Movement-DC Motor
 1. Type: Class A, fully enclosed, permanent magnet.
 2. Rating: 24Vdc, 1.1A, 110W, 4000RPM, 0.3N-m.
 3. Mounting: Secured to chassis.
- B. Horizontal Movement-DC Motor
 1. Type: Fully enclosed, permanent magnet, integral reducer.
 2. Rating: 24Vdc, 1.8A, 62W, 260RPM, 1.0N-m.
 3. Mounting: Secured to chassis.

2.5 BATTERIES

- A. The life cycle (number of charging cycles) for batteries shall be in compliance with IEC 801-2.
- B. Provide rechargeable batteries with up to 120 transfers with a load of 200lbs (74kg) and up to 70 transfers with its maximum load of 550lbs (200kg).

2.6 CHARGER

- A. Charger Input: 100-240 Vac, 50/60 Hz.
- B. Charger Output: 27 Vdc, 1 A max.

- C. Supplemental to the charger provide a clip on charging station with indicator lights.

2.7 STRAPS AND SLING

- A. The straps shall be made of threaded nylon. The straps shall ensure the patient's safety by preventing the patient from falling out of the sling.
- B. The sling shall be made from a polyester/nylon net material that is pliable, breathable and easy to use. The sling shall cradle the body of the patient.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install ceiling mounted patient lift system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on drawings.
- B. If the distance in between the suspended ceiling and anchors is more than 18" consult with manufacturer to determine if lateral braces will be required.

3.2 INSTRUCTION AND PERSONNEL TRAINING

- A. Training shall be provided for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

3.3 TEST

- A. Conduct performance test, in the presence of the COR and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design and specification requirements.

3.4 INSPECTION

- A. Inspection of installed ceiling mounted patient lift systems shall be conducted in accordance with the manufacturer's installation checklist and the facilities installation checklist (Patient Safety Alert AL14-07) prior to use for patient movement.

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**SECTION 11 75 20
CEILING MOUNTED FALL
PROTECTION HARNESS SYSTEM**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. Ceiling mounted harness system to arrest falls during therapy exercises of physically challenged patients are specified in this section.

1.2 RELATED WORK

- A. Section 01 00 00, GENERAL REQUIREMENTS: Requirements for pre-test of equipment.

1.3 QUALITY ASSURANCE

- A. Inspection of equipment after installation is required prior to use for patient movement. Inspection shall be in accordance with manufacturer's installation checklist and the facilities installation checklist.

1.4 SUBMITTALS

- A. Submit in accordance with specification Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA AND SAMPLES.
- B. Certificates of Compliance
- C. Manufacturer's Literature and Data:
 - 1. Weight Bearing Capacity
 - 2. Harness
 - 3. Strap Length
 - 4. All equipment anchors and supports. Submittals shall include weights, dimensions, center of gravity, standard connections, manufacturer's recommendations and behavior problems (e.g., vibration, thermal expansion,) associated with equipment or piping so that the proposed installation can be properly reviewed.
- D. Individual Room layouts showing location of lift system installation shall be approved before proceeding with installation of lifts.
- E. Manufacturer's Checklist for after installation inspection.

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are listed in the text by the basic designation only.
- B. International Organization for Standardization (IOS):
 - 10535-06 Hoist for the Transfer of Disabled Persons-Requirements and Test Methods
- C. Underwriters Laboratories (UL):
 - 60601-1(2003)..... Medical Electrical Equipment: General Requirements for Safety

94-2013 UL Standards for Safety Test for Flammability of Plastic
Materials for Parts in Devices and Appliances-Fifth Edition

D. International Electromagnetic Commission (IEC):

801-2(1991)..... Electromagnetic Compatibility for Industrial-Process
Measurement and Control Equipment-Part 2: Electromagnetic
Discharge Requirements

E. Patient Safety Alert AL 14-07

PART 2 - PRODUCTS

2.1 GENERAL

- A. The Ceiling Mounted Fall Protection Harness System consists of an overhead, heavy duty, aluminum extrusion track. Users wear a harness which attaches to a 360 degree, swivel lanyard that connects to a high-performance trolley. The trolley inserts into the track, allowing users to move along the track as needed.

2.2 CEILING TRACK SYSTEM

- A. Heavy Duty Track tested and rated to hold up to 500 lbs
1. Aluminum extrusion – Grade 6005A-T5
 2. Mid-Span deflection suspension supports - .090"
 3. Support Spacing – 48" centers maximum.

2.3 TROLLEY

- A. High Performance Trolley tested and rated to hold up to 500 lbs.
1. Trolley composed of steel plates.
 2. The rollers machined from UHMW plastic.
 3. The roller axles machined from 304 stainless steel.

2.4 LANYARD

- A. Provide lanyard with adjustable cam release system that allows therapist to easily adjust tension for patient and ceiling height.
1. The adjustable back up safety cam serves as an extra safety measure.
 2. A 360 degree swivel at the top and bottom allows unfettered movement.
 3. Lanyard to adjust to accommodate any ceiling height.

2.5 HARNESS

- A. Vest shape harness with backpad
- B. Harness to include 5 points of adjustment allowing up to 4" of chest strap adjustment.
- C. The padded shoulder, leg and back made of closed cell foam with mesh lining that allows the material to breathe.
- D. Harnesses to include quick connect friction torso buckle with a release tab.

- E. Positioning D-Rings wrapped with heavy duty fabric and a wear pad to increase durability.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Install ceiling mounted fall protection harness system as per manufacturer's instruction and under the supervision of manufacturer's qualified representative and as shown on drawings.

3.2 INSTRUCTION AND PERSONNEL TRAINING

- A. Training shall be provided for the required personnel to educate them on proper operation and maintenance for the lift system equipment.

3.3 TEST

- A. Conduct performance test, in the presence of the COR and a manufacturer's field representative, to show that the patient lift system equipment and control devices operate properly and in accordance with design and specification requirements.

3.4 INSPECTION

- A. Inspection of installed ceiling mounted patient lift systems shall be conducted in accordance with the manufacturer's installation checklist and the facilities installation checklist prior to use for patient movement.

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**SECTION 12 24 00
WINDOW SHADES**

PART 1 - GENERAL

1.1 DESCRIPTION

Manually operated sunscreen roller shades. Window shades shall be furnished complete, including brackets, fittings and hardware.

1.2 RELATED WORK

- A. Color of shade cloth and color of exposed parts: Section 09 06 00, SCHEDULE FOR FINISHES.

1.3 QUALITY CONTROL

Manufacturer's Qualification: Shade manufacturer shall provide evidence that the manufacture of shades are a major product, and that the shades have performed satisfactorily on similar installations.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Samples:
1. Shade cloth, each type, 600 mm (24 inch) square, including cord and ring, showing color, finish and texture.
- C. Manufacturer's literature and data; showing details of construction and hardware for:
Window shades

1.5 APPLICABLE PUBLICATIONS

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced to in the text by the basic designation only.
- B. Federal Specifications (Fed. Spec.):
AA-V-00200B Venetian Blinds, Shade, Roller, Window, Roller, Slat, Cord, and Accessories

PART 2 - PRODUCTS

2.1 SHADE CLOTH

- A. Environmentally certified shadecloth, fabricated from TPO for both core yarn and hacket, single thickness, non-raveling 0.030 inch (0.762 mm) thick fabric
1. Weave: 5% open 2x2 basket weave.
- B. Room darkening (PVC free) shadecloth with opaque acrylic backing: 0.008 inches thick (0.19 mm) blackout material and weighing 0.94 lbs per square yard, comprising of 53% fiberglass, 45% acrylic, 2% poly finish.

2.2 SHADE BAND

- A. Shade Bands: Construction of shade band includes the fabric, the hem weight, hem-pocket, shade roller tube, and the attachment of the shade band to the roller tube. Sewn hems and open hem pockets are not acceptable.
 - 1. Hem Pockets and Hem Weights: Fabric hem pocket with welded seams (including welded ends) and concealed hem weights. Hem weights shall be of appropriate size and weight for shade band. Hem weight shall be continuous inside a sealed hem pocket. Hem pocket construction and hem weights shall be similar, for all shades within one room.
 - 2. Shade Band and Shade Roller Attachment:
 - a. Use extruded aluminum shade roller tube of a diameter and wall thickness required to support shade fabric without excessive deflection. Roller tubes less than 1.55 inch (39.37 mm) in diameter for manual shades are not acceptable.
 - b. Provide for positive mechanical engagement with drive/brake mechanism.
 - c. Provide for positive mechanical attachment of shade band to roller tube; shade band shall be made removable / replaceable with a snap-on snap-off spline mounting, without having to remove shade roller from shade brackets.
 - d. Mounting spline shall not require use of adhesives, adhesive tapes, staples, and/or rivets.
 - e. Any method of attaching shade band to roller tube that requires the use of: adhesive, adhesive tapes, staples, and/or rivets are not acceptable.

2.3 SHADE FABRICATION

- A. Fabricate units to completely fill existing openings from head to sill and jamb-to-jamb, unless specifically indicated otherwise.
- B. Fabricate shadecloth to hang flat without buckling or distortion. Fabricate with heat-sealed trimmed edges to hang straight without curling or raveling. Fabricate unguided shadecloth to roll true and straight without shifting sideways more than 1/8 inch (3.18 mm) in either direction per 8 feet (2438 mm) of shade height due to warp distortion or weave design.
- C. Provide battens in standard shades as required to assure proper tracking and uniform rolling of the shadebands. Contractor shall be responsible for assuring the width-to-height ratios shall not exceed manufacturer's standards or, in absence of such standards, shall be responsible for establishing appropriate standards to assure proper tracking and rolling of the shadecloth within specified standards. Battens shall be roll-formed stainless steel or tempered steel, as required.
- D. For railroaded shadebands, provide seams in railroaded multi-width shadebands as required to meet size requirements and in accordance with seam alignment as acceptable to Architect. Seams shall be properly located. Furnish battens in place of plain seams when the width, height, or weight of the shade exceeds manufacturer's standards. In absence of such standards, assure

proper use of seams or battens as required to, and assure the proper tracking of the railroaded multi-width shadebands.

- E. Provide battens for railroaded shades when width-to-height ratios meet or exceed manufacturer's standards. In absence of manufacturer's standards, the contractor is responsible for proper use and placement of battens to assure proper tracking and roll of shadebands.

2.4 COMPONENTS

A. Access and Material Requirements:

1. Provide shade hardware allowing for the removal of shade roller tube from brackets without removing hardware from opening and without requiring end or center supports to be removed.
2. Provide shade hardware that allows for removal and re-mounting of the shade bands without having to remove the shade tube, drive, or operating support brackets.
3. Use only engineered plastics for all plastic components of shade hardware. Styrene based plastics, and/or polyester, or reinforced polyester will not be acceptable.

B. Manual Operated Chain Drive Hardware and Brackets:

1. Provide for universal, regular and offset drive capacity, allowing drive chain to fall at front, rear or non-offset for all shade drive end brackets. Universal offset shall be adjustable for future change.
2. Provide hardware capable for installation of a removable fascia, for both regular and/or reverse roll, which shall be installed without exposed fastening devices of any kind.
3. Provide shade hardware system that allows for removable regular and/or reverse roll fascias to be mounted continuously across two or more shade bands without requiring exposed fasteners of any kind.
4. Provide shade hardware system that allows for operation of multiple shade bands by a single chain operator, subject to manufacturer's design criteria. Connectors shall be offset to assure alignment from the first to the last shade band.
5. Provide shade hardware system that allows multi-banded manually operated shades to be capable of smooth operation when the axis is offset a maximum of 6 degrees on each side of the plane perpendicular to the radial line of the curve, for a 12 degrees total offset.
6. Provide positive mechanical engagement of drive mechanism to shade roller tube. Friction fit connectors for drive mechanism connection to shade roller tube are not acceptable.
7. Provide shade hardware constructed of minimum 1/8 inch (3.18 mm) thick plated steel or heavier as required to support 150 percent of the full weight of each shade.
8. Drive Bracket / Brake Assembly:
 - a. Fully integrated with all accessories, including, but not limited to: fascia, room darkening side / sill channels, center supports and connectors for multi-banded shades.

- b. Drive sprocket and brake assembly shall rotate and be supported on a welded 3/8 inch (9.525 mm) steel pin.
 - c. The brake shall be an over-unning clutch design which disengages to 90 percent during the raising and lowering of the shade. The brake shall withstand a pull force of 50 lbs in the stopped position.
 - d. The braking mechanism shall be applied to an oil-impregnated hub on to which the brake system is mounted. The oil impregnated hub design includes an articulated brake assembly, which assures a smooth operation in raising and lowering the shades. The assembly shall be permanently lubricated. Products that require externally applied lubrication and or not permanently lubricated are not acceptable.
 - e. The entire assembly shall be fully mounted on the steel support bracket, and fully independent of the shade tube assembly, which may be removed and reinstalled without effecting the roller shade limit adjustments.
- C. Drive Chain: Stainless steel chain rated to 90 lbs minimum breaking strength. Nickel plate chain shall not be acceptable.

2.5 ACCESSORIES

- A. Roller Shade Pocket for recessed mounting in acoustical tile, or drywall ceilings as indicated on Drawings.
- 1. Provide either aluminum and or formed steel shade pocket, sized to accommodate roller shades, with exposed extruded aluminum closure mount, tile support and removable closure panel to provide access to shades.
 - a. Provide vented pocket such that there will be a minimum of four 1 inch (25.4 mm) diameter holes per foot allowing the solar gain to flow above the ceiling line.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Window Shades: Mount window shades on end of face brackets, set on metal gussets, or casing of windows as required. Provide extension face brackets where necessary at mullions. In existing buildings, provide brackets similar to those on existing windows.
- 1. Locate rollers in level position as high as practicable at heads of windows to prevent infiltration of light over rollers.
 - 2. Where extension brackets are necessary, on mullions or elsewhere, for alignment of shades, provide metal lugs, and rigidly anchor lugs and brackets.
 - 3. Place brackets and rollers so that shades will not interfere with window and screen hardware.
 - 6. Shade installation methods not specifically described, are subject to approval of COR..

- A. Install roller shades level, plumb, square, and true according to manufacturer's written instructions, and located so shade band is no closer than 2 inches (50 mm) to interior face of glass. Allow proper clearances for window operation hardware.
- B. Adjust and balance roller shades to operate smoothly, easily, safely, and free from binding or malfunction throughout entire operational range.
- C. Clean roller shade surfaces after installation, according to manufacturer's written instructions.
- D. Engage installer to train Government's maintenance personnel to adjust, operate, and maintain roller shade system.

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SECTION 12 31 00
MANUFACTURED METAL CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies refinishing and reinstallation of existing metal casework and related accessories.

1.2 RELATED WORK

- A. Color of casework finish: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Countertops: Section 12 36 00 COUNTERTOPS.

1.3 QUALITY ASSURANCE

- A. Installer has technical qualifications, experience, trained personnel, and facilities to install specified items.
- B. Furnish supervision of installation at construction site by a qualified technician regularly employed by casework installer.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Certificates:
 - 1. Manufacturer's Certificate of qualifications specified and finish on casework.
 - 2. Contractor's Certificate of installer's qualifications specified.
- C. Shop Drawings (1/2 Full Scale):
 - 1. Fastenings and method of installation.
- D. Samples:
 - 1. Metal plate, 150 mm (six inch) square, showing chemical resistant finish, in each color.

PART 2 – PRODUCTS

2.1 MATERIALS:

- A. Sheet Steel:
 - 1. ASTM A794/A794M, cold rolled, Class 1 finish, stretcher leveled.
 - 2. Other types of cold rolled steel meeting requirements of ASTM A568/A568M are acceptable for concealed parts.
- B. Laminated Glass: Fabricate of two sheets of 3 mm (1/8 inch) thick clear ASTM C1172, Kind LT glass, laminated together with a 1.5 mm (0.060 inch) thick vinyl interlayer, to a total overall thickness of 8 mm (5/16 inch).
- C. Glazing Cushions:

1. Channel shaped, of rubber, vinyl or polyethylene plastic, with vertical flanges not less than 2 mm (3/32 inch) thick and horizontal web 3 mm (1/8 inch) thick.
2. Flanges may have bulbous terminals above the glazing heads or terminate flush with top of beads.

D. Fasteners:

1. Exposed to View: Chrome plated steel or stainless steel, or finished to match adjacent surface.
2. Provide round head or countersunk fasteners where exposed in cabinets.
3. Expansion Bolts: Fed Spec. A-A-55615. Do not provide lead or plastic shields.
4. Nuts: Fed Spec FF-N-836. Type III, Style 15 where exposed.
5. Sex Bolts: Capable of supporting twice the load.

2.2 MANUFACTURED PRODUCTS:

- A. When two (2) or more units are required, use products of one (1) manufacturer.
- B. Manufacturer of casework assemblies is to assume complete responsibility for the final assembled unit.
- C. Provide products of a single manufacturer for parts which are alike.

2.3 CASEWORK FABRICATION:

A. General:

1. Welding: Comply with AWS Standards D1.1/D1.1M and D1.3/D1.3M.
2. Reinforce with angles, channels, and gussets to support intended loads, notch tightly, fit and weld joints.
3. Constructed of sheet steel, except where reinforcing required.

B. Minimum Steel Thickness:

0.89 mm (0.035 inch) (20 gage)	Drawer fronts, backs, bodies, closure plates or scribe and filler strips less than 75 mm (3 inches) wide, sloping top, shelf reinforcement channel and shelves. Toe space or casework soffits and ceilings under sloping tops.
1.20 mm (0.047 inch) (18 gage)	Base pedestals, casework top sides, back, and bottom panels, closure scribe and filler strips 75 mm (3 inches) or more. Reinforcement for drawers with locks. Tables legs, spreaders and stretchers, when fabricated of cold rolled tubing. Metal for desks; except legs and aprons. Door exterior and interior panels, flush or glazed. Cross rails of base units. Front bottom rails, back bottom rails; rails may be 1.49 mm (0.059 inch) (16 gage) thick. Uprights or posts. Top corner gussets.

3 mm (0.12 inch) Reinforcement for hinge reinforcement inside doors and cabinets.
(11 gage)

C. Casework Construction:

1. Welded assembly.
2. Fabricate with enclosed uprights or posts full height or width at front. Include sides, backs, bottoms, soffits, ceilings under sloping tops, headers and rail, assembled to form an integral unit.
3. Form sides to make rabbeted stile, 19 to 28 mm (3/4 to 1-1/8 inch) wide, closed by channel containing shelf adjustment slots.
4. Make bottom of walls units flush, double panel construction.
5. Make top and cross rails of "U" shaped channel.
6. Provide enclosed backs and bottoms in cabinets, including drawer units.
7. Provide finish panel on exposed cabinet backs.
8. Do not install screws and bolts in construction or assembly of casework, except to secure hardware, applied door stops, accessories, removable panels, and where casework is required to be fastened, end to end or back to back.
9. Fabricate casework, except benches, and desks with finished end panels.
10. Close flush exposed soffits of wall hung shelving, knee spaces in counters, and toe spaces at bases.
11. Provide reinforcing for hardware.
12. Size Dimensions:
 - a. Use dimensions shown on construction documents or within tolerances specified.
 - b. Tolerance:

	Depth	Nominal Dim (mm (inch))	Plus Tolerance (mm (inch))	Minus Tolerance (mm (inch))
	Depth	305 (12)	1 (25)	0 (0)
	Width	- -	0 (0)	1 (25)
Wall Hung Cabinet	Height	- -	1 (25)	1 (25)

- 1) Manufacturer's Tolerance for the same Length, Depth or Height of Cabinet: Not to exceed 1.58 mm (0.0625 inches).

D. Doors:

1. Hollow metal type, flush and glazed doors not less than 16 mm (5/8 inch) thick.

2. Fabricate flush metal doors of two (2) panels formed into pans with corners welded and ground smooth. Provide flush doors with a sound deadening core.
 3. Fabricate glazed metal doors with reinforced frame and construct either from one (1) piece of steel, or have separate stiles and rails mitered and welded at corners, and welds ground smooth.
 - a. Secure removable glazing members with screws to back of doors.
 - b. Install glass in rubber or plastic glazing channels.
 4. Provide sheet steel hinge reinforcement inside doors.
 5. Doors removable without use of tools except where equipped with locks.
- E. Sloping Tops:
1. Provide sloping tops for casework where shown on construction documents.
 2. Where ceilings interfere with installation of sloping tops. Provide filler plates as specified.
 3. Omit sloping tops or filler plates whenever a gypsum wall board bulkhead assembly is furred down to top face of casework.
 4. Provide exposed ends of sloping tops with flush closures.
 5. Fasten sloping tops with sheet metal screws inserted from cabinet interior; space fastener as recommended by manufacturer.
- F. Shelves:
1. Capable of supporting an evenly distributed minimum load of 122 kg per square meter (25 pounds per square foot) without visible distortion.
 2. Flange shelves down 19 mm (3/4 inch) on edges, with front and bearing edges flanged back 13 mm (1/2 inch).
 3. For shelves over 1067 mm (42 inches) in length and over 305 mm (12 inches) in depth install 38 mm by 13 mm by 0.9 mm (1 1/2 x 1/2 x 0.0359 inch) thick sheet steel hat channel reinforcement welded to underside midway between front and back and extending full length of shelf.
 4. Weld shelves to metal back and ends unless shown on construction documents as adjustable.
 5. Provide means of positive locking shelf in position, and to permit adjustment without use of tools.

2.4 HARDWARE:

- A. Factory installed.
- B. Exposed hardware, except as specified otherwise, satin finished chromium plated brass or nickel plated brass or anodized aluminum.
- C. Cabinet Locks:
 1. Where locks are shown on construction documents.
 2. Locked pair of hinged door over 915 mm (36 inches) high:

- a. ANSI/BHMA A156.5, similar to E0261, Key one (1) side.
 - b. On active leaf use three (3) point locking device, consisting of two (2) steel rods and lever controlled cam at lock, to operate by lever having lock cylinder housed therein.
 - c. On inactive leaf provide dummy lever of same design.
 - d. Provide keeper holes for locking device rods and cam.
- D. Cabinet Hardware: ANSI BHMA A156.9.
1. Provide drawer and door pulls of a design that can be operated with a force of 22.2 N (5 pounds) or less, with one (1) hand and not require tight grasping, pinching or twisting of the wrist.
 2. Cabinet Door Catch:
 - a. Install at bottom of wall cabinets, top of base cabinets and top and bottom of full height cabinet doors over 1220 mm (48 inches).
 - b. Omit on doors with locks.
 3. Butt Hinges:
 - a. B01351, minimum 1.8 mm (0.072 inch) thick chrome plated steel leaves.
 - b. Minimum 3.5 mm (0.139 inch) diameter stainless steel pins.
 - c. Full mortise type, five (5) knuckle design with 63 mm (2 1/2 inch) high leaves and hospital type tips.
 - d. Two (2) hinges per door except use three (3) hinges on doors 1220 mm (48 inches) and more in height. Use stainless steel leaves for tilting bin doors.
 - e. Do not weld hinges to doors or cabinets.
 4. Shelf Supports:
 - a. Install in casework where adjustable shelves are noted on construction documents.
 - b. Adjustable Shelf Standards: B04061 with shelf rest B04081.
 - c. Vertical Slotted Shelf Standard: B04102 with shelf brackets B04112 sized for shelf depth.

2.5 METAL FINISHES

- A. Comply with NAAMM 500 series and as specified.
- B. Steel Cabinets including Closures and Filler Strips:
 1. Acid resisting finish except hardware and stainless steel.
 2. After fabrication of cabinet submerge in a degreasing bath, and thoroughly rinse to remove dirt and grease, and other foreign matter.
 3. Apply non-metallic electrostatic paint coating, not less than one mil thick.
 4. Finish resistant to action of the following reagents when 10 drops (0.5 cm³) are applied to the surface and left open to the atmosphere for period of one hour.

Hydrochloric Acid 37 percent	Ethyl Alcohol
Phosphoric Acid 75 percent	Methylethyl Keytone
Sulfuric Acid 25 percent	Acetone
Glacial Acetic Acid	Ethyl Acetate
Sodium Hydroxide 10 percent	Ethyl Ether
Sodium Hydroxide (concentrated)	Carbon Tetrachloride
Ammonia Hydroxide (concentrated)	Xylene
Hydrogen Peroxide 5 percent	Phenol 85 Percent
Formaldehyde 37 percent	

PART 3 - EXECUTION

3.1 COORDINATION

- A. Before installing casework, verify wall and floor surfaces covered by casework have been finished.
- B. Verify location and size of mechanical and electrical services as required.
- C. Verify reinforcement of walls and partitions for support and anchorage of casework.

3.2 INSTALLATION:

- A. Install casework in accordance with manufacturer's written instructions.
 - 1. Install in available space; arranged for safe and convenient operation and maintenance.
 - 2. Align cabinets for flush joints except where shown otherwise on construction documents.
 - 3. Install with bottom of wall cabinets in alignment and tops of base cabinets aligned level, plumb, true, and straight to a tolerance of 3.2 mm in 2438 mm (1/8 inch in 96 inches).
 - 4. Install corner cabinets with hinges on corner side with filler or spacers sufficient to allow opening of drawers.

3.3 FASTENINGS AND ANCHORAGE:

- A. Do not anchor to wood ground strips.
- B. Provide hat shape metal spacers where fasteners span gaps or spaces.
- C. Use 6 mm (1/4 inch) diameter toggle or expansion bolts, or other appropriate size and type fastening device for securing casework to walls or floor. Use expansion bolts shields having holding power beyond tensile and shear strength of bolt and breaking strength of bolt head.
- D. Use 6 mm (1/4 inch) diameter hex bolts for securing cabinets together.
- E. Use 6 mm (1/4 inch) by minimum 38 mm (1-1/2 inch) length lag bolt anchorage to wood blocking for concealed fasteners.
- F. Use not less than No. 12 or 14 wood screws with not less than 38 mm (1 1/2 inch) penetration into wood blocking.
- G. Space fastening devices 305 mm (12 inches) on center with minimum of three (3) fasteners in 915 or 1219 mm (3 or 4 foot) unit width.
- H. Anchor floor mounted cabinets with a minimum of four (4) bolts through corner gussets. Anchor bolts may be combined with or separate from leveling device.

- I. Secure cabinets in alignment with hex bolts or other internal fastener devices removable from interior of cabinets without special tools. Do not use fastener devices which require removal of tops for access.
- J. Where units abut end to end, anchor together at top and bottom of sides at front and back. Where units are back to back, anchor backs together at corners with hex bolts placed inconspicuously inside casework.
- K. Where type, size, or spacing of fastenings is not shown or specified on construction documents, show on shop drawings proposed fastenings and method of installation.

3.4 ADJUSTMENTS:

- A. Adjust equipment to insure proper alignment and operation.
- B. Replace or repair damaged or improperly operating materials, components or equipment.

3.5 CLEANING:

- A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter resulting from work of this section.
- B. Remove from job site trash, debris and packing materials resulting from work of this section.
- C. Leave installed areas clean of dust and debris resulting from work of this section.

3.6 INSTRUCTIONS:

- A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.
- B. Provide in service training both prior to and after facility opening. Coordinate in service activities with COR.
- C. Commencing at least seven (7) days prior to opening of facility, provide one (1) 4-hour day of on-site orientation and technical instruction on use and cleaning procedures application of products and systems specified herein.

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SECTION 12 32 00
MANUFACTURED WOOD CASEWORK

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies plastic laminate casework as detailed on the drawings, including related components and accessories required to form integral units. Wood casework items shown on the drawings, but not specified below shall be included as part of the work under this section, and applicable portions of the specification shall apply to these items. Each like item of casework shall be of the same design and by one manufacturer.

1.2 RELATED WORK

- A. Color and Finish of Plastic Laminate: Section 09 06 00, SCHEDULE FOR FINISHES.
- B. Lavatories and Plumbing in Casework: Section 22 40 00, PLUMBING FIXTURES.

1.3 MANUFACTURER'S QUALIFICATIONS

The fabrication of casework shall be by a manufacturer who produces casework similar to the casework specified and shown.

1.4 SUBMITTALS

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Manufacturer's Literature and Data:
 - Locks for doors and drawers
 - Adhesive cements
- C. Samples:
 - Plastic laminate, 150 mm (six inch) square
- D. Shop Drawings (1/2 full size):
 - 1. All casework, showing details of construction, including materials, hardware and accessories.
 - 2. Cabinets and counters showing faucets in connection with sink bowls, and electrical fixtures and receptacles which are mounted on cabinets and counters.
 - 3. Fastenings and method of installation.

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 basic designation only.
- B. American Society for Testing and Materials (ASTM):
 - A167-99 (R2009).....Stainless and Heat-Resisting chromium-Nickel Steel Plate, Sheet and Strip

- A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength Low Alloy
- C. Composite Panel Association (CPA):
A208.1-09.....Particleboard
- D. U.S. Department of Commerce Product Standards (Prod. Std):
PS1-95Construction and Industrial Plywood
- E. Hardwood, Plywood and Veneer Association (HPVA):
HP-1-09Hardwood and Decorative Plywood
- F. Architectural Woodwork Institute (AWI):
Architectural Woodwork Quality Standards, Guide Specifications Quality Certification Program - 1999
- G. American Society of Mechanical Engineers (ASME):
A112.18.1-05.....Plumbing Fixture Fittings
- H. National Electrical Manufacturers Association (NEMA):
LD3-05.....High Pressure Decorative Laminates
LD3.1-95.....Performance, Application Fabrication and Installations of High-Pressure Decorative Laminates

PART 2 - PRODUCTS

2.1 PLASTIC LAMINATE:

- A. NEMA LD-3.
- B. Exposed decorative surfaces including countertops, both sides of cabinet doors, and for items having plastic laminate finish. General purpose Type HGL.
- C. Cabinet Interiors Including Shelving: Both of following options to comply with NEMA, LD3.1 as a minimum.
1. Plastic laminate clad plywood or particle board.
 2. Resin impregnated decorative paper thermally fused to particle board.
- D. Backing sheet on bottom of plastic laminate covered wood tops. Backer Type BKL.
- E. Post Forming Fabrication, Decorative Surface: Post forming Type HGP.

2.2 PARTICLEBOARD

CPA A208.1, Type 1, Grade 1-M-3.

2.3 HARDWARE

- A. Where pin tumbler locks are specified, disc tumbler lock , with brass working parts and case. Locks for each type casework, shall be keyed differently and shall be master-keyed for each type service. Provide two keys for each lock. Exposed hardware, except as otherwise specified, shall be satin finished chromium plated brass or nickel plated brass.
- B. Marking of Locks and Keys:

1. The name of the manufacturer, or trademark by which manufacturer can readily be identified, legibly marked on each lock.
 2. The key change number marked on the exposed face of lock, and also stamped on each key.
 3. Key change numbers shall provide sufficient information for replacement of the key by the manufacturer.
- C. Hinged Doors:
1. Doors 900 mm (36 inches) and more in height shall have three hinges and doors less than 900 mm (36 inches) in height shall have two hinges. Each door shall close against two rubber bumpers.
 2. Hinges: Fabricate hinges with minimum 2 mm (0.072 inch) thick chromium plated steel leaves, and with minimum 3.5 mm (0.139 inch) diameter stainless steel pin. Hinges shall be concealed European type.
 3. Fasteners: Provide full thread wood screws to fasten hinge leaves to door and cabinet frame. Finish screws to match finish of hinges.
- D. Door Catches:
1. Friction or Magnetic type, fabricated with metal housing.
 2. Provide one catch for cabinet doors 1200 mm (48 inches) high and under, and two for doors over 1200 mm (48 inches) high.
- E. Locks:
1. Cylinder type pin tumbler.
 2. Equip doors and drawers where shown with locks.
- F. Drawer and Door Pulls:
- Doors and drawers shall have flush pulls, fabricated of either chromium plated brass, chromium plated steel, stainless steel, or anodized aluminum.
- G. Drawer Slides:
1. Full extension steel slides with nylon ball-bearing rollers.
 2. Slides shall have positive stop.
 3. Equip drawers with rubber bumpers.
- H. Shelf Standards (Except For Fixed Shelves):
- Bright zinc-plated steel for recessed mounting with screws, 16 mm (5/8 inch) wide by 5 mm (3/16 inch) high providing 13 mm (1/2 inch) adjustment, complete with shelf supports.

2.4 FABRICATION

- A. Casework shall be of the flush overlay design and, except as otherwise specified, be of premium grade construction and of component thickness in conformance with AWI Quality Standards.
- B. Fabricate casework of plastic laminated covered plywood or particleboard as follows:

1. Where shown, doors drawers shelves all semi-concealed surfaces shall be plastic laminated.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Set casework in place; level, plumb and accurately scribe and secure to walls, and/or floors.
- B. The installation shall be complete including all trim and hardware. Leave the casework clean and free from defects.

3.2 FASTENINGS

- A. Fastenings for securing casework to adjoining construction shall be as detailed on the drawings or approved shop drawings.
- B. See Section 05 50 00, METAL FABRICATIONS for reinforcement of walls and partitions for casework anchorage.

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SECTION 12 34 00
INTEGRATED PATIENT CARE MODULAR SYSTEM

PART 1 – GENERAL

1.1 DESCRIPTION

- A. This section specifies integrated care modular system.
- B. System includes support components, storage units, accessories, countertops, sink modules and electrical wiring chases, for wall hung arrangements.

1.2 RELATED WORK

- A. Instructions: SECTION 01 00 00, GENERAL REQUIREMENTS.
- B. Steel studs 1.2 mm (0.047 inch, 18 gage) and heavier: SECTION 05 40 00, COLD-FORMED METAL FRAMING.
- C. Backing plates for wall mounted items: SECTION 09 22 16, NON-STRUCTURAL METAL FRAMING.
- D. Plumbing requirements: DIVISION 22, PLUMBING.
- E. Electrical requirements: DIVISION 26, ELECTRICAL.

1.3 SUBMITTALS

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Product data:
 - 1. Manufacturer's literature and other data showing compliance with the specification.
 - 2. List of 3 similar projects completed within last 5 years with names and addresses.
- C. Certification:
 - 1. Manufacturer's qualifications specified.
 - 2. Installer's qualifications specified.
- D. Shop drawings:
 - 1. Drawings complete, accurate and to scale.
 - 2. Show:
 - a. Location of each component.
 - b. Dimensions and clearance as required.
 - c. Identify each component with both drawing identification and manufacturer's product number.
 - d. Details including cuts, holes, scribes, attachments and specialized construction requirements.
 - 3. Installation procedures: Show dimensions, methods of assembly, anchorage, installation and conditions relating to adjoining work.
 - 4. Placement Listing: Itemized listing by room number of components provided.

5. Complete listing of each component used.
6. Include the weight of each component.
- E. Samples:
 1. Support rail, 1200 mm (48 inches) long.
 2. Cabinet and countertop finishes.
- F. Operational and Maintenance Manual

1.4 QUALITY ASSURANCE

- A. Approval by Contracting Officer is required of manufacturer and installer based upon certification of qualifications specified.
- B. Manufacturer's qualifications:
 1. Manufacturer is regularly engaged in design and manufacture of modular plastic casework, casework components and accessories of scope and type similar to requirements of this project for a period of not less than 5 years.
 2. Manufacturer has successfully completed at least 3 projects of scope and type similar to requirements of this project.
- C. Installer Qualifications:
 1. Installer is approved by modular plastic casework manufacturer.
 2. Installer has completed at least 3 projects in last 5 years in which these products were installed.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle to prevent damage and deterioration until final acceptance of project.
- B. Deliver and store materials in manufacturer's original, labeled containers after building is enclosed and wet work is complete and dry.
- C. Store materials in a secure, locked area.
- D. Repair or replace damaged items due to storage or handling.

1.6 WARRANTY

Warranty casework system components against structural failure of components, disassembly of cabinets, shelves and countertops period shall be 5 years.

1.7 APPLICABLE PUBLICATIONS

- A. Publications listed below form a part of this specification to extent referenced.
Publications are referenced in the text by basic designation.
- B. American Hardwood Association:
A135.4-04 Basic Hardwood
- C. American National Standards Institute (ANSI):
A208.1-09 Particleboard

- D. American Society for Testing and Materials (ASTM):
- A36M-08 Carbon Structural Steel
 - A167-99 (R2009) Stainless and Heat-Resisting Chromium Steel Plate
Sheet and Strip
 - A283/A283M-03(R 2007)..... Low and Intermediate Tensile Strength Carbon Steel
Plates
 - A1008/A1008M-11 Steel Sheet, Carbon Cold-Rolled, Commercial Quality
 - A423/A423M-09 Seamless and Electric-Welded Low-Alloy Steel Tubes
 - A568/A568M-11 Steel, Sheet, Carbon, Structural and High-Strength, Low-
Alloy Hot-Rolled and Cold-Rolled, General Requirements
 - B221-08 Aluminum and Aluminum-Alloy Extruded Bars, Rods
Wire, Profiles and Tubes
 - B456-11 Electrodeposited Coatings of Copper Plus, Nickel Plus
Chromium and Nickel Plus Chromium
 - D1201-99(R2004) Polyester Thermosetting Molding Compound
 - D4673-02(R2008) Acrylonitrile-Butadiene-Styrene (ABS) Molding and
Extrusion Materials
 - E84-11 Surface Burning Characteristics of Plastics and Alloys
Building Materials
- E. National Association of Architectural Metal Manufacturers (NAAMM):
- AMP 500-06 Metal Finishes Manual
- F. National Electrical Manufacturers Association (NEMA):
- LD-3-05 High Pressure Decorative Laminates
 - LD-3.1-95 Performance, Application, Fabrication and Installation of
High Pressure Decorative Laminates
- G. National Fire Protection Association (NFPA):
- 70-11 National Electric Code (NEC)
- H. National Sanitation Foundation (NSF):
- 30-92 Cabinetry and Laboratory Furniture for Hospitals
- I. U.S. Department of Commerce, Product Standard (PS):
- PS1-95 Construction and Industrial Plywood
- J. Scientific Equipment and Furniture Association (SEFA):
- 2-10 Installation of Scientific Laboratory Furniture and
Equipment
- K. Underwriters Laboratories (UL): Annual Fire Resistance Directories

PART 2- PRODUCT

2.1 DESIGN REQUIREMENTS

- A. Components provided by one manufacturer. Products of other manufacturers used meet specified flexibility and interchangeability requirements.
- B. Components interchangeable to form flexible system which will accommodate change:
 - 1. Dimensions of products are nominal and shown on drawings and schedules.
 - 2. Hanging components modular on same increments.
 - 3. Selectively removable and replaceable without disturbing adjacent components.
- C. Combustible components: Maximum flame spread rating of 25 and smoke development of 450 when tested in accordance with ASTM E84.
- D. Basic Support Components:
 - 1. Service Modules:
 - a. Steel support frames designed to support storage assemblies and work surfaces, enclosed plumbing and electrical lines and hold fixtures.
 - b. Used to form work area configurations that are easily rearranged.
 - c. Modules maybe installed as wall-attached structures or in freestanding configurations.
 - d. Adjacent modules capable of being joined together.
 - e. Modules equipped with stability accessories such as wall attachments brackets as required. Show details on shop drawings.
 - f. Provide access panels for easy access to interior of pipe chase areas. Access panels supported individually and not tied into each other.
 - g. Modules contain method to secure piping for fixtures, electrical outlets and sinks. Detail on shop drawing.
 - h. Modules shipped completely finished preassembled, ready for installation.
 - 2. Vertical Wall Strips:
 - a. Fabricated of 18 ga. Cold rolled steel with powdercoated finish.
 - b. Wall-mounted designed to suspend selected components that require vertical height adjustments.
 - c. Vertical adjustment 25 mm (1 inch) maximum.
 - d. Only one walls strip required between side by side suspended components.
 - e. Wall strips mounted to walls or service modules by mechanical fasteners. Wall strips maybe an integral part of service modules.
 - f. Created a minimum space of 75 mm (3 inch) to accommodate plumbing, power, data and electrical connections.
 - 3. Horizontal Support Rail:
 - a. Fabricated of anodized aluminum.

- b. Designed to suspend selected components in one place, allowing them to be removed and replaced in same or different location.
 - c. Rail designed to be supported from vertical rails or service modules.
 - d. Rail configuration able to receive each hanging component.
 - e. Rail able to be cut to any length using simple hand tool or applied to form continuous runs.
 - f. System designed to eliminate area of potential dust accumulation or bacteriological growth.
 - g. Rail shall be mounted to walls or service modules by mechanical fasteners to provide a permanent installation.
 - h. Rail shall have available end caps, connectors, appropriate wall anchors and anti-dislodgement clips.
4. Panel Support System:
- a. Steel hanger supports with slots of 25mm (1 inch) intervals for suspension of casework or countertops.
 - b. Adjustable level or slides to provide uniform height on adjacent units.
 - c. Allow removal, replacement or relocation without removing adjacent panels.
 - d. Capable of installation on top of finished floor without use of fasteners to floors.
 - e. Have electrical channels as specified in electrical components with two duplex outlets per panel side.
 - f. Heights from 800 mm (34 inches) to 2000 mm (80 inches) standard with manufacturer.
 - g. Widths from 300 mm (12 inches) to 1200 mm (48 inches) standard with manufacturer.
 - h. Connectors to withstand weight of loaded components and stress of movement under loaded conditions, including a variety of panel configurations and panels of differing heights.
- E. Counter Tops and Work Surfaces:
- 1. Capable of being suspended from vertical support rails or horizontal wall strips or service modules.
 - 2. Provide 25 mm (1 inch) thick solid surface work surfaces with round corners available with or without integral backsplash.
 - 3. Capable of being easily relocated and installed without tools.
 - 4. Have capability to suspend and easily change under counter mounted storage units.
 - 5. Provide leveling adjustments capability so units can be brought into a level position.
 - 6. Secured using mechanical fasteners. Show detail on shop drawings.
- F. Modular Storage Units:

1. Fabricate with no exterior cracks, crevices, joints corners or angles that may facilitate bacterial accumulation.
2. Design to accept drawers, shelves, tambour doors and other accessories as noted. Drawer and shelf guides integrally molded into unit. Provide for shelf adjustments or drawer adjustments.
3. Provide unit with a top or be able to accept a lid.
4. Capable of being assembled by simple hand action without tools, except for those components fastening to work surfaces.
5. Designed to be suspended from support rail or from countertops.
6. Units, when broken apart for periodic washing and sanitizing operations have inherent capability for easy draining.

G. Shelves:

1. Continuous molded lip around perimeter designed to retain liquid spillage and retain container dividers.
2. Self stacking for storage.
3. Capability to easily accept snap-on labels.
4. Provide container dividers, as shown.

H. Miscellaneous Components:

1. Sink modules:
 - a. Meet requirements of work services.
 - b. Design to hang on support rail and service modules.
 - c. Provide solid front and sides to conceal plumbing hardware.
 - d. Have integrated backsplash.
 - e. 100 mm (4 inch) faucet shall be available that is AC/DC power and has an AC powered faucet sensor, hydro-powered faucet sensor or battery powered faucet sensor.
 - f. Sink enclosure that mounts under the sink, made from material to prevent moisture contamination.
2. Electrical components:
 - a. UL listed and approved in UL Fire Resistance Directories.
 - b. Comply with NFPA 70 and DIVISION 26, ELECTRICAL.
 - c. Provide general circuits for power not less than four, of 20-amp maximum rated load in power support system.
 - d. Electrical channels divided with shielding plate for not less than 35 pair cables for communication systems in panel support system.
 - e. Lay in cable channel design metal raceways.
3. Plumbing Components:

- a. Comply with DIVISION 22, PLUMBING.
 - b. Sinks and fittings as specified in SECTION 12 36 00, COUNTERTOPS - size and type as shown.
4. Included in casework features that are part of the manufacturer's standards commercial product.
- I. Assembly and Disassembly:
 1. Mechanical interlock system that does not require tools. Positive locking system that prevents potential of accidental dislodged.
 2. Use of standard hand tools where fasteners used, no special designed tools permitted.
 3. Components of such size and weight that can easily be lifted or moved by one person or with transportation designed for such purpose.
- J. Live Load Capacity:
 1. Loads in addition to weight of components supported.
 2. Panel types; minimum of 130 kg (300 lbs) maximum of 500 kg (1100 lbs) per panel per sides.
 3. Open panel types: Minimum of 86 kg (190 lbs), maximum of 181 kg (400 lbs).
 4. Roller rails: 136 kg (300 lbs) per linear foot.
 5. Vertical wall strips: Minimum 272 Kg (600 lbs).
 6. Service modules: frames: 998 kg (2200 lbs).
 7. Undercounter storage units: 91 kg (200 lbs).
 8. Overhead Storage Units:
 - a. 750mm (30 inches)wide by 375 mm (15 inch) deep by 525 mm (21 inches) high, maximum of 32 kg(70 lbs).
 - b. 1200 mm (48 inches) wide by 375 mm (15 inches) deep by 525 mm (21 inches) high maximum of 64 kg (140 lbs.)
 - c. Manufactures standard modular sizes acceptable.
 9. Special Storage Units:
 - a. 550 mm (22 inches) wide by 600 mm (24 inches) deep by 625 mm (25 inches) high maximum of 91 kg (200 lbs).
 - b. 550 mm (22 inches) wide by 750 mm (30 inches) deep by 625 mm (25 inches) high: maximum of 91 kg (200 lbs).
 - c. Pullout shelves or fixed shelves. Maximum of 23 kg (50 lbs) each.
 - d. Manufacturers standard modular sizes acceptable
 10. Countertop 18 kg sq. per meter (40 lbs sq. foot)
- K. Finish:
 1. Selected from manufactures standard colors.

2. More than one color may be selected for units.
 3. Steel components finished with chemical resistant paint.
- L. Locks:
1. Manufactures standard design.
 2. Drawers capable of locks into cabinets or lockable lids.
 3. Cabinets capable of locking.

2.2 MATERIALS

- A. Carbon Structural Steel: ASTM A36M
- B. Stainless Steel: ASTM A167, Type 302B with number 4 finish minimum.
- C. Steel plates: ASTM A283.
- D. Sheet Steel: ASTM A1008 or A568.
- E. Steel Tubes: ASTM A423.
- F. Aluminum: ASTM B221.
- G. ABS compounds: ASTM D4673.
- H. Plastic Laminate: NEMA LD-3.
- I. Hardboard: AHA A135.4, Class 1, tempered.
- J. Particleboard: ANSI A208.1.

2.3 FABRICATION

- A. Manufacturer's standard design of modular casework system meeting design requirements.
 1. Casework requirements specified are intended to establish essential minimum requirements.
 2. Dimensions of components shown are nominal to represent module requirements.
 3. Provide components compatible with each other as to color, finish and hardware.
- B. Components of ABS compounds, ASTM D4673, with integral color throughout and molded to manufacturer's standard system design.
- C. Components stain and rust-resistant capable of withstanding washing temperatures up to 85 degrees C (185 degrees F) without distortion or physical imperfections.
- D. Storage modules, plastic laminate exposed surfaces including interiors conforming to and fabricated in accordance with LD3.1, NSF 30, over plywood conforming to PS1 or not less than 641 Kg/ cubic meter (45 lbs. per cubic foot) particle board conforming to ANSI A 208.1.
- E. Storage modules of molded plastic:
 1. Fire-retardant thermoplastic or sheet-molding compound ASTM D 1201, injection-molding, compression-molding or vacuum-forming technique.
 2. Constructed to achieve structural strength, durability and resistance to acids, stains, corrosion and heat.

- 3. Color integral throughout plastic.
- F. Comply with NSF 30.
- G. Fabricate frames and rails of steel or aluminum as standard with modular casework manufacturer's system.
- H. Fabricate electrical components to comply with NEC 70 and with modular casework manufactures system.
- I. Finish metals in accordance with NAAMM AMP 500-505 and plated steel in accordance with ASTM B456 as standard with modular casework manufacturer's system.
- J. Fabricate steel components of ASTM A36M, A283, A1008 or A568 as standard with casework system manufacturer.
- K. Weld In accordance with ANSI D1.1 or D9.1 Finish welds smooth and free of sharp edges where exposed.
- L. Plated Metal: Finish in accordance with ASTM B456 for steel products and NAAMM AMP 500-505.
- M. Painted Steel: Finish in accordance with NAAMM AMP 500-505
- N. Anodized Aluminum: Finish as standard with modular cabinet manufacturers system.

2.4 COUNTERTOPS

- A. Exposed work surfaces finished with solid surface materialthat meets or exceeds NEMA standards for vertical grade.

PART 3 – EXECUTION

3.1 EXAMINATION

- A. Examine substrates and adjoining construction and conditions under which work is to be installed.
- B. Do not proceed with the work until unsatisfactory conditions detrimental to proper and timely completion of the work have been corrected.

3.2 SEQUENCING AND SCHEDULE

- A. Begin only after work of other trades is complete, i.e., wall and floor finish completed, ceilings installed, light fixtures and diffusers installed and connected and area is free of trash and debris.
- B. Fixed components may be installed in areas which can not be secured.
- C. Install non-fixed components and accessories just prior to final inspection, unless areas where installation is complete is locked against entry.
- D. Coordinate with DIVISION 21, FIRE SUPPRESSION, DIVISION 22, PLUMBING, DIVISION 23, HEATING, VENTILATING, AND AIR CONDITIONING, DIVISION 26, ELECTRICAL, DIVISION 27, COMMUNICATIONS, and DIVISION 28, DIVISION ELECTRONIC SAFETY AND SECURITY trades to avoid interference and completion of service connections.

3.3 INSTALLATION

- A. Assemble and install components in accordance with manufacturer's written instructions and recommendation and SEFA 2.3
- B. Anchor fixed components firmly in position; square, level, plumb and properly connect using mechanical fasteners, wood or sheet metal screws are not permitted.
- C. Perform cutting of components to receive work installed by others.
- D. Support Rail Attachments:
 - 1. Install true to horizontal at heights shown; maximum tolerance for uneven floors is plus or minus 13 mm (1/2 inch).
 - 2. Shim as necessary to accommodate variations in wall surface not exceeding 5 mm (3/16 inch) at fastener.
- E. Wall Strips:
 - 1. Install true to vertical and spaced as shown on installation drawing.
 - 2. Align slots to assure that hanging units will be level.
- F. Furnish pipe supports in utility chases no closer than 1200 mm (48 inch) between centers.

3.4 ADJUSTMENTS

- A. Adjust equipment to insure proper alignment and operation.
- B. Replace or repair damaged or improperly operating materials, components or equipment.

3.5 CLEANING

- A. Immediately following installation, clean each item, removing finger marks, soil and foreign matter resulting from work of this section.
- B. Remove from job site trash, debris and packing materials resulting from work of this section.
- C. Leave installed areas clean of dust and debris resulting from work of this section.

3.6 INSTRUCTIONS

- A. Provide operational and cleaning manuals and verbal instructions in accordance with Article INSTRUCTIONS, SECTION 01 00 00, GENERAL REQUIREMENTS.
- B. Provide in service training both prior to and after facility opening. Coordinate in service activities with Contracting Officer.
- C. Prior to Facility Opening:
 - 1. Furnish complete schedule of in service training activities including list of recommended personnel to attend activity, time required, and names of instructors.
 - 2. Furnish instructional literature and manuals illustrating locker, frame and drawer packing procedures.

3. Commencing at least 7 days prior to opening of facility, provide 3 days of on-site orientation and technical instruction on use and application of products and systems specified herein.
- D. After Facility Opening: Provide a problem solving and in service technical review of system 30 days thereafter.

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**SECTION 12 36 00
COUNTERTOPS**

PART 1 - GENERAL

1.1 DESCRIPTION

- A. This section specifies casework countertops with integral accessories.
- B. Integral accessories include:
 - 1. Sinks with traps and drains.

1.2 RELATED WORK

- A. Color and patterns of plastic laminate: SECTION 09 06 00, SCHEDULE FOR FINISHES.
- B. SECTION 12 31 00, MANUFACTURED METAL CASEWORK
- C. SECTION 12 32 00, MANUFACTURED WOOD CASEWORK
- D. SECTION 22 11 00 FACILITY WATER DISTRIBUTION
- E. SECTION 22 13 00 FACILITY SANITARY AND VENT PIPING
- F. SECTION 22 62 00 VACUUM SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES
- G. SECTION 22 63 00 GAS SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES
- H. SECTION 22 66 00 CHEMICAL-WASTE SYSTEMS FOR LABORATORY AND HEALTHCARE FACILITIES

1.3 SUBMITTALS

- A. Submit in accordance with SECTION 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- B. Shop Drawings
 - 1. Show dimensions of section and method of assembly.
 - 2. Show details of construction at 1/2 scale.
- C. Samples:
 - 1. 150 mm (6 inch) square samples each top.
 - 2. Front edge, back splash, end splash and core with surface material and booking.

1.4 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. Composite Panel Association (CPA):
 - A208.1-09..... Particleboard
- C. American Society of Mechanical Engineers (ASME):
 - A112.18.1-12..... Plumbing Supply Fittings
 - A112.1.2-12..... Air Gaps in Plumbing System
- D. American Society for Testing and Materials (ASTM):

- A167-99 (R2009).....Stainless and Heat-Resisting Chromium-Nickel Steel Plate,
Sheet and Strip
- A1008-10.....Steel, Sheet, Cold-Rolled, Carbon, Structural, High Strength, Low
Alloy
- D256-10.....Pendulum Impact Resistance of Plastic
- D570-98(R2005).....Water Absorption of Plastics
- D638-10.....Tensile Properties of Plastics
- D785-08.....Rockwell Hardness of Plastics and Electrical Insulating Materials
- D790-10.....Flexural Properties of Unreinforced and Reinforced Plastics and
Electrical Insulating Materials
- D4690-99(2005)Urea-Formaldehyde Resin Adhesives
- E. Federal Specifications (FS):
- A-A-1936Adhesive, Contact, Neoprene Rubber
- F. U.S. Department of Commerce, Product Standards (PS):
- PS 1-95Construction and Industrial Plywood
- G. National Electrical Manufacturers Association (NEMA):
- LD 3-05.....High Pressure Decorative Laminates

PART 2 - PRODUCTS

2.1 MATERIALS

- A. Compact Laminate: NEMA LD 3.
1. High pressure solid composite with solid phenolic backer for impact resistance.
- B. Molded Resin:
1. Non-glare epoxy resin or furan resin compounded and cured for minimum physical properties specified:

Flexural strength	70 MPa (10,000 psi)	ASTM D790
Rockwell hardness	105	ASTM D785
Water absorption, 14 hours (weight)	.01%	ASTM D570

2. Material of uniform mixture throughout.
- C. Particleboard: CPA A208.1, Grade 2-M-2.
- D. Adhesive
1. For plastic laminate FS A-A-1936.
 2. For wood products: ASTM D4690, unextended urea resin or unextended melamine resin, phenol resin, or resorcinol resin.
 3. For Field Joints:
 - a. Epoxy type, resistant to chemicals as specified for plastic laminate laboratory surfaces.

b. Fungi resistant: ASTM G-21, rating of 0.

E. Fasteners:

1. Metals used for welding same metal as materials joined.
2. Use studs, bolts, spaces, threaded rods with nuts or screws suitable for materials being joined with metal splice plates, channels or other supporting shape.

F. Solid Polymer Material:

1. Filled Methyl Methacrylic Polymer.
2. Performance properties required:

Property	Result	Test
Elongation	0.3% min.	ASTM D638
Hardness	90 Rockwell M	ASTM D785
Gloss (60° Gordon)	5-20	NEMA LD3.1
Color stability	No change	NEMA LD3 except 200 hour
Abrasion resistance	No loss of pattern Max wear depth 0.0762 mm (0.003 in) - 10000 cycles	NEMA LD3
Water absorption weight (5 max)	24 hours 0.9	ASTM D-570
Izod impact	14 N·m/m (0.25 ft-lb/in)	ASTM D256 (Method A)
Impact resistance	No fracture	NEMA LD-3 900 mm (36") drop 1 kg (2 lb.) ball
Boiling water surface resistance	No visible change	NEMA LD3
High temperature resistance	Slight surface dulling	NEMA LD3

3. Cast into sheet form and bowl form.
4. Color throughout with subtle veining through thickness.
5. Joint adhesive and sealer: Manufacturers silicone adhesive and sealant for joining methyl methacrylic polymer sheet.
6. Bio-based products will be preferred.

2.2 SINKS

A. Molded Resin:

1. Cast or molded in one piece with interior corners 25 mm (one inch) minimum radius.
2. Minimum thickness of sides and ends 13 mm (1/2 inch), bottom 16 mm (5/8 inch).
3. Molded resin outlet for drain and standpipe overflow.

4. Provide clamping collar permitting connection to 38 mm (1-1/2 inch) or 50 mm (2 inch) waste outlet and trap, making sealed but not permanent connection.

B. Sinks of Methyl Methacrylic Polymer:

1. Minimum 19 mm (3/4 inch) thick, cast into bowl shape with overflow to drain.
2. Provide for underhung installation to countertop.
3. Provide openings for drain.

2.3 TRAPS AND FITTINGS

A. Material as specified in DIVISION 22, PLUMBING.

B. For Molded Resin Sinks:

1. Chemical resisting P-traps and fittings for chemical waste service.
2. Provide traps with cleanout plug easily removable without tools.

C. Plaster traps:

1. Cast iron body with porcelain enamel exterior finish.
2. 50 mm (2 inch) female threaded side inlet and outlet.
3. Removable galvanized cage having integral baffles and replaceable brass screens.
4. Removable gasketed cover.
5. Minimum overall dimensions: 350 x 350 x 400 mm high (14 x 14 x 16 inches) with 175 mm (7 inch) water seal.
6. Non-siphoning and easily accessible for cleaning.

D. Air Gap Fittings: ASME A112.1.2.

E. Methyl Methacrylic Polymer Sink Traps:

1. Cast or wrought brass with flat grid strainer, off-set tail piece, adjustable 38 x 32 mm (1-1/2 x 1 1/4-inch) P trap.
2. Chromium plated finish.

2.4 COUNTERTOPS

- A. Fabricate in largest sections practicable.
- B. Fabricate with joints flush on top surface.
- C. Fabricate countertops to overhang front of cabinets and end of assemblies 25 mm (one inch) except where against walls or cabinets.
- D. Provide 1 mm (0.039 inch) thick metal plate connectors or fastening devices (except epoxy resin tops).
- E. Join edges in a chemical resistant waterproof cement or epoxy cement, except weld metal tops.
- F. Fabricate with end splashes where against walls or cabinets.
- G. Splash Backs and End Splashes:
 1. Not less than 19 mm (3/4 inch) thick.
 2. Height 100 mm (4 inches) unless noted otherwise.
 3. Laboratories and pharmacy heights or where fixtures or outlets occur: Not less than 150 mm (6 inches) unless noted otherwise.

4. Fabricate epoxy splash back in maximum lengths practical of the same material.
- H. Drill or cutout for sinks, and penetrations.
 1. Accurately cut for size of penetration.
 2. Cutout for VL 81 photographic enlarger cabinet.
 - a. Finish cutout to fit flush with vertical side of cabinet, allowing adjustable shelf to fit into cutout space of cabinet at counter top level. Finish cutout surface as an exposed edge.
 - b. Provide braces under enlarger space to support not less than 45 kg (100 pounds) centered on opening side along backsplash.
- I. Compact Laminate Countertops:
 1. Fabricate compact laminate with phenolic backer, 1-inch thick.
 2. Front edge over cabinets not less than 38 mm (1-1/2 inches) thick
 3. All edges to be clean and smooth. Sand all rough edges.
- J. Molded Resin Tops:
 1. Molded resin with drip groove cut on underside of overhanging edge.
 2. Finish thickness of top minimum 25 mm (1 inch).
 3. Joints: Epoxy Type.
 4. Secure reagent shelves to counter tops with fasteners from underside and seal seam.
- K. Methyl Methacrylic Polymer Tops:
 1. Fabricate countertop of methyl methacrylic polymer cast sheet, 19 mm (3/4 inch) thick.
 2. Fabricate back splash and end splash to height shown.
 3. Fabricate skirt to depth shown.
 4. Fabricate with marine edge where sinks occur.
 5. Fabricate in one piece for full length from corner to corner up to 3600 mm (12 feet).
 6. Join pieces with adhesive sealant.
 7. Cut out countertop for lavatories, plumbing trim.
 8. Provide concealed fasteners and epoxy cement for anchorage of sinks to countertop.

PART 3 - EXECUTION

3.1 INSTALLATION

- A. Before installing countertops verify that wall surfaces have been finished as specified and that mechanical and electrical service locations are as required.
- B. Secure countertops to supporting rails of cabinets with metal fastening devices, or screws through pierced slots in rails.
 1. Where type, size or spacing of fastenings is not shown or specified, submit shop drawings showing proposed fastenings and method of installation.
 2. Use round head bolts or screws.
 3. Use epoxy or silicone to fasten the epoxy resin countertops to the cabinets.
 4. Use wood or sheet metal screws for wood or plastic laminate tops; minimum penetration into top 16 mm (5/8 inch), screw size No 8, or 10.

C. Sinks

1. Install molded resin sinks with epoxy compound to form watertight seal with underside of molded resin top.
 - a. Install sink with not less than two channel supports with threaded rods and nuts at each end, expansion bolted to molded resin top.
 - b. Design support for a twice the full sink weight.
 - c. Install with overflow standpipes.
2. Install methyl methacrylic polymer sinks in manufacturers recommended adhesive sealer or epoxy compound to underside of methyl methacrylic polymer countertop.
 - a. Bolt or screw to countertop to prevent separation of bowl and fracture of adhesive sealant joint.
 - b. Install drain and traps to sink.

3.2 PROTECTION AND CLEANING

- A. Tightly cover and protect against dirt, water, and chemical or mechanical injury.
- B. Clean at completion of work.

--- E N D ---