contract number; approximate roof area; detailed roof system description, including deck type, membrane, number of plies, method of application, manufacturer, insulation and cover board system and thickness; presence of tapered insulation for primary drainage, presence of vapor retarder; date of completion; installing Contractor identification and contact information; membrane manufacturer warranty expiration, warranty reference number, and contact information. Install card at roof top or access location as directed by the Contracting Officer and provide a paper copy to the Contracting Officer.

2.1.1 Bonding Adhesive

Provide TPO membrane manufacturer's low volatile organic compound (VOC) membrane adhesive, as supplied by roof membrane manufacturer, and recommended by the manufacturer's printed data for bonding of TPO membrane materials to acceptable insulation, wood, metal, concrete or other acceptable substrate materials. Bonding adhesive shall not be used to bond membrane materials to each other.

2.1.2 Water Cutoff Mastic/Water Block

As supplied by the roof membrane manufacturer and recommended by the manufacturer's printed data.

2.1.3 Membrane Flashing

Membrane flashing, including self-adhering membrane flashing, perimeter flashing, flashing around roof penetrations and prefabricated pipe seals, shall be minimum polymer thickness 0.045 inch reinforced TPO for 5, 10, 15 year warranties, and shall be utilized as recommended and supplied by the roof membrane manufacturer or minimum 0.060 inch thick reinforced TPO roof membrane and flashing's for 20 year warranties.

2.1.4 Membrane Fasteners and Plates

Coated, corrosion-resistant fasteners as recommended and supplied by the TPO roof membrane manufacturer and meeting the requirements of FM 4470 and FM RoofNav (www. roofnav.com) or FM P7825 for Class I roof deck construction and the wind uplift resistance specified. Fasteners and Plates to be supplied and warranted for the substrate type(s) by TPO membrane manufacturer and recommended by TPO membrane manufacturer's printed data.

2.1.4.1 Stress Plates, Bar or Rail for Fasteners

Corrosion-resistant stress plates as recommended by the roof membrane manufacturer's printed instructions and meeting the requirements of FM 4470 must be utilized and must be supplied by TPO roof membrane manufacturer. Stress plates shall be formed to prevent dishing or cupping. Manufacturer-supplied anchoring bar or rails may be utilized for high wind conditions.

2.1.4.2 Auxiliary Fasteners

Corrosion resistance screws, nails, or anchors must be suitable for intended attachment purpose and be recommended and supplied for use by the TPO roof membrane manufacturer.

2.1.5 Pre-manufactured Accessories

Pre-manufactured accessories shall be manufacturer's standard for intended purpose, must comply with applicable specification section, be compatible with the membrane roof system and approved for use and supplied by the TPO roof membrane manufacturer. Pre-fabricated Curbs shall be gauge G90 galvanized with minimum 4 inch flange for attachment to roof nailers. Curbs shall provide minimum height of 10 inches above the finished roof membrane surface.

2.1.6 TPO Walk Tread

Provide the following: TPO Walk Tread

2.1.6.1 TPO Walk Tread

Scrim reinforced 0.096 inch thickness TPO membrane with a textured surface, compatible with and supplied by manufacturer of the TPO roof membrane.

2.1.7 Roof Insulation

Insulation system and facer material shall be compatible with membrane application specified and be approved and supplied by the TPO membrane roof manufacturerand as specified in Section 07 22 00 ROOF AND DECK INSULATION.

2.1.8 Wood Products

Fire retardant treated materials shall not be in contact with TPO membrane or TPO accessory products, unless approved by the membrane manufacturer and the Contracting Officer.
Text

2.2 Reinforced TPO Membrane

Reinforced polyvinyl chloride (TPO) membrane shall contain fibers or scrim, and shall comply with ASTM D 4434, Type II, Grade I or Type III or Type IV, fleece backed, or ASTM D 6754, and in all cases shall provide 0.045 inch minimum thickness for mechanically fastened application. Not withstanding the ASTM standards referenced, reinforced TPO roof membranes provided under this section shall have the minimum, labeled thickness specified. TPO membrane thickness specified herein is exclusive of backing material on the bottom of fleece-backed membrane. Principal polymer used in manufacture of the membrane sheet shall be TPO. Width and length of TPO membrane roofing sheet shall be consistent with membrane attachment methods and wind uplift requirements, and shall be as large as practical. In order to minimize joints and 3-way overlaps, prefabricated sheets are not accepted. Maximum reinforced TPO membrane roofing sheet dimensions to be the maximum width obtainable from TPO membrane roof manufacturer in order to minimize seams in the field of the roof.

PART 3 EXECUTION

3.1 EXAMINATION

Ensure that the following conditions exist prior to application of the roofing materials:

a. Drains, curbs, control joints, expansion joints, perimeter walls, roof penetrating components, and equipment supports are in place.

b. Surfaces are rigid, clean, dry, smooth, and free from cracks, holes, and sharp changes in elevation.

c. Substrate is sloped to provide positive drainage.

d. Walls and vertical surfaces are constructed to receive counterflashing, and will permit mechanical fastening of the base flashing materials.

e. Treated wood nailers are in place on non-nailable surfaces, to permit nailing of base flashing at minimum height of 8 inches above finished roofing surface.

f. Pressure-preservative treated wood nailers are fastened in place at eaves, gable ends, openings, and intersections with vertical surfaces for securing of membrane, edging strips, attachment flanges of sheet metal, and roof fixtures. Embedded nailers are flush with deck surfaces. Surface-applied nailers are the same thickness as the roof insulation.

g. Avoid contact of TPO materials with fire retardant treated wood, except as approved by the TPO membrane roof manufacturer and Contracting Officer.

h. Insulation boards are installed smoothly and evenly, and are not broken, cracked, or curled. There are no gaps in insulation board joints exceeding 1/4 inch in width. Insulation is attached as specified in Section 07 22 00 ROOF AND DECK INSULATION. Insulation is being roofed over on the same day the insulation is installed.

3.2 APPLICATION METHOD

Apply entire TPO membrane roofing utilizing mechanically fastened application method. Apply roofing materials as per manufacturer recommendations and/or herein. Manufacturer recommendations prevail over those here listed.

3.2.1 Special Precautions

a. Do not dilute coatings or sealants unless specifically recommended by the material manufacturer's printed application instructions. Do not thin liquid materials or cleaners used for cleaning TPO sheet.

b. Keep liquids in airtight containers, and keep containers closed except when removing materials.

c. Use liquid components, including adhesives, within their shelf life period. Store adhesives at 60 to 80 degrees F prior to use. Avoid excessive adhesive application and adhesive spills, as they can be destructive to some thermoplastic sheets and insulations; follow adhesive manufacturer's printed application instructions. Mix and use liquid components in accordance with label directions and manufacturer's printed instructions.

d. Provide clean, dry cloths or pads for applying membrane cleaners and cleaning of membrane.

e. Do not use heat guns or open flame to expedite drying of adhesives or primers.

f. Require workmen and others who walk on the membrane to wear clean, soft-soled shoes to avoid damage to roofing materials.

g. Do not use equipment with sharp edges which could puncture the TPO membrane roofing sheet.

h. Shut down air intakes and any related mechanical systems and seal open vents and air intakes when applying solvent-based materials in the area of the opening or intake. Coordinate shutdowns with the Contracting Officer.

3.2.2 TPO Roofing Membrane

Only felt-backed membrane shall be placed directly on concrete deck or other hard surface which may otherwise damage the membrane, absent the felt backing. Non-felt-backed TPO membrane roofing sheet shall not be placed directly on concrete deck or other hard surface which may damage the membrane. Membrane shall be overlapped a minimum of 3 inches at sides for adhered applications and 5.5-7 inchesfor mechanically fastened applications and minimum 4 inches at ends. Where possible, direction of laps shall allow water to flow over and not into the lap. Membrane joints shall be free of wrinkles and fishmouths. The entire length of hot-air-welded seams shall be probe-tested and corrected during the day of installation. Defective areas shall be re-welded. Wrinkles, fishmouths, or damaged areas shall be cut out and the area covered with membrane using a continuous hot-air-welded seam on all sides. Repairs shall be probe-tested for continuity. Hot-air-welded seams are to be accomplished in accordance with the TPO membrane roofing manufacturer's published requirements.

3.2.2.1 Nailing

Membrane shall be fastened to nailers in accordance with the membrane manufacturer's approved instructions. Unless otherwise specified, nails shall be staggered on 4 inch centers maximum; screws for sheet metal shall be staggered on 8 inch centers maximum; and a row of fasteners shall be at least 1/2 inch from edges of sheet metal.

3.2.2.2 Flashing

Roof edges, projections through the roof and changes in roof planes shall be flashed. The seam shall be sealed a minimum of 3 inches beyond the fasteners which attach the membrane to nailers. The installed flashing's shall be secured at the top of the flashing a maximum of 12 inches on centers under the counterflashing or cap. Where possible, prefabricated components shall be used for pipe seals and flashing accessories.

3.2.2.3 Expansion Joints

Expansion joints shall be covered using Prefabricated covers or elastomeric flashing in accordance with the recommendations of the manufacturer.

3.2.2.4 Cutoffs

If work is terminated prior to weatherproofing the entire roof, the membrane shall be sealed to the roof deck. Flutes in metal decking shall be sealed off along the cutoff edge. Membrane shall be pulled free or cut to expose the insulation when resuming work and cut insulation sheets used for fill-in shall be removed. Asphalt or coal-tar products shall not be used

for sealing.

3.2.2.5 Walkways

Walkways shall be installed on a loose-laid pad of the membrane material extending at least 1 inch beyond the walkway material, and as specified by the manufacturer. Stone ballast shall not be placed below or above walkways.

3.2.3 Mechanically Fastened Membrane Application

Layout membrane and lap adjoining sheets in accordance with membrane manufacturer's printed instructions such that the minimum recommended seam width is maintained and to ensure that seam width is as required by tested assembly meeting specified wind resistance requirements. Account for additional overlap required for placement of fasteners and plates or battens beyond the closed seam. Allow for sufficient membrane to form proper membrane terminations. Ensure membrane is free of wrinkles and ridges in the installation. Mechanically secure the membrane sheet with specified fasteners in the lap area. Space fasteners as required to provide the wind uplift resistance specified and in accordance with submitted fastener patterns for the field, corner, and perimeter roof areas. Set fasteners firm to plate or batten. Form field hot-air-welded seams and laps and/or coverstrips, as specified. Check all seams and ensure full/continuous lap seal.

3.2.4 Perimeter Attachment

Mechanically secure roof membrane sheet at roof perimeter in a manner to comply with wind resistance requirements and in accordance with membrane manufacturer's printed application instructions. When adhesively bonding a mechanically fastened system in perimeter areas, the perimeter boundary of the adhesive bond shall be the same as the boundary required for additional perimeter mechanical fastening to meet wind resistance requirements.

3.2.5 Securement at Base Tie-In Conditions

Mechanically fasten the roof membrane at penetrations, at base of curbs and walls, and at all locations where the membrane turns and angles greater than 4 degrees (1:12). Space fasteners a maximum of 12 inches on center, except where more frequent attachment is required to meet specified wind resistance or where recommended by the roof membrane manufacturer. Cover over fasteners with a layer of flashing material. Hot-air-weld all seams of flashing material as recommended by the roof membrane manufacturer's printed data.

3.2.6 Membrane Flashing

a. Install flashing and flashing accessories as the roof membrane is installed. Apply flashing to cleaned surfaces and as recommended by the roof membrane manufacturer and as specified. Utilize reinforced TPO membrane flashing and prefabricated accessory flashing's as recommended by the roof membrane manufacturer.

b. Completely adhere flashing sheets in place. Hot-air-weld the seams of flashing membrane in the same manner as roof membrane, except as otherwise recommended by the membrane manufacturer's printed instructions and approved by the Contracting Officer. Mechanically fasten top edge of base flashing with manufacturer recommended termination bar fastened at maximum 12 inches on center. Sheet metal

counter-flashing shall be installed over the termination bar in the completed work. Mechanically fasten top edge of base flashing for all other terminations in a manner recommended by the roof membrane manufacturer. Apply reinforced TPO flashing membrane over top of exposed nailers and blocking and to overlap top edge of base flashing installation at curbs, parapet walls, expansion joints and as otherwise indicated. Metal flashing's are specified under Section 07 60 00 FLASHING AND SHEET METAL.

c. Roof drains are specified in Section 22 00 00 PLUMBING, GENERAL PURPOSE. Flashing for roof drains, are specified in Section 07 60 00 FLASHING AND SHEET METAL. Provide a tapered insulation sump into the drain bowl area. Tapered slope shall not exceed 15 degrees (3:12) for fiberglass reinforced TPO membrane. Tapered insulation shall have surface suitable for adhering membrane in the drain sump area. Avoid field seams running through or within 24 inches of roof drain, or as otherwise recommended by the roof membrane manufacturer.

d. Adhere the membrane to the tapered insulation in the drain sump area. Apply TPO membrane manufacturer's compatible sealant and extend membrane sheets over edge of drain bowl opening at the roof drain deck flange in accordance with membrane manufacturer's printed application instructions. Membrane shall be free of wrinkles and folds in the drain area. Securely clamp membrane in the flashing clamping ring. Ensure membrane is cut to within 3/4 inch of inside rim of clamping ring to maintain drainage capacity. Do not cut back to bolt holes.

3.2.7 Pre-fabricated Curbs

Prefabricated curbs shall be securely anchored to nailer or other base substrate and flashed with TPO membrane flashing materials.

3.2.7.1 Set-On Accessories

Where pipe or conduit blocking, supports and similar roof accessories, or isolated paver block, are set on the membrane, adhere reinforced membrane or walkpad material, as recommended by the roof membrane manufacturer, to bottom of accessories prior to setting on roofing membrane. Specific method of installing set-on accessories must permit normal movement due to expansion, contraction, vibration, and similar occurrences without damaging roofing membrane. Do not mechanically secure set-on accessories through roofing membrane into roof deck substrate.

3.2.7.2 Lightning Protection

Lightning protection system components shall be flashed or attached to the roof membrane in a manner acceptable to the TPO membrane roof manufacturer and compliant with Code requirements.

3.2.8 Roof Walkways

Install walkways at roof access points and where otherwise indicated for traffic areas and for access to mechanical equipment, in accordance with the TPO membrane roof manufacturer's printed instructions.

3.2.9 Correction of Deficiencies

Where any form of deficiency is found, additional measures shall be taken as deemed necessary by the Contracting Officer to determine the extent of

the deficiency and corrective actions shall be as directed by the Contracting Officer.

3.2.10 Clean Up

Remove debris, scraps, containers and other rubbish and trash resulting from installation of the roofing system from job site each day.

3.3 PROTECTION OF APPLIED ROOFING

At the end of the day's work and when precipitation is imminent, protect applied membrane roofing system from water intrusion.

3.3.1 Water Cutoffs

Straighten insulation line using loose-laid cut insulation sheets and seal the terminated edge of the roof membrane system in an effective manner. Seal off flutes in metal decking along the cutoff edge. Remove the water cut-offs to expose the insulation when resuming work, and remove the insulation sheets used for fill-in.

3.3.2 Temporary Walkways, Runways, and Platforms

Do not permit storing, walking, wheeling, and trucking directly on applied roofing system. Provide temporary walkways, runways, and platforms of smooth clean boards, mats or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to live load limits of roof construction. Use rubber-tired equipment for roofing work.

3.4 FIELD QUALITY CONTROL

3.4.1 Construction Monitoring

During progress of the roof work, make visual inspections as necessary to ensure compliance with specified parameters. Additionally, verify the following:

a. Equipment is in working order. Metering devices are accurate.

b. Materials are not installed in adverse weather conditions.

c. Substrates are in acceptable condition, in compliance with specification, prior to application of subsequent materials.

(1) Nailers and blocking are provided where and as needed.

(2) Insulation substrate is smooth, properly secured to its substrate, and without excessive gaps prior to membrane application.

(3) The proper number, type, and spacing of fasteners are installed.

(4) Materials comply with the specified requirements.

(5) All materials are properly stored, handled and protected from moisture or other damages. Liquid components are properly mixed prior to application.

(6) Adhesives are applied uniformly to both mating surfaces and checked for proper set prior to bonding mating materials. Mechanical attachments are spaced as required, including additional fastening of membrane in corner and perimeter areas as required.

(7) Membrane is properly overlapped.

(8) Membrane seaming is as specified by TPO membrane manufacturer. All seams are checked at the end of each work day.

(9) Applied membrane is inspected and repaired as necessary prior to paver installation.

(10) Membrane is adhered without ridges, wrinkles, kinks, fishmouths.

(11) Installer adheres to specified and detailed application parameters.

(12) Associated flashing's and sheet metal are installed in a timely manner in accord with the specified requirements.

(13) Paver ballast is within the specified weight range.

(14) Temporary protection measures are in place at the end of each work shift.

3.4.2 Manufacturer's Inspection

Manufacturer's technical representative shall visit the site a minimum of 3 times during the installation for purposes of reviewing materials installation practices and adequacy of work in place. Inspections shall occur during the first 20 squares of membrane installation, at mid-point of the installation, and at substantial completion, at a minimum. Additional inspections need not exceed one for each 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors shall be performed as requested by the Contracting Officer. After each inspection, a report, signed by the manufacturer's technical representative shall be submitted by the roofing Contractor to the Contracting Officer within 3 working days. The report shall note overall quality of work, deficiencies and any other concerns, and recommended corrective action.

3.5 INSTRUCTIONS TO GOVERNMENT PERSONNEL

Furnish written and verbal instructions on proper maintenance procedures to designated Government personnel. Furnish instructions by a competent representative of the roof membrane manufacturer and include a minimum of 4 hours on maintenance and emergency repair of the membrane. Include a demonstration of membrane repair, and give sources of required special tools. Furnish information on safety requirements during maintenance and emergency repair operations.

3.6 ROOF DRAIN TEST

After completing roofing but prior to Government acceptance, perform the following test for watertightness. Plug roof drains and fill with water to edge of drain sump for 8 hours. Do not plug secondary overflow drains at

the same time as adjacent primary drain. To ensure some drainage from roof, do not test all drains at same time. Measure water at beginning and end of the test period. When precipitation occurs during test period, repeat test. When water level falls, remove water, thoroughly dry, and inspect installation; repair or replace roofing at drain to provide for a properly installed watertight flashing seal. Repeat test until there is no water leakage.

-- End of Section --

SECTION 07 60 00

FLASHING AND SHEET METAL
08/08

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI/SPRI RD-1	(2004) Standard for Retrofit Roof Drains

AMERICAN WELDING SOCIETY (AWS)

AWS D1.2/D1.2M	(2008) Structural Welding Code - Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A 167	(1999; R 2009) Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip
ASTM A 308/A 308M	(2006) Standard Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot Dip Process
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 101	(2007) Standard Specification for Lead-Coated Copper Sheet and Strip for Building Construction
ASTM B 209	(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 32	(2008) Standard Specification for Solder Metal
ASTM B 370	(2009) Standard Specification for Copper Sheet and Strip for Building Construction
ASTM B 69	(2008) Standard Specification for Rolled Zinc
ASTM D 1784	(2008) Standard Specification for Rigid

	Poly(Vinyl Chloride) (PVC) Compounds and Chlorinated Poly(Vinyl Chloride) (CPVC) Compounds
ASTM D 226/D 226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 41	(2005) Asphalt Primer Used in Roofing, Dampproofing, and Waterproofing
ASTM D 4586	(2007) Asphalt Roof Cement, Asbestos-Free

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2006) Architectural Sheet Metal Manual, Sixth Edition, Second Printing

1.2 GENERAL REQUIREMENTS

Finished sheet metalwork will form a weathertight construction without waves, warps, buckles, fastening stresses or distortion, which allows for expansion and contraction. Sheet metal mechanic is responsible for cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades. Coordinate installation of sheet metal items used in conjunction with roofing with roofing work to permit continuous roofing operations.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Covering on flat, sloped, or curved surfaces; G
Gutters; G
Downspouts; G
Expansion joints; G
Splash pans; G
Flashing for roof drains; G
Base flashing; G
Counterflashing; G
Flashing at roof penetrations; G
Reglets; G
Scuppers; G
Copings; G
Drip edge; G
Conductor heads

Indicate thicknesses, dimensions, fastenings and anchoring methods, expansion joints, and other provisions necessary for thermal expansion and contraction. Scaled manufacturer's catalog data may be submitted for factory fabricated items.

SD-11 Closeout Submittals

Quality Control Plan

Submit for sheet metal work in accordance with paragraph entitled "Field Quality Control."

1.4 DELIVERY, HANDLING, AND STORAGE

Package and protect materials during shipment. Uncrate and inspect materials for damage, dampness, and wet-storage stains upon delivery to the job site. Remove from the site and replace damaged materials that cannot be restored to like-new condition. Handle sheet metal items to avoid damage to surfaces, edges, and ends. Store materials in dry, weather-tight, ventilated areas until immediately before installation.

PART 2 PRODUCTS

2.1 MATERIALS

Use any metal listed by SMACNA Arch. Manual for a particular item, unless otherwise specified or indicated. Conform to the requirements specified and to the thicknesses and configurations established in SMACNA Arch. Manual for the materials.

Furnish sheet metal items in 8 to 10 foot lengths. Single pieces less than 8 feet long may be used to connect to factory-fabricated inside and outside corners, and at ends of runs. Factory fabricate corner pieces with minimum 12 inch legs. Provide accessories and other items essential to complete the sheet metal installation. Provide accessories made of the same or compatible materials as the items to which they are applied. Fabricate sheet metal items of the materials specified below and to the gage, thickness, or weight shown in Table I at the end of this section. Provide sheet metal items with mill finish unless specified otherwise. Where more than one material is listed for a particular item in Table I, each is acceptable and may be used except as follows:

2.1.1 Exposed Sheet Metal Items

Must be of the same material. Consider the following as exposed sheet metal: gutters, including hangers; downspouts; gravel stops and fascias; cap, valley, steeped, base, and eave flashings and related accessories.

2.1.2 Drainage

Do not use copper for an exposed item if drainage from that item will pass over exposed masonry, stonework or other metal surfaces. In addition to the metals listed in Table I, lead-coated copper may be used for such items.

2.1.3 Copper, Sheet and Strip

ASTM B 370, cold-rolled temper, H 00 (standard).

2.1.4 Lead-Coated Copper Sheet

ASTM B 101.

2.1.5 Lead Sheet

Minimum weight 4 pounds per square foot.

2.1.6 Steel Sheet, Zinc-Coated (Galvanized)

ASTM A 653/A 653M.

2.1.6.1 Finish

Exposed exterior items of zinc-coated steel sheet must have a baked-on, factory-applied color coating of polyvinylidene fluoride or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Provide finish coating dry-film thickness of 0.8 to 1.3 mils.

2.1.7 Zinc Sheet and Strip

ASTM B 69, Type I, a minimum of 0.024 inch thick.

2.1.8 Stainless Steel

ASTM A 167, Type 302 or 304, 2D Finish, fully annealed, dead-soft temper.

2.1.9 Terne-Coated Steel

Minimum of 14 by 20 inch with minimum of 40 pound coating per double base box. ASTM A 308/A 308M.

2.1.10 Aluminum Alloy Sheet and Plate

ASTM B 209, anodized clear form alloy, and temper appropriate for use.

2.1.10.1 Alclad

When fabricated of aluminum, fabricate the items Alclad 3003, Alclad 3004, Alclad 3005, clad on both sides unless otherwise indicated.

a. Gutters, downspouts, and hangers

b. Gravel stops and fascias

c. Flashing

2.1.10.2 Finish

Exposed exterior sheet metal items of aluminum must have a baked-on, factory-applied color coating of polyvinylidene fluoride (PVF2) or other equivalent fluorocarbon coating applied after metal substrates have been cleaned and pretreated. Provide finish coating dry-film thickness of 0.8 to 1.3 mils.

2.1.11 Aluminum Alloy, Extruded Bars, Rods, Shapes, and Tubes

ASTM B 221.

2.1.12 Solder

ASTM B 32, 95-5 tin-antimony.

2.1.13 Polyvinyl Chloride Reglet

ASTM D 1784, Type II, Grade 1, Class 14333-D, 0.075 inch minimum thickness.

2.1.14 Bituminous Plastic Cement

ASTM D 4586, Type I.

2.1.15 Roofing Felt

ASTM D 226/D 226M.

2.1.16 Asphalt Primer

ASTM D 41.

2.1.17 Fasteners

Use the same metal or a metal compatible with the item fastened. Use stainless steel fasteners to fasten dissimilar materials.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Metal Roofing

3.1.1.1 Standing-seam Method

Make standing seams parallel with slope of roof. Fabricate sheets into long lengths at shop by locking short dimensions together and thoroughly soldering joints thus formed. In applying metal, turn up one edge of course at each side seam at right angles 1.5 inch. Then install 2 by 3 inch cleats spaced 12 inch apart by fastening one end of each cleat to roof with two one inch long nails and folding roof end back over nail heads. Turn end adjoining turned-up side seam up over upstanding edge of course. Turn up adjoining edge of next course 1.75 inch and abutting upstanding edges locked, turned over, and flattened against one side of standing seam. Make standing seams straight, rounded neatly at the top edges, and stand about one inch above roof deck. All sheets must be same length, except as required to complete run or maintain pattern. Locate transverse joints of each panel half way between joints in adjacent sheets. Align joints of alternate sheets horizontally to produce uniform pattern, as shown in SMACNA Arch. Manual.

3.1.1.2 Flat-seam Method

Lay metal so short dimension is parallel to gutter or eave lines and so water will flow over and not into seams. Make seams by turning edges of sheet 3/4 inch and lock and solder together. If sheets are laid one at a time, secure to roof deck with cleats, using three cleats to each sheet, two on long side and one on short side. Use cleats inch wide, hooked over 3/4 inch upturned edges of sheets, and nail to roof deck with two one inch long nails. Turn back roof end of cleat over nail heads before next sheet is applied. If desired, sheets may be made into long lengths at shop by locking short dimensions together and soldering seams thus formed. Turn long lengths 3/4 inch, and secure each length to roof deck by cleats spaced 12 inch apart. Mallet and solder seams after pans are in place." All sheets to be same length, except as required to complete run or maintain pattern.

Locate transverse joints of each panel half way between joints in adjacent sheets. Align joints of alternate sheets horizontally to produce uniform pattern, as shown in SMACNA Arch. Manual.

3.1.2 Workmanship

Make lines and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1/2 inch hem on the concealed side. Make sheet metal exposed to the weather watertight with provisions for expansion and contraction.

Make surfaces to receive sheet metal plumb and true, clean, even, smooth, dry, and free of defects and projections. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793, Architectural Sheet Metal Manual. Provide sheet metal flashing in the angles formed where roof decks abut walls, curbs, ventilators, pipes, or other vertical surfaces and wherever indicated and necessary to make the work watertight. Join sheet metal items together as shown in Table II.

3.1.3 Nailing

Confine nailing of sheet metal generally to sheet metal having a maximum width of 18 inch. Confine nailing of flashing to one edge only. Space nails evenly not over 3 inch on center and approximately 1/2 inch from edge unless otherwise specified or indicated. Face nailing will not be permitted. Where sheet metal is applied to other than wood surfaces, include in shop drawings, the locations for sleepers and nailing strips required to secure the work.

3.1.4 Cleats

Provide cleats for sheet metal 18 inch and over in width. Space cleats evenly not over 12 inch on center unless otherwise specified or indicated. Unless otherwise specified, provide cleats of 2 inch wide by 3 inch long and of the same material and thickness as the sheet metal being installed. Secure one end of the cleat with two nails and the cleat folded back over the nailheads. Lock the other end into the seam. Where the fastening is to be made to concrete or masonry, use screws and drive in expansion shields set in concrete or masonry. Pretin cleats for soldered seams.

3.1.5 Bolts, Rivets, and Screws

Install bolts, rivets, and screws where indicated or required. Provide compatible washers where required to protect surface of sheet metal and to provide a watertight connection. Provide mechanically formed joints in aluminum sheets 0.040 inch or less in thickness.

3.1.6 Seams

Straight and uniform in width and height with no solder showing on the face.

3.1.6.1 Flat-lock Seams

Finish not less than 3/4 inch wide.

3.1.6.2 Lap Seams

Finish soldered seams not less than one inch wide. Overlap seams not

soldered, not less than 3 inch.

3.1.6.3 Loose-Lock Expansion Seams

Not less than 3 inch wide; provide minimum one inch movement within the joint. Completely fill the joints with the specified sealant, applied at not less than 1/8 inch thick bed.

3.1.6.4 Standing Seams

Not less than one inch high, double locked without solder.

3.1.6.5 Flat Seams

Make seams in the direction of the flow.

3.1.7 Soldering

Where soldering is specified, apply to copper, terne-coated stainless steel, zinc-coated steel, and stainless steel items. Pretin edges of sheet metal before soldering is begun. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.7.1 Edges

Scrape or wire-brush the edges of lead-coated material to be soldered to produce a bright surface. Flux brush the seams in before soldering. Treat with soldering acid flux the edges of stainless steel to be pretinned. Seal the joints in aluminum sheets of 0.040 inch or less in thickness with specified sealants. Do not solder aluminum.

3.1.8 Welding and Mechanical Fastening

Use welding for aluminum of thickness greater than 0.040 inch. Aluminum 0.040 inch or less in thickness must be butted and the space backed with formed flashing plate; or lock joined, mechanically fastened, and filled with sealant as recommended by the aluminum manufacturer.

3.1.8.1 Welding of Aluminum

Use welding of the inert gas, shield-arc type. For procedures, appearance and quality of welds, and the methods used in correcting welding work, conform to AWS D1.2/D1.2M.

3.1.8.2 Mechanical Fastening of Aluminum

Use No. 12, aluminum alloy, sheet metal screws or other suitable aluminum alloy or stainless steel fasteners. Drive fasteners in holes made with a No. 26 drill in securing side laps, end laps, and flashings. Space fasteners 12 inch maximum on center. Where end lap fasteners are required to improve closure, locate the end lap fasteners not more than 2 inch from the end of the overlapping sheet.

3.1.9 Protection from Contact with Dissimilar Materials

3.1.9.1 Copper or Copper-bearing Alloys

Paint with heavy-bodied bituminous paint surfaces in contact with

dissimilar metal, or separate the surfaces by means of moistureproof building felts.

3.1.9.2 Aluminum

Do not allow aluminum surfaces in direct contact with other metals except stainless steel, zinc, or zinc coating. Where aluminum contacts another metal, paint the dissimilar metal with a primer followed by two coats of aluminum paint. Where drainage from a dissimilar metal passes over aluminum, paint the dissimilar metal with a non-lead pigmented paint.

3.1.9.3 Metal Surfaces

Paint surfaces in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.1.9.4 Wood or Other Absorptive Materials

Paint surfaces that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

3.1.10 Expansion and Contraction

Provide expansion and contraction joints at not more than 32 foot intervals for aluminum and at not more than 40 foot intervals for other metals. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval. Space joints evenly. Join extruded aluminum gravel stops and fascias by expansion and contraction joints spaced not more than 12 feet apart.

3.1.11 Base Flashing

Extend up vertical surfaces of the flashing not less than 8 inch and not less than 4 inch under the roof covering. Where finish wall coverings form a counterflashing, extend the vertical leg of the flashing up behind the applied wall covering not less than 6 inch. Overlap the flashing strips with the previously laid flashing not less than 3 inch. Fasten the strips at their upper edge to the deck. Horizontal flashing at vertical surfaces must extend vertically above the roof surface and fastened at their upper edge to the deck a minimum of 6 inch on center with hex headed, galvanized shielded screws a minimum of 2-inch lap of any surface. Solder end laps and provide for expansion and contraction. Extend the metal flashing over crickets at the up-slope side of curbs, and similar vertical surfaces extending through sloping roofs, the metal flashings. Install and fit the flashings so as to be completely weathertight. Provide factory-fabricated base flashing for interior and exterior corners. Do not use metal base flashing on built-up roofing.

3.1.12 Counterflashing

Except where indicated or specified otherwise, insert counterflashing in reglets located from 9 to 10 inch above roof decks, extend down vertical surfaces over upturned vertical leg of base flashings not less than 3 inch. Fold the exposed edges of counterflashings 1/2 inch. Where stepped counterflashings are required, they may be installed in short lengths a minimum 8 inch by 8 inch or may be of the preformed one-piece type. Provide end laps in counterflashings not less than 3 inch and make it weathertight with plastic cement. Do not make lengths of metal

counterflashings exceed 10 feet. Form the flashings to the required shapes before installation. Factory-form the corners not less than 12 inch from the angle. Secure the flashings in the reglets with lead wedges and space not more than 18 inch apart; on stair/elevator towers short runs, place wedges closer together. Fill caulked-type reglets or raked joints which receive counterflashing with caulking compound. Turn up the concealed edge of counterflashings built into masonry or concrete walls not less than 1/4 inch and extend not less than 2 inch into the walls. Install counterflashing to provide a spring action against base flashing.

3.1.13 Metal Reglets

Provide factory fabricated caulked type or friction type reglets with a minimum opening of 1/4 inch and a depth of 1 1/4 inch, as approved.

3.1.13.1 Caulked Reglets

Provide with rounded edges and metal strap brackets or other anchors for securing to the concrete forms. Provide reglets with a core to protect them from injury during the installation. Provide built-up mitered corner pieces for internal and external angles. Wedge the flashing in the reglets with lead wedges every 18 inch, caulked full and solid with an approved compound.

3.1.13.2 Friction Reglets

Provide with flashing receiving slots not less than 5/8 inch deep, one inch jointing tongues, and upper and lower anchoring flanges installed at 24 inch maximum snaplock receiver. Insert the flashing the full depth of the slot and lock by indentations made with a dull-pointed tool, wedges, and filled with a sealant. For friction reglets, install flashing snaplock receivers at 24 inch on center maximum. When the flashing has been inserted the full depth, caulk the slot and lock and fill with sealant.

3.1.14 Polyvinyl Chloride Reglets

Rigid polyvinyl chloride reglets ASTM D 1784, Type II, Grade 1, Class 14333-D, 0.075 inch minimum thickness may be provided in lieu of metal reglets for temporary construction.

3.1.15 Metal Drip Edge

Provide a metal drip edge, designed to allow water run-off to drip free of underlying construction, at eaves and rakes prior to the application of roofing shingles. Apply directly on the wood deck at the eaves and over the underlay along the rakes. Extend back from the edge of the deck not more than 3 inch and secure with compatible nails spaced not more than 10 inch on center along upper edge.

3.1.16 Gutters

The hung type of shape indicated and supported on underside by brackets that permit free thermal movement of the gutter. Provide gutters in sizes indicated complete with mitered corners, end caps, outlets, brackets, and other accessories necessary for installation. Bead with hemmed edge or reinforce the outer edge of gutter with a stiffening bar not less than 3/4 by 3/16 inch of material compatible with gutter. Fabricate gutters in sections not less than 8 feet. Lap the sections a minimum of one inch in the direction of flow or provide with concealed splice plate 6 inch minimum. Join the gutters, other than aluminum, by riveted and soldered

joints. Join aluminum gutters with riveted sealed joints. Provide expansion-type slip joints midway between outlets. Install gutters below slope line of the roof so that snow and ice can slide clear. Support gutters on adjustable hangers spaced not more than 30 inch on center. Adjust gutters to slope uniformly to outlets, with high points occurring midway between outlets. Fabricate hangers and fastenings from metals.

3.1.17 Downspouts

Space supports for downspouts according to the manufacturer's recommendation for the masonry or steel substrate. Types, shapes and sizes are indicated. Provide complete including elbows and offsets. Provide downspouts in approximately 10 foot lengths. Provide end joints to telescope not less than 1/2 inch and lock longitudinal joints. Provide gutter outlets with wire ball strainers for each outlet. Provide strainers to fit tightly into outlets and be of the same material used for gutters. Keep downspouts not less than one inch away from walls. Fasten to the walls at top, bottom, and at an intermediate point not to exceed 5 feet on center with leader straps or concealed rack-and-pin type fasteners. Form straps and fasteners of metal compatible with the downspouts.

3.1.17.1 Terminations

Neatly fit into the drainage connection the downspouts terminating in drainage lines and fill the joints with a portland cement mortar cap sloped away from the downspout. Provide downspouts terminating in splash blocks with elbow-type fittings. Provide splash pans as specified.

3.1.18 Flashing for Roof Drains

Provide a 30 inch square sheet indicated. Taper insulation to drain from 24 inch out. Set flashing on finished felts in a full bed of asphalt roof cement, ASTM D 4586. Heavily coat the drain flashing ring with asphalt roof cement. Clamp the roof membrane, flashing sheet, and stripping felt in the drain clamping ring. Secure clamps so that felts and drain flashing are free of wrinkles and folds. Retrofit roof drains must conform to ANSI/SPRI RD-1.

3.1.19 Scuppers

Line interior of scupper openings with sheet metal. Extend the lining through and project outside of the wall to form a drip on the bottom edge and form to return not less than one inch against the face of the outside wall at the top and sides. Fold outside edges under 1/2 inch on all sides. Provide the perimeter of the lining approximately 1/2 inch less than the perimeter of the scupper. Join the top and sides of the lining on the roof deck side to a closure flange by a locked and soldered joint. Join the bottom edge by a locked and soldered joint to the closure flange, where required, form with a ridge to act as a gravel stop around the scupper inlet. Provide surfaces to receive the scupper lining and coat with bituminous plastic cement.

3.1.20 Conductor Heads

Type indicated and fabricated of the same material as the downspouts. Set the depth of top opening equal to two-thirds of the width. Provide outlet tubes not less than 4 inch long. Flat-lock solder the seams. Where conductor heads are used in conjunction with scuppers, set the conductor a minimum of 2 inch wider than the scupper. Attach conductor heads to the

wall with masonry fasteners, and loose-lock to provide conductor heads with screens of the same material. Securely fasten screens to the heads.

3.1.21 Splash Pans

Install splash pans where downspouts discharge on roof surfaces and at other locations as indicated. Unless otherwise shown, provide pans not less than 24 inch long by 18 inch wide with metal ribs across the bottom of the pan. Form the sides of the pan with vertical baffles not less than one inch high in the front, and 4 inch high in the back doubled over and formed continuous with horizontal roof flanges not less than 4 inch wide. Bend the rear flange of the pan to contour of cant strip and extend up 6 inch under the side wall covering or to height of base flashing under counterflashing. Bed the pans and roof flanges in plastic bituminous cement and strip-flash as specified.

3.1.22 Sheet Metal Covering on Flat, Sloped, or Curved Surfaces

Except as specified or indicated otherwise, cover and flash all minor flat, sloped, or curved surfaces such as crickets, bulkheads, dormers and small decks with metal sheets of the material used for flashing; maximum size of sheets, 16 by 18 inch. Fasten sheets to sheathing with metal cleats. Lock seams and solder. Lock aluminum seams as recommended by aluminum manufacturer. Provide an underlayment of roofing felt for all sheet metal covering.

3.1.23 Expansion Joints

Provide expansion joints for roofs, walls, and floors as indicated. Provide evenly spaced joints. Provide an additional joint where the distance between the last expansion joint and the end of the continuous run is more than half the required interval spacing. Conform to the requirements of Table I.

3.1.23.1 Roof Expansion Joints

Consist of curb with wood nailing members on each side of joint, bituminous base flashing, metal counterflashing, and metal joint cover. Bituminous base flashing is specified in Roofing Section. Provide counterflashing as specified in paragraph "Counterflashing," except as follows: Provide counterflashing with vertical leg of suitable depth to enable forming into a horizontal continuous cleat. Secure the inner edge to the nailing member. Make the outer edge projection not less than one inch for flashing on one side of the expansion joint and be less than the width of the expansion joint plus one inch for flashing on the other side of the joint. Hook the expansion joint cover over the projecting outer edges of counterflashing. Provide roof joint with a joint cover of the width indicated. Hook and lock one edge of the joint cover over the shorter projecting flange of the continuous cleat, and the other edge hooked over and loose locked with the longer projecting flange. Joints are specified in Table II.

3.1.23.2 Floor and Wall Expansion Joints

Provide U-shape with extended flanges for expansion joints in concrete and masonry walls and in floor slabs.

3.1.24 Flashing at Roof Penetrations and Equipment Supports

Provide metal flashing for all pipes, ducts, and conduits projecting

through the roof surface and for equipment supports, guy wire anchors, and similar items supported by or attached to the roof deck.

3.1.25 Single Pipe Vents

See Table I, footnote (d). Set flange of sleeve in bituminous plastic cement and nail 3 inch on center. Bend the top of sleeve over and extend down into the vent pipe a minimum of 2 inch. For long runs or long rises above the deck, where it is impractical to cover the vent pipe with lead, use a two-piece formed metal housing. Set metal housing with a metal sleeve having a 4 inch roof flange in bituminous plastic cement and nailed 3 inch on center. Extend sleeve a minimum of8 inch above the roof deck and lapped a minimum of 3 inch by a metal hood secured to the vent pipe by a draw band. Seal the area of hood in contact with vent pipe with an approved sealant.

3.1.26 Copings

Provide coping using 24 gauge steel or aluminum sheets 8 or 10 feet long joined by a 3/4 inch locked and soldered seam.Terminate outer edges in edge strips. Install with sealed splice plate joints as indicated.

3.2 PAINTING

Field-paint sheet metal for separation of dissimilar materials.

3.2.1 Aluminum Surfaces

Shall be solvent cleaned and given one coat of zinc-molybdate primer and one coat of aluminum paint.

3.3 CLEANING

Clean exposed sheet metal work at completion of installation. Remove grease and oil films, handling marks, contamination from steel wool, fittings and drilling debris, and scrub-clean. Free the exposed metal surfaces of dents, creases, waves, scratch marks, and solder or weld marks.

3.4 REPAIRS TO FINISH

Scratches, abrasions, and minor surface defects of finish may be repaired in accordance with the manufacturer's printed instructions and as approved. Repair damaged surfaces caused by scratches, blemishes, and variations of color and surface texture. Replace items which cannot be repaired.

3.5 FIELD QUALITY CONTROL

Establish and maintain a Quality Control Plan for sheet metal used in conjunction with roofing to assure compliance of the installed sheet metalwork with the contract requirements. Remove work that is not in compliance with the contract and replace or correct. Include quality control, but not be limited to, the following:

a. Observation of environmental conditions; number and skill level of sheet metal workers; condition of substrate.

b. Verification that specified material is provided and installed.

c. Inspection of sheet metalwork, for proper size(s) and

thickness(es), fastening and joining, and proper installation.

3.5.1 Procedure

Submit for approval prior to start of roofing work. Include a checklist of points to be observed. Document the actual quality control observations and inspections. Furnish a copy of the documentation to the Contracting Officer at the end of each day.

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Aluminum, Inch	Stainless Steel, Inch	Terne-Coated Steel, Inch	Zinc-Coated Steel, U.S. Std. Gage
Building Expansion Joints				
Cover.....	.032	.015	.015	24
Waterstop-bellows or flanged, U-type.....	-	.015	.015	-
Covering on minor flat, pitched or curved surfaces.....	.040	.018	.018	-
Downspouts and leaders.....	.032	.015	.015	24
Downspout clips and anchors.....	.040 clip	-	-	-
	.125 anchor	-	-	-
Downspout straps, 2-inch.....	.060	.050	-	-
Conductor heads.....	.032	.015	.015	-
Scupper lining.....	.032	.015	.015	-
Strainers, wire diameter or gage....	.144 diameter	.109 diameter		-
Flashings:				
Base.....	.040	.018	.018	24
Cap (Counter-flashing)	.032	.015	.015	26
Roof drain.....				
Pipe vent sleeve(d)				
Coping.....	-	-	-	-
Extrusions.....	.075	-	-	-
Sheets, corrugated.....	.032	.015	.015	-
Sheets, smooth.....	.050	.018	.018	24
Edge strip.....	.050	.025	-	-
Gutters:				
Gutter section.....	.032	.015	.015	24
Continuous cleat.....	.032	.015	.015	24
Hangers, dimensions.....	1 inch x .080 inch (c)	1 inch x .037 inch	-	-
Joint Cover plates...	.032	.015	.015	24
See Table II)				

TABLE I. SHEET METAL WEIGHTS, THICKNESSES, AND GAGES

Sheet Metal Items	Aluminum, Inch	Stainless Steel, Inch	Terne-Coated Steel, Inch	Zinc-Coated Steel, U.S. Std. Gage
Reglets (c).....	-	.010	.010	-
Splash pans.....	.040	.018	.018	-

(a) Brass.

(b) May be lead weighing 4 pounds per square foot.

(c) May be polyvinyl chloride.

(d) 2.5 pound minimum lead sleeve with 4 inch flange. Where lead sleeve is impractical, refer to paragraph entitled "Single Pipe Vents" for optional material.

TABLE II. SHEET METAL JOINTS

Item Designation	TYPE OF JOINT: Copper, Terne-Coated Steel, Zinc-Coated Steel and Stainless Steel	Aluminum	Remarks
Joint cap for building expansion seam, cleated joint at roof	1.25 inch single lock, standing seam, cleated	1.25 inch single lock, standing	- - -
Flashings			
Base	One inch 3 inch lap for expansion joint	One inch flat locked, soldered; sealed; 3 inch lap for expansion joint	Aluminum producer's recommended hard setting sealant for locked aluminum joints. Fill each metal expansion joint with a joint sealing compound compound.
Cap-in reglet	3 inch lap	3 inch lap	Seal groove with joint sealing compound.
Reglets	Butt joint	- - -	Seal reglet groove with joint sealing

TABLE II. SHEET METAL JOINTS

Item Designation	TYPE OF JOINT: Copper, Terne-Coated Steel, Zinc-Coated Steel and Stainless Steel	Aluminum	Remarks
			compound.
Edge strip	Butt	Butt	- - -
Gutters	1.5 inch lap, riveted and soldered	One inch flat locked, riveted, and sealed	Aluminum producers recommended hard setting sealant for locked aluminum joints.

(a) Provide a 3 inch lap elastomeric flashing with manufacturer's recommended sealant.

(b) Seal polyvinyl chloride reglet with manufacturer's recommended sealant.

-- End of Section --

SECTION 07 61 14.00 20

STEEL STANDING SEAM ROOFING
08/08

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI SG03-3	(2002) Cold-Formed Steel Design Manual Set

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2009a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 366/A 366M	(1997e1) Standard Specification for Commercial Steel, Sheet, Carbon,(0.15 Maximum Percent Cold-Rolled
ASTM A 570/A 570M	(1998) Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 792/A 792M	(2009a) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM D 2244	(2009a) Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D 2247	(2002) Testing Water Resistance of Coatings in 100% Relative Humidity
ASTM D 4214	(2007) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D 522	(1993a; R 2008) Mandrel Bend Test of Attached Organic Coatings

ASTM D 523	(2008) Standard Test Method for Specular Gloss
ASTM D 968	(2005e1) Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM E 1592	(2005) Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM E 84	(2009c) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM G 23	(1996) Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials

SHEET METAL AND AIR CONDITIONING CONTRACTORS' NATIONAL ASSOCIATION (SMACNA)

SMACNA 1793	(2006) Architectural Sheet Metal Manual, Sixth Edition, Second Printing

1.2 DEFINITIONS

1.2.1 Field-Formed Seam

Seams of panels so configured that when adjacent sheets are installed the seam is sealed utilizing mechanical or hand seamers. Crimped (45 degree bend), roll formed (180 degree bend), double roll formed (2 - 180 degree bends), and roll and lock systems are types of field-formed seam systems.

1.2.2 Snap Together Seam

Panels so configured that the male and female portions of the seam interlock through the application of foot pressure or tamping with a mallet. Snap-on cap configurations are a type of snap together system.

1.2.3 Pre-Formed

Formed to the final, less field-formed seam, profile and configuration in the factory.

1.2.4 Field-Formed

Formed to the final, less field-formed seam, profile and configuration at the site of work prior to installation.

1.2.5 Roofing System

The roofing system is defined as the assembly of roofing components, including roofing panels, flashing, fasteners, and accessories which, when assembled properly result in a watertight installation.

1.3 SYSTEM DESCRIPTION

1.3.1 Design Requirements

a. Panels shall be continuous lengths up to manufacturer's standard longest lengths, with no joints or seams, except where indicated or specified. Ribs of adjoining sheets shall be in continuous contact from eave to ridge. Individual panels of snap together type systems shall be removable for replacement of damaged material.

b. There shall be no exposed or penetrating fasteners except where shown on approved shop drawings. Fasteners into steel shall be stainless steel, zinc cast head, or cadmium plated steel screws inserted into predrilled holes. There shall be a minimum of two fasteners per clip. Single fasteners will be allowed when supporting structural members are prepunched or predrilled.

c. Snap together type systems shall have a capillary break and a positive side lap locking device. Field-formed seam type systems shall be mechanically locked closed by the manufacturer's locking tool. The seam shall include a continuous factory applied sealant when required by the manufacturer to withstand the wind loads specified.

d. Roof panel anchor clips shall be concealed and designed to allow for longitudinal thermal movement of the panels, except where specific fixed points are indicated. Provide for lateral thermal movement in panel configuration or with clips designed for lateral and longitudinal movement.

1.3.2 Design Conditions

The system shall be designed to resist positive and negative loads specified herein in accordance with the AISI SG03-3. Panels shall support walking loads without permanent distortion or telegraphing of the structural supports.

1.3.2.1 Wind Uplift

The design uplift pressures for the roof system shall be computed and applied using a basic wind speed of 90 miles per hour (mph). Roof system and attachments shall resist the following wind loads, in pounds per square foot (psf):

	Negative
a. At eaves	49.2
b. At ridge	49.2
c. At building corners	72.7
d. At central areas	28.3

The design uplift force for each connection assembly shall be that pressure given for the area under consideration, multiplied by the tributary load area of the connection assembly, and multiplied by the appropriate factor of safety, as follows:

a. Single fastener in a connection: 3.0

b. Two or more fasteners in each connection: 2.25

1.3.2.2 Roof Live Loads

Loads shall be applied on the horizontal projection of the roof structure. The minimum roof design live load shall be 20 psf.

1.3.2.3 Thermal Movement

System shall be capable of withstanding thermal movement based on a temperature range of 10 degrees F below design low air temperature

1.3.2.4 Deflection

Panels shall be capable of supporting design loads between unsupported spans with deflection of not greater than L/180 of the span.

1.3.3 Structural Performance

The structural performance test methods and requirements of the Standing Seam Roofing Systems (SSRS) shall be in accordance with ASTM E 1592.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Roofing; G

Submit roofing drawings to supplement the instructions and diagrams. Drawings shall include design and erection drawings containing an isometric view of the roof showing the design uplift pressures and dimensions of edge, ridge and corner zones; and show typical and special conditions including flashings, materials and thickness, dimensions, fixing lines, anchoring methods, sealant locations, sealant tape locations, fastener layout, sizes, and spacing, terminations, penetrations, attachments, and provisions for thermal movement. Details of installation shall be in accordance with the manufacturer's Standard Instructions and details or the SMACNA 1793. Prior to submitting shop drawings, have drawings reviewed and approved by the manufacturer's technical engineering department.

SD-03 Product Data

Roofing panels; G
Attachment clips
Closures
Accessories
Fasteners
Sealants

Insulation, including joint sealing measures for vapor barrier

facing

Sample warranty certificate; G

Submit for materials to be provided. Submit data sufficient to indicate conformance to specified requirements.

SD-04 Samples

Roofing panel

Submit a 12 inch long by full width section of typical panel.

For color selection, submit 2 by 4 inch metal samples in color, finish and texture selected. When colors are not indicated, submit samples of not less than six different manufacturer's standard colors for selection.

Accessories

Submit each type of accessory item used in the project including, but not limited to each type of anchor clip, closure, fastener, and leg clamp.

Sealants
Intermediate Support Section

Submit full size samples of each intermediate support section, 12 inches long.

SD-05 Design Data

Design calculations; G

SD-06 Test Reports

Field Inspection; G

Submit manufacturer's technical representative's field inspection reports as specified in paragraph entitled "Manufacturer's Field Inspection."

Structural performance tests; G
Finish tests

SD-07 Certificates

Manufacturer's Technical Representative's Qualifications; G

Statement of Installer's Qualifications

Submit documentation from roofing manufacturer proving the manufacturer's technical representative meets below specified requirements. Include name, address, telephone number, and experience record.

Submit documentation proving the installer is factory-trained, has the specified experience, and authorized by the manufacturer to install the products specified.

SD-08 Manufacturer's Instructions

Installation manual; G

Submit manufacturers printed installation manual, instructions, and standard details.

SD-11 Closeout Submittals

Information card; G

For each roofing installation, submit a typewritten card or photoengraved aluminum card containing the information listed on Form 1 located at the end of this section.

1.5 DESIGN CALCULATIONS

Provide design calculations prepared by a professional engineer specializing in structural engineering verifying that system supplied and any additional framing meets design load criteria indicated. Coordinate calculations with manufacturer's test results. Include calculations for:

Wind load uplift design pressure at roof locations specified in paragraph entitled "Wind Uplift."

Clip spacing and allowable load per clip.

Fastening of clips to structure or intermediate supports.

Intermediate support spacing and framing and fastening to structure when required.

Allowable panel span at anchorage spacing indicated.

Safety factor used in design loading.

Governing code requirements or criteria.

Edge and termination details.

1.6 QUALITY ASSURANCE

1.6.1 Preroofing Conference

After submittals are received and approved but before roofing and insulation work, including associated work, is preformed, the Contractor shall hold a preroofing conference to review the following:

a. The drawings and specifications

b. Procedure for on site inspection and acceptance of the roofing substrate and pertinent structural details relating to the roofing system

c. Contractor's plan for coordination of the work of the various trades involved in providing the roofing system and other components secured to the roofing

d. Safety requirements

The preroofing conference shall be attended by the Contractor and personnel directly responsible for the roofing and insulation installation, mechanical and electrical work, and the roofing manufacturer's technical representative. Conflicts among those attending the preroofing conference shall be resolved and confirmed in writing before roofing work, including associated work, is begun. Prepare written minutes of the preroofing conference and submit to the Contracting Officer.

1.6.2 Manufacturer

The SSMRS shall be the product of a metal roofing industry - recognized manufacturer who has been in the practice of manufacturing SSMRS for a period of not less than 5 years and who has been involved in at least 5 projects similar in size and complexity to this project.

1.6.3 Manufacturer's Technical Representative

The representative shall have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and with installations in the geographical area where construction will take place. The manufacturer's representative shall be an employee of the manufacturer with at least 5 years experience in installing the roof system. The representative shall be available to perform field inspections and attend meetings as required herein, and as requested by the Contracting Officer.

1.6.4 Installer's Qualifications

The roofing system installer shall be factory-trained, approved by the metal roofing system manufacturer to install the system, and shall have a minimum of three years experience as an approved applicator with that manufacturer. The applicator shall have applied five installations of similar size and scope as this project within the previous 3 years.

1.6.5 Single Source

Roofing panels, clips, closures, and other accessories shall be standard products of the same manufacturer; shall be the latest design by the manufacturer; and shall have been designed by the manufacturer to operate as a complete system for the intended use.

1.6.6 Laboratory Tests For Panel Finish

The term "appearance of base metal" refers to the metal coating on steel. Panels shall meet the following test requirements:

a. Formability Test: When subjected to a 180 degree bend over a 1/8 inch diameter mandrel in accordance with ASTM D 522, exterior coating film shall show only slight microchecking and no loss of adhesion.

b. Accelerated Weathering Test: Withstand a weathering test for a minimum of 2000 hours in accordance with ASTM G 23, Method 1 without cracking, peeling, blistering, loss of adhesion of the protective coating, or corrosion of the base metal. Protective coating that can be readily removed from the base metal with a penknife blade or similar instrument shall be considered to indicate loss of adhesion.

c. Chalking Resistance: After the 2000-hour weatherometer test, exterior coating shall not chalk greater than No. 8 rating when measured in accordance with ASTM D 4214 test procedures.

d. Color Change Test:

After the 2000 -hour weatherometer test, exterior coating color change shall not exceed 2 NBS units when measured in accordance with ASTM D 2244 test procedure.

e. Abrasion Resistance Test for Color Coating: When subjected to the falling sand test in accordance with ASTM D 968, coating system shall withstand a minimum of 100 liters of sand per mil thickness before appearance of base metal.

f. Humidity Test: When subjected to a humidity cabinet test in accordance with ASTM D 2247 for 1000 hours, a scored panel shall show no signs of blistering, cracking, creepage, or corrosion.

g. Gloss Test: The gloss of the finish shall be 30 plus or minus 5 at an angle of 60 degrees, when measured in accordance with ASTM D 523.

h. Glare Resistance Test:

Surfaces of panels that will be exposed to the exterior shall have a specular reflectance of not more than 10 when measured in accordance with ASTM D 523 at an angle of 85 degrees. Specular reflectance may be obtained with striations or embossing. Requirements specified under "Formability Test" will be waived if necessary to conform to this requirement.

1.7 WARRANTY

Furnish manufacturer's no-dollar-limit materials and workmanship warranty for the roofing system. The warranty period shall be not less than 20 years from the date of Government acceptance of the work. The warranty shall be issued directly to the Government. The warranty shall provide that if within the warranty period the metal roofing system becomes non-watertight or shows evidence of corrosion, perforation, rupture or excess weathering due to deterioration of the roofing system resulting from defective materials or installed workmanship the repair or replacement of the defective materials and correction of the defective workmanship shall be the responsibility of the roofing system manufacturer. Repairs that become necessary because of defective materials and workmanship while roofing is under warranty shall be performed within 7 days after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within the specified period of time will constitute grounds for having the repairs performed by others and the cost billed to the manufacturer. The Contractor shall also provide a 2 year contractor installation warranty.

1.8 DELIVERY, STORAGE AND HANDLING

Deliver, store, and handle preformed panels, bulk roofing products and other manufactured items in a manner to prevent damage or deformation.

1.8.1 Delivery

Provide adequate packaging to protect materials during shipment. Crated materials shall not be uncrated until ready for use, except for inspection. Immediately upon arrival of materials at the jobsite, inspect materials for damage, dampness, and staining. Damaged or permanently stained materials that cannot be restored to like-new condition shall be replaced with satisfactory material. If materials are wet, remove the moisture and re-stack and protect the panels until used.

1.8.2 Storage

Stack materials on platforms or pallets and cover with tarpaulins or other suitable weathertight covering which prevents water trapping or condensation. Store materials so that water which might have accumulated during transit or storage will drain off. Do not store the panels in contact with materials that might cause staining, such as mud, lime, cement, fresh concrete or chemicals. Protect stored panels from wind damage.

1.8.3 Handling

Handle material carefully to avoid damage to surfaces, edges and ends.

PART 2 PRODUCTS

2.1 ROOFING PANELS

Panels shall have interlocking ribs for securing adjacent sheets. System for securing the roof covering to structural framing members shall be concealed clip fastening system with no fasteners penetrating the panels except at the ridge or eave, rakes, penetrations, and end laps. Backing plates and ends of panels at end laps shall be predrilled or prepunched; factory prepare ends of panels to be lapped by trimming part of seam, die-setting or swaging ends of panels. Length of sheets shall be sufficient to cover the entire length of any unbroken roof slope when such slope is 30 feet or less. When length of run exceeds 30 feet, each sheet in the run shall extend over two or more spans. Sheets longer than 30 feet may be furnished if approved by the Contracting Officer. Width of sheets shall provide not less than 16 inches of coverage in place. Height of corrugations of adjacent roof sheets shall be not less than 2.25 inches (nominal). Make provisions for expansion and contraction at either ridge or eave, consistent with the type of system to be used. Panels from coil stock shall be formed without warping, waviness or ripples not part of the panel profile and shall be free of damage to the finish coating system.

2.1.1 Material

Zinc-coated steel conforming to ASTM A 653/A 653M, G90coating designation or aluminum-zinc alloy coated steel conforming to ASTM A 792/A 792M, AZ 55 coating. Minimum thickness to be 0.023 inch thick (24 gage) minimum except when mid field of roof is subject to design wind uplift pressures of 60 psf or greater, entire roof system shall have a minimum thickness of 0.030 inch (22 gage).

2.1.2 Texture

Smooth.

2.1.3 Finish

Factory color finish.

2.1.3.1 Factory Color Finish

Provide factory applied, thermally cured coating to exterior and interior of metal roof and wall panels and metal accessories.

2.2 INTERMEDIATE SUPPORTS

Fabricate panel subgirts, subpurlins, T-bars, Z-bars and tracks from galvanized steel conforming to ASTM A 653/A 653M, G90, Grade D (16 gage and heavier), Grade A (18 gage and lighter); or steel conforming to ASTM A 36/A 36M, ASTM A 570/A 570M, or ASTM A 1008/A 1008M prime painted with zinc-rich primer. Size, shape, thickness and capacity as required to meet the load, insulation thickness and deflection criteria specified.

2.3 ATTACHMENT CLIPS

Fabricate clips from ASTM A 366/A 366M, ASTM A 570/A 570M, or ASTM A 1008/A 1008M steel hot-dip galvanized in accordance with ASTM A 653/A 653M, G 90, or Series 300 stainless steel. Size, shape, thickness and capacity as required to meet the load, insulation thickness and deflection criteria specified.

2.4 ACCESSORIES

Sheet metal flashings, gutters, downspouts, trim, moldings, closure strips, pre-formed crickets, caps, equipment curbs, and other similar sheet metal accessories used in conjunction with preformed metal panels shall be of the same material as used for the panels. Provide metal accessories with a factory color finish to match the roofing panels, except that such items which will be concealed after installation may be provided without the finish if they are stainless steel. Metal shall be of a thickness not less than that used for the panels. Thermal spacer blocks and other thermal barriers at concealed clip fasteners shall be as recommended by the manufacturer except that wood spacer blocks are not allowed.

2.4.1 Closures

2.4.1.1 Rib Closures

Corrosion resisting steel, closed-cell or solid-cell synthetic rubber, neoprene or polyvinyl chloride pre-molded to match configuration of rib opening. Material for closures shall not absorb water.

2.4.1.2 Ridge Closures

Metal-clad foam or metal closure with foam secondary closure matching panel configuration for installation on surface of roof panel between panel ribs at ridge and headwall roof panel flashing conditions and terminations. Foam material shall not absorb water.

2.4.2 Fasteners

Zinc-coated steel, corrosion resisting steel, zinc cast head, or nylon capped steel, type and size specified below or as otherwise approved for the applicable requirements. Design the fastening system to withstand the

design loads specified. Exposed fasteners shall be gasketed or have gasketed washers on the exterior side of the covering to waterproof the penetration. Washer material shall be compatible with the covering; have a minimum diameter of 3/8 inch for structural connections; and gasketed portion of fasteners or washers shall be neoprene or other equally durable elastomeric material approximately 1/8 inch thick.

2.4.2.1 Screws

Not smaller than No. 14 diameter if self-tapping type and not smaller than No. 12 diameter if self-drilling and self-tapping.

2.4.2.2 Bolts

Not smaller than 1/4 inch diameter, shouldered or plain shank as required, with proper nuts.

2.4.2.3 Automatic End-Welded Studs

Automatic end-welded studs shall be shouldered type with a shank diameter of not smaller than 3/16 inch and cap or nut for holding covering against the shoulder.

2.4.2.4 Explosive Driven Fasteners

Fasteners for use with explosive actuated tools shall have a shank diameter of not smaller than 0.145 inch with a shank length of not smaller than 1/2 inch for fastening to steel and not smaller than one inch for fastening to concrete.

2.4.2.5 Rivets

Blind rivets shall be stainless steel with 1/8 inch nominal diameter shank. Rivets shall be threaded stem type if used for other than the fastening of trim. Rivets with hollow stems shall have closed ends.

2.4.3 Sealants

Elastomeric type containing no oil or asphalt. Exposed sealant shall cure to a rubberlike consistency. Concealed sealant shall be the non-hardening type. Seam sealant shall be factory-applied, non-skinning, non-drying, and shall conform to the roofing manufacturer's recommendations. Silicone-based sealants shall not be used in contact with finished metal panels and components unless approved otherwise by the Contracting Officer.

2.4.4 GASKETS AND INSULATING COMPOUNDS

Nonabsorptive and suitable for insulating contact points of incompatible materials. Insulating compounds shall be nonrunning after drying.

2.5 THERMAL INSULATION

Flexible blanket, rigid, or semi-rigid faced with a flexible vapor retarder. Insulation and facing shall have a flame-spread rating of 50 or less in accordance with ASTM E 84. Vapor retarder facing shall have a permeance rating of 0.05 perm or less. Provide a thermal resistance "R" value of 30 or more. Facings and finishes shall be factory-applied.

2.6 LINER PANELS

Fabricate liner panels of the same material as roof panels, and formed or patterned to prevent waviness and distortion. Liner panels shall have a factory applied, one mil thick minimum painted coating on the inside face and a prime coat on the liner side.

PART 3 EXECUTION

3.1 EXAMINATION

Examine surfaces to receive standing seam metal roofing and flashing. Ensure that surfaces are plumb and true, clean, even, smooth, as dry and free from defects and projections which might affect the installation.

3.2 PROTECTION FROM CONTACT WITH DISSIMILAR MATERIALS

3.2.1 Cementitious Materials

Paint metal surfaces which will be in contact with mortar, concrete, or other masonry materials with one coat of alkali-resistant coating such as heavy-bodied bituminous paint.

3.3 INSTALLATION

Install in accordance with the approved manufacturer's erection instructions, shop drawings, and diagrams. Panels shall be in full and firm contact with attachment clips. Where prefinished 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 necessary repairs have been made with material of the same color as the weather coating, be approved before being installed. Seal completely openings through panels. Correct defects or errors in the materials. Replace materials which cannot be corrected in an approved manner with nondefective materials. Provide molded closure strips where indicated and where necessary to provide weathertight construction. Use shims as required to ensure attachment clip line is true. Use a spacing gage at each row of panels to ensure that panel width is not stretched or shortened. Provide one layer of asphalt-saturated felt placed perpendicular to roof slope, covered by one layer of rosin-sized building paper placed parallel to roof slope with side laps down slope and attached with roofing nails. Overlap side and end laps 3 inches, offset seams in building paper with seams in felt.

3.3.1 Roof Panels

Apply roofing panels with the standing seams parallel to the slope of the roof. Provide roofing panels in longest practical lengths from ridge to eaves (top to eaves on shed roofs), with no transverse joints except at the junction of ventilators, curbs, skylights, chimneys, and similar openings. Install flashing to assure positive water drainage away from roof penetrations. Locate panel end laps such that fasteners do not engage supports or otherwise restrain the longitudinal thermal movement of panels. Form field-formed seam type system seams in the field with an automatic mechanical seamer approved by the manufacturer. Attach panels to the structure with concealed clips incorporated into panel seams. Clip attachment shall allow roof to move independently of the structure, except at fixed points as indicated.

3.3.2 Insulation Installation

Insulation shall be installed between covering and supporting members to present a neat appearance. Fold and staple and tape seams unless approved otherwise by the Contracting Officer.

3.3.2.1 Rigid or Semi-Rigid Insulation

Install in areas where insulation is exposed to view. Fasten securely without loose joints or unsightly sags.

3.3.2.2 Blanket Insulation

May be used in concealed locations. Lap facing at joints and fasten in a manner that will provide tight joints.

3.3.3 Flashings

Provide flashing, related closures and accessories as indicated and as necessary to provide a weathertight installation. Install flashing to ensure positive water drainage away from roof penetrations. Flash and seal the roof at the ridge, eaves and rakes, and projections through the roof. Place closure strips, flashing, and sealing material in an approved manner that will assure complete weathertightness. Details of installation which are not indicated shall be in accordance with the SMACNA 1793, panel manufacturer's approved printed instructions and details, or the approved shop drawings. Allow for expansion and contraction of flashing.

3.3.4 Flashing Fasteners

Fastener spacings shall be in accordance with the panel manufacturer's recommendations and as necessary to withstand the design loads indicated. Install fasteners in roof valleys as recommended by the manufacturer of the panels. Install fasteners in straight lines within a tolerance of 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. Do not drill through sealant tape. 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.

3.3.5 Rib and Ridge Closure/Closure Strips

Set closure/closure strips in joint sealant material and apply sealant to mating surfaces prior to adding panel.

3.4 PROTECTION OF APPLIED ROOFING

Do not permit storing, walking, wheeling, and trucking directly on applied roofing materials. Provide temporary walkways, runways, and platforms of smooth clean boards or planks as necessary to avoid damage to applied roofing materials, and to distribute weight to conform to indicated live load limits of roof construction.

3.5 CLEANING

Clean exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from roofs. Remove grease and oil films, excess sealants, handling marks, contamination from steel wool, fittings and drilling debris and scrub the work clean. Exposed metal surfaces shall be free of dents, creases, waves, scratch marks, solder or weld marks and damage to the finish coating.

3.6 MANUFACTURER'S FIELD INSPECTION

Manufacturer's technical representative shall visit the site as necessary during the installation process to assure panels, flashings, and other components are being installed in a satisfactory manner. Manufacturer's technical representative shall perform a field inspection during the first 20 squares of roof panel installation and at substantial completion prior to issuance of warranty, as a minimum, and as otherwise requested by the Contracting Officer. Additional inspections shall not exceed one for 100 squares of total roof area with the exception that follow-up inspections of previously noted deficiencies or application errors shall be performed as requested by the Contracting Officer. Each inspection visit shall include a review of the entire installation to date. After each inspection, a report, signed by the manufacturer's technical representative, shall be submitted to the Contracting Officer noting the overall quality of work, deficiencies and any other concerns, and recommended corrective actions in detail. Notify Contracting Officer a minimum of 2 working days prior to site visit by manufacturer's technical representative.

3.7 COMPLETED WORK

Completed work shall be plumb and true without oil canning, dents, ripples, abrasion, rust, staining, or other damage detrimental to the performance or aesthetics of the completed roof assembly.

3.8 INFORMATION CARD

For each roof, provide a typewritten card, laminated in plastic and framed for interior display or a photoengraved 0.032 inchthick aluminum card for exterior display. Card to be 8 1/2 by 11 inches minimum and contain the information listed on Form 1 at end of this section. Install card near point of access to roof, or where indicated.

3.9 FORM ONE

FORM 1 - PREFORMED STEEL STANDING SEAM ROOFING SYSTEM COMPONENTS

1. Contract Number:

2. Building Number & Location:

3. Deck/Substrate Type:

4. Slopes of Deck/Roof Structure:

5. Insulation Type & Thickness:

6. Insulation Manufacturer:

7. Vapor Retarder: ( )Yes ( )No

8. Vapor Retarder Type:

9. Preformed Steel Standing Seam Roofing Description:

a. Manufacturer (Name, Address, & Phone No.):
b. Product Name:
c. Width:
d. Gage:
e. Base Metal:
f. Method of Attachment:

10. Repair of Color Coating:

a. Coating Manufacturer (Name, Address & Phone No.):
b. Product Name:
c. Surface Preparation:
d. Recoating Formula:
e. Application Method:

11. Statement of Compliance or Exception:_____
_____
_____

12. Date Roof Completed:

13. Warranty Period: From_____ To_____

14. Roofing Contractor (Name & Address):

15. Prime Contractor (Name & Address):

Contractor's Signature _____ Date:

Inspector's Signature _____ Date:

-- End of Section --

SECTION 07 84 00

FIRESTOPPING
10/07

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E 119	(2009c) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E 1399	(1997; R 2005) Cyclic Movement and Measuring the Minimum and Maximum Joint Widths of Architectural Joint Systems
ASTM E 1966	(2007) Fire-Resistive Joint Systems
ASTM E 814	(2009) Standard Test Method for Fire Tests of Through-Penetration Fire Stops
ASTM E 84	(2009c) Standard Test Method for Surface Burning Characteristics of Building Materials

FM GLOBAL (FM)

FM AS 4991	(2001) Approval of Firestop Contractors
FM P7825a	(2005) Approval Guide Fire Protection

UNDERWRITERS LABORATORIES (UL)

UL 1479	(2003; Rev thru Dec 2008) Standard for Fire Tests of Through-Penetration Fire Stops
UL 2079	(2004; Mar 2006) Tests for Fire Resistance of Building Joint Systems
UL 723	(2008) Standard for Test for Surface Burning Characteristics of Building Materials
UL Fire Resistance	(2009) Fire Resistance Directory

1.2 SYSTEM DESCRIPTION

Furnish and install tested and listed firestopping systems, combination of materials, or devices to form an effective barrier against the spread of

flame, smoke and gases, and maintain the integrity of fire resistance rated walls, partitions, floors, and ceiling-floor assemblies, including through-penetrations and construction joints and gaps. Through-penetrations include the annular space around pipes, tubes, conduit, wires, cables and vents. Construction joints include those used to accommodate expansion, contraction, wind, or seismic movement; firestopping material shall not interfere with the required movement of the joint. Gaps requiring firestopping include gaps between the curtain wall and the floor slab and between the top of the fire-rated walls and the roof or floor deck above.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Firestopping Materials.

Detail drawings including manufacturer's descriptive data, typical details conforming to UL Fire Resistance or other details certified by another nationally recognized testing laboratory, installation instructions or UL listing details for a firestopping assembly in lieu of fire-test data or report. For those firestop applications for which no UL tested system is available through a manufacturer, a manufacturer's engineering judgement, derived from similar UL system designs or other tests, shall be submitted for review and approval prior to installation. Submittal shall indicate the firestopping material to be provided for each type of application. When more than a total of 5 penetrations and/or construction joints are to receive firestopping, provide drawings that indicate location, "F" and "T" ratings, and type of application.

SD-07 Certificates

Firestopping Materials.

Certificates attesting that firestopping material complies with the specified requirements. In lieu of certificates, drawings showing UL classified materials as part of a tested assembly may be provided. Drawings showing evidence of testing by an alternate nationally recognized independent laboratory may be substituted.

Installer Qualifications.

Documentation of training and experience.

1.4 1.4 QUALITY ASSURANCE

Engage an experienced Installer who is:

a. FM Research approved in accordance with FM AS 4991, or

b. Certified, licensed, or otherwise qualified by the firestopping manufacturer as having the necessary staff, training, and a minimum of 3 years experience in the installation of manufacturer's products in

accordance with specified requirements. A manufacturer's willingness to sell its firestopping products to the Contractor or to an installer engaged by the Contractor does not in itself confer installer qualifications on the buyer. The Installer shall have been trained by a direct representative of the manufacturer (not distributor or agent) in the proper selection and installation procedures.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials in the original unopened packages or containers showing name of the manufacturer and the brand name. Store materials off the ground, protected from damage and exposure to elements. Remove damaged or deteriorated materials from the site.

1.6 SEQUENCING

Coordinate the specified work with other trades. Apply firestopping materials, at penetrations of pipes and ducts, prior to insulating, unless insulation meets requirements specified for firestopping. Apply firestopping materials at building joints and construction gaps, prior to completion of enclosing walls or assemblies. Cast-in-place firestop devices shall be located and installed in place before concrete placement. Pipe, conduit or cable bundles shall be installed through cast-in-place device after concrete placement but before area is concealed or made inaccessible.

PART 2 PRODUCTS

2.1 FIRESTOPPING MATERIALS

Provide firestopping materials consisting of commercially manufactured, asbestos-free, noncombustible products FM P7825a approved, or UL listed, for use with applicable construction and penetrating items, complying with the following minimum requirements:

2.1.1 Fire Hazard Classification

Material shall have a flame spread of 25 or less, and a smoke developed rating of 50 or less, when tested in accordance with ASTM E 84 or UL 723. Material shall be an approved firestopping material as listed in UL Fire Resistance or by a nationally recognized testing laboratory.

2.1.2 Toxicity

Material shall be nontoxic to humans at all stages of application or during fire conditions.

2.1.3 Fire Resistance Rating

Firestop systems shall be UL Fire Resistance listed or FM P7825a approved with "F" rating at least equal to fire-rating of fire wall or floor in which penetrated openings are to be protected, except that "F" rating may be 3 hours in through-penetrations of 4 hour fire rated wall or floor. Firestop systems shall also have "T" rating where required.

2.1.3.1 Through-Penetrations

Firestopping materials for through-penetrations, as described in paragraph SYSTEM DESCRIPTION, shall provide "F" and "T" fire resistance ratings in accordance with ASTM E 814 or UL 1479. Fire resistance ratings shall be as

follows:

a. Penetrations of Fire Resistance Rated Walls and Partitions: F Rating = Rating of wall or partition being penetrated.

2.1.3.2 Construction Joints and Gaps

Fire resistance ratings of construction joints, as described in paragraph SYSTEM DESCRIPTION, and gaps such as those between floor slabs or roof decks and curtain walls shall be the same as the construction in which they occur. Construction joints and gaps shall be provided with firestopping materials and systems that have been tested in accordance with ASTM E 119, ASTM E 1966 or UL 2079 to meet the required fire resistance rating. Systems installed at construction joints shall meet the cycling requirements of ASTM E 1399 or UL 2079.

PART 3 EXECUTION

3.1 PREPARATION

Areas to receive firestopping shall be free of dirt, grease, oil, or loose materials which may affect the fitting or fire resistance of the firestopping system. For cast-in-place firestop devices, formwork or metal deck to receive device prior to concrete placement shall be sound and capable of supporting device. Prepare surfaces as recommended by the manufacturer.

3.2 INSTALLATION

Completely fill void spaces with firestopping material regardless of geometric configuration, subject to tolerance established by the manufacturer. Firestopping systems for filling floor voids 4 inches or more in any direction shall be capable of supporting the same load as the floor is designed to support or shall be protected by a permanent barrier to prevent loading or traffic in the firestopped area. Install firestopping in accordance with manufacturer's written instructions. Provide tested and listed firestop systems in the following locations, except in floor slabs on grade:

a. Penetrations of duct, conduit, tubing, cable and pipe through floors and through fire-resistance rated walls, partitions, and ceiling-floor assemblies.

b. Penetrations of vertical shafts such as pipe chases, elevator shafts, and utility chutes.

c. Gaps at the intersection of floor slabs and curtain walls, including inside of hollow curtain walls at the floor slab.

d. Gaps at perimeter of fire-resistance rated walls and partitions, such as between the top of the walls and the bottom of roof decks.

e. Construction joints in floors and fire rated walls and partitions.

f. Other locations where required to maintain fire resistance rating of the construction.

3.2.1 Insulated Pipes and Ducts

Thermal insulation shall be cut and removed where pipes or ducts pass through firestopping, unless insulation meets requirements specified for firestopping. Replace thermal insulation with a material having equal thermal insulating and firestopping characteristics.

3.2.2 Fire Dampers

Iinstall and firestop fire dampers in accordance with Section 23 00 00 AIR SUPPLY, DISTRIBUTION, VENTILATION, AND EXHAUST SYSTEM.

3.2.3 Data and Communication Cabling

Cabling for data and communication applications shall be sealed with re-enterable firestopping products that do not cure over time. Firestopping shall be modular devices, containing built-in self-sealing intumescent inserts. Firestopping devices shall allow for cable moves, adds or changes without the need to remove or replace any firestop materials.

-- End of Section --

SECTION 07 92 00

JOINT SEALANTS
01/07

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 1311	(2002) Standard Specification for Solvent Release Agents
ASTM C 734	(2006) Low-Temperature Flexibility of Latex Sealants After Artificial Weathering
ASTM C 919	(2008) Use of Sealants in Acoustical Applications
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM D 1056	(2007) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D 1667	(2005) Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D 217	(2002; R 2008) Cone Penetration of Lubricating Grease
ASTM D 2452	(2003; R 2009) Standard Test Method for Extrudability of Oil- and Resin-Base Caulking Compounds
ASTM D 2453	(2003; R 2009) Standard Test Method for Shrinkage and Tenacity of Oil- and Resin-Base Caulking Compounds
ASTM E 84	(2009c) Standard Test Method for Surface Burning Characteristics of Building Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Sealants; G
Primers
Bond breakers
Backstops

Manufacturer's descriptive data including storage requirements, shelf life, curing time, instructions for mixing and application, and primer data (if required). Provide a copy of the Material Safety Data Sheet for each solvent, primer or sealant material.

SD-07 Certificates

Sealant

Certificates of compliance stating that the materials conform to the specified requirements.

1.3 ENVIRONMENTAL CONDITIONS

Apply sealant when the ambient temperature is between 40 and 90 degrees F.

1.4 DELIVERY AND STORAGE

Deliver materials to the job site in unopened manufacturers' external shipping containers, with brand names, date of manufacture, color, and material designation clearly marked thereon. Label elastomeric sealant containers to identify type, class, grade, and use. Carefully handle and store materials to prevent inclusion of foreign materials or subjection to sustained temperatures exceeding 90 degrees F or less than 0 degrees F.

1.5 QUALITY ASSURANCE

1.5.1 Compatibility with Substrate

Verify that each of the sealants are compatible for use with joint substrates.

1.5.2 Joint Tolerance

Provide joint tolerances in accordance with manufacturer's printed instructions.

1.5.3 Mock-Up

Project personnel is responsible for installing sealants in mock-up prepared by other trades, using materials and techniques approved for use on the project.

1.6 SPECIAL WARRANTY

Guarantee sealant joint against failure of sealant and against water penetration through each sealed joint for five years.

PART 2 PRODUCTS

2.1 SEALANTS

Provide sealant that has been tested and found suitable for the substrates to which it will be applied.

2.1.1 Interior Sealant

Provide ASTM C 920, Type S or M, Grade NS, Class 12.5, Use NT. Location(s) and color(s) of sealant for the following:

	LOCATION	COLOR
a.	Small voids between walls or partitions and adjacent lockers, casework, shelving, door frames, built-in or surface-mounted equipment and fixtures, and similar items.	As selected
b.	Perimeter of frames at doors, windows, and access panels which adjoin exposed interior concrete and masonry surfaces.	As selected
c.	Joints of interior masonry walls and partitions which adjoin columns, pilasters, concrete walls, and exterior walls unless otherwise detailed.	As selected
d.	Joints between edge members for acoustical tile and adjoining vertical surfaces.	As selected
e.	Interior locations, not otherwise indicated or specified, where small voids exist between materials specified to be painted.	As selected
f.	Joints between bathtubs and ceramic tile; joints between shower receptors and ceramic tile; joints formed where nonplaner tile surfaces meet.	As selected
g.	Joints formed between tile floors and tile base cove; joints between tile and dissimilar materials; joints occurring where substrates change.	As selected
h.	Behind escutcheon plates at valve pipe penetrations and showerheads in showers.	As selected

2.1.2 Exterior Sealant

For joints in vertical surfaces, provide ASTM C 920, Type S or M, Grade NS, Class 25, Use NT. For joints in horizontal surfaces, provide ASTM C 920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

	LOCATION	COLOR
a.	Joints and recesses formed where frames and subsills of windows, doors, louvers, and vents adjoin masonry, concrete, or metal frames. Use sealant at both exterior and interior surfaces of exterior wall penetrations.	Match adjacent surface color
b.	Joints between new and existing exterior	Match adjacent

	LOCATION	COLOR
	masonry walls.	surface color
c.	Masonry joints where shelf angles occur.	Match adjacent surface color
d.	Expansion and control joints.	Match adjacent surface color
e.	Interior face of expansion joints in exterior concrete or masonry walls where metal expansion joint covers are not required.	Match adjacent surface color
f.	Voids where items pass through exterior walls.	Match adjacent surface color
g.	Metal reglets, where flashing is inserted into masonry joints, and where flashing is penetrated by coping dowels.	Match adjacent surface color
h.	Metal-to-metal joints where sealant is indicated or specified.	Match adjacent surface color
i.	Joints between ends of gravel stops, fascias, copings, and adjacent walls.	Match adjacent surface color

2.1.3 Floor Joint Sealant

ASTM C 920, Type S or M, Grade P, Class 25, Use T. Provide location(s) and color(s) of sealant as follows:

	LOCATION	COLOR
a.	Seats of metal thresholds for exterior doors.	As selected
b.	Control and expansion joints in floors, slabs, ceramic tile, and walkways.	As selected

2.1.4 Acoustical Sealant

Rubber or polymer-based acoustical sealant conforming to ASTM C 919 must have a flame spread of 25 or less and a smoke developed rating of 50 or less when tested in accordance with ASTM E 84. Acoustical sealant must have a consistency of 250 to 310 when tested in accordance with ASTM D 217, and must remain flexible and adhesive after 500 hours of accelerated weathering as specified in ASTM C 734, and must be non-staining.

2.1.5 Preformed Sealant

Provide preformed sealant of polybutylene or isoprene-butylene based pressure sensitive weather resistant tape or bead sealant capable of sealing out moisture, air and dust when installed as recommended by the manufacturer. At temperatures from minus 30 to plus 160 degrees F, the sealant must be non-bleeding and no loss of adhesion.

2.2 PRIMERS

Provide a nonstaining, quick-drying type and consistency recommended by the sealant manufacturer for the particular application.

2.3 BOND BREAKERS

Provide the type and consistency recommended by the sealant manufacturer to prevent adhesion of the sealant to backing or to bottom of the joint.

2.4 BACKSTOPS

Provide glass fiber roving or neoprene, butyl, polyurethane, or polyethylene foams free from oil or other staining elements as recommended by sealant manufacturer. Provide 25 to 33 percent oversized backing for closed cell and 40 to 50 percent oversized backing for open cell material, unless otherwise indicated. Make backstop material compatible with sealant. Do not use oakum and other types of absorptive materials as backstops.

2.4.1 Rubber

Conform to ASTM D 1056, Type 1, open cell, or Type 2, closed cell.

2.4.2 PVC

Conform to ASTM D 1667, Grade VO 12, open-cell foam, round cross section for Polyvinyl chloride (PVC) backing.

2.4.3 Neoprene

Conform to ASTM D 1056, closed cell expanded neoprene cord Type 2, Class C, Grade 2C2 for Neoprene backing.

2.4.4 Butyl Rubber Based

Provide Butyl Rubber Based Sealants of single component, solvent release, color as selected, conforming to ASTM C 1311.

2.4.5 Silicon Rubber Base

Provide Silicon Rubber Based Sealants of single component, solvent release, color as selected, conforming to ASTM C 920, Non-sag.

2.5 CAULKING

Conform to ASTM D 2452 and ASTM D 2453.

2.6 CLEANING SOLVENTS

Provide type(s) recommended by the sealant manufacturer except for aluminum and bronze surfaces that will be in contact with sealant.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Clean surfaces from dirt frost, moisture, grease, oil, wax, lacquer, paint, or other foreign matter that would tend to destroy or impair adhesion. Remove oil and grease with solvent. Surfaces must be wiped dry with clean

cloths. When resealing an existing joint, remove existing caulk or sealant prior to applying new sealant. For surface types not listed below, contact sealant manufacturer for specific recommendations.

3.1.1 Steel Surfaces

Remove loose mill scale by sandblasting or, if sandblasting is impractical or would damage finish work, scraping and wire brushing. Remove protective coatings by sandblasting or using a residue-free solvent.

3.1.2 Aluminum or Bronze Surfaces

Remove temporary protective coatings from surfaces that will be in contact with sealant. When masking tape is used as a protective coating, remove tape and any residual adhesive just prior to sealant application. For removing protective coatings and final cleaning, use nonstaining solvents recommended by the manufacturer of the item(s) containing aluminum or bronze surfaces.

3.1.3 Concrete and Masonry Surfaces

Where surfaces have been treated with curing compounds, oil, or other such materials, remove materials by sandblasting or wire brushing. Remove laitance, efflorescence and loose mortar from the joint cavity.

3.2 SEALANT PREPARATION

Do not add liquids, solvents, or powders to the sealant. Mix multicomponent elastomeric sealants in accordance with manufacturer's instructions.

3.3 APPLICATION

3.3.1 Joint Width-To-Depth Ratios

a. Acceptable Ratios:

JOINT WIDTH	JOINT DEPTH Minimum	JOINT DEPTH Maximum
For metal, glass, or other nonporous surfaces:		
1/4 inch (minimum)	1/4 inch	1/4 inch
over 1/4 inch	1/2 of width	Equal to width
For, concrete, masonry,		
1/4 inch (minimum)	1/4 inch	1/4 inch
Over 1/4 inch to 1/2 inch	1/4 inch	Equal to width
Over 1/2 inch to 2 inch	1/2 inch	5/8 inch
Over 2 inch.	(As recommended by sealant manufacturer)	

b. Unacceptable Ratios: Where joints of acceptable width-to-depth ratios have not been provided, clean out joints to acceptable depths and grind or cut to acceptable widths without damage to the

adjoining work. Grinding is not required on metal surfaces.

3.3.2 Masking Tape

Place masking tape on the finish surface on one or both sides of a joint cavity to protect adjacent finish surfaces from primer or sealant smears. Remove masking tape within 10 minutes after joint has been filled and tooled.

3.3.3 Backstops

Install backstops dry and free of tears or holes. Tightly pack the back or bottom of joint cavities with backstop material to provide a joint of the depth specified. Install backstops in the following locations:

a. Where indicated.

b. Where backstop is not indicated but joint cavities exceed the acceptable maximum depths specified in paragraph entitled, "Joint Width-to-Depth Ratios".

3.3.4 Primer

Immediately prior to application of the sealant, clean out loose particles from joints. Where recommended by sealant manufacturer, apply primer to joints in concrete masonry units, wood, and other porous surfaces in accordance with sealant manufacturer's instructions. Do not apply primer to exposed finish surfaces.

3.3.5 Bond Breaker

Provide bond breakers to the back or bottom of joint cavities, as recommended by the sealant manufacturer for each type of joint and sealant used, to prevent sealant from adhering to these surfaces. Carefully apply the bond breaker to avoid contamination of adjoining surfaces or breaking bond with surfaces other than those covered by the bond breaker.

3.3.6 Sealants

Provide a sealant compatible with the material(s) to which it is applied. Do not use a sealant that has exceeded shelf life or has jelled and can not be discharged in a continuous flow from the gun. Apply the sealant in accordance with the manufacturer's printed instructions with a gun having a nozzle that fits the joint width. Force sealant into joints to fill the joints solidly without air pockets. Tool sealant after application to ensure adhesion. Make sealant uniformly smooth and free of wrinkles. Upon completion of sealant application, roughen partially filled or unfilled joints, apply sealant, and tool smooth as specified. Apply sealer over the sealant when and as specified by the sealant manufacturer.

3.4 PROTECTION AND CLEANING

3.4.1 Protection

Protect areas adjacent to joints from sealant smears. Masking tape may be used for this purpose if removed 5 to 10 minutes after the joint is filled.

3.4.2 Final Cleaning

Upon completion of sealant application, remove remaining smears and stains and leave the work in a clean and neat condition.

a. Masonry and Other Porous Surfaces: Immediately scrape off fresh sealant that has been smeared on masonry and rub clean with a solvent as recommended by the sealant manufacturer. Allow excess sealant to cure for 24 hour then remove by wire brushing or sanding.

b. Metal and Other Non-Porous Surfaces: Remove excess sealant with a solvent-moistened cloth.

-- End of Section --

SECTION 08 11 13

STEEL DOORS AND FRAMES

07/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A250.4	(2001) Test Procedure and Acceptance Criteria for Physical Endurance for Steel Doors and Hardware Reinforcings
ANSI A250.6	(1997) Hardware on Standard Steel Doors (Reinforcement - Application)
ANSI A250.8	(1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames

AMERICAN WELDING SOCIETY (AWS)

AWS D1.1/D1.1M	(2004) Structural Welding Code-Steel

ASTM INTERNATIONAL (ASTM)

ASTM A 591	(1998) Steel Sheet, Electrolytic Zinc-Coated, for Light Coating Mass Applications
ASTM A 653/A 653M	(2004a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(1999) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM C 578	(2004a) Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
ASTM C 591	(2001) Standard Specification for Unfaced Preformed Rigid Cellular Polyisocyanurate Thermal Insulation
ASTM C 612	(2000a) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
ASTM D 2863	(2000) Measuring the Minimum Oxygen Concentration to Support Candle-Like

Combustion of Plastics (Oxygen Index)

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA))

BHMA A115	(1991) Steel Door Preparation Standards (Consisting of A115.1 through A115.6 and A115.12 through A115.18)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2001) Standard for Fire Doors and Fire Windows
NFPA 105	(2003) The Installation of Smoke-Control Door Assemblies
NFPA 252	(2003) Standard Methods of Fire Tests of Door Assemblies

STEEL DOOR INSTITUTE (SDI/DOOR)

SDI 105	(1998) Recommended Erection Instructions for Steel Frames
SDI 111-F	Recommended Existing Wall Anchors for Standard Steel Doors and Frames
SDI 113	(1979) Apparent Thermal Performance of STEEL DOOR and FRAME ASSEMBLIES

UNDERWRITERS LABORATORIES (UL)

UL 10B	(1997) Fire Tests of Door Assemblies

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Standard Steel Doors; G
Heavy Duty Doors; G
Fire and Smoke Doors and Frames; G
Accessories
Weatherstripping
Standard Steel Frames; G
Welded Frames; G

Submit manufacturer's descriptive literature for doors, frames, and accessories. Include data and details on door construction, panel (internal) reinforcement, insulation, and door edge construction. When "custom hollow metal doors" are provided in lieu of "standard steel doors," provide additional details and data sufficient for comparison to ANSI A250.8 requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors, frames, and accessories undamaged and with protective

wrappings or packaging. Strap welded frames in bundles. Provide temporary steel spreaders securely fastened to the bottom of each welded frame. Store doors and frames on platforms under cover in clean, dry, ventilated, and accessible locations, with 1/4 inch airspace between doors. Remove damp or wet packaging immediately and wipe affected surfaces dry. Replace damaged materials with new.

1.4 DESIGN REQUIREMENTS

Refer to sheet S-1.0 for loading requirements and importance factor values.

PART 2 PRODUCTS

2.1 STANDARD STEEL DOORS

ANSI A250.8, except as specified otherwise. Prepare doors to receive door hardware. Undercut where indicated. Exterior doors shall have top edge closed flush and sealed to prevent water intrusion. Doors shall be 1-3/4 inch thick, unless otherwise indicated.

2.1.1 Classification - Level, Performance, Model

2.1.1.1 Heavy Duty Doors

ANSI A250.8, Level 2, physical performance Level B, with core construction as required by the manufacturer, of size(s) and design(s) indicated. Provide Level 2 where indicated.

2.2 INSULATED STEEL DOOR SYSTEMS

Insulated steel doors shall have a core of polyurethane foam and an R factor of 10.0 or more (based on a k value of 0.16); face sheets, edges, and frames of galvanized steel not lighter than 23 gage, 16 gage, and 16 gage respectively; magnetic weatherstripping; nonremovable-pin hinges; thermal-break aluminum threshold; and vinyl door bottom. Doors and frames shall receive phosphate treatment, rust-inhibitive primer, and baked acrylic enamel finish. Doors shall have been tested in accordance with ANSI A250.4 and shall have met the requirements for Level C. Prepare doors to receive specified hardware. Doors shall be 1-3/4 inch thick. Provide insulated steel doors and frames where shown.

2.3 ACCESSORIES

2.3.1 Louvers

2.4 INSULATION CORES

Insulated cores shall be of type specified, and provide an apparent U-factor of .48 in accordance with SDI 113 and shall conform to:

a. Rigid Polyurethane Modified Polyisocyanurate Foam: ASTM C 591, Type I or II, foamed-in-place or in board form, with oxygen index of not less than 22 percent when tested in accordance with ASTM D 2863; or

b. Rigid Polystyrene Foam Board: ASTM C 578, Type I or II; or

c. Mineral board: ASTM C 612, Type I.

2.5 STANDARD STEEL FRAMES

ANSI A250.8. Form frames to sizes and shapes indicated, with welded corners or welded field-assembled corners. Provide steel frames for doors, sidelights, mullions, and interior glazed panels, unless otherwise indicated.

2.5.1 Welded Frames

Continuously weld frame faces at corner joints. Mechanically interlock or continuously weld stops and rabbets. Grind welds smooth.

Weld frames in accordance with the recommended practice of the Structural Welding Code Sections 1 through 6, AWS D1.1/D1.1M and in accordance with the practice specified by the producer of the metal being welded.

2.5.2 Stops and Beads

Form stops and beads from 20 gage steel. Provide for glazed and other openings in standard steel frames. Secure beads to frames with oval-head, countersunk Phillips self-tapping sheet metal screws or concealed clips and fasteners. Space fasteners approximately 12 to 16 inch on center. Miter molded shapes at corners. Butt or miter square or rectangular beads at corners.

2.5.3 Anchors

Provide anchors to secure the frame to adjoining construction. Provide steel anchors, zinc-coated or painted with rust-inhibitive paint, not lighter than 18 gage.

2.5.3.1 Wall Anchors

Provide at least three anchors for each jamb. For frames which are more than 7.5 feet in height, provide one additional anchor for each jamb for each additional 2.5 feet or fraction thereof.

a. Masonry: Provide anchors of corrugated or perforated steel straps or 3/16 inch diameter steel wire, adjustable or T-shaped;

b. Stud partitions: Weld or otherwise securely fasten anchors to backs of frames. Design anchors to be fastened to closed steel studs with sheet metal screws, and to open steel studs by wiring or welding;and

c. Completed openings: Secure frames to previously placed concrete or masonry with expansion bolts in accordance with SDI 111-F.

2.5.3.2 Floor Anchors

Provide floor anchors drilled for 3/8 inch anchor bolts at bottom of each jamb member. Where floor fill occurs, terminate bottom of frames at the indicated finished floor levels and support by adjustable extension clips resting on and anchored to the structural slabs.

2.6 FIRE AND SMOKE DOORS AND FRAMES

NFPA 80 and NFPA 105 and this specification. The requirements of NFPA 80 and NFPA 105 shall take precedence over details indicated or specified.

2.6.1 Door and Frame Labels

Fire doors and frames shall bear the label of Underwriters Laboratories (UL), Factory Mutual Engineering and Research (FM), or Warnock Hersey International (WHI) attesting to the rating required. Testing shall be in accordance with NFPA 252 or UL 10B. Labels shall be metal with raised letters, and shall bear the name or file number of the door and frame manufacturer. Labels shall be permanently affixed at the factory to frames and to the hinge edge of the door. Door labels shall not be painted.

2.6.2 Astragal on Fire and Smoke Doors

On pairs of labeled fire doors, conform to NFPA 80 and UL requirements. On smoke control doors, conform to NFPA 105.

2.7 WEATHERSTRIPPING

As specified in Section 08 71 00 DOOR HARDWARE.

2.8 HARDWARE PREPARATION

Provide minimum hardware reinforcing gages as specified in ANSI A250.6. Drill and tap doors and frames to receive finish hardware. Prepare doors and frames for hardware in accordance with the applicable requirements of ANSI A250.8 and ANSI A250.6. For additional requirements refer to BHMA A115. Drill and tap for surface-applied hardware at the project site. Build additional reinforcing for surface-applied hardware into the door at the factory. Locate hardware in accordance with the requirements of ANSI A250.8, as applicable. Punch door frames, with the exception of frames that will have weatherstripping or lightproof gasketing, to receive a minimum of two rubber or vinyl door silencers on lock side of single doors and one silencer for each leaf at heads of double doors. Set lock strikes out to provide clearance for silencers.

2.9 FINISHES

2.9.1 Hot-Dip Zinc-Coated and Factory-Primed Finish

Fabricate doors and frames from hot dipped zinc coated steel, alloyed type, that complies with ASTM A 924/A 924Mand ASTM A 653/A 653M. The coating weight shall meet or exceed the minimum requirements for coatings having 0.4 ounces per square foot, total both sides, i.e., A40. Repair damaged zinc-coated surfaces by the application of zinc dust paint. Thoroughly clean and chemically treat to insure maximum paint adhesion. Factory prime as specified in ANSI A250.8.

2.9.2 Electrolytic Zinc-Coated Anchors and Accessories

Provide electrolytically deposited zinc-coated steel in accordance with ASTM A 591, Commercial Quality, Coating Class A. Phosphate treat and factory prime zinc-coated surfaces as specified in ANSI A250.8.

2.10 FABRICATION AND WORKMANSHIP

Finished doors and frames shall be strong and rigid, neat in appearance, and free from defects, waves, scratches, cuts, dents, ridges, holes, warp, and buckle. Molded members shall be clean cut, straight, and true, with joints coped or mitered, well formed, and in true alignment. Dress exposed

welded and soldered joints smooth. Design door frame sections for use with the wall construction indicated. Corner joints shall be well formed and in true alignment. Conceal fastenings where practicable.

2.10.1 Grouted Frames

For frames to be installed in exterior walls and to be filled with mortar or grout, fill the stops with strips of rigid insulation to keep the grout out of the stops and to facilitate installation of stop-applied head and jamb seals.

2.13 Field Painting

Field paint steel doors and frames in accordance with Section 09 90 00 PAINTS AND COATINGS, or as indicated on the drawings.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Frames

Set frames in accordance with SDI 105. Plumb, align, and brace securely until permanent anchors are set. Anchor bottoms of frames with expansion bolts or powder-actuated fasteners. Build in or secure wall anchors to adjoining construction. Backfill frames with mortar. Coat inside of frames with corrosion-inhibiting bituminous material. For frames in exterior walls, ensure that stops are filled with rigid insulation before grout is placed.

3.1.2 Doors

Hang doors in accordance with clearances specified in ANSI A250.8. After erection and glazing, clean and adjust hardware. Field paint steel doors and frames in accordance with 09 90 00 Painting and Coating.

3.1.3 Fire and Smoke Doors and Frames

Install fire rated smoke doors and frames in accordance with NFPA 80 and NFPA 105.

3.2 PROTECTION

Protect doors and frames from damage. Repair damaged doors and frames prior to completion and acceptance of the project or replace with new, as directed. Wire brush rusted frames until rust is removed. Clean thoroughly. Apply an all-over coat of rust-inhibitive paint of the same type used for shop coat.

3.3 CLEANING

Upon completion, clean exposed surfaces of doors and frames thoroughly. Remove mastic smears and other unsightly marks.

-- End of Section --

SECTION 08 11 16

ALUMINUM DOORS AND FRAMES
07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2005) Standard Specification for Carbon Structural Steel
ASTM B 209	(2006) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2006) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM E 283	(2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E 331	(2000) Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference

1.2 PERFORMANCE REQUIREMENTS

1.2.1 Structural

Shapes and thicknesses of framing members shall be sufficient to withstand the design wind load indicated 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. Provide glazing beads, moldings, and trim of not less than 0.050 inch nominal thickness.

1.2.2 Air Infiltration

When tested in accordance with ASTM E 283, air infiltration shall not exceed 0.06 cubic feet per minute per square footof fixed area at a test pressure of 6.24 pounds per square foot(50 mile per hour wind).

1.2.3 Water Penetration

When tested in accordance with ASTM E 331, there shall be no water penetration at a pressure of 8 pounds per square foot of fixed area.

1.3 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES.

SD-08 Manufacturer's Instructions

Doors and frames

Submit detail specifications and instructions for installation, adjustments, cleaning, and maintenance.

1.4 DELIVERY, STORAGE, AND HANDLING

Inspect materials delivered to the site for damage. Unload and store with minimum handling. Provide storage space in dry location with adequate ventilation, free from dust or water, and easily accessible for inspection and handling. Stack materials on nonabsorptive strips or wood platforms. Do not cover doors and frames with tarps, polyethylene film, or similar coverings. Protect finished surfaces during shipping and handling using manufacturer's standard method, except that no coatings or lacquers shall be applied to surfaces to which calking and glazing compounds must adhere.

1.5 FIELD MEASUREMENTS

Verify field measurements prior to fabrication.

PART 2 PRODUCTS

2.1 DOORS AND FRAMES

Swing-type aluminum doors and frames of size, design, and location indicated. Provide doors complete with frames, framing members, subframes, transoms, adjoining sidelights, adjoining window wall, trim, and accessories.

2.2 MATERIALS

2.2.1 Anchors

Stainless steel or steel with hot-dipped galvanized finish.

2.2.2 Weatherstripping

Continuous wool pile, silicone treated, or type recommended by door manufacturer.

2.2.3 Aluminum Alloy for Doors and Frames

ASTM B 221, Alloy 6063-T5 for extrusions. ASTM B 209, alloy and temper best suited for aluminum sheets and strips.

2.2.4 Fasteners

Hard aluminum or stainless steel.

2.2.5 Structural Steel

ASTM A 36/A 36M.

2.2.6 Aluminum Paint

Aluminum door manufacturer's standard aluminum paint.

2.3 FABRICATION

2.3.1 Aluminum Frames

Extruded aluminum shapes with contours approximately as indicated. Provide removable glass stops and glazing beads for frames accommodating fixed glass. Use countersunk stainless steel Phillips screws for exposed fastenings, and space not more than 12 inches on center. Mill joints in frame members to a hairline fit, reinforce, and secure mechanically.

2.3.2 Aluminum Doors

Of type, size, and design indicated and not less than 1-3/4 inch thick. Minimum wall thickness, 0.125 inch, except beads and trim, 0.050 inch. Door sizes shown are nominal and shall include standard clearances as follows: 0.093 inch at hinge and lock stiles, 0.125 inch between meeting stiles, 0.125 inch at top rails, 0.187 inch between bottom and threshold, and 0.687 inch between bottom and floor. Bevel single-acting doors 0.063 or 0.125 inch at lock, hinge, and meeting stile edges.

2.3.2.1 Full Glazed Stile and Rail Doors

Doors shall have narrow stiles and rails as indicated. Fabricate from extruded aluminum hollow seamless tubes or from a combination of open-shaped members interlocked or welded together. Fasten top and bottom rail together by means of welding or by 3/8 or 1/2 inch diameter cadmium-plated tensioned steel tie rods. Provide an adjustable mechanism of jack screws or other methods in the top rail to allow for minor clearance adjustments after installation.

2.3.2.2 Flush Doors

Use facing sheets with a plain smooth surface. Use one of the following constructions:

a. A phenolic resin-impregnated kraft paper honeycomb core, surrounded at edges and around glass and louvered areas with extruded aluminum shapes. The impregnation of core shall have a minimum of 18 percent resin content. Provide sheet aluminum door facings, not less than 0.032 inch thick laminated to a 0.10 inch thick tempered hardboard backing, and bond the backing to the honeycomb core. Bond facing sheets to core under heat and pressure with a thermosetting adhesive, and mechanically lock to the extruded edge members.

b. A phenolic resin-impregnated kraft paper honeycomb core. Use aluminum facing sheets not less than 0.050 inch thick and form into two pans which will eliminate seams on the faces. Bond honeycomb core to the face sheets using an epoxy resin or contact cement-type adhesive.

c. A solid fibrous core, surrounded at edges and around glass and louvered areas and cross-braced at intermediate points with extruded aluminum shapes. Use aluminum facing sheets of not less

than 0.050 inch thickness. Bond facing sheets to core under heat and pressure with a thermosetting adhesive, and mechanically lock to the extruded edge members.

d. Form from extruded tubular stiles and rails mitered at corners, reinforce, and continuously weld at miters. Facing sheets shall consist of 0.032 inch thick sheet aluminum internally reinforced with aluminum channels or Z-bars placed horizontally not more than 16 inch apart and extending full width of panel. Fit spaces between reinforcing with sound-deadening insulation. Facing sheets shall finish flush with faces of stiles and rails and be welded to reinforcing bars or channels and to stiles and rails.

e. Form from an internal grid system composed of extruded aluminum tubular sections. Provide extruded aluminum tubular sections at both sides, and at perimeters of louver and glass cutouts. Provide three extruded aluminum tubular sections at top and bottom of door. Wall thickness of tubular sections shall be not less than 0.09 inch except that lock rail shall be not less than0.125 inch thick, hinge lock rail shall be not less than 0.125 inch thick, and hinge rail edge shall be not less than 0.19 inch thick. Fill spaces in door with mineral insulation. Facing sheets shall be of aluminum not less than 0.09 inch thick.

f. Form from extruded aluminum members at top and bottom, both sides, and at perimeters of louver and glass cutouts. Wall sections of extruded aluminum members shall be not less than 0.09 inch thick and be properly reinforced for application of hardware. Framing members shall be covered on both sides with aluminum facing sheets not less than 0.064 inch thick. Fill door with foamed-in urethane with a 3 pound density.

2.3.3 Welding and Fastening

Where possible, locate welds on unexposed surfaces. Dress welds on exposed surfaces smoothly. Select welding rods, filler wire, and flux to produce a uniform texture and color in finished work. Remove flux and spatter from surfaces immediately after welding. Exposed screws or bolts will be permitted only in inconspicuous locations, and shall have countersunk heads. Weld concealed reinforcements for hardware in place.

2.3.4 Weatherstripping

Provide on stiles and rails of exterior doors. Fit into slots which are integral with doors or frames. Weatherstripping shall be replaceable without special tools, and adjustable at meeting rails of pairs of doors. Installation shall allow doors to swing freely and close positively. Air leakage of a single leaf weatherstripped door shall not exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283.

2.3.5 Anchors

On the backs of subframes, provide anchors of the sizes and shapes indicated for securing subframes to adjacent construction. Anchor transom bars at ends and mullions at head and sill. Where indicated, reinforce vertical mullions with structural steel members of sufficient length to extend up to the overhead structural slab or framing and secure thereto. Reinforce and anchor freestanding door frames to floor construction as

indicated on approved shop drawings and in accordance with manufacturer's recommendation. Place anchors near top and bottom of each jamb and at intermediate points not more than 25 inch apart.

2.3.6 Provisions for Hardware

Coordinate with Section 08 71 00 DOOR HARDWARE. Deliver hardware templates and hardware (except field-applied hardware) to the door manufacturer for use in fabrication of aluminum doors and frames. Cut, reinforce, drill, and tap doors and frames at the factory to receive template hardware. Provide doors to receive surface-applied hardware, except push plates, kick plates, and mop plates, with reinforcing only; drill and tap in the field. Provide hardware reinforcements of stainless steel or steel with hot-dipped galvanized finish, and secure with stainless steel screws. Provide reinforcement in core of flush doors as required to receive locks, door closers, and other hardware.

2.3.7 Provisions for Glazing

Provide extruded aluminum snap-in glazing beads on interior side of doors. Provide extruded aluminum, theft-proof, snap-in glazing beads or fixed glazing beads on exterior or security side of doors. Glazing beads shall have vinyl insert glazing gaskets. Design glazing beads to receive glass of thickness indicated or specified.

2.3.8 Finishes

Provide exposed aluminum surfaces with mill finish.

PART 3 EXECUTION

3.1 INSTALLATION

Plumb, square, level, and align frames and framing members to receive doors, transoms, adjoining sidelights, and, adjoining window walls. Anchor frames to adjacent construction as indicated and in accordance with manufacturer's printed instructions. Anchor bottom of each frame to rough floor construction with 3/32 inch thick stainless steel angle clips secured to back of each jamb and to floor construction; use stainless steel bolts and expansion rivets for fastening clip anchors. Hang doors to produce clearances specified in paragraph entitled "Aluminum Doors," of this section. After erection and glazing, adjust doors and hardware to operate properly.

3.2 PROTECTION FROM DISSIMILAR MATERIALS

3.2.1 Dissimilar Metals

Where aluminum surfaces come in contact with metals other than stainless steel, zinc, or small areas of white bronze, protect from direct contact to dissimilar metals.

3.2.1.1 Protection

Provide one of the following systems to protect surfaces in contact with dissimilar metals:

a. Paint the dissimilar metal with one coat of heavy-bodied bituminous paint.

b. Apply a good quality elastomeric sealant between the aluminum and the dissimilar metal.

c. Paint the dissimilar metal with one coat of primer and one coat of aluminum paint.

d. Use a nonabsorptive tape or gasket in permanently dry locations.

3.2.2 Drainage from Dissimilar Metals

In locations where drainage from dissimilar metals has direct contact with aluminum, provide protective paint to prevent aluminum discoloration.

3.2.3 Masonry and Concrete

Provide aluminum surfaces in contact with mortar, concrete, or other masonry materials with one coat of heavy-bodied bituminous paint.

3.2.4 Wood or Other Absorptive Materials

Provide aluminum surfaces in contact with absorptive materials subject to frequent moisture, and aluminum surfaces in contact with treated wood, with two coats of aluminum paint or one coat of heavy-bodied bituminous paint. In lieu of painting the aluminum, the Contractor shall have the option of painting the wood or other absorptive surface with two coats of aluminum paint and sealing the joints with elastomeric sealant.

3.3 CLEANING

Upon completion of installation, clean door and frame surfaces in accordance with door manufacturer's written recommended procedure. Do not use abrasive, caustic, or acid cleaning agents.

3.4 PROTECTION

Protect doors and frames from damage and from contamination by other materials such as cement mortar. Prior to completion and acceptance of the work, restore damaged doors and frames to original condition, or replace with new ones.

-- End of Section --

SECTION 08 14 00

WOOD DOORS
07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E 90	(2004) Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

WINDOW AND DOOR MANUFACTURERS ASSOCIATION (WDMA)

WDMA I.S. 1-A	(1999) Architectural Wood Flush Doors
WDMA I.S. 4	(1994) Water-Repellent Preservative Non-Pressure Treatment for Millwork

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Doors; G
Accessories
Water-resistant sealer
Sample warranty

SD-04 Samples

Doors

Prior to the delivery of wood doors, submit a sample section of each type of door which shows the stile, rail, veneer, finish, and core construction.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver doors to the site in an undamaged condition and protect against damage and dampness. Stack doors flat under cover. Support on blocking, a minimum of 4 inch thick, located at each end and at the midpoint of the door. Store doors in a well-ventilated building so that they will not be exposed to excessive moisture, heat, dryness, direct sunlight, or extreme changes of temperature and humidity. Do not store in a building under construction until concrete, masonry work, and plaster are dry. Replace defective or damaged doors with new ones.

1.4 WARRANTY

Warrant doors free of defects as set forth in the door manufacturer's standard door warranty.

PART 2 PRODUCTS

2.1 DOORS

Provide doors of the types, sizes, and designs indicated.

2.1.1 Flush Doors

Conform to WDMA I.S. 1-A for flush doors. Provide solid core doors.

2.1.1.1 Interior Flush Doors

Provide staved lumber core, Type II flush doors conforming to WDMA I.S. 1-A with faces of sound grade hardwood or hardboard for stain finish.

2.1.2 Acoustical Doors

WDMA I.S. 1-A, solid core, constructed to provide Sound Transmission Class rating of 45 when tested in accordance with ASTM E 90.

2.2 ACCESSORIES

2.2.1 Door Louvers

Fabricate from metal and of sizes indicated. Provide louvers with a minimum of 35 percent free air. Equip louvers with slat type.

2.2.2 Door Light Openings

Provide glazed openings with the manufacturer's standard wood moldings. Provide moldings for doors to receive natural finish of the same wood species and color as the wood face veneers.

2.3 FABRICATION

2.3.1 Marking

Stamp each door with a brand, stamp, or other identifying mark indicating quality and construction of the door.

2.3.2 Preservative Treatment

Treat doors scheduled for restrooms, janitor closets and other possible wet locations including exterior doors with a water-repellent preservative treatment and so marketed at the manufacturer's plant in accordance with WDMA I.S. 4. Wood doors and frames shall be dip-treated with waterborne boron solution.

2.3.3 Adhesives and Bonds

WDMA I.S. 1-A. Use Type I bond for exterior doors and Type II bond for interior doors. Provide a nonstaining adhesive on doors with a natural finish.

2.3.4 Prefitting

Provide factory prefinished and factory prefitted doors for the specified hardware, door frame and door-swing indicated. Machine and size doors at the factory by the door manufacturer in accordance with the standards under which the doors are produced and manufactured. The work includes sizing, bevelling edges, mortising, and drilling for hardware and providing necessary beaded openings for glass and louvers. Provide the door manufacturer with the necessary hardware samples, and frame and hardware schedules to coordinate the work.

2.3.5 Finishes

2.3.5.1 Field Staining

Field stain.

2.3.6 Water-Resistant Sealer

Provide manufacturer's standard water-resistant sealer compatible with the specified finishes.

PART 3 EXECUTION

3.1 INSTALLATION

Before installation, seal top and bottom edges of doors with the approved water-resistant sealer. Seal cuts made on the job immediately after cutting using approved water-resistant sealer. Fit, trim, and hang doors with a 1/16 inch minimum, 1/8 inch maximum clearance at sides and top, and a 3/16 inch minimum, 1/4 inch maximum clearance over thresholds. Provide 3/8 inch minimum, 7/16 inch maximum clearance at bottom where no threshold occurs. Bevel edges of doors at the rate of 1/8 inch in 2 inch. Door warp shall not exceed1/4 inch when measured in accordance with WDMA I.S. 1-A.

-- End of Section --

SECTION 08 33 23

OVERHEAD COILING DOORS
07/07

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE/SEI 7-05	(2006) Minimum Design Loads for Buildings and Other Structures

ASME INTERNATIONAL (ASME)

ASME B29.400	(2001; R 2008) Combination, "H" Type Mill Chains, and Sprockets

ASTM INTERNATIONAL (ASTM)

ASTM A 153/A 153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A 27/A 27M	(2010) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A 307	(2007b) Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength
ASTM A 36/A 36M	(2008) Standard Specification for Carbon Structural Steel
ASTM A 48/A 48M	(2003; R 2008) Standard Specification for Gray Iron Castings
ASTM A 53/A 53M	(2010) Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A 924/A 924M	(2010) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM D 2000	(2008) Standard Classification System for Rubber Products in Automotive Applications

ASTM E 330	(2002; R 2010) Structural Performance of Exterior Windows, Doors, Skylights and Curtain Walls by Uniform Static Air Pressure Difference
ASTM F 568M	(2007) Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

NEMA ICS 2	(2000; R 2005; Errata 2008) Standard for Controllers, Contactors, and Overload Relays Rated 600 V
NEMA ICS 6	(1993; R 2006) Enclosures
NEMA MG 1	(2009) Motors and Generators
NEMA ST 1	(1988; R 1994; R 1997) Specialty Transformers (Except General Purpose Type)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70	(2011) National Electrical Code
NFPA 80	(2010; TIA 10-2) Standard for Fire Doors and Other Opening Protectives

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(2010) Building Materials Directory

1.2 DESCRIPTION

Overhead coiling doors to be counterbalanced doors by methods of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed or self-lubricating bearings for rotating members. Doors to be coiling type, with interlocking slats, complete with anchoring and door hardware, guides, hood, and operating mechanisms, and designed for use on openings as indicated.

Fire-rated door assemblies must bear the Underwriters Laboratories, Warnock Hersey, Factory Mutual or other nationally recognized testing laboratory label for the rating listed on the drawings. Provide a permanent label for each door showing the manufacturer's name and address and the model/serial number of the door.

Oversized fire-rated door assemblies must be provided with a listing agency oversize label, or a certificate signed by an official of the manufacturing company certifying that the door and operator have been designed to meet the specified requirements.

1.3 PERFORMANCE REQUIREMENTS

1.3.1 Wind Loading

Design and fabricate door assembly to withstand the wind loading pressure of at least 96 pounds per square foot with a maximum deflection of 1/120 of the opening width. Provide test data showing compliance with ASTM E 330. Sound engineering principles may be used to interpolate or extrapolate test results to door sizes not specifically tested Complete assembly must meet or exceed the requirements of ASCE/SEI 7-05.

1.3.2 Fire-Rated Doors, Frames, and Hardware

Provide fire-rated doors, frames, and hardware which are tested, rated, and labeled in accordance with Underwriters Laboratories, Factory Mutual or Warnock Hersey. The labels must indicate the rating in hours, per NFPA 80 of duration of exposure to fire, with a letter following the hourly rating to designate the location for which the assembly is designed and the temperature rise on the unexposed face of the door at the end of 30 minutes of fire exposure.

Provide and attach metal UL labels to each item of hardware in accordance with requirements specified in the UL Bld Mat Dir.

1.3.3 Oversized Coiling Fire-rated Door Assemblies

Where fire-rated doors and frames exceed the size for which testing and labeling services are offered, furnish certificates of inspection from the UL, Factory Mutual or Warnock Hersey. State within certificates that except for size; doors, frames, and hardware are identical in design, materials, and construction to a door that has been tested and rated.

1.3.4 Operational Cycle Life

All portions of the door, hardware and operating mechanism that are subject to movement, wear, or stress fatigue must be designed to operate through a minimum number of 10 cycles per day. One complete cycle of door operation is defined as when the door is in the closed position, moves to the fully open position, and returns to the closed position.

1.4 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Provide fabrication drawings that show complete assembly with hardware and framing details for the following items:

Overhead Coiling Doors
Counterbalancing Mechanism
Manual Door Operators
Electric Door Operators
Bottom Bar
Guides
Mounting Brackets

Overhead Drum
Hood
Painting

Submit Installation Drawings in accordance with paragraph entitled, "Overhead Coiling Door Assemblies," of this section.

SD-03 Product Data

Submit manufacturer's catalog data for the following items listing all accessories including supports, locks and latches, and weather stripping.

Overhead Coiling Doors
Hardware
Counterbalancing Mechanism
Manual Door Operators
Electric Door Operators
Fire-Rated Door Assembly

SD-05 Design Data

Submit equipment and performance data for the following items in accordance with the paragraph entitled, "Performance Requirements," of this section.

Overhead Coiling Doors
Hardware
Counterbalancing Mechanism
Manual Door Operators
Electric Door Operators
Fire-Rated Door

SD-10 Operation and Maintenance Data

Submit Operation and Maintenance Manuals for Overhead Coiling Door Assemblies, including the following items:

Materials
Devices
Procedures
Manufacture's Brochures
Parts Lists
Cleaning

1.5 OVERHEAD COILING DOOR DETAIL SHOP DRAWINGS

Provide installation drawings for overhead coiling door assemblies which show elevations of each door type, shape and thickness of materials, finishes, details of joints and connections, and details of guides and fittings, rough opening dimensions, location and description of hardware, anchorage locations, and counterbalancing mechanism and door operator details. Show locations of replaceable fusible links wiring diagrams for power, signal and controls. Include a schedule showing the location of each door with the drawings.

Contractor must submit 6 copies of the Operation and Maintenance Manuals 30 calendar days prior to testing the Overhead Coiling Door Assemblies. Update and resubmit data for final approval no later than 30 calendar days

prior to contract completion.

Provide operation and maintenance manuals which are consistent with manufacturer's standard brochures, schematics, printed instructions, general operating procedures, and safety precautions. Provide test data that is legible and of good quality.

1.6 WARRANTY, OPERATION AND MAINTENANCE DATA

Submit Operation and Maintenance Manuals for Overhead Coiling Door Assemblies, including the following items:

- Materials
- Devices
- Electric Door Operators
- Hood
- Counterbalancing Mechanism
- Painting
- Procedures
- Manufacture's Brochures
- Parts Lists

Contractor must furnish a written guarantee that the helical spring and counterbalance mechanism are free from defects in material and workmanship and that they will remain so for not less than two years after completion and acceptance of the project.

Contractor must warrant that upon notification by the Government, he will immediately make good any defects in material, workmanship, and door operation within the same time period covered by the guarantee, at no cost to the Government.

1.7 DELIVERY AND STORAGE

Delivered doors to the jobsite wrapped in a protective covering with the brands and names clearly marked thereon. Store doors in a dry location that is adequately ventilated and free from dirt and dust, water, and other contaminants, and in a manner that permits easy access for inspection and handling.

PART 2 PRODUCTS

2.1 OVERHEAD COILING DOORS

2.1.1 Curtain Materials and Construction

Provide curtain slats which are fabricated from aluminum sheets conforming to ASTM B 209 (ASTM B 209M) sheet or ASTM B 221 (ASTM B 221M) extrusions, alloy and temper standard with manufacturer for type of use and finish indicated; thickness of 0.050 inch and as required to meet requirements.

Fabricate doors from interlocking cold-rolled slats, with section profiles as specified, designed to withstand the specified wind loading. Provide slats which are continuous without splices for the width of the door.

Provide slats filled with manufacturer's standard thermal insulation complying with maximum flame-spread and smoke-developed indexes of 75 and 450, respectively, according to ASTM E 84. Enclose insulation completely

within slat faces on interior surface of slats.

2.1.2 Locks

Provide end and/or wind locks of cast steel conforming to ASTM A 27/A 27M, Grade B; galvanized in accordance with ASTM A 653/A 653M, ASTM A 153/A 153M and ASTM A 924/A 924M and secured at every other curtain slat.

2.1.3 Weather Stripping

Weather-stripping at the door-head and jamb must be 1/8-inch thick sheet of natural or neoprene rubber with air baffles, secured to the insides of hoods with galvanized-steel fasteners through continuous galvanized-steel pressure bars at least 5/8-inch wide and 1/8-inch thick.

Threshold weather-stripping must be 1/8-inch thick sheet natural or neoprene rubber secured to the bottom bars.

Provide weather-stripping of natural or neoprene rubber conforming to ASTM D 2000.

2.1.4 Locking Devices

Slide Bolt to engage through slots in tracks for locking by padlock, located on both left and right jamb sides, operable from coil side.

Locking Device Assembly which includes cylinder lock, spring-loaded dead bolt, operating handle, cam plate, and adjustable locking bars to engage through slots in tracks.

2.1.5 Safety Interlock

Equip power-operated doors with safety interlock switch to disengage power supply when door is locked.

2.1.6 Overhead Drum

Fabricate drums from nominal 0.040-inch thick aluminum sheet complying with ASTM B 209 (ASTM B 209M), of alloy and temper recommended by manufacturer and finish for type of use and finish indicated.

2.2 HARDWARE

All hardware must conform to ASTM A 153/A 153M, ASTM A 307, ASTM F 568M, and ASTM A 27/A 27M.

2.2.1 Guides

Fabricate curtain jamb guides from the manufacturer's standard angles or channels of same material and finish as curtain slats unless otherwise indicated, with sufficient depth and strength to retain curtain, to allow curtain to operate smoothly, and to withstand loading. Slot bolt holes for track adjustment.

2.2.2 Equipment Supports

Fabricate door-operating equipment supports from the manufacturer's standard steel shapes and plates conforming to ASTM A 36/A 36M, galvanized in accordance with ASTM A 653/A 653M and ASTM A 924/A 924M. Size the shapes

and plates in accordance with the industry standards for the size, weight, and type of door installation.

2.3 COUNTERBALANCING MECHANISM

Counterbalance doors by means of manufacturer's standard mechanism with an adjustable-tension, steel helical torsion spring mounted around a steel shaft and contained in a spring barrel connected to top of curtain with barrel rings. Use grease-sealed or self-lubricating bearings for rotating members.

2.3.1 Brackets

Provide the manufacturer's standard mounting brackets of either cast iron or cold-rolled steel with one located at each end of the counterbalance barrel conforming to ASTM A 48/A 48M.

2.3.2 Counterbalance Barrels

Fabricate spring barrel of manufacturer's standard hot-formed, structural-quality, welded or seamless carbon-steel pipe, conforming to ASTM A 53/A 53M, of sufficient diameter and wall thickness to support rolled-up curtain without distortion of slats and to limit barrel deflection to not more than 0.03 inch per foot of span under full load.

2.3.3 Spring Balance

One or more oil-tempered, heat-treated steel helical torsion springs installed within the barrel capable of producing sufficient torque to assure easy operation of the door curtain. Provide and size springs to counterbalance weight of curtain, with uniform adjustment accessible from outside barrel. Secure ends of springs to barrel and shaft with cast-steel barrel plugs.

2.3.4 Torsion Rod for Counter Balance

Fabricate rod from the manufacturer's standard cold-rolled steel, sized to hold fixed spring ends and carry torsional load.

2.4 ELECTRIC DOOR OPERATORS

Provide electrical wiring and door operating controls conforming to the applicable requirements of NFPA 70.

Electric door-operator assemblies must be the sizes and capacities recommended and provided by the door manufacturer for specified doors. Assemblies must be complete with electric motors and factory-prewired motor controls, starter, gear reduction units, solenoid-operated brakes, clutch, remote-control stations, manual or automatic control devices, and accessories as required for proper operation of the doors.

Design the operators so that motors may be removed without disturbing the limit-switch adjustment and affecting the emergency auxiliary operators.

Provide a manual operator of crank-gear or chain-gear mechanisms with a release clutch to permit manual operation of doors in case of power failure. rrange the emergency manual operator so that it may be put into and out of operation from floor level, and its use will not affect the adjustment of the limit switches. Provide an electrical or mechanical

device which will automatically disconnect the motor from the operating mechanism when the emergency manual operating mechanism is engaged.

2.4.1 Door-Operator Types

Provide an operator which is mounted to the right or left door head plate with the operator on top of the door-hood assembly and connected to the door drive shaft with drive chain and sprockets. Headroom is required for this type of mounting.

2.4.2 Electric Motors

Provide motors which are the high-starting-torque, reversible, constant-duty electrical type with overload protection of sufficient torque and horsepower to move the door in either direction from any position and produce a door-travel speed of not less than 8 nor more than 12 inches per second without exceeding thehorsepower rating.

Provide motors which conform to NEMA MG 1 designation, temperature rating, service factor, enclosure type, and efficiency to the requirements specified.

2.4.3 Motor Bearings

Bearings must be bronze-sleeve or heavy-duty ball or roller antifriction type with full provisions for the type of thrust imposed by the specific duty load.

Pre-lubricate and factory seal bearings in motors less than 1/2 horsepower.

Equip motors coupled to worm-gear reduction units with either ball or roller bearings.

Equip bearings in motors 1/2 horsepower or larger with lubrication service fittings. Fit lubrication fittings with color-coded plastic or metal dust caps.

In any motor, bearings that are lubricated at the factory for extended duty periods do not need to be lubricated for a given number of operating hours. Display this information on an appropriate tag or label on the motor with instructions for lubrication cycle maintenance.

2.4.4 Motor Starters, Controls, and Enclosures

Each door motor must have a factory-wired, unfused, disconnect switch; a reversing, across-the-line magnetic starter with thermal overload protection; 120-volt operating coils with a control transformer limit switch; and a safety interlock assembled in a NEMA ICS 6 type enclosure as specified herein. Control equipment must conform to NEMA ICS 2.

Provide adjustable switches, electrically interlocked with the motor controls and set to stop the door automatically at the fully open and fully closed position.

2.4.5 Control Enclosures

Provide control enclosures that conform to NEMA ICS 6 for general purpose NEMA Type 1. Oil-tight and dust-tight NEMA Type 13.

2.4.6 Transformer

Provide starters with 230/460 to 115 volt control transformers with one secondary fuse when it is required to reduce the voltage on control circuits to 120 volts or less. Provide transformer that conforms to NEMA ST 1.

2.4.7 Safety-Edge Device

Provide each door with a pneumatic safety device extending the full width of the door and located within a U-section neoprene or rubber astragal mounted on the bottom rail of the bottom door section. Device must immediately stop and reverse the door upon contact with an obstruction in the door opening during downward travel and cause the door to return to full-open position. Safety device is not a substitute for a limit switch.

Connect safety device to the control circuit through a retracting safety cord and reel.

2.4.8 Speed-Reduction Units

Provide speed-reduction units consisting of hardened-steel worm and bronze worm gear assemblies running in oil or grease and encased in a sealed casing, coupled to the motor through a flexible coupling. Drive shafts must rotate on ball- or roller-bearing assemblies that are integral with the unit.

Provide minimum ratings of speed reduction units which are in accordance with AGMA provisions for class of service.

Ground worm gears to provide accurate thread form; machine teeth for all other types of gearing. Surface harden all gears.

Provide bearings which are the antifriction type equipped with oil seals.

2.4.9 Chain Drives

Provide roller chains that are power-transmission series steel roller type conforming to ASME B29.400, with a minimum safety factor of 10 times the design load.

Roller-chain side bars, rollers, pins, and bushings must be heat-treated or otherwise hardened.

Provide chain sprockets that are high-carbon steel with machine-cut hardened teeth, finished bore and keyseat, and hollow-head setscrews.

2.4.10 Brakes

Provide brakes which are 360-degree shoe brakes or shoe and drum brakes, solenoid-operated and electrically interlocked to the control circuit to set automatically when power is interrupted.

2.4.11 Clutches

Clutches must be the 4-inch diameter, multiple face, externally adjustable friction type or adjustable centrifugal type.

2.5 FIRE-RATED DOOR ASSEMBLY

Provide fire-rated door assemblies with the dimensions, fire rating, and operating type indicated with electric operators and assemblies that do not interfere with manufacturer's standard interconnecting fusible links.

Provide door manufacturer's standard interconnecting fusible links for door assemblies on both sides of the wall opening.

2.5.1 Fire Ratings

Provide fire-rated door assemblies complying with NFPA 80 Standard for Fire Doors and Other Opening Protectives and UL Fire Resistance - Volume 3.

2.6 SURFACE FINISHING

Comply with NAAMM's "Metal Finishes Manual for Architectural and Metal Products" for recommendations for applying and designating finishes. Noticeable variations in the same metal component are not acceptable. Variations in appearance of adjoining 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 GENERAL

Install overhead coiling door assembly, anchors and inserts for guides, brackets, motors, switches, hardware, and other accessories in accordance with approved detail drawings and manufacturer's written instructions. Upon completion of installation, doors must be free from all distortion.

Install overhead coiling doors, motors, hoods, and operators at the mounting locations as indicated for each door in the contract documents and as required by the manufacturer.

Install overhead coiling doors, switches, and controls along accessible routes in compliance with regulatory requirements for accessibility and as required by the manufacturer.

3.2 FIELD PAINTED FINISH

Steel doors and frames which are to be field painted must accordance with Section 09 90 00 PAINTS AND COATINGS and manufacturer's written instructions. Protect weather stripping from paint. Finishes must be free of scratches or other blemishes.

3.3 ACCEPTANCE PROVISIONS

After installation, adjust hardware and moving parts. Lubricate bearings and sliding parts as recommended by manufacturer to provide smooth operating functions for ease movement, free of warping, twisting, or distortion of the door assembly.

Adjust seals to provide weather-tight fit around entire perimeter.

Engage a factory-authorized service representative to perform startup service and checks according to manufacturer's written instructions.

Test the door opening and closing operation when activated by controls or alarm-connected fire-release system. Adjust controls and safeties. Replace damaged and malfunctioning controls and equipment. Reset door-closing mechanism after successful test.

Test and make final adjustment of new doors at no additional cost to the Government.

3.3.1 Maintenance and Adjustment

Not more than 90 calendar days after completion and acceptance of the project, the Contractor must examine, lubricate, test, and re-adjust doors as required for proper operation.

3.3.2 CLEANING

Clean aluminum doors in accordance with manufacturer's approved instructions.

-- End of Section --

SECTION 08 41 13.00 99

ALUMINUM-FRAMED ENTRANCES AND STOREFRONTS
11/06

PART 1 GENERAL

1.1 SUMMARY

1.2 Section Includes

Aluminum Entrances, glass and glazing, door hardware and components.

Type of Aluminum Entrance Includes:

Impact Resistance Entrances; Medium stile, 3-1/2" vertical face dimension, 1-3/4" depth, Interior structural silicone glazed, High traffic/impact resistant applications to match existing contractor to field verify prior to submitting BID.

1.3 REFERENCES

The publications listed below form a part of this section and the work requirements:

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501	(2005) Methods of Test for Exterior Walls
AAMA 503	(1992) Voluntary Specification for Field Testing of Metal Store-Fronts, Curtain Walls, and Sloped Glazing Systems

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A156.10	(1999) Power Operated Pedestrian Doors
ANSI Z97.1	(2004) Safety Glazing Materials Used in Buildings

ASTM INTERNATIONAL (ASTM)

ASTM B 221/B 221M	(2003) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM E 1105	(2000) Standard Test Method for Field Determination of Water Penetration of Installed Exterior Windows, Skylights, Doors, and Curtain Walls, by Uniform or Cyclic Static Air Pressure Difference
ASTM E 283	(2004) Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors, Under Specified Pressure Differences Across the Specimen
ASTM E 330	(2002) Structural Performance of Exterior

	Windows, Curtain Walls, and Doors by Uniform Static Air Pressure Difference
ASTM E 331	(2000) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E 783	(1993) Test Method for Field Measurement of Air Leakage Through Installed Exterior Windows and Doors

DADE COUNTY BUILDING CODE COMPLIANCE OFFICE (DCBCCO)

DCBCCO Protocols PA-202	(1994) Forced Entry Test

FLORIDA DEPARTMENT OF COMMUNITY AFFAIRS BUILDING CODES AND STANDARDS (FBC)

DCE/SFBC Section 3508	(2001) Missile Impact Test, Dade County Edition/Southern Florida Building Code

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA GM	(1997) Glazing Manual

INTERNATIONAL CODE COUNCIL (ICC)

SBCCI Chapter 12	(November 2001) Interior Environment

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR PART 1201	(2001) Safety Standard for Architectural Glazing Materials

UNDERWRITERS LABORATORIES (UL)

UL 325	(2002) Door, Drapery, Gate, Louver, and Window Operators and Systems

1.4 SYSTEM DESCRIPTION

1.4.1 Entrance Performance Requirements

1.4.1.1 Air Infiltration

For single acting offset pivot, butt hung or continuous geared hinge entrances in the closed and locked position, the test specimen must be tested in accordance with DCBCCO Protocols PA-202, ANSI A156.10, and ASTM E 283 at a pressure differential of 1.57 psf for pairs of doors. A pair of 6'0" x 8'0" entrance doors and frame must not exceed 1.2 cfm\ft2.

1.4.2 Structural

Test corner strength per Kawneer's dual moment load test procedure and certified by an independent testing laboratory to ensure weld compliance and corner integrity. Testing procedure and certified test results per AAMA 503, ASTM E 1105, ASTM E 783, ASTM E 331, DCE/SFBC Section 3508, SBCCI Chapter 12, and must be available upon request.

1.4.2.1 Uniform Load

A static air design load of 85 psf (65 psf for 9/16" laminated infill) must be applied in the positive and negative direction in accordance with DCBCCO Protocols PA-202, AAMA 501, and ASTM E 330. There must be no deflection in excess of l/180 of the span of any framing member. At a structural test load equal to 1.5 times the specified design load, no glass breakage must occur.

1.4.2.2 Forced Entry

Tested in accordance with SFBC 3603.2 (b)(5).

1.5 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES in sufficient detail to show full compliance with the specification:

Quality Assurance/Control Submittals:

SD-02 Shop Drawings

Shop drawings; G

SD-06 Test Reports

Submit Certified Test Reports showing compliance with specified performance characteristics and UL 325.

SD-07 Certificates

Submit for Owner's acceptance, Manufacturer's Product Warranty; G for entrance system as follows:

Warranty Period: Two (2) years from Date of Substantial Completion of the project provided however that the Limited Warranty begins in no event later than six months from date of shipment by manufacturer. In addition, welded door corner construction must be supported with a limited lifetime warranty for the life of the door under normal use.

1.6 QUALITY ASSURANCE

1.6.1 Qualifications

1.6.1.1 Installer Qualifications

Installer experienced (as determined by Subcontractor) to perform work of this section who has specialized in the installation of work similar to that required for this project and who is acceptable to product manufacturer.

1.6.1.2 Manufacturer Qualifications

Manufacturer capable of providing field service representation during construction, approving acceptable installer and approving application method. Provide three copies of Manufacturer's Product Warranty and

Certified Test Reports.

1.6.2 Pre-Installation Meetings

Conduct pre-installation meeting to verify project requirements, substrate conditions, manufacturer's installation instructions, and manufacturer's warranty requirements.

1.7 DELIVERY, STORAGE, AND HANDLING

1.7.1 Ordering

Comply with manufacturer's ordering instructions and lead-time requirements to avoid construction delays.

1.7.2 Packing, Shipping, Handling and Unloading

Deliver materials in manufacturer's original, unopened, undamaged containers with identification labels intact.

1.7.3 Storage and Protection

Store materials protected from exposure to harmful weather conditions. Handle storefront material and components to avoid damage. Protect storefront material against damage from elements, construction activities, and other hazards before, during and after storefront installation.

PART 2 PRODUCTS

2.1 Manufacturers

2.1.1 Design Based On

Kawneer Company, Inc.
555 Guthridge Court,
Technology Park/Atlanta
Norcross, GA 30092
Telephone: (770) 449-5555
Fax: (770) 734-1560

2.1.2 Proprietary Product(s)/System(s)

Kawneer Aluminum Entrances or approved equal.
Series: 350 IR Entrances
Finish/Color: Interpon D2000 Powder Coating "Midnight Blue"

2.2 Alternate Manufacturers

Alternate manufacturers are acceptable providing they meet the requirements and intent identified in this section and project drawings.

2.3 MATERIALS

2.3.1 Aluminum (Entrances and Components)

2.3.1.1 Material Standard

ASTM B 221/B 221M; 6063-T5 alloy and temper

The door stile and rail face dimensions of the entrance doors must match existing. Contractor shall field verify prior to submitting construction bid. It is anticipated that the dimensions shall be similar to the following:

Vertical Stile	**Top Rail**	**Bottom Rail**
3-1/2"	3-1/2"	6-1/2"

Major portions of the door members to be .125" nominal in thickness and glazing molding to be .050" thick.

2.3.1.2 Tolerances

Reference to tolerances for wall thickness and other cross-sectional dimensions of entrance members are nominal and in compliance with Aluminum Standards and Data, published by The Aluminum Association.

Glazing gaskets must be either EPDM elastomeric extrusions or a thermoplastic elastomer.

Structural silicone sealant to be Dow Corning 983 or 995.

2.4 ACCESSORIES

2.4.1 Fasteners

Where exposed, must be stainless steel.

2.4.2 Perimeter Anchors

When steel anchors are used, provide insulation between steel material and aluminum material to prevent galvanic action.

2.4.3 Standard Entrance Hardware

2.4.3.1 Weatherstripping

Equip meeting stiles on pairs of doors with an adjustable astragal utilizing wool pile with polymeric fin.

The door weathering on a single acting offset pivot or butt hung door and frame (single or pairs) must be comprised of a thermoplastic elastomer weathering on a tubular shape with a semi-rigid polymeric backing.

Sill Sweep Strips: EPDM blade gasket sweep strip in an aluminum extrusion applied to the interior exposed surface of the bottom rail with concealed fasteners. (Necessary to meet specified performance tests.)

2.4.3.2 Threshold

Extruded aluminum, one piece per door opening, with ribbed surface.

2.4.3.3 Offset Pivots

Manufacturer standard top and bottom pivots with one intermediate offset pivot.

2.4.3.4 Panic Device

Jackson 2086 Concealed Vertical Rod Exit Device or Paneline Concealed Rod Exit Device (tested to +/- 65 psf Uniform Load).

2.4.3.5 Closer

Surface closer only.

2.4.3.6 Security Lock/Dead Lock

A/R MS 1850A lock with (2) A/R 1871 cylinder operated flush bolts.

2.4.3.7 Cylinder(s)/Thumb-turn

Manufacturer standard.

2.4.3.8 Cylinder Guard

Manufacturer standard.

2.5 RELATED MATERIALS

2.5.1 Sealants

Refer to Section 07 92 00 JOINT SEALANTS.

2.5.2 Glass

Refer to Section 08 81 00 GLAZING.

2.6 FABRICATION

2.6.1 Entrance System Fabrication

Contractor shall prepare shop drawings prior to fabrication. Door corner construction must consist of mechanical clip fastening, SIGMA deep penetration plug welds and 1-1/8" long fillet welds inside and outside of all four corners. Exterior glazing stop must be hook-in type with EPDM glazing gaskets reinforced with non-stretchable cord. Interior glazing stop must be mechanically fastened to the door member and it must incorporate a silicone compatible spacer used with silicone sealant.

Accurately fit and secure joints and corners. Make joints hairline in appearance.

Prepare components with internal reinforcement for door hardware.

Arrange fasteners and attachments to conceal from view.

2.7 SOURCE QUALITY CONTROL

2.7.1 Source Quality

Provide aluminum entrances specified herein from a single source.

2.7.1.1 Building Enclosure System

When aluminum entrances are part of a building enclosure system, including

storefront framing, windows, curtain wall system and related products, provide building enclosure system products from a single source manufacturer.

2.7.2 Fabrication Tolerances

Fabricate aluminum entrances in accordance with entrance manufacturer's prescribed tolerances.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Site Verification of Conditions

Verify substrate conditions (which have been previously installed under other sections) are acceptable for product installation in accordance with manufacturer's instructions.

Verify openings are sized to receive storefront system and sill plate is level in accordance with manufacturer's acceptable tolerances.

3.1.2 Field Measurements

Verify actual measurements/openings by field measurements before fabrication; show recorded measurements on shop drawings. Coordinate field measurements, fabrication schedule with construction progress to avoid construction delays.

3.2 INSTALLATION

Install entrance system in accordance with manufacturer's instructions and AAMA storefront and entrance guide specifications manual.

Attach to structure to permit sufficient adjustment to accommodate construction tolerances and other irregularities.

Provide alignment attachments and shims to permanently fasten system to building structure.

Align assembly plumb and level, free of warp and twist. Maintain assembly dimensional tolerances aligning with adjacent work.

Set thresholds in bed of mastic and secure.

3.2.1 Adjusting

Adjust operating hardware for smooth operation.

3.2.2 Related Products Installation Requirements

3.2.2.1 Sealants (Perimeter)

Refer to Section 07 92 00 JOINT SEALANTS.

3.2.2.2 Glass

Refer to Section 08 81 00 GLAZING.

3.2.2.3 Reference

ANSI Z97.1, 16 CFR PART 1201 and GANA GM.

3.3 PROTECTION AND CLEANING

3.3.1 Protection

Protect installed product's finish surfaces from damage during construction. Protect aluminum storefront system from damage from grinding and polishing compounds, plaster, lime, acid, cement, or other harmful contaminants.

3.3.2 Cleaning

Repair or replace damaged installed products. Clean installed products in accordance with manufacturer's instructions prior to owner's acceptance. Remove construction debris from project site and legally dispose of debris.

-- End of Section --

SECTION 08 44 00

INSULATED TRANSLUCENT FIBERGLASS WALL PANEL UNITS
04/08

PART 1 GENERAL

1.1 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G

Include plans, elevations, sections, and details, indicating dimensions, tolerances, profiles, anchorage, connections, fasteners, provisions for expansion and contraction, drainage, flashing, finish, glazing, and attachments to other work.

SD-03 Product Data

Submit manufacturer's data sheets on each product to be used, including:

Installation methods
Maintenance instructions

SD-04 Samples

For each finish product and glazing material specified, submit one sample, minimum 12 inches wide, representing actual product and color(s).

SD-06 Test Reports

Submit certified test reports from a qualified independent testing agency, indicating skylights and wall systems comply with specified requirements, based on testing of current products. Submit results from the following tests:

Flame spread and smoke development, ASTM E 84. UL 723 Submit UL card
Burn extent, ASTM D 635
Color change, ASTM D 2244 in accordance with ASTM D 1436
Abrasion & Erosion Resistance, ASTM D 4060
Impact stregth, exterior face sheets, UL 972
Accelerated aging, ASTM D 1037
Bond tensile strength, ASTM C 297 after aging by ASTM D 1037
Bond shear strength, ASTM D1002
Beam bending strength, ASTM E 72
Insulating U-factor; G, NFRC 100, ASTM C 236
Self-ignition, ASTM D 1929
Class A burning brand, ASTM E 108
Air infiltration, ASTM E 283

Water penetration, ASTM E 331
Uniform load deflection, ASTM E 72 and ASTM E 330
Concentrated and Impact, Fall Through Resistance ASTM E 661
Certification authorization under the NFRC PCP (Framing and Panel)

SD-11 Closeout Submittals

WARRANTY; G

Documentation; (LEED)

LEED documentation relative to local/regional materials credit, recycled content credit, and rapidly renewable materials content, in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.2 QUALITY ASSURANCE

1.2.1 Manufacturer Qualifications

Manufacturer to have a minimum ten years documented experience in the fabrication of wall systems of the type required for this project and be capable of providing field service representation during installation.

1.2.2 Panel System

Panel system must be listed by the International Code Council Evaluation Service (ICC-ES) which requires quality control inspections and fire, structural and water infiltration testing of sandwich panel systems by an approved agency.

1.2.3 Single Source

Obtain each type of metal wall and liner panels, clips, closures and other accessories from the standard products of the single source from a single manufacturer to operate as a complete system for the intended use.

1.2.4 Performance Requirements

The manufacturer shall be responsible for the configuration and fabrication of the complete panel system.

1.2.4.1 Panel System

Panel system shall have less than 0.01cfm/ft² air leakage by ASTM E 283 at 6.24 PSF 50 mph and no water penetration by ASTM E 331 at 20 psf before and after structural testing by ASTM E 330.

1.2.5 Installer Qualifications

Installer to have minimum five years documented experience in the work of this section who has specialized in the installation of work similar to that required for this project and is approved by the manufacturer.

1.2.6 Preinstallation Meeting

Convene a pre-installation meeting 2 weeks before start of installation of wall systems. Require attendance of parties directly affecting work of this section, including Contractor, Architect, installer, and manufacturer's

representative. Review requirements for preparation, installation, cleaning, protection, and coordination with other work.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name, manufacturer, and location of installation.

1.3.2 Storage

Store products above the floor and under cover in a clean, dry area until ready for installation.

1.3.3 Handling

Protect materials and finish from damage during handling and installation.

1.4 SEQUENCING

a. Ensure that locating templates and other information required for installation of products of this section are furnished to affected trades in time to prevent interruption of construction progress.

b. Ensure that products of this section are supplied to affected trades in time to prevent interruption of construction progress.

1.5 PROJECT CONDITIONS

Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's absolute limits.

1.6 WARRANTY

The warranty period is to be no less than 2 years from the government acceptance of work. The warranty is to be issued directly to the Government. The warranty is to provide that if within the warranty period the translucent panel system shows evidence of excess weathering due to deterioration of the wall panel system resulting from defective materials and correction of the defective workmanship is to be the responsibility of the translucent panel system manufacturer. Walking on panel shall NOT void warranty.

PART 2 PRODUCTS

2.1 PANEL COMPONENTS

2.1.1 Face Sheets

2.1.1.1 Translucent Faces

Manufactured from glass fiber reinforced thermoset resins, formulated specifically for architectural use.

a. Thermoplastic - Polycarbonate and acrylic faces are not acceptable.

b. Face sheets shall not deform, deflect or drip when subjected to fire or flame.

2.1.1.2 Face Sheets

Face sheets shall not delaminate when exposed to 200°F for 30 minutes per IBC or 300°F for 25 minutes.

2.1.1.3 Interior Face Sheets

a. Flamespread: Underwriters Laboratories (UL) listed, which requires periodic unannounced retesting, with flamespread rating no greater than 50 and smoke developed no greater than 350 when tested in accordance with UL 723/ASTM E 84.

b. Burn extent by ASTM D 635 shall be no greater than 1 inch.

2.1.1.4 Exterior Face Sheets

a. Color Stability - Full Thickness of the exterior face sheet shall not change color more than 3.0 CIE Units Delta E by ASTM 2244 after 5 years outdoor South Florida weathering at 5 degrees facing south, determined by the average of at least five white samples. Color stability shall be unaffected by abrasion or scratching. ACCELERATED AGING TESTING IS NOT CONSIDERED EQUAL.

b. Erosion Resistance: Exterior face shall have a permanent glass erosion barrier embedded beneath the surface to provide long-term resistance to reinforcing fiber exposure. Exterior face surface loss shall not exceed .7 mils and 40 mgs when tested in accordance with ASTM D 4060 employing CS17 abrasive wheels at a head load of 500 grams for 1000 cycles.

c. Strength: Exterior face sheet shall be uniform in strength, impenetrable by hand held pencil and repel an impact equal to 70 ft. lbs. without fracture or tear when impacted by a 3-1/4inch diameter, 5 lb. free-falling ball per UL 972.

2.1.1.5 Appearance

a. Exterior face sheets: Smooth, 0.070 inch thick and crystal in color.

b. Interior face sheets: Smooth, 0.045 inch thick and crystal in color.

c. Face sheets shall not vary more than +/- 10% in thickness and be uniform in color. Provide sample of face sheet color to Architect prior to bid for approval

2.1.2 Grid Core

2.1.2.1 Thermally Broken I-Beam Grid Core

Thermally broken I-beam grid core shall be of 6063-T6 or 6005-T5 alloy and temper with provisions for mechanical interlocking of muntin-mullion and

perimeter. Width of I- beam shall be no less than 7/16 inch. The I-beam grid shall be machined to tolerances of not greater than +/- .002 inch.

2.1.2.2 I-Beam Thermal Break

Minimum 1 inch, thermoset. Urethane poured and de-bridged is not acceptable.

2.1.3 Laminate Adhesive

1. Heat and pressure resin type adhesive engineered for structural sandwich panel use, with minimum 25-years field use. Adhesive shall pass testing requirements specified by the International Code Council Acceptance Criteria for Sandwich Panel Adhesives.

2. Minimum tensile strength of 750 psi when the panel assembly is tested by ASTM C 297 after two (2) exposures to six (6) cycles each of the aging conditions prescribed by ASTM D 1037.

3. Minimum shear strength of the panel adhesive by ASTM D 1002 after exposure to five (5) separate conditions:

a. 50% Relative Humidity at 68° F: 540 PSI
b. 182° F: 100 PSI
c. Accelerated Aging by ASTM D 1037 at room temperature: 800 PSI
d. Accelerated Aging by ASTM D 1037 at 182° F: 250 PSI

2.2 PANEL CONSTRUCTION

1. Provide sandwich panels of flat fiberglass reinforced translucent face sheets laminated to a grid core of mechanically interlocking thermally broken I-beams. The adhesive bonding line shall be straight, cover the entire width of the I-beam and have a neat, sharp edge.

a. Thickness: 4 inch.
b. Light transmission: 50%
c. Solar heat gain coefficient: .65
d. U- factor: 0.55

2. Panels shall deflect no more than 1.9" at 30 psf in 10' 0 inch span without a supporting frame by ASTM E 72.

3. Panels shall withstand 1200°F fire for minimum one (1) hour without collapse or exterior flaming.

4. Thermally broken panels:

a. Minimum Condensation Resistance Factor of 80 by AAMA 1503 measured on the bond line.

b. Minimum CRF of 90 at center of grid cell.

2.3 BATTENS AND PERIMETER CLOSURE SYSTEM

2.3.1 Closure System

Extruded aluminum 6063-T6 and 6063-T5 alloy and temper clamp-tite screw type closure system.

1. Thermally broken perimeter system shall have a urethane bridge.

2.3.2 Sealing Tape

Manufacturer's standard, pre-applied to closure system at the factory under controlled conditions.

2.3.3 Fasteners

300 series stainless steel screws for aluminum closures, excluding final fasteners to the building.

2.3.4 Finish

Exposed aluminum to be manufacturer's factory applied finish that meets the performance requirements of AAMA 2604.

1. Color to be custom color as selected by Architect.

2.4 OPERABLE GLAZING

2.4.1 General

Windows HC 2000 shall be designed specifically for inclusion in the translucent panel unit wall system and factory unitized to panels.

2.4.1 Performance

Windows shall pass or exceed requirements of AAMA/WDMA/CSA - 101/I.S.2/A440-05.

Prepare aluminum surfaces for painting in accordance with ASTM D 1730, Type B, Method 2 or 3.

2.4.2 Construction

All Window frame members shall be of heavy gauge 6060-T5 extruded aluminum with a thermal break. Frame sections shall be coped and joined by stainless steel screws at each corner. All joints exposed to the weather shall be sealed with an elastic compound. All openings shall be double weather-stripped using T-slot bulb gaskets to insure minimum air infiltration.

1. Operating sash shall be hollow extruded design, mitered and joined with heavy reinforcing corners.
2. Both operable and fixed lites shall be inside glazed with an expanded EPDM closed cell sponge gasket to the exterior, with aluminum glazing bead and a driven EPDM wedge gasket to the interior for rapid removal and replacement.

2.4.3 Hardware

1. Hinges on operating windows shall be 4 bar stainless steel with adjustable friction blocks.

2. Locking hardware shall be of cam lever design and shall be made of cast white bronze.

2.4.4 Glazing

Windows shall be glazed with 1", Low E, double-insulated glass and tinted film (Minimum SHGC of 0.235 and Maximum U-Value of 0.27).

2.4.5 Finish of Exposed Aluminum

Manufacturer's factory applied finish which meets the requirements of AAMA 2604. Color to be custom color as selected by Architect.

PART 3 EXECUTION

3.1 EXAMINATION

Examine substrates, supporting structure and installation conditions. Do not proceed with panel erection until unsatisfactory conditions have been corrected.

3.2 PREPARATION

3.2.1 Metal Protection

1. Where aluminum will contact dissimilar metals, protect against galvanic action by painting contact surfaces with primer or by applying sealant or tape recommended by manufacturer for this purpose.

2. Where aluminum will contact concrete or masonry, protect against corrosion by painting contact surfaces with bituminous paint or method recommended by manufacturer.

3. Where aluminum will contact pressure treated wood, separate dissimilar materials by methods recommended by manufacturer.

3.3 INSTALLATION

1. Install the panel system in accordance with the manufacturer's installation recommendations and approved shop drawings.

a. Anchor component parts securely in place by permanent mechanical attachment system.
b. Accommodate thermal and mechanical movements.
c. Set perimeter framing in a full bed of sealant compound, or with joint fillers or gaskets to provide weather-tight construction.

2. Install joint sealants at perimeter joints and within the panel system in accordance with manufacturer's installation instructions.

3.4 CLEANING

Clean the panel system inside and outside, immediately after installation, according to manufacturer's written recommendations. Collect and place scrap/waste materials in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on-site; transport demolished materials from government property and legally dispose of them.

-- End of Section --

SECTION 08 51 13.00 40

ALUMINUM WINDOWS
04/07

PART 1 GENERAL

1.1 REFERENCES

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

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(2003) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA WSG.1	(1995) Window Selection Guide

ASTM INTERNATIONAL (ASTM)

ASTM A 1011/A 1011M	(2006b) Standard Specification for Steel, Sheet, and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
ASTM A 36/A 36M	(2005) Standard Specification for Carbon Structural Steel
ASTM A 501	(2007) Standard Specification for Hot-Formed Welded and Seamless Carbon Steel Structural Tubing
ASTM B 117	(2007) Standing Practice for Operating Salt Spray (Fog) Apparatus
ASTM B 221	(2006) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B 244	(1997; R 2002) Standard Method for Measurement of Thickness of Anodic Coatings on Aluminum and of Other Nonconductive Coatings on Nonmagnetic Basis Metals with Eddy-Current Instruments
ASTM C 920	(2005) Standard Specification for Elastomeric Joint Sealants
ASTM D 1593	(1999) Standard Specification for Non-rigid Vinyl Chloride Plastic Film and Sheeting

NATIONAL WOOD WINDOW AND DOOR ASSOCIATION (NWWDA)

AAMA/NWWDA 101/I.S.2	(1997) Voluntary Guide Specifications for Aluminum, Poly(Vinyl Chloride)(PVC) and Wood Windows and Glass Doors

STEEL WINDOW INSTITUTE (SWI)

SWI SWS	(2005 Steel Window Specifications

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Paint 101	(1982) Paint Specification No. 101 Aluminum Alkyd Paint Leafing (Type I) and Non-Leafing (Type II)
SSPC Paint 12	(1982; E 2000) Paint Specification No. 12 Cold-Applied Asphalt Mastic (Extra Thick Film)

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Manufacturer's catalog data shall be submitted for the following items, including operating hardware, locking assemblies and strikes, pole and sash operators and weatherstripping.

Fixed Windows; G

1.3 DELIVERY, HANDLING, AND STORAGE

Windows, mullions, accessories, and trim shall be delivered in the manufacturer's unbroken containers and shall be handled carefully at all times to prevent damage.

Windows shall be stored on edge above ground and protected from the weather in accordance with the manufacturer's directions.

1.4 FIELD MEASUREMENTS

Field measurements shall be taken prior to preparation of the drawings and fabrication.

1.5 PERFORMANCE REQUIREMENTS

1.5.1 Wind Loading Design Pressure

Window components, including mullions, hardware, and anchors, shall be designed to withstand a wind-loading design pressure of at least 50 pounds per square foot (psf).

1.5.2 Tests

Windows proposed for use shall be tested in accordance with AAMA/NWWDA 101/I.S.2 for the particular type and quality window specified.

Tests shall be performed by a nationally recognized independent testing laboratory equipped and capable of performing the required tests. Results of the tests shall be submitted as certified laboratory reports required herein.

Minimum design load for a uniform-load structural test shall be 50 psf.

Projected windows shall be tested in accordance with the applicable portions of the AAMA WSG.1 for air infiltration, water resistance, uniform-load deflection, and uniform-load structural test.

PART 2 PRODUCTS

2.1 FIXED WINDOWS

Windows shall be high-performance classification projected aluminum sash complete with fins, closures, accessories, fittings, and trim, meeting or exceeding AAMA/NWWDA 101/I.S.2 for Type P-A2-HP and the requirements specified.

Windows, mullions, hardware, and anchors shall be designed to withstand the wind loading specified.

Outswinging vents shall have not less than a 6-footclearance above the finished grade.

2.1.1 Materials

Frames, ventilators, mullions, mullion covers, glazing beads, and fittings shall be extruded aluminum shapes fabricated from aluminum conforming to ASTM B 221, 6063-T5 alloy, AAMA/NWWDA 101/I.S.2. Aluminum sheet and plate shall be 5005 alloy, temper as required.

Joint sealing compound shall be a gun grade, nonsag, single-component butyl or acrylic sealant conforming to ASTM C 920.

Weatherstripping shall be extruded flexible polyvinylchloride, weatherstripping grade, conforming to ASTM D 1593, Type I, with a tensile strength of at least 2,200 pounds per square inch (psi) and a tear strength of not less than 275 pounds per inch.

2.1.2 Construction

Windows shall be unequal-leg type, double-contact weathering, with 5/8-inch anchorage and a combined depth of frame and ventilator of not less than 1-3/4 inches. Frames shall be not less than 1-1/2 inches deep, and the ventilator shall be not less than 1-5/8 inches deep. Minimum web thickness for solid sections shall be 1/8 inch. Tubular sections shall have a minimum web thickness of 3/32 inch, and flanges shall be not less than 1/8 inch thick.

Allowance for expansion between component parts shall be provided for window assemblies.

Integral drip holes or weepholes shall be provided for exterior in-sill sections at not more than 2 feet on center.

Tubular sections shall be used in horizontal meeting rails longer than 48-7/8 inches.

Corners of window frame assemblies shall be coped, double mortised-and-tenoned, and riveted, or shall be mitered and welded.

Welds shall be continuous across the web member and up the abutting flanges on the unexposed surface. Welds shall be dressed smooth and flush on exposed and contact surfaces and shall exhibit no discoloration, pitting, or surface defects.

Corner joints shall be accurately fitted, flush, watertight hairline joints not exceeding 1/64 inch in width. Joint-sealing compound shall be applied to the unexposed surface of all mortise and tenon joints.

2.1.3 Glazing Provisions

Windows shall be designed for inside glazing, using snap-on, screwless, extruded or roll-formed aluminum, or AISI series-300 corrosion-resistant steel beads. Fixed glazing stops and stop beads shall be 3/4 inch high by 1/16 inch thick. Width of the stop bead shall be as required for the glass thickness.

2.1.4 Aluminum Sills

Sills shall be the profiles and dimensions indicated, the same alloy and finish as windows, at least 1/8 inch thick, and furnished the full width of the window opening.

Sills shall be securely anchored in place with concealed anchors not more than 18 inches on center.

2.2 Window Materials

Window Frames and sash members, mullions, mullion covers, screen frames, and glazing beads shall be extruded aluminum shapes fabricated from aluminum conforming to ASTM B 221, 6063-T5 aluminum alloy.

Joint-sealing compound shall be a gun grade, nonsag, single-component butyl or acrylic sealant conforming to ASTM C 920.

2.2.1 Subframes

Subframe members shall be formed from steel sheets conforming to ASTM A 1011/A 1011M, Grade 36, steel shapes conforming to ASTM A 36/A 36M, or steel tubing conforming to ASTM A 501.

2.2.2 Window Construction

Frames, sash, and head members shall have a minimum thickness of 0.062 inch. Sills shall have a minimum thickness of 0.093 inch, fabricated with an integral stiffening rib, and have weep holes not more than 2 feet on center.

Horizontal sash members, muntins, and meeting rails shall be fabricated of extruded tubular-aluminum sections. Minimum depth of horizontal sash members and meeting rails shall be 1-1/16 inches. Sash lift shall be the

full width of the window, extruded as an integral part of the sash.

Frames shall have a minimum depth of 3 inches and shall be provided with integral stiffening ribs, fins, drip at head, and weatherstripping grooves.

Frame and sash members shall be mechanically joined or welded to form rigid flush watertight joints. Joints shall be hairline not exceeding 1/64 inch and shall be sealed with factory-applied joint compound where required to provide a watertight joint.

Expansion between component parts of the window shall be provided to preclude absorption of thermal stresses in each unit.

2.3 FINISH

Aluminum windows, mullions, glazing beads, trim, and accessory fittings shall be cleaned, and receive an Architectural Class II natural anodic coating (designation AA-M-12C22A31) in accordance with AA DAF-45. Anodic coating shall be not less than 0.4 mil.

Thickness of the anodic coating shall be tested in accordance with ASTM B 244.

Anodic coating shall be continuous and, without being lacquered, shall be capable of withstanding 500 hours of salt-spray exposure for Class A anodic coatings and 250 hours of salt-spray exposure for Class B anodic coatings when tested in accordance with ASTM B 117.

PART 3 EXECUTION

3.1 INSTALLATION

Windows shall be set plumb, level to a tolerance of not more than 1/16 inch in 10 feet and in alignment without frame distortion and securely anchored in place as indicated, in accordance with the manufacturer's printed instructions and the approved drawings.

Fasteners shall be concealed except for specifically indicated mullion covers, window-operating hardware, screen attachment hardware, and similar surface-applied trim.

Steel work shall be drilled and tapped for the attaching window units, trim, and accessories. Where window units are set in prepared masonry openings, anchorage items shall be placed during wall construction. Anchors and fasteners shall be welded or bolted securely to the frame and shall be built-in, anchored, or bolted to the building construction with sufficient anchors to hold each window unit firmly in place. Anchors shall be not more than 18 inches on center at heads, jambs, and sills.

Fasteners, clips, fittings, aluminum trim, closures, and shapes shall be provided as indicated and as required to provide a complete installation.

Joints shall be sealed between sash units, aluminum sills, mullions, and covers and similar metal-to-metal contact surfaces with sealant or tape as recommended and furnished by the window manufacturer. Installations shall be weathertight.

Joint sealing and calking between metal and masonry is specified in Section 07 92 00 JOINT SEALANTS.

3.2 DISSIMILAR MATERIALS

Aluminum shall be kept from direct contact with steel or other dissimilar materials by painting, nonabsorptive tape, gasket, or other approved system as recommended by the manufacturer and as specified.

Aluminum surfaces in contact with steel shall be given one coat of zinc-chromate primer, applied to a dry-film thickness of not less than 1.5 mils, or one coat of a suitable nonhardening joint compound capable of excluding moisture from the joint during prolonged service.

Steel surfaces in contact with aluminum shall be given one coat of zinc-chromate paint, applied to a dry-coat thickness of 1.5 mils, and two or more coats of aluminum paint conforming to SSPC Paint 101, aluminum alkyd, Type II, applied to a dry-film thickness of 1.5 mils for each coat and a total dry-film thickness of 3.0 mils.

Corrosion-resistant, aluminized, or hot-dip galvanized steel placed in contact with aluminum need not be painted.

Aluminum surfaces placed in contact with wood, concrete, or masonry construction shall be given one coat of bituminous paint conforming to SSPC Paint 12, applied to a thickness of at least 1/16 inch.

3.3 ADJUSTMENT AFTER INSTALLATION

After the sash is erected and glazed, ventilators shall be lubricated and adjusted for smooth weathertight operation. Guides shall be waxed or lubricated and balances shall be adjusted for the proper tension.

Weatherstripping shall make weathertight contact around the entire weatherstripped area when ventilators are closed and locked. Weatherstripping shall not cause the sash to bind or prevent closing and locking the ventilator.

3.4 FEELER-GAGE FIELD TEST

Windows shall be tested after installation, glazing, and adjustment for metal-to-metal contact between ventilators and frames by feeler-gage tests in accordance with SWI SWS.

Windows failing to meet the requirements of the feeler-gage tests shall be corrected as required to meet the tests. Such windows shall be retested and, if they fail the tests again, shall be removed and replaced.

3.5 CLEANING AFTER INSTALLATION

Interior and exterior metal surfaces of windows shall be cleaned of mortar, plaster, paint spattering or spots, and other foreign matter, and washed with soap and water, brushed with a fiber brush, and thoroughly rinsed with clear water. Acid solutions, steel wool, or other harsh abrasives shall not be used.

Stained or discolored windows shall be cleaned in accordance with the window manufacturer's recommendations. Windows that cannot be satisfactorily cleaned and windows with abraded, stained, or defective surface finish that cannot be satisfactorily repaired shall be replaced.

-- End of Section --

SECTION 08 62 00

TUBULAR DAYLIGHTING DEVICES
08/09

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 1003	(2007e1) Haze and Luminous Transmittance of Transparent Plastics

1.2 SYSTEM DESCRIPTION

Furnish and install commercially available tubular daylighting devices which satisfy all requirements contained in this section and have been verified by load testing and independent design analyses (if required) to meet specified design requirements. Provide environmentally preferable products and work practices, applicable to daylight devices, considering raw materials acquisition, production, manufacturing, packaging, distribution, reuse, operation, maintenance, and/or disposal of the products or services used in the daylighting devices. The daylighting devices system shall be UV-stabilized, shatter proof and energy efficient. The plastics used in the manufacture of the daylighting devices shall be light transmitting plastics for daylighting applications.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Shop Drawings; G

SD-03 Product Data

Tubular Daylighting Devices; G
Warranty

SD-06 Test Reports

Test Reports

SD-07 Certificates

Daylighting Devices
Qualifications

1.4 QUALITY ASSURANCE

a. Provide documentation of Qualifications for the following: The manufacturer shall be a company specializing in the manufacture of the specified products with a minimum of 5 years documented experience. The installer shall have documented experience of 5 years minimum performing the work specified.

1.5 DELIVERY, STORAGE, AND HANDLING

System modules shall be factory assembled to the greatest extent possible. Panels shall be shipped to the jobsite in rugged shipping units and shall be ready for erection. All daylight devices shall have conspicuous decals affixed warning individuals against sitting or stepping on the units. Skylight panels shall be stored on the long edge, several inches above the ground, blocked and under cover to prevent warping. Deliver unit daylight devices in manufacturer's original containers, dry, undamaged, with seals and labels intact. All products shall be delivered, stored and protected in accordance with manufacturer's recommendations.

1.6 WARRANTY

Provide to the Government the manufacturer's complete warranty for materials, workmanship, and installation. The warranty shall be for 10 years from the time of project completion and shall no be prorated. The warranty shall guarantee, but shall not be limited to, the following:

a. Light transmission and color of the panels shall not change after exposure to heat of 300 degrees F for 25 minutes.

b. There is no delamination of the panel affecting appearance, performance, weatherability or structural integrity of the panels or the completed system.

c. There is no fiberbloom on the panel face.

d. Change in light transmission of no more than 6 percent in accordance with ASTM D 1003, and in color (yellowing index) no more than 10 points in comparison to the original specified value over a 10 year period.

PART 2 PRODUCTS

2.1 TUBULAR DAYLIGHTING DEVICES

a. Tubular Daylighting Devices General: Transparent roof-mounted skylight dome and self-flashing curb, reflective tube, and ceiling level diffuser assembly, transferring sunlight to interior spaces; complying with ICC AC-16.

b. 14 Inch (350 mm) Daylighting System:

1. Roof Dome Assembly: Transparent, UV and impact resistant dome with flashing base supporting dome and top of tube.

a. Outer Dome Glazing: Type DA, 0.125 inch (3.25 mm) minimum thickness impact resistant injection molded acrylic classified as CC2 material; UV inhibiting (100 percent UV C, 100 percent UV B and 98.5 percent UV C), impact modified acrylic blend.

b. Variable prism optic molded into outer dome to capture

low angle sunlight and limit high angle sunlight.

c. Shock Inner Dome Glazing: Type DI, 0.115 inch (2.9 mm) minimum thickness classified as CC1 material. High impact resistant injection molded acrylic required for high velocity wind zones.

d. Aluminum sheet, thickness 0.015 inch (0.4 mm) with Spectralight Infinity. Positioned in dome to capture low angle sunlight.

2. Reflective Extension Tube: Aluminum sheet, thickness 0.015 inch (0.4 mm).

a. Interior Finish: High reflactance specular finish on exposed reflective surface. Visible spectrum (400 nm to 760 nm) greater than 99 percent. Total solar spectrum (400 nm to 2500 nm) less than 80.2 percent.

3. Accessories:

a. Loca Dimmer Control utilizing butterfly baffle design of reflective material to minimize shadowing when in use. Provided with dimmer switch and cable.

1. Daylight Dimmer: Type D Electro-mechanically actuated daylight valve; for universal input voltage, series Type T02: circuited, 4 conductor, 22 gauge cable; providing daylight output between 2 and 100 percent.

2. Switch: Type SW, Manufacturer-specific low voltage DC DP/DT switch (white) required to operate Daylight Dimmer. Note: A maximum of 10 units can be connected to one switch.

3. Cable: Type CA, Two conductor, 22 gauge, low voltage cable (500 ft.) for multiple unit DC connections.

b. Wire Suspension Kit: Type E, Use the wire suspension kit when additional bracing to the structure is required.

2.2 ACCESSORIES

a. Fasteners: Same material as metals being fastened, non-magnetic steel, non-corrosive metal of type recommended by manufacturer, or injection molded nylon.

b. Suspension Wire: Steel, annealed, galvanized finish, size and type for application and ceiling system requirement.

c. Sealant: Polyurethane or copolymer based elastomeric sealant as provided or recommended by manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

Field verify all submitted opening sizes, dimensions and tolerances; preparation of openings shall include isolating dissimilar materials from aluminum system to avoid damage by electrolysis. The installer shall examine area of installation to verify readiness of site conditions and to notify the Contractor about any defects requiring correction. Verify when structural support is ready to receive all specified work and to convene a pre-installation conference, if approved by the Contracting Officer,

including the Contractor, skylight installer and all parties directly affecting and affected by the specified work. Do not commence work until conditions are satisfactory.

3.2 ERECTION

Erect translucent skylight system in accordance with the approved shop drawings supplied by the manufacturer. Submit drawings showing fabrication details, materials, dimensions, installation methods, anchors, and relationship to adjacent construction. Fastening and sealing shall be in accordance with the manufacturer's shop drawings. All panel protection shall be removed and, after other trades have completed work on adjacent materials, panel installation shall be carefully inspected and adjusted, if necessary, to ensure proper installation and weather-tight conditions. All staging, lifts and hoists required for the complete installation and field measuring shall be provided. System shall be installed clean of dirt, debris or staining and thoroughly examined for removal of all protective material prior to final inspection of the designated work area. Snow rakes shall not be used on roof windows/daylight devices.

-- End of Section --

SECTION 08 71 00

DOOR HARDWARE
07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM E 283	(1991; R 1999) Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

BUILDERS HARDWARE MANUFACTURERS ASSOCIATION (BHMA)

BHMA A156.1	(2000) Butts and Hinges
BHMA A156.3	(2001) Exit Devices
BHMA A156.4	(2000) Door Controls - Closers
BHMA A156.6	(2005) Architectural Door Trim
BHMA A156.7	(2003) Template Hinge Dimensions
BHMA A156.15	(2001) Closer Holder Release Device
BHMA A156.16	(2002) Auxiliary Hardware
BHMA A156.18	(2003) Materials and Finishes
BHMA A156.21	(2001) Thresholds
BHMA A156.22	(2003) Door Gasketing Systems

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 80	(2001) Standard for Fire Doors and Fire Windows
NFPA 101	(2003) Life Safety Code

STEEL DOOR INSTITUTE (SDI/DOOR)

ANSI A250.8	(1998) SDI-100 Recommended Specifications for Standard Steel Doors and Frames

UNDERWRITERS LABORATORIES (UL)

UL Bld Mat Dir	(2003) Building Materials Directory

1.2 SUBMITTALS

Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Hardware schedule;G
Keying system; G

SD-03 Product Data

Hardware items

SD-08 Manufacturer's Instructions

Installation

SD-10 Operation and Maintenance Data

Hardware Schedule; G items, Data Package 1

Submit data package in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Key Bitting; G

1.3 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)	BHMA Finish Designation

1.4 KEY BITTING CHART REQUIREMENTS

Submit key bitting charts to the Contracting Officer prior to completion of the work. Include:

a. Complete listing of all keys (AA1, AA2, etc.).

b. Complete listing of all key cuts (AA1-123456, AA2-123458).

c. Tabulation showing which key fits which door.

d. Copy of floor plan showing doors and door numbers.

e. Listing of 20 percent more key cuts than are presently required in each master system.

1.5 QUALITY ASSURANCE

1.5.1 Hardware Manufacturers and Modifications

Provide, as far as feasible, locks, hinges, and closers of one lock, hinge, or closer manufacturer's make. Modify hardware as necessary to provide features indicated or specified.

1.6 DELIVERY, STORAGE, AND HANDLING

Deliver hardware in original individual containers, complete with necessary appurtenances including fasteners and instructions. Mark each individual container with item number as shown in hardware schedule.

PART 2 PRODUCTS

2.1 TEMPLATE HARDWARE

Provide hardware to be applied to metal manufactured to template. Promptly furnish template information or templates to door and frame manufacturers. Conform to BHMA A156.7 for template hinges. Coordinate hardware items to prevent interference with other hardware.

2.2 HARDWARE FOR FIRE DOORS AND EXIT DOORS

Provide all hardware necessary to meet the requirements of NFPA 80 for fire doors and NFPA 101 for exit doors, as well as to other requirements indicated, even if such hardware is not specifically mentioned under paragraph entitled "Hardware Schedule." Provide the label of Underwriters Laboratories, Inc. for such hardware listed in UL Bld Mat Dir or labeled and listed by another testing laboratory acceptable to the Contracting Officer.

2.3 HARDWARE ITEMS

Clearly and permanently mark with the manufacturer's name or trademark, hinges, locks, latches, exit devices, bolts and closers where the identifying mark will be visible after the item is installed. For closers with covers, the name or trademark may be beneath the cover.

2.3.1 Hinges

BHMA A156.1, 4-1/2 by 4-1/2 inch unless otherwise indicated. Construct loose pin hinges for exterior doors and reverse-bevel interior doors so that pins will be nonremovable when door is closed. Other antifriction bearing hinges may be provided in lieu of ball-bearing hinges.

2.3.2 Locks and Latches

2.3.3 Exit Devices

BHMA A156.3, Grade 1. Provide adjustable strikes for rim type devices. Provide adjustable strikes for pairs of doors. Provide touch bars in lieu of conventional crossbars and arms.

2.3.4 Cylinders and Cores

Provide cylinders and cores for new locks, including locks provided under other sections of this specification. Provide cylinders and cores with s

even pin tumblers. Provide cylinders from products of one manufacturer, and provide cores from the products of one manufacturer. Rim cylinders, mortise cylinders, and knobs of bored locksets have interchangeable cores which are removable by special control keys. Cores shall be, Small Format Interchangeable Core (S.F.I.C.)to be compatible with 7 pin best cores.

2.3.5 Lock Trim

Cast, forged, or heavy wrought construction and commercial plain design.

2.3.5.1 Lever Handles

Provide lever handles in lieu of knobs. Conform to the minimum requirements of BHMA A156.13 for mortise locks of lever handles for exit devices.

2.3.6 Keys

Provide control construction core keys for all locks.

2.3.7 Door Bolts

BHMA A156.16. Provide dustproof strikes for bottom bolts, except for doors having metal thresholds.

2.3.8 Closers

BHMA A156.4, Series C02000, Grade 1, with PT 4C. Provide with brackets, arms, mounting devices, fasteners, full size covers, and other features necessary for the particular application. Size closers in accordance with manufacturer's recommendations, or provide multi-size closers, Sizes 1 through 6, and list sizes in the Hardware Schedule. Provide manufacturer's 10 year warranty.

2.3.9 Closer Holder-Release Devices

BHMA A156.15.

2.3.10 Door Protection Plates

BHMA A156.6.

2.3.10.1 Sizes of Kick Plates

2 inch less than door width for single doors; less than door width for pairs of doors.

2.3.11 Door Stops and Silencers

BHMA A156.16. Silencers Type L03011. Provide three silencers for each single door, two for each pair.

2.3.12 Thresholds

BHMA A156.21. Use J35100, with vinyl or silicone rubber insert in face of stop, for exterior doors opening out, unless specified otherwise.

2.3.13 Door Gasketing Systems

BHMA A156.22. Provide the type and function designation where specified in

paragraph entitled "Hardware Schedule". Provide a set to include head and jamb seals, sweep strips, and, for pairs of doors, astragals. Air leakage of weather stripped doors not to exceed 1.25 cubic feet per minute of air per square foot of door area when tested in accordance with ASTM E 283.

2.4 FASTENERS

Provide fasteners of proper type, quality, size, quantity, and finish with hardware. Provide stainless steel or nonferrous metal fasteners that are exposed to weather. Provide fasteners of type necessary to accomplish a permanent installation.

2.5 FINISHES

BHMA A156.18. Provide hardware in BHMA 630 finish (satin stainless steel), unless specified otherwise.

PART 3 EXECUTION

3.1 INSTALLATION

Install hardware in accordance with manufacturers' printed installation instructions. Fasten hardware to wood surfaces with full-threaded wood screws or sheet metal screws. Provide machine screws set in expansion shields for fastening hardware to solid concrete and masonry surfaces. Provide toggle bolts where required for fastening to hollow core construction. Provide through bolts where necessary for satisfactory installation.

3.1.1 Weather Stripping Installation

Handle and install weather stripping to prevent damage. Provide full contact, weather-tight seals. Operate doors without binding.

3.1.1.1 Stop-Applied Weather Stripping

Fasten in place with color-matched sheet metal screws not more than 9 inch on center after doors and frames have been finish painted.

3.1.1.2 Interlocking Type Weather Stripping

Provide interlocking, self-adjusting type on heads and jambs and flexible hook type at sills. Nail weather stripping to door one inch on center and to heads and jambs at 4 inch on center

3.1.1.3 Spring Tension Type Weather Stripping

Provide spring tension type on heads and jambs. Provide bronze nails with bronze, stainless steel nails with stainless steel. Space nails not more than 1-1/2 inch on center.

3.1.2 Lightproofing and Soundproofing Installation

Install as specified for stop-applied weather stripping.

3.1.3 Threshold Installation

Extend thresholds the full width of the opening and notch end for jamb stops. Set thresholds in a full bed of sealant and anchor to floor with

cadmium-plated, countersunk, steel screws.

3.2 FIRE DOORS AND EXIT DOORS

Install hardware in accordance with NFPA 80 for fire doors, NFPA 101 for exit doors.

3.3 HARDWARE LOCATIONS

ANSI A250.8, unless indicated or specified otherwise.

a. Kick and Armor Plates: Push side of single-acting doors. Both sides of double-acting doors.

3.4 FIELD QUALITY CONTROL

After installation, protect hardware from paint, stains, blemishes, and other damage until acceptance of work. Submit notice of testing 15 days before scheduled, so that testing can be witnessed by the Contracting Officer. Adjust hinges, locks, latches, bolts, holders, closers, and other items to operate properly. Demonstrate that permanent keys operate respective locks, and give keys to the Contracting Officer. Correct, repair, and finish, as directed, errors in cutting and fitting and damage to adjoining work.

-- End of Section --

SECTION 08 81 00

GLAZING
02/09

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI Z97.1	(2004) Safety Glazing Materials Used in Buildings

ASTM INTERNATIONAL (ASTM)

ASTM C 1036	(2006) Standard Specification for Flat Glass
ASTM C 1172	(2003) Standard Specification for Laminated Architectural Flat Glass
ASTM C 1184	(2005) Standard Specification for Structural Silicone Sealants
ASTM C 509	(2006) Elastomeric Cellular Preformed Gasket and Sealing Material
ASTM C 669	(2000) Glazing Compounds for Back Bedding and Face Glazing of Metal Sash
ASTM C 864	(2005) Dense Elastomeric Compression Seal Gaskets, Setting Blocks, and Spacers
ASTM C 920	(2008) Standard Specification for Elastomeric Joint Sealants
ASTM D 2287	(1996; R 2001) Nonrigid Vinyl Chloride Polymer and Copolymer Molding and Extrusion Compounds
ASTM D 395	(2003; R 2008) Standard Test Methods for Rubber Property - Compression Set
ASTM E 1300	(2007e1) Determining Load Resistance of Glass in Buildings
ASTM E 773	(2001) Accelerated Weathering of Sealed Insulating Glass Units
ASTM E 774	(1997) Classification of the Durability of Sealed Insulating Glass Units

GLASS ASSOCIATION OF NORTH AMERICA (GANA)

GANA Glazing Manual	(2004) Glazing Manual
GANA Sealant Manual	(1990) Sealant Manual

INSULATING GLASS MANUFACTURERS ALLIANCE (IGMA)

IGMA TB-3001	(1990) Guidelines for Sloped Glazing
IGMA TM-3000	(1997) Glazing Guidelines for Sealed Insulating Glass Units
IGMA TR-1200	(1983) Commercial Insulating Glass Dimensional Tolerances

NATIONAL FENESTRATION RATING COUNCIL (NFRC)

NFRC 100	(2004) Procedure for Determining Fenestration Product U-Factors
NFRC 200	(2004) Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Transmittance at Normal Incidence

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

Energy Star	(1992; R 2006) Energy Star Energy Efficiency Labeling System

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-378	(Basic; Notice 1) Putty Linseed Oil Type, (for Wood-Sash-Glazing

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1201	Safety Standard for Architectural Glazing Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Insulating Glass; G

Documentation for Energy Star qualifications.

Glazing Accessories

Manufacturer's descriptive product data, handling and storage recommendations, installation instructions, and cleaning instructions.

SD-04 Samples

Insulating Glass; G
Sealant

Two 8 x 10 inch samples of each of the following: low "E" glass and insulating glass units.

Three samples of each indicated material. Samples of plastic sheets shall be minimum 5 by 7 inches.

SD-07 Certificates

Insulating Glass

Certificates stating that the glass meets the specified requirements. Labels or manufacturers marking affixed to the glass will be accepted in lieu of certificates.

SD-08 Manufacturer's Instructions

Setting and sealing materials
Glass setting

Submit glass manufacturer's recommendations for setting and sealing materials and for installation of each type of glazing material specified.

1.3 SYSTEM DESCRIPTION

Glazing systems shall be fabricated and installed watertight and airtight to withstand thermal movement and wind loading without glass breakage, gasket failure, deterioration of glazing accessories, and defects in the work. Glazed panels shall comply with the safety standards, as indicated in accordance with ANSI Z97.1. Glazed panels shall comply with indicated wind/snow loading in accordance with ASTM E 1300.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver products to the site in unopened containers, labeled plainly with manufacturers' names and brands. Store glass and setting materials in safe, enclosed dry locations and do not unpack until needed for installation. Handle and install materials in a manner that will protect them from damage.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not start glazing work until the outdoor temperature is above 40 degrees Fand rising, unless procedures recommended by the glass manufacturer and approved by the Contracting Officer are made to warm the glass and rabbet surfaces. Provide ventilation to prevent condensation of moisture on glazing work during installation. Do not perform glazing work during damp or rainy weather.

PART 2 PRODUCTS

2.1 GLASS

ASTM C 1036, unless specified otherwise. In doors and sidelights, provide

safety glazing material conforming to 16 CFR 1201.

2.1.1 Clear Glass

For interior glazing (i.e., pass and observation windows), 1/4 inch thick glass should be used.

Type I, Class 1 (clear), Quality q5 (B). Provide for glazing openings not indicated or specified otherwise. Use double-strength sheet glass or 1/8 inch float glass for openings up to and including 15 square feet, 3/16 inch for glazing openings over 15 square feet but not over 30 square feet, and 1/4 inch for glazing openings over 30 square feet but not over 45 square feet.

2.1.2 Laminated Glass

ASTM C 1172, Kind LA fabricated from two nominal 1/8 inch pieces of Type I, Class 1, Quality q3, flat annealed transparent glass conforming to ASTM C 1036. Flat glass shall be laminated together with a minimum of 0.030 inch thick, clear polyvinyl butyral interlayer. The total thickness shall be nominally 1/4 inch. Fabricated from two pieces of Type I, Class 1, Quality q3 glass laminated together with a clear 0.015 inch thick polyvinyl butyral interlayer or alternatives such as resin laminates, conforming to requirements of 16 CFR 1201 and ASTM C 1172. Color shall be clear.

2.1.3 Mirrors

2.1.3.1 Glass Mirrors

Glass for mirrors shall be Type I transparent flat type, Class 1-clear, Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036. Glass shall be coated on one surface with silver coating, copper protective coating, and mirror backing paint. Silver coating shall be highly adhesive pure silver coating of a thickness which shall provide reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, and shall be free of pinholes or other defects. Copper protective coating shall be pure bright reflective copper, homogeneous without sludge, pinholes or other defects, and shall be of proper thickness to prevent "adhesion pull" by mirror backing paint. Mirror backing paint shall consist of two coats of special scratch and abrasion-resistant paint, and shall be baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.

2.2 INSULATING GLASS UNITS

Two panes of glass separated by a dehydrated 1/2 inch airspace, filled with argon gas, and hermetically sealed. Glazed systems (including frames) shall be Energy Star labeled products as appropriate to climate zone and as applicable to window type, with a whole-window Solar Heat Gain Coefficient (SHGC) maximum of .235 determined according to NFRC 200 procedures. Glazed panels and curtain walls shall have a U-factor maximum of .27 Btu per square foot x hr x degree F in accordance with NFRC 100. Glazing shall meet or exceed a luminous efficacy of 1.0. Dimensional tolerances shall be as specified in IGMA TR-1200. The units shall meet CBA Grade requirement when tested in accordance with ASTM E 773 and ASTM E 774, Class A. Spacer shall be black, roll-formed, steel-reinforced butyl rubber with bent or tightly welded or keyed and sealed joints to completely seal the spacer periphery and eliminate moisture and hydrocarbon vapor transmission into airspace through the corners. Primary seal shall be compressed polyisobutylene and

the secondary seal shall be a specially formulated silicone. Glass shall be coated to provide a maximum of 25% visual light transmittance, coating color to be selected by Contracting Officer from manufacturer's full range.

2.2.1 Buildings

Two panes of glass separated by a dehydrated airspace, filled with argon gas and hermetically sealed.

Insulated glass units shall have a Solar Heat Gain Coefficient (SHGC) maximum of .235 and a U-factor maximum of .27 Btu per square foot x hr x degree F.

The inner light shall be ASTM C 1172, clear annealed flat glass Type I, Class I, Quality q3. The outer light shall be ASTM C 1036, Type I, Class 2 (tinted heat absorbing). Inner light may be coated or treated to achieve performance criteria.

2.3 SETTING AND SEALING MATERIALS

Provide as specified in the GANA Glazing Manual, IGMA TM-3000, IGMA TB-3001, and manufacturer's recommendations, unless specified otherwise herein. Do not use metal sash putty, nonskinning compounds, nonresilient preformed sealers, or impregnated preformed gaskets. Materials exposed to view and unpainted shall be gray or neutral color.

2.3.1 Putty and Glazing Compound

Glazing compound shall conform to ASTM C 669 for face-glazing metal sash. Putty shall be linseed oil type conforming to CID A-A-378for face-glazing primed wood sash. Putty and glazing compounds shall not be used with insulating glass or laminated glass.

2.3.2 Glazing Compound

ASTM C 669. Use for face glazing metal sash. Do not use with insulating glass units or laminated glass.

2.3.3 Sealants

Provide elastomeric and structural sealants.

2.3.3.1 Elastomeric Sealant

ASTM C 920, Type S, Grade NS, Class 12.5, Use G. Use for channel or stop glazing metal sash. Sealant shall be chemically compatible with setting blocks, edge blocks, and sealing tapes, with sealants used in manufacture of insulating glass units. Color of sealant shall be white.

2.3.3.2 Structural Sealant

ASTM C 1184, Type S.

2.3.4 Joint Backer

Joint backer shall have a diameter size at least 25 percent larger than joint width; type and material as recommended in writing by glass and sealant manufacturer.

2.3.5 Preformed Channels

Neoprene, vinyl, or rubber, as recommended by the glass manufacturer for the particular condition.

2.3.6 Sealing Tapes

Preformed, semisolid, PVC-based material of proper size and compressibility for the particular condition, complying with ASTM D 2287. Use only where glazing rabbet is designed for tape and tape is recommended by the glass or sealant manufacturer. Provide spacer shims for use with compressible tapes. Tapes shall be chemically compatible with the product being set.

2.3.7 Setting Blocks and Edge Blocks

Closed-cell neoprene setting blocks shall be dense extruded type conforming to ASTM C 509 and ASTM D 395, Method B, Shore A durometer between 70 and 90. Edge blocking shall be Shore A durometer of 50 (+ or - 5). Silicone setting blocks shall be required when blocks are in contact with silicone sealant. Profiles, lengths and locations shall be as required and recommended in writing by glass manufacturer. Block color shall be black.

2.3.8 Glazing Gaskets

Glazing gaskets shall be extruded with continuous integral locking projection designed to engage into metal glass holding members to provide a watertight seal during dynamic loading, building movements and thermal movements. Glazing gaskets for a single glazed opening shall be continuous one-piece units with factory-fabricated injection-molded corners free of flashing and burrs. Glazing gaskets shall be in lengths or units recommended by manufacturer to ensure against pull-back at corners. Glazing gasket profiles shall be as indicated on drawings.

2.3.8.1 Fixed Glazing Gaskets

Fixed glazing gaskets shall be closed-cell (sponge) smooth extruded compression gaskets of cured elastomeric virgin neoprene compounds conforming to ASTM C 509, Type 2, Option 1.

2.3.8.2 Wedge Glazing Gaskets

Wedge glazing gaskets shall be high-quality extrusions of cured elastomeric virgin neoprene compounds, ozone resistant, conforming to ASTM C 864, Option 1, Shore A durometer between 65 and 75.

2.3.8.3 Aluminum Framing Glazing Gaskets

Glazing gaskets for aluminum framing shall be permanent, elastic, non-shrinking, non-migrating, watertight and weathertight.

2.3.9 Accessories

Provide as required for a complete installation, including glazing points, clips, shims, angles, beads, and spacer strips. Provide noncorroding metal accessories. Provide primer-sealers and cleaners as recommended by the glass and sealant manufacturers.

2.4 MIRROR ACCESSORIES

2.4.1 Mirror Frames

Mirrors shall be provided with mirror frames (J-mold channels) fabricated of one-piece roll-formed Type 304 stainless steel with No. 4 brushed satin finish and concealed fasteners which will keep mirrors snug to wall. Frames shall be 1-1/4 x 1/4 x 1/4 inch continuous at top and bottom of mirrors. Concealed fasteners of type to suit wall construction material shall be provided with mirror frames.

2.4.2 Mirror Clips

Concealed fasteners of type to suit wall construction material shall be provided with clips.

PART 3 EXECUTION

3.1 PREPARATION

Preparation, unless otherwise specified or approved, shall conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, IGMA TM-3000, and manufacturer's recommendations. Determine the sizes to provide the required edge clearances by measuring the actual opening to receive the glass. Grind smooth in the shop glass edges that will be exposed in finish work. Leave labels in place until the installation is approved, except remove applied labels on heat-absorbing glass and on insulating glass units as soon as glass is installed. Securely fix movable items or keep in a closed and locked position until glazing compound has thoroughly set.

3.2 GLASS SETTING

Shop glaze or field glaze items to be glazed using glass of the quality and thickness specified or indicated. Glazing, unless otherwise specified or approved, shall conform to applicable recommendations in the GANA Glazing Manual, GANA Sealant Manual, IGMA TB-3001, IGMA TM-3000, and manufacturer's recommendations. Aluminum windows, wood doors, and wood windows may be glazed in conformance with one of the glazing methods described in the standards under which they are produced, except that face puttying with no bedding will not be permitted. Handle and install glazing materials in accordance with manufacturer's instructions. Use beads or stops which are furnished with items to be glazed to secure the glass in place. Verify products are properly installed, connected, and adjusted.

3.2.1 Sheet Glass

Cut and set with the visible lines or waves horizontal.

3.2.2 Patterned Glass

Set glass with one patterned surface with smooth surface on the weather side. When used for interior partitions, place the patterned surface in same direction in all openings.

3.2.3 Insulating Glass Units

Do not grind, nip, or cut edges or corners of units after the units have left the factory. Springing, forcing, or twisting of units during setting

will not be permitted. Handle units so as not to strike frames or other objects. Installation shall conform to applicable recommendations of IGMA TB-3001 and IGMA TM-3000.

3.2.4 Installation of Heat-Absorbing Glass

Glass shall have clean-cut, factory-fabricated edges. Field cutting will not be permitted.

3.2.5 Installation of Laminated Glass

Sashes which are to receive laminated glass shall be weeped to the outside to allow water drainage into the channel.

3.3 ADDITIONAL REQUIREMENTS FOR GLAZING CONTROL TOWER WINDOWS

3.3.1 Materials and Methods of Installation

Comply with the manufacturer's warranty and written instructions, except as indicated. Install units with the heat-absorbing glass to the exterior. Secure glass in place with bolts and spring clips. The minimum clearance between bolts and edge of glass unit shall be 3/16 inch. The glass shall be edged with 3/16 inch thick continuous neoprene, vinyl, or other approved material. Trim edging after installation. The channel shapes or strips shall be firmly held against the glass by the spring action of the extruded metal moldings. Resilient setting blocks, spacer strips, clips, bolts, washers, angles, applicable glazing compound, and resilient channels or cemented-on materials shall be as recommended in the written instructions of the glass manufacturer, as approved.

3.3.2 Tolerances and Clearances of Units

Design to prevent the transfer of stress in the setting frames to the glass. Springing, twisting, or forcing of units during setting will not be permitted.

3.4 CLEANING

Clean glass surfaces and remove labels, paint spots, putty, and other defacement as required to prevent staining. Glass shall be clean at the time the work is accepted.

3.5 PROTECTION

Glass work shall be protected immediately after installation. Glazed openings shall be identified with suitable warning tapes, cloth or paper flags, attached with non-staining adhesives. Reflective glass shall be protected with a protective material to eliminate any contamination of the reflective coating. Protective material shall be placed far enough away from the coated glass to allow air to circulate to reduce heat buildup and moisture accumulation on the glass. Upon removal, separate protective materials for reuse or recycling. Glass units which are broken, chipped, cracked, abraded, or otherwise damaged during construction activities shall be removed and replaced with new units.

-- End of Section --

SECTION 08 91 00

METAL WALL LOUVERS
08/08

PART 1 GENERAL

1.1 REFERENCES

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

AIR MOVEMENT AND CONTROL ASSOCIATION INTERNATIONAL (AMCA)

AMCA 500-D	(1998) Laboratory Methods of Testing Dampers for Rating
AMCA 511	(1999; R 2004) Certified Ratings Program for Air Control Devices

ALUMINUM ASSOCIATION (AA)

AA DAF-45	(2003) Designation System for Aluminum Finishes

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 611	(1998) Voluntary Specification for Anodized Architectural Aluminum

ASTM INTERNATIONAL (ASTM)

ASTM A 366/A 366M	(1997e1) Standard Specification for Commercial Steel, Sheet, Carbon,(0.15 Maximum Percent Cold-Rolled
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 209	(2007) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B 221	(2008) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Wall louvers; G

SD-03 Product Data

Metal Wall Louvers; G

SD-04 Samples

Wall louvers

1.3 DELIVERY, STORAGE, AND PROTECTION

Deliver materials to the site in an undamaged condition. Carefully store materials off the ground to provide proper ventilation, drainage, and protection against dampness. Louvers shall be free from nicks, scratches, and blemishes. Replace defective or damaged materials with new.

1.4 DETAIL DRAWINGS

Show all information necessary for fabrication and installation of wall louvers. Indicate materials, sizes, thicknesses, fastenings, and profiles.

1.5 COLOR SAMPLES

Colors of finishes for wall louvers shall closely approximate colors indicated. Where color is not indicated, submit the manufacturer's standard colors to the Contracting Officer for selection.

PART 2 PRODUCTS

2.1 MATERIALS

2.1.1 Galvanized Steel Sheet

ASTM A 653/A 653M, coating designation G90.

2.1.2 Aluminum Sheet

ASTM B 209, alloy 3003 or 5005 with temper as required for forming.

2.1.3 Extruded Aluminum

ASTM B 221, alloy 6063-T5 or -T52.

2.1.4 Cold Rolled Steel Sheet

ASTM A 366/A 366M, Class 1, with matte finish. Use for interior louvers only.

2.2 METAL WALL LOUVERS

Weather resistant type, with bird screens and made to withstand a wind load of not less than 30 pounds per square foot. Wall louvers shall bear the AMCA certified ratings program seal for air performance and water penetration in accordance with AMCA 500-D and AMCA 511. The rating shall show a water penetration of 0.20 or less ounce per square foot of free area at a free velocity of 800 feet per minute.

2.2.1 Extruded Aluminum Louvers

Fabricated of extruded 6063-T5 or -T52 aluminum with a wall thickness of not less than 0.081 inch.

2.2.2 Formed Metal Louvers

Formed of galvanized steel sheet not thinner than 16 U.S. gage, or aluminum sheet not less than 0.08 inch thick.

2.2.3 Mullions and Mullion Covers

Same material and finish as louvers. Provide mullions for all louvers more than 5 feet in width at not more than 5 feet on centers. Provide mullions covers on both faces of joints between louvers.

2.2.4 Screens and Frames

For aluminum louvers, provide 1/2 inch square mesh, 14 or 16 gage aluminum or 1/4 inch square mesh, 16 gage aluminum bird screening. For steel louvers, provide 1/2 inch square mesh, 12 or 16 gage zinc-coated steel; 1/2 inch square mesh, 16 gage copper; or 1/4 inch square mesh, 16 gage zinc-coated steel or copper bird screening. Mount screens in removable, rewirable frames of same material and finish as the louvers.

2.3 FASTENERS AND ACCESSORIES

Provide stainless steel screws and fasteners for aluminum louvers and zinc-coated or stainless steel screws and fasteners for steel louvers. Provide other accessories as required for complete and proper installation.

2.4 FINISHES

2.4.1 Aluminum

Exposed aluminum surfaces shall be factory finished with an anodic coating. Louvers shall have the same finish.

2.4.1.1 Anodic Coating

Clean exposed aluminum surfaces and provide an anodized finish conforming to AA DAF-45 and AAMA 611. Finish shall be:

a. Architectural Class II (0.4 mil to 0.7 mil), designation AA-M10-C22-A31, clear (natural) or A32, integral color anodized.

2.4.2 Steel

Provide factory-applied coating. Clean and phosphate treat exposed surfaces and apply rust-inhibitive primer and baked enamel finish coat, one mil minimum total dry film thickness, color to be selected by Contracting Officer from manufacturer's standard colors.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Wall Louvers

Install using stops or moldings, flanges, strap anchors, or jamb fasteners as appropriate for the wall construction and in accordance with manufacturer's recommendations.

3.1.2 Screens and Frames

Attach frames to louvers with screws or bolts.

3.2 PROTECTION FROM CONTACT OF DISSIMILAR MATERIALS

3.2.1 Copper or Copper-Bearing Alloys

Paint copper or copper-bearing alloys in contact with dissimilar metal with heavy-bodied bituminous paint or separate with inert membrane.

3.2.2 Aluminum

Where aluminum contacts metal other than zinc, paint the dissimilar metal with a primer and two coats of aluminum paint.

3.2.3 Metal

Paint metal in contact with mortar, concrete, or other masonry materials with alkali-resistant coatings such as heavy-bodied bituminous paint.

3.2.4 Wood

Paint wood or other absorptive materials that may become repeatedly wet and in contact with metal with two coats of aluminum paint or a coat of heavy-bodied bituminous paint.

-- End of Section --

SECTION 09 06 90

COLOR SCHEDULE
05/09

PART 1 GENERAL

1.1 SYSTEM DESCRIPTION

This section covers only the color of the exterior and interior materials and products that are exposed to view in the finished construction. The word "color", as used herein, includes surface color and pattern. Requirements for quality and method of installation are covered in other appropriate sections of the specifications. Specific locations where the various materials are required are shown on the drawings. Items not designated for color in this section may be specified in other sections. When color is not designated for items, propose a color for approval.

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-04 Samples

Color Schedule; G

PART 2 PRODUCTS

2.1 REFERENCE TO MANUFACTURER'S COLOR

Where color is shown as being specific to one manufacturer, an equivalent color by another manufacturer may be submitted for approval. Manufacturers and materials specified are not intended to limit the selection of equal colors from other manufacturers.

2.2 COLOR SCHEDULE

The color schedule lists the colors, patterns and textures required for exterior and interior finishes, including both factory applied and field applied colors. Submit 3 sets of color boards, 120 days after the Contractor is given Notice to proceed, complying with the following requirements:

a. Color boards shall reflect all actual finish textures, patterns, and colors required for this contract.

b. Materials shall be labeled with the finish type, manufacturer's name, pattern, and color reference.

c. Samples shall be on size 8-1/2 by 11 inch boards with a maximum spread of size 25-1/2 by 33 inches for foldouts.

d. Samples for this color board are required in addition to samples requested in other specification sections.

e. Color boards shall be submitted to the following Contracting Officer

2.2.1 Exterior Walls

Exterior wall colors shall apply to exterior wall surfaces including recesses at entrances and projecting vestibules. Conduit shall be painted to closely match the adjacent surface color. Wall color shall be provided to match the colors listed below.

2.2.1.1 Mortar:

A. Angelus Block, "Champagne"
B. Angelus Block, "Slate"

2.2.1.2 Concrete Masonry Units:

A. Angelus Block, Burnished, "Champagne"
B. Angelus Block, Burnished, "Slate"

2.2.1.3 Metal Wall Panels, Hardware, and Associated Trim:

PAC, CLAD "Champagne"

2.2.1.4 Glass and Glazing:

A. Insulated Translucent Wall Panels - Kalwall, "Crystal"
B. Storefront System - Solarban 70XL, "Azuria"
C. Glazing - Solarban 70XL, "Azuria"

2.2.2 Exterior Trim

Exterior trim shall be provided to match the colors listed below.

2.2.2.1 Steel Doors and Door Frames:

Painted to match color of "CMU B" (Angelus Block "Slate")

2.2.2.2 Steel Windows (mullion, muntin, sash, trim, and sill):

Painted to match color of "CMU B" (Angelus Block "Slate")

2.2.2.3 Aluminum Doors and Door Frames:

Clear Anodized

2.2.2.4 Aluminum Windows (mullion, muntin, sash, trim, and sill):

Clear Anodized

2.2.2.5 Fascia:

PAC-CLAD, "Champagne"

2.2.2.6 Soffits and Ceilings:

PAC-CLAD, "Champagne"

2.2.2.7 Overhangs: at curved roofs

PAC-CLAD, "Copper Penny"

2.2.2.8 Downspouts, Gutters, Louvers, and Flashings:

Painted to match adjacent surface color as closely as possible.

2.2.2.9 Coping:

PAC-CLAD, "Champagne"

2.2.2.10 Caulking and Sealants:

Clear, white, or gray to match adjacent surfaces as closely as possible.

2.2.2.11 Control Joints:

Clear, white, or gray to match adjacent surfaces as closely as possible.

2.2.2.12 Guardrails:

A. Steel posts, handrails, hardware: painted to match metal wall panels as closely as possible (PAC-CLAD "Champagne")
B. Cable rail: Stainless steel

2.2.3 Exterior Roof

Roof color shall apply to exterior roof surfaces including sheet metal flashings and copings, mechanical units, roof trim, pipes, conduits, electrical appurtenances, and similar items. Provide roof color to match the colors listed below.

2.2.3.1 Metal:

PAC-CLAD "Copper Penny"

2.2.3.2 TPO:

White

2.2.3.3 Penetrations:

Shall match roof in color, as closely as possible.

2.2.4 Interior Floor Finishes

Provide flooring materials to match the colors listed below.

2.2.4.1 Carpet Tile:

Provide color samples for selection by the Contracting Officer's Technical Representative.

2.2.4.2 Vinyl Composition Tile:

Provide color samples for selection by the Contracting Officer's

Technical Representative.

2.2.4.3 Stair Risers:

Industrial gray

2.2.4.4 Ceramic Tile:

Dal Tile, "Almond"

2.2.4.5 Grout:

DAl Tile, "Almond"

2.2.4.6 Concrete Micro-Topping:

Provide color samples from manufacturer's standard colors for selection by the Contracting Officer's TEchnical Representative.

2.2.5 Interior Base Finishes

Provide base materials to match the colors listed below.

2.2.5.1 Resilient Base and Moldings:

Roppe, Color 114 "Lunar Dust"

2.2.5.2 Ceramic Tile:

Dal Tile, "Almond"

2.2.5.3 Grout:

Dal Tile, "Almond"

2.2.6 Interior Wall Finishes

Interior wall color shall apply to the entire wall surface, including reveals, vertical furred spaces, grilles, diffusers, electrical and access panels, and piping and conduit adjacent to wall surfaces unless otherwise specified. Items not specified in other paragraphs shall be painted to match adjacent wall surface. Provide wall materials to match the colors listed below.

2.2.6.1 Paint:

Vista Paint, "Oat Cake"

2.2.6.2 Ceramic Tile:

Dal Tile, "Almond"

2.2.6.3 Ceramic Tile Grout:

Dal Tile, "Almond"

2.2.6.4 Metal Panels:

PAC-CLAD, "Champagne"

2.2.6.5 Glazed Units:

Insulated Translucent Wall Panels - Kalwall "Crystal"

2.2.6.6 Columns:

To match metal wall panels (PAC-CLAD "Champagne")

2.2.7 Interior Ceiling Finishes

Ceiling colors shall apply to ceiling surfaces including soffits, furred down areas, grilles, diffusers, registers, and access panels. Ceiling color shall also apply to joist, underside of roof deck, and conduit and piping where joists and deck are exposed and required to be painted. Provide ceiling materials to match the colors listed below.

2.2.7.1 Ceiling Tile and Grid:

A. Acostical Units: White
B. Curved Aluminum Units: USG "Metallic Oyster"

2.2.7.2 Paint:

Vista Paint "Oat Cake"

2.2.7.3 Metal Deck:

Painted to match curved aluminum ceiling units (USG "Metallic Oyster") as closely as possible.

2.2.7.4 Structural Framing:

Painted to match curved aluminum ceiling units (USG "Metallic Oyster") as closely as possible.

2.2.8 Interior Trim

Provide interior trim to match the colors listed below.

2.2.8.1 Steel Doors:

Industrial Gray, matte finish

2.2.8.2 Steel Door Frames:

Industrial Gray, to match steel doors

2.2.8.3 Aluminum Doors and Door Frames:

Clear Anodized

2.2.8.4 Aluminum Windows :

(mullion, muntin, sash, trim, and sill) clear anodized

2.2.8.5 Wood Stain:

Natural/clear finish

2.2.8.6 Fire Extinguisher Cabinets:

White

2.2.8.7 Handrails:

Gray

2.2.8.8 Ladders:

Pre-finished as per manufacturer's standard colors.

2.2.8.9 Metal Stairs:

Gray

2.2.8.10 Exposed Ductwork:

White

2.2.8.11 Benches and Lockers:

Bradley "Charcoal Gray"

2.2.9 Interior Miscellaneous

Provide miscellaneous items to match the colors listed below.

2.2.9.1 Toilet Partitions and Urinal Screens:

Bradley "Charcoal Gray"

2.2.9.2 Plastic Laminate:

Pionite "Slate"

2.2.9.3 Solid Surfacing Material:

Bradley Terreon RE "Oat"

2.2.9.4 Metal Casework:

Contractor to provide color samples for selection by Contracting Officer's Technical Representative.

2.2.9.5 Wall Switch Handles and Standard Receptacle Bodies:

Ivory

2.2.9.6 Electrical Device Cover Plates:

Ivory

2.2.9.7 Electrical Panels:

To match adjacent wa;; as closely as possible.

2.2.9.8 Shower Curtain:

Beige, mildew resistant

2.2.9.9 Shower Curtain Rod:

Stainless steel

2.3 PLACEMENT SCHEDULE

Placement of color shall be in accordance with the Finish Schedule: shown on the drawings

PART 3 EXECUTION (Not Applicable)

-- End of Section --

SECTION 09 22 00

SUPPORTS FOR PLASTER AND GYPSUM BOARD
02/10

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

AISC 341	(2005; Supp 2005) Seismic Provisions for Structural Steel Buildings

ASTM INTERNATIONAL (ASTM)

ASTM A 463/A 463M	(2009a) Standard Specification for Steel Sheet, Aluminum-Coated
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 645	(2009a) Nonstructural Steel Framing Members
ASTM C 754	(2009a) Installation of Steel Framing Members to Receive Screw-Attached Gypsum Panel Products
ASTM C 841	(2003e1; R 2008) Installation of Interior Lathing and Furring
ASTM C 847	(2009) Standard Specification for Metal Lath

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM ML/SFA 920	(1991) Metal Lathing and Furring

UNDERWRITERS LABORATORIES (UL)

UL Fire Resistance	(2009) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Metal support systems

Submit for the erection of metal framing, furring, and ceiling suspension systems. Indicate materials, sizes, thicknesses, and fastenings.

1.3 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the job site and store in ventilated dry locations. Storage area shall permit easy access for inspection and handling. If materials are stored outdoors, stack materials off the ground, supported on a level platform, and fully protected from the weather. Handle materials carefully to prevent damage. Remove damaged items and provide new items.

PART 2 PRODUCTS

2.1 MATERIALS

Provide steel materials for metal support systems with galvanized coating ASTM A 653/A 653M, G-60; aluminum coating ASTM A 463/A 463M, T1-25; or a 55-percent aluminum-zinc coating. Provide support systems and attachments per AISC 341 in seismic zones.

2.1.1 Materials for Attachment of Lath

2.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C 841, and ASTM C 847.

2.1.1.2 Non-loadbearing Wall Framing

NAAMM ML/SFA 920.

2.1.2 Materials for Attachment of Gypsum Wallboard

2.1.2.1 Suspended and Furred Ceiling Systems

ASTM C 645.

2.1.2.2 Nonload-Bearing Wall Framing and Furring

ASTM C 645, but not thinner than 0.0179 inch thickness, with 0.0329 inch minimum thickness supporting wall hung items such as cabinetwork, equipment and fixtures 0.0329 inch thickness. The ASTM certified third party testing statement for equivalent thicknesses shall not apply.

2.1.2.3 Furring Structural Steel Columns

ASTM C 645. Steel (furring) clips and support angles listed in UL Fire Resistance may be provided in lieu of steel studs for erection of gypsum wallboard around structural steel columns.

2.1.2.4 Z-Furring Channels with Wall Insulation

Not lighter than 26 gage galvanized steel, Z-shaped, with 1-1/4 inch and 3/4 inch flanges and depth as required by the insulation thickness provided.

PART 3 EXECUTION

3.1 INSTALLATION

3.1.1 Systems for Attachment of Lath

3.1.1.1 Suspended and Furred Ceiling Systems and Wall Furring

ASTM C 841, except as indicated otherwise.

3.1.1.2 Non-loadbearing Wall Framing

NAAMM ML/SFA 920, except provide framing members 16 inches o.c. unless indicated otherwise.

3.1.2 Systems for Attachment of Gypsum Wallboard

3.1.2.1 Suspended and Furred Ceiling Systems

ASTM C 754, except provide framing members 16 inches o.c. unless indicated otherwise.

3.1.2.2 Non-loadbearing Wall Framing and Furring

ASTM C 754, except as indicated otherwise.

3.1.2.3 Furring Structural Steel Columns

Install studs or galvanized steel clips and support angles for erection of gypsum wallboard around structural steel columns in accordance with the UL Fire Resistance, design number(s) indicated of the fire resistance rating indicated.

3.1.2.4 Z-Furring Channels with Wall Insulation

Install Z-furring channels vertically spaced not more than 24 inches o.c. Locate Z-furring channels at interior and exterior corners in accordance with manufacturer's printed erection instructions. Fasten furring channels to masonry walls with powder-driven fasteners or hardened concrete steel nails through narrow flange of channel. Space fasteners not more than 24 inches o.c.

3.2 ERECTION TOLERANCES

Provide framing members which will be covered by finish materials such as wallboard, plaster, or ceramic tile set in a mortar setting bed, within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/4 inch in 8 feet from a straight line;

c. Studs: 1/4 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/4 inch in 8 feet from a true plane.

Provide framing members which will be covered by ceramic tile set in dry-set mortar, latex-portland cement mortar, or organic adhesive within the following limits:

a. Layout of walls and partitions: 1/4 inch from intended position;

b. Plates and runners: 1/8 inch in 8 feet from a straight line;

c. Studs: 1/8 inch in 8 feet out of plumb, not cumulative; and

d. Face of framing members: 1/8 inch in 8 feet from a true plane.

-- End of Section --

SECTION 09 29 00

GYPSUM BOARD
08/09

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI A108.11	(1992) Interior Installation of Cementitious Backer Units
ANSI/CTI A108/A118/A136.1	(2005) Specification for the Installation of Ceramic Tile

ASTM INTERNATIONAL (ASTM)

ASTM C 1002	(2007) Standard Specification for Steel Self-Piercing Tapping Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Wood Studs or Steel Studs
ASTM C 1047	(2009) Standard Specification for Accessories for Gypsum Wallboard and Gypsum Veneer Base
ASTM C 1178/C 1178M	(2008) Standard Specification for Glass Mat Water-Resistant Gypsum Backing Panel
ASTM C 1396/C 1396M	(2009a) Standard Specification for Gypsum Board
ASTM C 36/C 36M	(2003e1) Gypsum Wallboard
ASTM C 442/C 442M	(2004e1) Gypsum Backing Board, Gypsum Coreboard, and Gypsum Shaftliner Board
ASTM C 475/C 475M	(2002; R 2007) Joint Compound and Joint Tape for Finishing Gypsum Board
ASTM C 514	(2004e1; R 2009) Standard Specification for Nails for the Application of Gypsum Board
ASTM C 840	(2008) Application and Finishing of Gypsum Board
ASTM C 954	(2007) Steel Drill Screws for the Application of Gypsum Panel Products or Metal Plaster Bases to Steel Studs from

	0.033 in. (0.84 mm) to 0.112 in. (2.84 mm) in Thickness

GYPSUM ASSOCIATION (GA)

GA 214	(2007) Recommended Levels of Gypsum Board Finish
GA 216	(2007) Application and Finishing of Gypsum Board
GA 600	(2009) Fire Resistance Design Manual

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

UNDERWRITERS LABORATORIES (UL)

UL Fire Resistance	(2009) Fire Resistance Directory

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Cementitious backer units; G
Glass Mat Water-Resistant Gypsum Tile Backing Board; G
Water-Resistant Gypsum Backing Board; G
Accessories

Submit for each type of gypsum board and for cementitious backer units.

Gypsum Board; G (LEED)

Submit documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Adhesives; (LEED)
Joint Treatment Materials

Submit manufacturer's product data, indicating VOC content.

Local/Regional Materials; G (LEED)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products

included in project.

SD-07 Certificates

Asbestos Free Materials; G

Certify that gypsum board types, gypsum backing board types, cementitious backer units, and joint treating materials do not contain asbestos.

SD-08 Manufacturer's Instructions

Material Safety Data Sheets

SD-10 Operation and Maintenance Data

Manufacturer maintenance instructions
Waste Management; G

SD-11 Closeout Submittals

Local/Regional Materials; G (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Gypsum Board; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Adhesives; (LEED)

LEED documentation relative to low emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 DELIVERY, STORAGE, AND HANDLING

1.3.1 Delivery

Deliver materials in the original packages, containers, or bundles with each bearing the brand name, applicable standard designation, and name of manufacturer, or supplier.

1.3.2 Storage

Keep materials dry by storing inside a sheltered building. Where necessary to store gypsum board and cementitious backer units outside, store off the ground, properly supported on a level platform, and protected from direct exposure to rain, snow, sunlight, and other extreme weather conditions. Provide adequate ventilation to prevent condensation. Store per manufacturer's recommendations for allowable temperature and humidity range. Gypsum wallboard shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants. Do not store panels near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.3.3 Handling

Neatly stack gypsum board and cementitious backer units flat to prevent sagging or damage to the edges, ends, and surfaces.

1.4 ENVIRONMENTAL CONDITIONS

1.4.1 Temperature

Maintain a uniform temperature of not less than 50 degrees F in the structure for at least 48 hours prior to, during, and following the application of gypsum board, cementitious backer units, and joint treatment materials, or the bonding of adhesives.

1.4.2 Exposure to Weather

Protect gypsum board and cementitious backer unit products from direct exposure to rain, snow, sunlight, and other extreme weather conditions.

1.4.3 Temporary Ventilation

Provide temporary ventilation for work of this section.

1.5 SUSTAINABLE DESIGN REQUIREMENTS

1.5.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Gypsum board materials may be locally available.

1.6 QUALIFICATIONS

Furnish type of gypsum board work specialized by the installer with a minimum of 3 years of documented successful experience.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to specifications, standards and requirements specified. Provide gypsum board types, gypsum backing board types, cementitious backing units, and joint treating materials manufactured from asbestos free materials only. Submit Material Safety Data Sheets and manufacturer maintenance instructions for gypsum materials including adhesives.

2.1.1 Gypsum Board

ASTM C 36/C 36M and ASTM C 1396/C 1396M. Gypsum board shall contain a minimum of 5 percent post-consumer recycled content, or a minimum of 20 percent post-industrial recycled content. Paper facings shall contain 100 percent post-consumer recycled paper content. Gypsum cores shall contain a minimum of 95 percent post-industrial recycled gypsum content.See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Gypsum board may contain post-consumer or post-industrial recycled content.

2.1.1.1 Regular

48 inch wide, 5/8 inch thick, tapered edges.

2.1.1.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.2 Gypsum Backing Board

ASTM C 442/C 442M, gypsum backing board shall be used as a base in a multilayer system.

2.1.2.1 Regular

48 inch wide, 5/8 inch thick, square edges.

2.1.2.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, square edges.

2.1.3 Regular Water-Resistant Gypsum Backing Board

ASTM C 1396/C 1396M

2.1.3.1 Regular

48 inch wide, 5/8 inch thick, tapered edges.

2.1.3.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, tapered edges.

2.1.4 Glass Mat Water-Resistant Gypsum Tile Backing Board

ASTM C 1178/C 1178M

2.1.4.1 Regular

48 inch wide, 5/8 inch thick, square edges.

2.1.4.2 Type X (Special Fire-Resistant)

48 inch wide, 5/8 inch thick, square edges.

2.1.5 Cementitious Backer Units

ANSI/CTI A108/A118/A136.1.

2.1.6 Joint Treatment Materials

ASTM C 475/C 475M. Use all purpose joint and texturing compound containing inert fillers and natural binders, including lime compound. Pre-mixed compounds shall be free of antifreeze, vinyl adhesives, preservatives, biocides and other slow releasing compounds.

2.1.6.1 Embedding Compound

Specifically formulated and manufactured for use in embedding tape at gypsum board joints and compatible with tape, substrate and fasteners.

2.1.6.2 Finishing or Topping Compound

Specifically formulated and manufactured for use as a finishing compound.

2.1.6.3 All-Purpose Compound

Specifically formulated and manufactured to serve as both a taping and a finishing compound and compatible with tape, substrate and fasteners.

2.1.6.4 Setting or Hardening Type Compound

Specifically formulated and manufactured for use with fiber glass mesh tape.

2.1.6.5 Joint Tape

Use cross-laminated, tapered edge, reinforced paper, or fiber glass mesh tape recommended by the manufacturer.

2.1.7 Fasteners

2.1.7.1 Nails

ASTM C 514.

2.1.7.2 Screws

ASTM C 1002, Type "G", Type "S" or Type "W" steel drill screws for fastening gypsum board to gypsum board, wood framing members and steel framing members less than 0.033 inch thick. ASTM C 954 steel drill screws for fastening gypsum board to steel framing members 0.033 to 0.112 inch thick. Provide cementitious backer unit screws with a polymer coating.

2.1.7.3 Staples

No. 16 USS gage flattened galvanized wire staples with 7/16 inch wide crown outside measurement and divergent point for base ply of two-ply gypsum board application. Use as follows:

Length of Legs (inch)	Thickness of Gypsum Board (inch)
1 1/8	1/2
1 1/4	5/8

2.1.8 Adhesives

Do not use adhesive containing benzene, carbon tetrachloride, or trichloroethylene. Adhesive must meet the requirements of LEED low emitting materials credit.

2.1.8.1 Adhesive for Fastening Gypsum Board to Metal Framing

Not permitted.

2.1.9 Gypsum Studs

Provide one inch minimum thickness and 6 inch minimum width. Studs may be of one inch thick gypsum board or multilayers fastened to required thickness. Conform to ASTM C 36/C 36M or ASTM C 442/C 442M for material.

2.1.10 Accessories

ASTM C 1047. Fabricate from corrosion protected steel or plastic designed for intended use. Accessories manufactured with paper flanges are not acceptable. Flanges shall be free of dirt, grease, and other materials that may adversely affect bond of joint treatment.

2.1.11 Water

Provide clean, fresh, and potable water.

PART 3 EXECUTION

3.1 EXAMINATION

3.1.1 Framing and Furring

Verify that framing and furring are securely attached and of sizes and spacing to provide a suitable substrate to receive gypsum board and cementitious backer units. Verify that all blocking, headers and supports are in place to support plumbing fixtures and to receive soap dishes, grab bars, towel racks, and similar items. Do not proceed with work until framing and furring are acceptable for application of gypsum board and cementitious backer units.

3.2 APPLICATION OF GYPSUM BOARD

Apply gypsum board to framing and furring members in accordance with ASTM C 840 or GA 216 and the requirements specified. Apply gypsum board with separate panels in moderate contact; do not force in place. Stagger end joints of adjoining panels. Neatly fit abutting end and edge joints. Use gypsum board of maximum practical length; select panel sizes to minimize waste. Cut out gypsum board to make neat, close, and tight joints around openings. In vertical application of gypsum board, provide panels in lengths required to reach full height of vertical surfaces in one continuous piece. Lay out panels to minimize waste; reuse cutoffs whenever feasible. Surfaces of gypsum board and substrate members may not be bonded together with an adhesive, except where prohibited by fire rating(s). Treat edges of cutouts for plumbing pipes, screwheads, and joints with water-resistant compound as recommended by the gypsum board manufacturer. Minimize framing by floating corners with single studs and drywall clips. Install 5/8 inch gypsum or 1/2 inch ceiling board over framing at 24 inches on center. Provide type of gypsum board for use in each system specified herein as indicated.

3.2.1 Semi-Solid Gypsum Board Partitions

Provide in accordance with ASTM C 840, System IV or GA 216 .

3.2.2 Solid Gypsum Board Partitions

Provide in accordance with ASTM C 840, System V or GA 216.

3.2.3 Adhesive Application to Interior Masonry or Concrete Walls

Apply in accordance with ASTM C 840, System VI or GA 216.

3.2.4 Application of Gypsum Board to Steel Framing and Furring

Apply in accordance with ASTM C 840, System VIII or GA 216.

3.2.5 Gypsum Board for Wall Tile or Tile Base Applied with Adhesive

In dry areas (areas other than tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply glass mat water-resistant gypsum tile backing board or water-resistant gypsum backing board in accordance with ASTM C 840, System X or GA 216.

3.2.6 Exterior Application

Apply exterior gypsum board (such as at soffits) in accordance with ASTM C 840, System XI or GA 216.

3.2.7 Control Joints

Install expansion and contraction joints in ceilings and walls in accordance with ASTM C 840, System XIII or GA 216. Fill control joints between studs in fire-rated construction with firesafing insulation to match the fire-rating of construction.

3.3 APPLICATION OF CEMENTITIOUS BACKER UNITS

3.3.1 Application

In wet areas (tubs, shower enclosures, saunas, steam rooms, gang shower rooms), apply cementitious backer units in accordance with ANSI A108.11. Place a 15 lb asphalt impregnated, continuous felt paper membrane behind cementitious backer units, between backer units and studs or base layer of gypsum board. Place membrane with a minimum 6 inch overlap of sheets laid shingle style.

3.3.2 Joint Treatment

ANSI A108.11.

3.4 FINISHING OF GYPSUM BOARD

Tape and finish gypsum board in accordance with ASTM C 840, GA 214 and GA 216. Finish plenum areas above ceilings to Level 1 in accordance with GA 214. Finish water resistant gypsum backing board, ASTM C 1396/C 1396M, to receive ceramic tile to Level 2 in accordance with GA 214. Finish walls and ceilings to receive a heavy-grade wall covering or heave textured finish before painting to Level 3 in accordance with GA 214. Finish walls and ceilings without critical lighting to receive flat paints, light textures, or wall coverings to Level 4 in accordance with GA 214. Finish all gypsum board walls, partitions and ceilings to Level 5 in accordance with GA 214. Provide joint, fastener depression, and corner treatment. Tool joints as smoothly as possible to minimize sanding and dust. Do not use fiber glass mesh tape with conventional drying type joint compounds; use setting or hardening type compounds only. Provide treatment for water-resistant gypsum board as recommended by the gypsum board manufacturer. Protect workers, building occupants, and HVAC systems from

gypsum dust.

3.4.1 Uniform Surface

Wherever gypsum board is to receive eggshell, semigloss or gloss paint finish, or where severe, up or down lighting conditions occur, finish gypsum wall surface in accordance to GA 214 Level 5. In accordance with GA 214 Level 5, apply a thin skim coat of joint compound to the entire gypsum board surface, after the two-coat joint and fastener treatment is complete and dry.

3.5 SEALING

Seal openings around pipes, fixtures, and other items projecting through gypsum board and cementitious backer units as specified in Section 07 92 00 JOINT SEALANTS. Apply material with exposed surface flush with gypsum board or cementitious backer units.

3.6 FIRE-RESISTANT ASSEMBLIES

Wherever fire-rated construction is indicated, provide materials and application methods, including types and spacing of fasteners, wall and ceiling framing in accordance with the specifications contained in UL Fire Resistance for the Design Number(s) indicated, or GA 600 for the File Number(s) indicated. Joints of fire-rated gypsum board enclosures shall be closed and sealed in accordance with UL test requirements or GA requirements. Seal penetrations through rated partitions and ceilings tight in accordance with tested systems.

3.7 PATCHING

Patch surface defects in gypsum board to a smooth, uniform appearance, ready to receive finishes.

3.8 WASTE MANAGEMENT

As specified in Waste Management Plan and as follows. Separate clean waste gypsum products from contaminants. Do not include wood, plastic, metal, asphalt-impregnated gypsum board, or any gypsum board coated with glass fiber, vinyl, decorative paper, or other finish. Place in designated area and protect from moisture and contamination.

Identify manufacturer's policy for collection or return of remaining construction scrap, unused material, and packaging material. Institute demolition and construction recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

SECTION 09 30 00

CERAMIC TILE
01/07

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 185/A 185M	(2007) Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
ASTM C 1026	(1987; R 2002) Standard Test Method for Measuring the Resistance of Ceramic Tile to Freeze-Thaw Cycling
ASTM C 1028	(2007) Standard Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method
ASTM C 144	(2004) Standard Specification for Aggregate for Masonry Mortar
ASTM C 150/C 150M	(2009) Standard Specification for Portland Cement
ASTM C 206	(2003) Standard Specification for Finishing Hydrated Lime
ASTM C 207	(2006) Standard Specification for Hydrated Lime for Masonry Purposes
ASTM C 241/C 241M	(2009) Standard Specification for Abrasion Resistance of Stone Subjected to Foot Traffic
ASTM C 33/C 33M	(2008) Standard Specification for Concrete Aggregates
ASTM C 373	(1988; R 2006) Water Absorption, Bulk Density, Apparent Porosity, and Apparent Specific Gravity of Fired Whiteware Products
ASTM C 482	(2002; R 2009) Bond Strength of Ceramic Tile to Portland Cement
ASTM C 501	(1984; R 2002) Relative Resistance to Wear

	of Unglazed Ceramic Tile by the Taber Abraser
ASTM C 648	(2004; R 2009) Breaking Strength of Ceramic Tile
ASTM C 847	(2009) Standard Specification for Metal Lath
ASTM D 226/D 226M	(2009) Standard Specification for Asphalt-Saturated Organic Felt Used in Roofing and Waterproofing
ASTM D 4068	(2009) Chlorinated Polyethylene Sheeting for Concealed Water-Containment Membrane
ASTM E 2129	(2005) Standard Practice for Data Collection for Sustainability Assessment of Building Products
ASTM F 446	(1985; R 2009) Grab Bars and Accessories Installed in the Bathing Area

MARBLE INSTITUTE OF AMERICA (MIA)

MIA Design Manual	(2003) Dimension Stone Design Manual

TILE COUNCIL OF AMERICA (TCA)

TCA Hdbk	(2007) Handbook for Ceramic Tile Installation

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

36 CFR 1191	Americans with Disabilities Act (ADA) Accessibility Guidelines for Buildings and Facilities

1.2 SYSTEM DESCRIPTION

1.2.1 General Requirements

Close space, in which tile is being set, to traffic and other work. Keep closed until tile is firmly set. Do not walk or work on newly tiled floors without using kneeling boards or equivalent protection of the tiled surface. Keep traffic off horizontal portland cement mortar installations for at least 72 hours. Keep all traffic off epoxy installed floors for at least 40 hours after grouting, and heavy traffic off for at least 7 days, unless otherwise specifically authorized by manufacturer.

1.2.2 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Tile materials may be locally available.

1.2.3 Environmental Data

Submit Table 1 of ASTM E 2129 for the following products: ceramic tile.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Local/Regional Materials; G (LEED)

Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Environmental Data; G
Tile; G (LEED)
Setting-Bed; G
Mortar, Grout, and Adhesive; (LEED); G

Manufacturer's catalog data and preprinted installation and cleaning instructions. Indicate VOC content.

Reinforcing Wire Fabric; (LEED)

Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

SD-04 Samples

Tile; G
Accessories
Marble Thresholds
Grout; G

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

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in

accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Tile; (LEED)
Reinforcing Wire Fabric; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Adhesives; (LEED)

LEED documentation relative to low-emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the project site in manufacturer's original unopened containers with seals unbroken and labels and hallmarks intact. Protect materials from weather, and store them under cover in accordance with manufacturer's printed instructions.

1.5 ENVIRONMENTAL REQUIREMENTS

Do not perform ceramic tile work unless the substrate and ambient temperature is at least 50 degrees F and rising. Maintain temperature above 50 degrees F while the work is being performed and for at least 7 days after completion of the work. When temporary heaters are used, ventilate the area to the outside to avoid carbon dioxide damage to new tilework.

1.6 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1-year period.

1.7 EXTRA MATERIALS

Supply an extra two percent of each type tile used in clean and marked cartons.

PART 2 PRODUCTS

2.1 TILE

Conform to TCA Hdbk for standard grade tile. Provide grade sealed containers. Mark seals with the marks on the signed master grade certificate. Provide an impact resistant tile with a minimum floor breaking strength for wall tile of 90 pound and for floor tile of 250 pound in accordance with ASTM C 648. The manufacturer will provide a frost resistant rating for tile used in cold climate projects as determined by ASTM C 1026. Provide a 0.50 maximum percent water absorption in accordance with ASTM C 373. Provide a minimum coefficient of friction of 0.60 wet and dry in accordance with ASTM C 1028. Coordinate the color with Section 09 06 90 COLOR SCHEDULE. Tile shall contain a minimum of 10 percent post-consumer recycled content, or a minimum of 40 percent post-industrial recycled content, unless specified otherwise. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Tile may contain post-consumer or post-industrial recycled content.

2.1.1 Porcelain Tile

Furnish an unglazed porcelain tile and trim with the color extending uniformly through the body of the tile. Porcelain tile shall contain a minimum of 70 percent post-industrial recycled content. Criteria for tile to meet or exceed is as follows: Abrasive wear in accordance with ASTM C 501 and bonding strength in accordance with ASTM C 482. Comply with 36 CFR 1191 for coefficient of friction for interior tiled floors. Coordinate color with Section 09 06 90 COLOR SCHEDULE.

2.1.2 Accessories

Provide built-in type accessories of the same materials and finish as the wall tile. Provide accessories as follows:

	Quantity	Location
a. Recessed soap holder and hand hold combination: support static load in compliance with ASTM F 446	6	showers

2.2 SETTING-BED

Compose the setting-bed of the following materials:

2.2.1 Aggregate for Concrete Fill

Conform to ASTM C 33/C 33M for aggregate fill. Do not exceed one-half the thickness of concrete fill for maximum size of coarse aggregate.

2.2.2 Portland Cement

Conform to ASTM C 150/C 150M for cement, Type I, white for wall mortar and gray for other uses.

2.2.3 Sand

Conform to ASTM C 144 for sand.

2.2.4 Hydrated Lime

Conform to ASTM C 206 for hydrated lime, Type S or ASTM C 207, Type S.

2.2.5 Metal Lath

Conform to ASTM C 847 for flat expanded type metal lath, and weighing a minimum 2.5 pound/square yard.

2.2.6 Reinforcing Wire Fabric

Conform to ASTM A 185/A 185M for wire fabric. Provide 2 by 2 inch mesh, 16/16 wire or 1-1/2 by 2 inch mesh, 16/13 wire. Wire fabric shall be manufactured from a minimum of 80 percent recycled post-consumer waste and a minimum of 10 percent recycled post-industrial waste. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Wire fabric may contain post-consumer or post-industrial recycled content.

2.3 WATER

Provide potable water.

2.4 MORTAR, GROUT, AND ADHESIVE

Interior adhesives, sealants, primers and sealants used as filler must meet the requirements of LEED low emitting materials credit and to the following for mortar, grout, adhesive, and sealant:

2.4.1 Dry-Set Portland Cement Mortar

TCA Hdbk. Zero-volatile organic compound (VOC) content.

2.4.2 Latex-Portland Cement Mortar

TCA Hdbk. Zero-VOC content.

2.4.3 Ceramic Tile Grout

TCA Hdbk; petroleum-free and plastic-free. Maximum VOC content of 150 grams/liter.

2.4.4 Epoxy Resin Grout

TCA Hdbk. Prohibited unless specifically indicated otherwise.

2.4.5 Furan Resin Grout

TCA Hdbk and consist of an intimate mixture of furfuryl-alcohol resin with carbon filler and catalyst. Prohibited unless specifically indicated otherwise.

2.4.6 Sealants

Comply with applicable regulations regarding toxic and hazardous materials and as specified. Single-component polyurethane sealant shall have a zero-VOC content. Two-component polyurethane sealant shall have a maximum VOC content of 45 grams/liter.

2.5 MARBLE THRESHOLDS

Provide marble thresholds of size required by drawings or conditions. Categorize marble Group A as classified by MIA Design Manual. Provide a fine sand-rubbed finish marble with gray in color as approved by the Contracting Officer. Provide minimum 12.0 marble abrasion when tested in accordance with ASTM C 241/C 241M.

2.6 MEMBRANE MATERIALS

Conform to ASTM D 226/D 226M, Type 1 for 15 pound waterproofing membrane, asphalt-saturated building felt. Conform to ASTM D 4068 4 mil for polyethylene film.

PART 3 EXECUTION

3.1 PREPARATORY WORK AND WORKMANSHIP

Inspect surface to receive tile in conformance to the requirements of

TCA Hdbk for surface conditions for the type setting bed specified and for workmanship. Provide variations of tiled surfaces that fall within maximum values shown below:

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

3.2 GENERAL INSTALLATION REQUIREMENTS

Do not start tile work until roughing in for mechanical and electrical work has been completed and tested, and built-in items requiring membrane waterproofing have been installed and tested. Do not start floor tile installation in spaces requiring wall tile until after wall tile has been installed. Apply tile in colors and patterns indicated in the area shown on the drawings. Install tile with the respective surfaces in true even planes to the elevations and grades shown. Provide special shapes as required for sills, jambs, recesses, offsets, external corners, and other conditions to provide a complete and neatly finished installation. Solidly back tile bases and coves with mortar.

3.3 INSTALLATION OF WALL TILE

Install wall tile in accordance with the TCA Hdbk.

3.3.1 Workable or Cured Mortar Bed

Install tile over workable mortar bed or a cured mortar bed at the option of the Contractor. Install a 4 mil polyethylene membrane, metal lath, and scratch coat. Conform to TCA Hdbk for workable mortar bed, materials, and installation of tile. Conform to TCA Hdbk for cured mortar bed and materials.

3.3.2 Dry-Set Mortar and Latex-Portland Cement Mortar

Use Dry-set or Latex-Portland Cement to install tile in accordance with TCA Hdbk. Use Latex Portland Cement when installing porcelain ceramic tile.

3.3.3 Organic Adhesive

Conform to TCA Hdbk for the organic adhesive installation of ceramic tile.

3.3.4 Furan Mortar and Grout

Conform to TCA Hdbk for furan mortar and grout installation.

3.4 INSTALLATION OF FLOOR TILE

Install floor tile in accordance with TCA Hdbk. Install shower receptors in accordance with TCA Hdbk.

3.4.1 Workable or Cured Mortar Bed

Install floor tile over a workable mortar bed or a cured mortar bed at the option of the Contractor. Conform to TCA Hdbk for workable mortar bed materials and installation. Conform to TCA Hdbk for cured mortar bed

materials and installation. Provide minimum 1/4 inch to maximum 3/8 inch joints in uniformed width.

3.4.2 Dry-Set and Latex-Portland Cement

Use dry-set or Latex-Portland cement mortar to install tile directly over properly cured, plane, clean concrete slabs in accordance with TCA Hdbk. Use Latex Portland cement when installing porcelain ceramic tile.

3.4.3 Ceramic Tile Grout

Prepare and install ceramic tile grout in accordance with TCA Hdbk.

3.4.4 Waterproofing

Shower pans are specified in Section 22 00 00 PLUMBING, GENERAL PURPOSE. Conform to the requirements of Section 07 12 00 BUILT-UP BITUMINOUS WATERPROOFING for waterproofing under concrete fill.

3.4.5 Concrete Fill

Provide a 3500 psi concrete fill mix to dry as consistency as practicable. Compose concrete fill by volume of 1 part Portland cement to 3 parts fine aggregate to 4 parts coarse aggregate, and mix with water to as dry a consistency as practicable. Spread, tamp, and screed concrete fill to a true plane, and pitch to drains or levels as shown. Thoroughly damp concrete fill before applying setting-bed material. Reinforce concrete fill with one layer of reinforcement, with the uncut edges lapped the width of one mesh and the cut ends and edges lapped a minimum 2 inch. Tie laps together with 18 gauge wire every 10 inch along the finished edges and every 6 inch along the cut ends and edges. Provide reinforcement with support and secure in the centers of concrete fills. Provide a continuous mesh; except where expansion joints occur, cut mesh and discontinue across such joints. Provide reinforced concrete fill under the setting-bed where the distance between the under-floor surface and the finished tiles floor surface is a minimum 2 inch, and of the same thickness that the mortar setting-bed over the concrete fill with the thickness required in the specified TCA Hdbk method.

3.5 INSTALLATION OF MARBLE THRESHOLDS

Install thresholds where indicated, in a manner similar to that of the ceramic tile floor. Provide thresholds full width of the opening. Install head joints at ends not exceeding 1/4 inch in width and grouted full.

3.6 EXPANSION JOINTS

Form and seal joints as specified in Section 07 92 00JOINT SEALANTS.

3.6.1 Walls

Provide expansion joints at control joints in backing material. Wherever backing material changes, install an expansion joint to separate the different materials.

3.6.2 Floors

Provide expansion joints over construction joints, control joints, and expansion joints in concrete slabs. Provide expansion joints where tile

abuts restraining surfaces such as perimeter walls, curbs and columns and at intervals of 24 to 36 feet each way in large interior floor areas and 12 to 16 feet each way in large exterior areas or areas exposed to direct sunlight or moisture. Extend expansion joints through setting-beds and fill.

3.7 CLEANING AND PROTECTING

Upon completion, thoroughly clean tile surfaces in accordance with manufacturer's approved cleaning instructions. Do not use acid for cleaning glazed tile. Clean floor tile with resinous grout or with factory mixed grout in accordance with printed instructions of the grout manufacturer. After the grout has set, provide a protective coat of a noncorrosive soap or other approved method of protection for tile wall surfaces. Cover tiled floor areas with building paper before foot traffic is permitted over the finished tile floors. Provide board walkways on tiled floors that are to be continuously used as passageways by workmen. Replace damaged or defective tiles.

3.8 WASTE MANAGEMENT

Separate waste, including metal and cardboard, in accordance with the Waste Management Plan and recycle or reuse. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in designated containers and areas. Close and seal tightly partly used sealant and adhesive containers and store in protected, well-ventilated, fire-safe area at moderate temperature. Place materials defined as hazardous or toxic waste, including used sealant and adhesive tubes and containers, in designated containers and areas and dispose of properly. Crush broken tile, offcuts smaller than a half tile, and excess mortar and grout for use as mosaic, sub-base, or fill. Institute recycling to take advantage of manufacturer's programs. When such a service is not available, seek local recyclers to reclaim the materials.

-- End of Section --

SECTION 09 51 00

ACOUSTICAL CEILINGS
08/10

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM A 1008/A 1008M	(2009a) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardened
ASTM A 641/A 641M	(2009a) Standard Specification for Zinc-Coated (Galvanized) Carbon Steel Wire
ASTM A 653/A 653M	(2009a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM B 633	(2007) Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
ASTM C 423	(2009a) Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method
ASTM C 635/C 635M	(2007) Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings
ASTM C 636/C 636M	(2008) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM C 834	(2010) Latex Sealants
ASTM E 1264	(2008) Acoustical Ceiling Products
ASTM E 1414	(2006) Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum
ASTM E 1477	(1998a; R 2008) Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers
ASTM E 580/E 580M	(2009a) Application of Ceiling Suspension

	Systems for Acoustical Tile and Lay-In Panels in Areas Requiring Moderate Seismic Restraint
ASTM E 795	(2005) Mounting Test Specimens During Sound Absorption Tests

GREENGUARD ENVIRONMENTAL INSTITUTE (GEI)

GEI	Greenguard Standards for Low Emitting Products

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	Scientific Certification Systems (SCS)Indoor Advantage

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(1989; R 2005) Adhesive and Sealant Applications

U.S. DEPARTMENT OF DEFENSE (DOD)

UFC 3-310-04	(2007; Change 1) Seismic Design for Buildings

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2009) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

UNDERWRITERS LABORATORIES (UL)

UL Fire Resistance	(2010) Fire Resistance Directory

1.2 SYSTEM DESCRIPTION

Provide sound controlling units mechanically mounted on a ceiling suspension system for acoustical treatment. The unit size, texture, finish, and color must be as specified. The location and extent of acoustical treatment shall be as shown on the approved detail drawings. Submit drawings showing suspension system, method of anchoring and fastening, details, and reflected ceiling plan.

1.2.1 Ceiling Attenuation Class and Test

Provide a ceiling system with an attenuation class (CAC) of 40 for when determined in accordance with ASTM E 1414. Provide fixture attenuators over light fixtures and other ceiling penetrations, and provide acoustical blanket insulation adjacent to partitions, as required to achieve the specified CAC. Provide test ceiling continuous at the partition and assembled in the suspension system in the same manner that the ceiling will be installed on the project.

1.2.2 Ceiling Sound Absorption

Determine the Noise Reduction Coefficient (NRC) in accordance with ASTM C 423 Test Method. A sound-attenuating backer may be provided to achieve the specified NRC, provided it is in accordance with manufacturer's recommendations.

1.2.3 Light Reflectance

Determine light reflectance factor in accordance with ASTM E 1477 Test Method.

1.2.4 Other Submittals Requirements

The following shall be submitted:

a. Manufacturer's data indicating percentage of recycle material in acoustic ceiling tiles to verify affirmative procurement compliance.

b. Total weight and volume quantities of acoustic ceiling tiles with recycle material.

c. Manufacturer's catalog showing UL classification of fire-rated ceilings giving materials, construction details, types of floor and roof constructions to be protected, and UL design number and fire protection time rating for each required floor or roof construction and acoustic ceiling assembly.

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

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

1.2.4.1 LEED Submittal Requirements

The following documentation shall be submitted in accordance with LEED:

a. Documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project. Documentation relative to recycled content credit shall be in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

b. Documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project. Documentation relative to local/regional materials credit shall be in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

c. Documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content

products to total dollar value of products included in project. Documentation relative to rapidly renewable materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook

d. Documentation relative to low-emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Approved Detail Drawings; G

SD-03 Product Data

Ceiling Units; G
Certification (LEED); G
Suspension System; G

SD-04 Samples

Ceiling Units; G
Suspension System; G

SD-06 Test Reports

Ceiling Attenuation Class and Test; G

SD-07 Certificates

Ceiling Units

SD-11 Closeout Submittals

Documentation; (LEED)

LEED documentation relative to local/regional materials credit, recycled content credit, and rapidly renewable materials content, in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Adhesives; (LEED)

LEED documentation relative to low emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 SUSTAINABLE DESIGN CERTIFICATION

Product shall be third party certified by GEI Greenguard Indoor Air Quality Certified, SCS Scientific Certification Systems Indoor Advantage or equal. Certification shall be performed annually and shall be current.

1.5 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the site in the manufacturer's original unopened containers with brand name and type clearly marked. Carefully handle and store materials in dry, watertight enclosures. Immediately before installation, store acoustical units for not less than 24 hours at the same temperature and relative humidity as the space where they will be installed in order to assure proper temperature and moisture acclimation. Acoustical units shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants.

1.6 ENVIRONMENTAL REQUIREMENTS

Maintain a uniform temperature of not less than 60 degrees F nor more than 85 degrees F and a relative humidity of not more than 70 percent for 24 hours before, during, and 24 hours after installation of acoustical units.

1.7 SCHEDULING

Complete and dry interior finish work such as plastering, concrete and terrazzo work before ceiling installation. Complete mechanical, electrical, and other work above the ceiling line; install and start operating heating, ventilating, and air conditioning systems in order to maintain temperature and humidity requirements.

1.8 WARRANTY

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

1.9 EXTRA MATERIALS

Furnish spare tiles, from the same lot as those installed, of each color at the rate of 5 tiles for each 1000 tiles installed.

PART 2 PRODUCTS

2.1 CEILING UNITS

Comply with EPA requirements in accordance with Section 01 62 35 RECYCLED / RECOVERED MATERIALS. Submit two samples of each type of acoustical unit and each type of suspension grid tee section showing texture, finish, and color. Conform acoustical units to ASTM E 1264, Class A, and the following requirements:

2.1.1 Affirmative Procurement

Mineral Wool, Cellulose, and Laminated Paperboard used in acoustic ceiling tiles are materials listed in the EPA's Comprehensive Procurement Guidelines (CPG) (http://www.epa.gov/cpg/). EPA's recommended Recovered Materials Content Levels for Mineral Wool, Cellulose, Structural Fiberboard and Laminated Paperboard are:

Product	Material	Percent of Post Consumer Materials	Percent of Total Recovered Materials
Laminate Paperboard	Post Consumer Paper	100	100
Rock Wool	Slag	75	
Cellulose	Post Consumer Paper	75	75

a. The recommended recovered materials content levels are based on the weight (not volume) of materials in the insulating core only.

b. For informational purposes, a list of known sources for acoustical ceiling tiles using recycled material is provided in the EPA/CPG Supplier database at http://www.ergweb2.com/cpg4review/user/cpg search.cfm.

c. Note that the Contractor is not limited to these sources. A product meeting CPG recycle requirements from other sources may be submitted for the Government's approval.

d. Submit recycled material content data for acoustic ceiling tiles indicating compliance with affirmative procurement and LEED requirements.

e. Submit total weight and volume quantities of acoustic ceiling tiles with recycle material.

2.1.2 Rapidly Renewable Content

Provide acoustical ceiling tiles that contain a minimum of 10% rapidly renewable materials. Submit documentation relative to rapidly renewable material credit, in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

2.1.3 Units for Exposed-Grid System

a. Type: III (non-asbestos mineral fiber with painted finish).

b. Flame Spread: Class A, 25 or less

c. Pattern: C D E.

d. Minimum NRC: 0.70 in all rooms and areas when tested on mounting Type E-400 of ASTM E 795.

e. Minimum Light Reflectance Coefficient: LR-1, 0.75 or greater.

f. Nominal size: 24 by 48 by 3/4 inch.

g. Edge detail: Square.

h. Finish: Factory-applied standard finish.

i. Minimum CAC: 40.

j. Minimum recycled content: 58%

2.1.4 Units for Curved Grid System

a. Type: Perforated Painted Aluminum
b. Flame Spread: Class A, 25 or less
c. Pattern: Square perforations, 11% open area
d. Minimum NRC: 0.65, including sound-attenuating backer
e. Minimal Light Refletance Coefficient: LR-1, 0.75 or greater
f. Nominal Size: 2 feet by 6 feet
g. Finish: Factory-applied painted metal finish
h. Minimum CAC: 40
i. Minimum recycled content: 90%

2.2 SUSPENSION SYSTEM

2.2.1 Exposed-Grid Suspension

Provide standard exposed-grid suspension system conforming to ASTM C 635/C 635M for intermediate-duty systems. Provide surfaces exposed to view of aluminum or steel with a factory-applied white baked-enamel finish. Provide wall molding having a flange of not less than 15/16 inch. Provide mitered corners. Suspended ceiling framing system must have the capability to support the finished ceiling, light fixtures, air diffusers, and accessories, as shown. Provide a suspension system with a maximum deflection of 1/360 of the span length. Conform seismic details to the guidance in UFC 3-310-04 and ASTM E 580/E 580M.

2.2.2 Curved Grid Suspension System

Provide standard curved grid suspension system conforming to ASTM C 635/C 635M for intermediate duty systems. Provide standard grid profile exposed to view of steel, with factory-applied finish to match panel units. Provide wall molding having a flange of not less than 15/16 inch. Provide a suspension system with a maximum deflection of 1/360 of the spen length. Conform seismic details to the guidance in UFC 3-310-04 and ASTM E 580/E 580M.

2.3 HANGERS

Provide hangers and attachment capable of supporting a minimum 300 pound ultimate vertical load without failure of supporting material or attachment.

2.3.1 Wires

Conform wires to ASTM A 641/A 641M, Class 1, 0.11 inch in diameter.

2.3.2 Straps

Provide straps of 1 by 3/16 inch galvanized steel conforming to ASTM A 653/A 653M, with a light commercial zinc coating or ASTM A 1008/A 1008M with an electrodeposited zinc coating conforming to ASTM B 633, Type RS.

2.4 ADHESIVE

Use adhesive as recommended by tile manufacturer and complying with the requirements of SCAQMD Rule 1168.

2.5 FINISHES

Use manufacturer's standard textures, patterns and finishes as specified for acoustical units and suspension system members. Treat ceiling suspension system components to inhibit corrosion.

2.6 COLORS AND PATTERNS

Use colors and patterns for acoustical units and suspension system components as specified in Section 09 06 90 COLOR SCHEDULE, or on the drawing.

2.7 ACOUSTICAL SEALANT

Conform nonstaining acoustical sealant to ASTM C 834 and the requirements of SCAQMD Rule 1168.

PART 3 EXECUTION

3.1 INSTALLATION

Examine surfaces to receive directly attached acoustical units for unevenness, irregularities, and dampness that would affect quality and execution of the work. Rid areas, where acoustical units will be cemented, of oils, form residue, or other materials that reduce bonding capabilities of the adhesive. Complete and dry interior finish work such as plastering, concrete, and terrazzo work before installation. Complete and approve mechanical, electrical, and other work above the ceiling line prior to the start of acoustical ceiling installation. Provide acoustical work complete with necessary fastenings, clips, and other accessories required for a complete installation. Do not expose mechanical fastenings in the finished work. Lay out hangers for each individual room or space. Provide hangers to support framing around beams, ducts, columns, grilles, and other penetrations through ceilings. Keep main runners and carrying channels clear of abutting walls and partitions. Provide at least two main runners for each ceiling span. Wherever required to bypass an object with the hanger wires, install a subsuspension system so that all hanger wires will be plumb.

3.1.1 Suspension System

Install suspension system in accordance with ASTM C 636/C 636M and as specified herein. Do not suspend hanger wires or other loads from underside of steel decking.

3.1.1.1 Plumb Hangers

Install hangers plumb and not pressing against insulation covering ducts and pipes. Where lighting fixtures are supported from the suspended ceiling system, provide hangers at a minimum of four hangers per fixture and located not more than 6 inch from each corner of each fixture.

3.1.1.2 Splayed Hangers

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

3.1.2 Wall Molding

Provide wall molding where ceilings abut vertical surfaces. Miter corners where wall moldings intersect or install corner caps. Secure wall molding not more than 3 inch from ends of each length and not more than 16 inch on centers between end fastenings. Provide wall molding springs at each acoustical unit in semi-exposed or concealed systems.

3.1.3 Ceiling Units

Install ceiling units in accordance with the approved installation instructions of the manufacturer. Ensure that edges of acoustical units are in close contact with metal supports, with each other, and in true alignment. Arrange ceiling units so that units less than one-half width are minimized. Hold units in exposed-grid system in place with manufacturer's standard hold-down clips, if units weigh less than 1 psf or if required for fire resistance rating.

3.1.4 Caulking

Seal all joints around pipes, ducts or electrical outlets penetrating the ceiling. Apply a continuous ribbon of acoustical sealant on vertical web of wall or edge moldings.

3.1.5 Adhesive Application

Wipe back of tile to remove accumulated dust. Daub acoustical units on back side with four equal daubs of adhesive. Apply daubs near corners of tiles. Ensure that contact area of each daub is at least 2 inch diameter in final position. Press units into place, aligning joints and abutting units tight and uniform without differences in joint widths.

3.2 CEILING ACCESS PANELS

Locate ceiling access panels directly under the items which require access.

3.3 CLEANING

Following installation, clean dirty or discolored surfaces of acoustical units and leave them free from defects. Remove units that are damaged or improperly installed and provide new units as directed.

3.4 RECLAMATION PROCEDURES

Neatly stack ceiling tile, designated for recycling by the Contracting Officer, on 4 by 4 foot pallets not higher than 4 foot. Panels must be completely dry. Shrink wrap and symmetrically stack pallets on top of each other without falling over.

-- End of Section --

SECTION 09 65 00

RESILIENT FLOORING
02/09

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM D 4078	(2002; R 2008) Water Emulsion Floor Polish
ASTM D 5603	(2001; R 2008) Rubber Compounding Materials - Recycled Vulcanizate Particulate Rubber
ASTM E 648	(2009a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source
ASTM F 1066	(2004) Standard Specification for Vinyl Composition Floor Tile
ASTM F 1482	(2004e1; R 2009) Installation and Preparation of Panel Type Underlayments to Receive Resilient Flooring
ASTM F 1861	(2008) Resilient Wall Base
ASTM F 1869	(2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride
ASTM F 2169	(2002; R 2008) Resilient Stair Treads
ASTM F 2170	(2009) Determining Relative Humidity in Concrete Floor Slabs in situ Probes
ASTM F 710	(2008) Standard Practice for Preparing Concrete Floors to Receive Resilient Flooring

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

1.2 SYSTEM DESCRIPTION

1.2.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local/recycled material requirements. Flooring materials may be locally available. Flooring and accessories may contain post-consumer or post-industrial recycled content.

1.2.2 Fire Resistance Requirements

Provide a minimum average critical radiant flux of 0.45 watts per square centimeter for flooring in corridors and exits when tested in accordance with ASTM E 648.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-02 Shop Drawings

Resilient Flooring and Accessories

Scaled drawings indicating patterns (including location of patterns and colors) and dimensions.

SD-03 Product Data

Resilient Flooring and Accessories; G

Manufacturer's descriptive data.

Adhesives; (LEED)

Manufacturer's descriptive data, documentation stating physical characteristics, and mildew and germicidal characteristics. Provide Material Safety Data Sheets (MSDS) for all primers and adhesives to the Contracting Officer. Highlight VOC emissions.

Vinyl Composition Tile;G
Wall Base; G
Stair Treads, Risers and Stringers

LEED documentation indicating percentage of post-industrial and post-consumer recycled content per unit of product. Indicate relative dollar value of recycled content products to total dollar value of products included in project.

Local/Regional Materials

LEED documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products

included in project.

LEED documentation indicating type of biobased material in product and biobased content. Indicate relative dollar value of biobased content products to total dollar value of products included in project.

SD-04 Samples

Resilient Flooring and Accessories; G

Three samples of each indicated color and type of flooring, base, mouldings, and accessories. Provide a minimum 2-1/2 by 4 inch sample.

SD-06 Test Reports

Moisture, Alkalinity and Bond Tests; G

Copy of test reports for moisture and alkalinity content of concrete slab, and bond test stating date of test, person conducting the test, and the area tested.

SD-08 Manufacturer's Instructions

Surface Preparation
Installation

Manufacturer's printed installation instructions for all flooring materials and accessories, including preparation of substrate, seaming techniques, and recommended adhesives.

SD-10 Operation and Maintenance Data

Resilient Flooring and Accessories

Data Package 1 in accordance with Section 01 78 23 OPERATION AND MAINTENANCE DATA.

SD-11 Closeout Submittals

Local/Regional Materials

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Resilient Flooring and Accessories

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Adhesives

LEED documentation relative to low-emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.4 DELIVERY, STORAGE, AND HANDLING

Deliver materials to the building site in original unopened containers bearing the manufacturer's name, style name, pattern color name and number, production run, project identification, and handling instructions. Store materials in a clean, dry, secure, and well-ventilated area free from strong contaminant sources and residues with ambient air temperature maintained above 68 degrees F and below 85 degrees F, stacked according to manufacturer's recommendations. Remove resilient flooring products from packaging to allow ventilation prior to installation. Protect materials from the direct flow of heat from hot-air registers, radiators and other heating fixtures and appliances. Observe ventilation and safety procedures specified in the MSDS. Do not store rubber surface products with materials that have a high capacity to adsorb volatile organic compound (VOC) emissions. Do not store exposed rubber surface materials in occupied spaces. Do not store near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas to receive resilient flooring at a temperature above 68 degrees F and below 85 degrees F for 3 days before application, during application and 2 days after application, unless otherwise directed by the flooring manufacturer for the flooring being installed. Maintain a minimum temperature of 55 degrees F thereafter. Provide adequate ventilation to remove moisture from area and to comply with regulations limiting concentrations of hazardous vapors.

1.6 SCHEDULING

Schedule resilient flooring application after the completion of other work which would damage the finished surface of the flooring.

1.7 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a one year period.

PART 2 PRODUCTS

2.1 VINYL COMPOSITION TILE

Conform to ASTM F 1066 Class 2, (through pattern tile), Composition 1, asbestos-free, 12 inch square and 3/32 inch thick. Provide color and pattern uniformly distributed throughout the thickness of the tile. Tile shall contain a minimum of 90 percent recycled material.

2.2 WALL BASE

Conform to ASTM F 1861, Type TS (vulcanized thermoset rubber) or Type TP (thermoplastic rubber), Style A (straight - installed with carpet) and Style B (coved - installed with resilient flooring). Provide 4 inch high and a minimum 1/8 inch thick wall base. Provide job formed corners in matching height, shape, and color. Rubber shall contain a minimum of 90 percent post-consumer recycled material. With Vulcanizate Particulate Rubber, use recycled tire treads in accordance with ASTM D 5603, fine mesh size particulate. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Rubber sheet flooring may contain post-consumer or post-industrial recycled content.

2.3 STAIR TREADS, RISERS AND STRINGERS

Conform to ASTM F 2169, Type TS (vulcanized thermoset rubber) or Type TP (thermoplastic rubber). Conform to ASTM F 2169 for surface of treads Class 2 raised diamond stud pattern. Provide square or round nosing. Provide either a one piece nosing/tread/riser or a two piece nosing/tread design with a matching coved riser. Rubber shall contain a minimum of 90 percent post-consumer recycled material. With Vulcanizate Particulate Rubber, use recycled tire treads in accordance with ASTM D 5603, fine mesh size particulate. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Rubber may contain post-consumer or post-industrial recycled content.

2.4 MOULDING

Provide tapered mouldings of rubber and types as recommended by flooring manufacturer for both edges and transitions of flooring materials specified. Provide vertical lip on moulding of maximum 1/4 inch. Provide bevel change in level between 1/4 and 1/2 inch with a slope no greater than 1:2.

2.5 ADHESIVES

Provide adhesives for flooring, base and accessories as recommended by the manufacturer and comply with local indoor air quality standards. Interior adhesives shall meet the requirements of LEED low emitting materials credit. VOC content shall be less than 50 grams/L.

2.6 SURFACE PREPARATION MATERIALS

Provide surface preparation materials, such as panel type underlayment, lining felt, and floor crack fillers as recommended by the flooring manufacturer for the subfloor conditions. Comply with ASTM F 1482 for panel type underlayment products. Use one of the following substrates:

a. Concrete.

2.7 POLISH/FINISH

Provide polish finish as recommended by the manufacturer and conform to ASTM D 4078 for polish.

2.8 CAULKING AND SEALANTS

Provide caulking and sealants in accordance with Section 07 92 00 JOINT SEALANTS.

2.9 MANUFACTURER'S COLOR, PATTERN AND TEXTURE

Provide color, pattern and texture for resilient flooring and accessories selected from manufacturer's standard colors. Provide flooring in any one continuous area or replacement of damaged flooring in continuous area from same production run with same shade and pattern.

PART 3 EXECUTION

3.1 EXAMINATION

Examine and verify that site conditions are in agreement with the design package. Report all conditions that will prevent a proper installation. Do not take any corrective action without written permission from the Government. Work will proceed only when conditions have been corrected and accepted by the installer.

3.2 SURFACE PREPARATION

Provide a smooth, true, level plane for surface preparation of the flooring, except where indicated as sloped. Floor to be flat to within 3/16 inch in 10 feet. Prepare subfloor in accordance with flooring manufacturer's recommended instructions. Prepare the surfaces of lightweight concrete slabs (as defined by the flooring manufacturer) as recommended by the flooring manufacturer. Comply with ASTM F 710 for concrete subfloor preparation. Floor fills or toppings may be required as recommended by the flooring manufacturer. Install underlayments, when required by the flooring manufacturer, in accordance with manufacturer's recommended printed installation instructions. Comply with ASTM F 1482 for panel type underlayments. Before any work under this section is begun, correct all defects such as rough or scaling concrete, chalk and dust, cracks, low spots, high spots, and uneven surfaces. Repair all damaged portions of concrete slabs as recommended by the flooring manufacturer. Remove concrete curing and sealer compounds from the slabs, other than the type that does not adversely affect adhesion. Remove paint, varnish, oils, release agents, sealers, waxes, and adhesives, as required by the flooring product in accordance with manufacturer's printed installation instructions.

3.3 MOISTURE, ALKALINITY AND BOND TESTS

Determine the suitability of the concrete subfloor for receiving the resilient flooring with regard to moisture content and pH level by moisture and alkalinity tests. Conduct moisture testing in accordance with ASTM F 1869 or ASTM F 2170, unless otherwise recommended by the flooring manufacturer. Conduct alkalinity testing as recommended by the flooring manufacturer. Determine the compatibility of the resilient flooring adhesives to the concrete floors by a bond test in accordance with the flooring manufacturer's recommendations.

3.4 PLACING VINYL COMPOSITION, LINOLEUM AND SOLID VINYL TILES

Install tile flooring and accessories in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's directions. Keep tile lines and joints square, symmetrical, tight, and even. Keep each floor in true, level plane, except where slope is indicated. Vary edge width as necessary to maintain full-size tiles in the field, no edge tile to be less than one-half the field tile size, except where irregular shaped rooms make it impossible. Cut flooring to fit around all permanent fixtures, built-in furniture and cabinets, pipes, and outlets. Cut, fit, and scribe edge tile to walls and partitions after field flooring has been applied.

3.5 PLACING MOULDING

Provide moulding where flooring termination is higher than the adjacent finished flooring and at transitions between different flooring materials.

When required, locate moulding under door centerline. Moulding is not required at doorways where thresholds are provided. Secure moulding with adhesive as recommended by the manufacturer. Prepare and apply adhesives in accordance with manufacturer's printed directions.

3.6 PLACING WALL BASE

Install wall base in accordance with manufacturer's printed installation instructions. Prepare and apply adhesives in accordance with manufacturer's printed directions. Tighten base joints and make even with adjacent resilient flooring. Fill voids along the top edge of base at masonry walls with caulk. Roll entire vertical surface of base with hand roller, and press toe of base with a straight piece of wood to ensure proper alignment. Avoid excess adhesive in corners.

3.7 PLACING STAIR TREADS, RISERS, AND STRINGERS

Secure and install stair treads, risers, and stringers in accordance with manufacturer's printed installation instructions. Cover the surface of treads and risers the full width of the stairs. Provide equal length pieces butted together to cover the treads and risers for stairs wider than manufacturer's standard lengths.

3.8 CLEANING

Immediately upon completion of installation of flooring in a room or an area, dry/clean the flooring and adjacent surfaces to remove all surplus adhesive. Clean flooring as recommended in accordance with manufacturer's printed maintenance instructions. No sooner than 5 days after installation, wash flooring with a nonalkaline cleaning solution, rinse thoroughly with clear cold water, and, except for rubber flooring and stair treads, risers and stringers, vinyl and other flooring not requiring polish finish by manufacturer, apply the number of coats of polish in accordance with manufacturer's written instructions. Clean and maintain all other flooring as recommended by the manufacturer.

3.9 WASTE MANAGEMENT

Separate offcuts and waste materials and reuse or recycle in accordance with the Waste Management Plan, keeping sheet materials larger than 2 square feet and tiles larger than 1/2 tiles separate for reuse. Identify manufacturer's policy for collection or return of construction scrap, unused material, demolition scrap, and/or packaging material. Place materials defined as hazardous or toxic waste in designated containers and dispose of properly. Close and seal tightly partly used sealant and adhesive containers and store protected in a well ventilated fire-safe area at moderate temperature.

3.10 PROTECTION

From the time of installation until acceptance, protect flooring from damage as recommended by the flooring manufacturer. Remove and replace flooring which becomes damaged, loose, broken, or curled and wall base which is not tight to wall or securely adhered.

-- End of Section --

SECTION 09 68 00

CARPET
01/07

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC 107	(2002) Colorfastness to Water
AATCC 16	(2004) Colorfastness to Light
AATCC 165	(1999) Colorfastness to Crocking: Textile Floor Coverings - AATCC Crockmeter Method
AATCC 174	(1998) Antimicrobial Activity Assessment of Carpets

ASTM INTERNATIONAL (ASTM)

ASTM D 3278	(1996; R 2004e1) Flash Point of Liquids by Small Scale Closed-Cup Apparatus
ASTM D 5252	(2005) Operation of the Hexapod Drum Tester
ASTM D 5417	(2005) Operation of the Vettermann Drum Tester
ASTM D 5793	(2005) Binding Sites Per Unit Length or Width of Pile Yarn Floor Coverings
ASTM D 5848	(2005) Mass Per Unit Area of Pile Yarn Floor Coverings
ASTM E 2129	(2005) Standard Practice for Data Collection for Sustainability Assessment of Building Products
ASTM E 648	(2006a) Standard Test Method for Critical Radiant Flux of Floor-Covering Systems Using a Radiant Heat Energy Source

CARPET AND RUG INSTITUTE (CRI)

CRI 104	(2002) Standard for Installation Specification of Commercial Carpet

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION (ISO)

ISO 2551	(1981) Machine-made Textile Floor

	Coverings - Determination of Dimensional Changes Due to the Effects of Varied Water and Heat Conditions

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 101	(2005; Errata 2006; TIA 2006; TIA 2006) Life Safety Code, 2006 Edition
NFPA 253	(2005) Test for Critical Radiant Flux of Floor Covering Systems Using a Radiant Heat Energy Source

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FS SS-W-40	(Rev A; Int Am 1, Notice 1) Wall Base: Rubber, and Vinyl Plastic

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; R 2005) Leadership in Energy and Environmental Design(tm) Green Building Rating System for New Construction (LEED-NC)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

16 CFR 1630	Standard for the Surface Flammability of Carpets and Rugs (FF 1-70)
40 CFR 247	Comprehensive Procurement Guideline for Products Containing Recovered Materials

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Carpet; G
Carpet Pads
Carpet Moldings
Base; G

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. Submit manufacturer's catalog data for the following items:

1) Carpet Pads
2) Carpet Moldings
3) Base

Surface Preparation
Installation

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

Regulatory Requirements

Three copies of report stating that carpet and carpet components contain recycled materials and/or involvement in a recycling or reuse program. Include in the report percentage of post-industrial and post-consumer recycled material and relative dollar value of recycled content products to total dollar value of products included in project. Include manufacturer's certification of compliance with Carpet and Rug Institute's Green Label Indoor Air Quality program

Environmental Data

Documentation indicating type of bio based material in product and bio based content. Indicate relative dollar value of bio based content products to total dollar value of products included in project.

SD-04 Samples

Carpet; G

a. Carpet: Three "Production Quality" samples 18 by 18 inches of each carpet proposed for use, showing quality, pattern, and color specified.

b. Vinyl or Aluminum Moldings: Three pieces of each type at least 12 inches long.

c. Special Treatment Materials: Three samples showing system and installation method.

SD-06 Test Reports

Moisture and Alkalinity Tests

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

SD-07 Certificates

Carpet

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

Regulatory Requirements

Report stating that the carpet contains recycled materials and indicating the actual percentage of recycled material.

Certificates, showing conformance with the referenced standards contained in this section, for the following:

1) Carpet Pads
2) Carpet Moldings
3) Base

SD-10 Operation and Maintenance Data

Carpet; G
Cleaning and Protection

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

Operational Service

Documentation of manufacturer's maintenance agreement or take-back program for carpet. Include contact information, summary of procedures, and the limitations and conditions applicable to the project. Indicate manufacturer's commitment to reclaim materials for recycling and/or reuse.

SD-11 Closeout Submittals

Local/Regional Materials; G (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Carpet; (LEED)

LEED documentation relative to recycled content credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Carpet; (LEED)

Adhesives and Concrete Primer; (LEED)

LEED documentation relative to low-emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 REGULATORY REQUIREMENTS

Provide the Carpet and Rug Institute (CRI) Indoor Air Quality (IAQ) label for carpet, carpet cushion, and adhesives or demonstrate compliance with testing criteria and frequencies through independent laboratory test results. Carpet, carpet cushion, and adhesives bearing the label will indicate that the carpet has been tested and meets the criteria of the CRI IAQ Carpet Testing Program, and minimizes the impact on indoor air quality. Procure carpet in accordance with 40 CFR 247, and where possible,purchased locally to reduce emissions of fossil fuels from transporting.

1.4 DELIVERY AND STORAGE

Deliver materials to the site in the manufacturer's original wrappings and packages clearly labeled with the manufacturer's name, brand name, size, dye lot number, and related information. Remove materials from packaging and store them in a clean, dry, well ventilated area (100 percent outside air supply, minimum of 1.5 air changes per hour, and no recirculation), protected from damage, soiling, and moisture, and strong contaminant sources and residues,and maintain at a temperature above 60 degrees F for 2 days prior to installation. Carpet or carpet tiles shall not be stored with materials which have high emissions of volatile organic compounds (VOCs) or other contaminants. Do not store carpet near materials that may offgas or emit harmful fumes, such as kerosene heaters, fresh paint, or adhesives.

1.5 ENVIRONMENTAL REQUIREMENTS

Maintain areas in which carpeting is to be installed at a temperature above 60 degrees F and below 90 degrees F for 2 days before installation, during installation, and for 2 days after installation. Provide temporary ventilation during work of this section. Maintain a minimum temperature of 55 degrees F thereafter for the duration of the contract. Do not permit traffic or movement of furniture or equipment in carpeted area for 24 hours after installation. Complete other work which would damage the carpet prior to installation of carpet.

1.6 SUSTAINABLE DESIGN REQUIREMENTS

1.6.1 Local/Regional Materials

Use materials or products extracted, harvested, or recovered, as well as manufactured, within a 500 mile radius from the project site, if available from a minimum of three sources.See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total local material requirements. Carpet materials may be locally available.

1.6.2 Environmental Data

Submit Table 1 of ASTM E 2129 for the following products: Carpet, Pad, & Adhesives.

1.7 SCHEDULING

Install carpet systems after the installation and ventilation period of materials or finishes which have high short-term emissions of VOCs, formaldehyde, particulates, or other air-borne compounds which may be adsorbed by or settle on the carpet tiles.

1.8 WARRANTY

Provide manufacturer's standard performance guarantees or warranties including minimum ten (10) year wear warranty, two (2) year material and workmanship and ten (10) year tuft bind and delamination.

1.9 OPERATIONAL SERVICE

Collect information from the manufacturer about maintenance agreement options, and submit to Contracting Officer. Service shall reclaim materials for recycling and/or reuse. Service shall not landfill or burn reclaimed materials. When such a service is not available, local recyclers shall be

sought after to reclaim the materials.

1.10 EXTRA MATERIAL

Provide extra material from same dye lot consisting of uncut carpet tiles for future maintenance. Provide a minimum of 5 percent of total square yards of each carpet type, pattern, and color.

PART 2 PRODUCTS

2.1 CARPET

Furnish first quality carpet; free of visual blemishes, streaks, poorly dyed areas, fuzzing of pile yarn, spots or stains, and other physical and manufacturing defects. Provide carpet materials and treatments as reasonably nonallergenic and free of other recognized health hazards. Provide a static control construction on all grade carpets which gives adequate durability and performance. Provide the Carpet and Rug Institute (CRI)Indoor Air Quality (IAQ) Label. Carpet type bearing the label will indicate that carpet has been tested and meets the criteria of the CRI Green Label Requirements for Indoor Air Quality Test Criteria. Carpet tiles shall have Carpet Component Identification Codes as established by the CRI for future recycling. The labels shall be permanently printed or attached to the carpet backing. The codes shall identify, at minimum, the carpet's face fiber, primary backing, and secondary backing.

2.1.1 Polyester Carpet Face Fibers

For informational purposes, a list of sources known to recycle polyester carpet face fibers is provided below. Note that the Contractor is not limited to these sources. An approved product from other sources may be submitted for the Government's approval during construction. Acceptable manufacturer's include, but are not limited to:

Bretlin, Inc.
LaFayette, Georgia

Central Vermont Carpet
Barre, Vermont

Environmental Building Supplies
Portland, Oregon

Image Industries
Amuchee, Georgia

Martin Color-FI
Edgefield, South Carolina

Talisman Mills, Inc.
Mequon, Wisconsin

2.1.2 Physical Characteristics

2.1.2.1 Modular Tile Carpet

Carpet shall comply with the following:

a. Carpet Construction: per drawings.

b. Type: Modular tile 24 by 24 inch square with 0.15 percent growth/shrink rate in accordance with ISO 2551.

c. Pile Type: Level-loop per drawings.

d. Pile Fiber: Commercial 100 percent branded (federally registered trademark) nylon staple, minimum 10 percent post-consumer or 40 percent post-industrial recycled content with 25 percent minimum total combined recycled content.

e. Gauge or Pitch: Minimum 1/12 per inch in accordance with ASTM D 5793.

f. Finished Pile Yarn Weight: Minimum 134.7 ounces per square yard. This does not include weight of backings. Determine weight in accordance with ASTM D 5848.

g. Backing Materials: Provide primary backing materials like those customarily used and accepted by the trade for each type of carpet. Provide secondary backing to suit project requirements of those customarily used and accepted by the trade for each type of carpet, except when a special unitary back designed for glue down is needed. See Section 01 33 29 LEED(tm) DOCUMENTATION for cumulative total recycled content requirements. Carpet backing may contain post-consumer or post-industrial recycled content.

2.2 PERFORMANCE REQUIREMENTS

a. ARR (Appearance Retention Rating): Test carpet with the minimum 3.0-3.5 (Heavy) ARR 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.

b. Flammability and Critical Radiant Flux Requirements: Comply carpet with 16 CFR 1630. Provide carpet in corridors and exits with a minimum average critical radiant flux to meet minimum standards of NFPA 101 when tested in accordance with ASTM E 648.

c. Tuft Bind: Provide tuft bind force required to pull a tuft or loop free from carpet backing with a minimum 10 pound average force for loop pile or 3 pound average force for cut pile.

d. Colorfastness to Crocking: Comply dry and wet crocking with AATCC 165 and with a Class 4 minimum rating on the AATCC Color Transference Chart for all colors.

e. Colorfastness to Light: Comply colorfastness to light with AATCC 16, Test Option E "Water-Cooled Xenon-Arc Lamp, Continuous Light" and with a minimum 4 grey scale rating after 40 hours.

f. Colorfastness to Water: Comply colorfastness to water with AATCC 107 and with a minimum 4.0 gray scale rating and a minimum 4.0 transfer scale rating.

g. Delamination Strength: Provide delamination strength for tufted carpet with a secondary back of minimum 2.5 lbs/inch.

h. Antimicrobial: Nontoxic antimicrobial treatment in accordance with AATCC 174 Part I (qualitative), guaranteed by the carpet manufacturer to last the life of the carpet.

2.3 CARPET PADS

Provide a sponge rubber pad, 64-ounce flame spread in accordance with NFPA 253.

2.3.1 Carpet Cushion

For informational purposes, a list of sources known to recycle carpet cushions is provided below. Note that the Contractor is not limited to these sources. An approved product from other sources may be submitted for the Government's approval during construction. Acceptable manufacturer's include, but are not limited to:

Collins & Aikman Floor Coverings
Dalton, Georgia

Chris Craft International Products
Waterford, New York

Carpenter Company
Richmond, Virginia

Dixie Manufacturing Corporation
Norfolk, Virginia

2.3.2 Recycling Requirements

Provide rubber carpet cushions with recycled tire rubber and be made from 60-90 percent of post consumer content and 60-90 percent or synthetic carpet cushions with recycled carpet fabrication scrap and be made from 100 percent of total recovered materials content.

2.4 CARPET MOLDINGS

Install carpet moldings, either vinyl or aluminum, where floor covering material changes or carpet edge does not abut a vertical surface.

2.5 BASE

Conform to FS SS-W-40 for vinyl base. Provide minimum overall thickness of base not less than 0.125 inch, color as selected from manufacturer's full line. Straight style, 4 inch high. Furnish base in rolls not less than 96 feet long. Premold corners with wings not less than 2 inch long.

2.6 ADHESIVES AND CONCRETE PRIMER

Adhesives and concrete primers shall comply with applicable regulations regarding toxic and hazardous materials. Use peel and stick dry adhesive or wet adhesive with a maximum VOC content of 50 grams/liter. Provide waterproof, nonflammable, and nonstaining adhesives and concrete primers for carpet installation to meet local air-quality standards, and as required by the carpet manufacturer. Provide release adhesive for modular tile carpet as recommended by the carpet manufacturer. Provide adhesives flashpoint of minimum 140 degrees F in accordance with ASTM D 3278.

2.7 TAPE

Provide tape for seams as recommended by the carpet manufacturer for the type of seam used in installation. Any seam sealant shall have a maximum VOC content of 50 grams/liter. Do not use sealants that contain 1,1,1-trichloroethane or toluene.

PART 3 EXECUTION

3.1 SURFACE PREPARATION

Do not install carpet on surfaces that are unsuitable and will prevent a proper installation. Repair holes, cracks, depressions, or rough areas using material recommended by the carpet or adhesive manufacturer. Free floor of any foreign materials and sweep clean. Before beginning work, test subfloor with glue and carpet to determine "open time" and bond.

3.2 MOISTURE AND ALKALINITY TESTS

Test concrete slab shall for moisture content and excessive alkalinity in accordance with CRI 104.

3.3 PREPARATION OF CONCRETE SUBFLOOR

Do not commence installation of the carpeting shall until concrete substrate is at least 90 days old. Prepare the concrete surfaces in accordance with instructions of the carpet manufacturer. Match carpet, when required, and adhesives to prevent off-gassing to a type of curing compounds, leveling agents, and concrete sealer.

3.4 INSTALLATION

Isolate area of installation from rest of building. Perform all work by installers who are CFI certified (International Certified Floor covering Installer Association), or manufacturer's approved installers. Conduct installation in accordance with the manufacturer's printed instructions and CRI 104. Protect edges of carpet meeting hard surface flooring with molding and install in accordance with the molding manufacturer's printed instructions. Mothproofing for wool carpets shall use autofoam mothproofing system. Follow ventilation, personal protection, and other safety precautions recommended by the adhesive manufacturer. Continue ventilation during installation and for at least 72 hours following installation.

3.4.1 Modular Tile Installation

Install modular tiles with release adhesive and snugly jointed together. Lay tiles in an alternating pattern with accessibility to the subfloor where required.

3.5 CLEANING AND PROTECTION

3.5.1 Cleaning

After installation of the carpet, remove debris, scraps, and other foreign matter. Remove soiled spots and adhesive from the face of the carpet with appropriate spot remover. Cut off and remove protruding face yarn. Vacuum carpet clean with a high-efficiency particulate air (HEPA) filtration vacuum.

3.5.2 Protection

Protect the installed carpet from soiling and damage with heavy, reinforced, nonstaining kraft paper, plywood, or hardboard sheets. Lap and secure edges of kraft paper protection to provide a continuous cover. Restrict traffic for at least 48 hours. Remove protective covering when directed by the Contracting Officer.

3.6 REMNANTS

Collect information from manufacturer about maintenance agreement or take-back program options, and provide to Contracting Officer. Manage waste as specified in the Waste Management Plan. Non-retained scraps shall be set aside and returned to manufacturer for recycling into new product.

-- End of Section --

SECTION 09 90 00

PAINTS AND COATINGS
04/06

PART 1 GENERAL

1.1 REFERENCES

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

AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS (ACGIH)

ACGIH 0100Doc	(2005) Documentation of the Threshold Limit Values and Biological Exposure Indices

ASTM INTERNATIONAL (ASTM)

ASTM D 2092	(2001) Preparation of Zinc-Coated (Galvanized) Steel Surfaces for Painting
ASTM D 4263	(1983; R 1999) Indicating Moisture in Concrete by the Plastic Sheet Method
ASTM D 4444	(1992; R 2003) Use and Calibration of Hand-Held Moisture Meters
ASTM D 523	(1989; R 1999) Specular Gloss
ASTM F 1869	(2004) Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride

GREEN SEAL (GS)

GC-03	(1997) Anti-Corrosive Paints
GS-11	(1993) Paints

MASTER PAINTERS INSTITUTE (MPI)

MPI 1	(Jan 2004) Aluminum Paint
MPI 101	(Jan 2004) Epoxy Anti-Corrosive Metal Primer
MPI 107	(Jan 2004) Rust Inhibitive Primer (Water-Based)
MPI 108	(Jan 2004) High Build Epoxy Coating, Low Gloss
MPI 11	(Jan 2004) Exterior Latex, Semi-Gloss, MPI Gloss Level 5
MPI 110	(Jan 2004) Water Based Light Industrial

	Coating, G6, G5, G3
MPI 134	(Jan 2004) Galvanized Primer (Waterbased)
MPI 145	(Jan 2004) Institutional Low Odor / VOC Interior Latex, MPI Gloss Level 3
MPI 146	(Jan 2004) Institutional Low Odor/VOC Interior Latex, MPI Gloss Level 4
MPI 19	(Jan 2004) Inorganic Zinc Rich Primer
MPI 2	(Jan 2004) Aluminum Heat Resistant Enamel (up to 427 C and 800 F
MPI 21	(Jan 2004) Heat Resistant Enamel, Gloss (up to 205 degrees C and 400 degrees F), MPI Gloss Level 6
MPI 22	(Jan 2004) Aluminum Paint, High Heat (up to 590 degrees C and 1100 degrees F.
MPI 23	(Jan 2004) Surface Tolerant Metal Primer
MPI 26	(Jan 2004) Cementitious Galvanized Metal Primer
MPI 4	(Jan 2004) Interior/Exterior Latex Block Filler
MPI 47	(Jan 2004) Interior Alkyd, Semi-Gloss, MPI Gloss Level 5
MPI 50	(Jan 2004) Interior Latex Primer Sealer
MPI 57	(Jan 2004) Interior Oil Modified Urethane Clear Satin
MPI 72	(Jan 2004) Polyurethane, Two Component, Pigmented, Gloss
MPI 79	(Jan 2004) Alkyd Anti-Corrosive Metal Primer
MPI 90	(Jan 2004) Interior Wood Stain, Semi-Transparent
MPI 94	(Jan 2004) Exterior Alkyd, Semi-Gloss, MPI Gloss Level 5
MPI 95	(Jan 2004) Quick Drying Primer for Aluminum

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS SP01-01	(2000) Environmentally Preferable Product Specification for Architectural and Anti-Corrosive Paints

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT (SCAQMD)

SCAQMD Rule 1168	(1989; R 2005) Adhesive and Sealant Applications

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

SSPC Guide 3	(1982; R 1995) A Guide to Safety in Paint Application
SSPC PA 1	(20050) Shop, Field, and Maintenance Painting
SSPC SP 1	(1982; R 2004) Solvent Cleaning
SSPC SP 10	(2000; R 2004) Near-White Blast Cleaning
SSPC SP 2	(1982; R 2004) Hand Tool Cleaning
SSPC SP 3	(1982; R 2004) Power Tool Cleaning
SSPC SP 6	(2000; R 2004) Commercial Blast Cleaning
SSPC SP 7	(2000; R 2004) Brush-Off Blast Cleaning
SSPC VIS 1	(2002) Guide and Reference Photographs for Steel Surfaces Prepared by Dry Abrasive Blast Cleaning
SSPC VIS 3	(1993; R 2000) Visual Standard for Power-and Hand-Tool Cleaned Steel

U.S. ARMY CORPS OF ENGINEERS (USACE)

EM 385-1-1	(2003) Safety -- Safety and Health Requirements

U.S. DEPARTMENT OF DEFENSE (DOD)

MIL-STD-101	(Rev B) Color Code for Pipelines & for Compressed Gas Cylinders

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

FED-STD-313	(Rev D; Am 1) Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities

U.S. GREEN BUILDING COUNCIL (USGBC)

LEED	(2002; E2005) Leadership in Energy and Environmental Design (tm) Green Building Rating System for New Construction (LEED NC)

U.S. NATIONAL ARCHIVES AND RECORDS ADMINISTRATION (NARA)

29 CFR 1910.1000	Air Contaminants

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. The following shall be submitted in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

The current MPI, "Approved Product List" which lists paint by 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 a 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 Products List is acceptable.

Samples of specified materials may be taken and tested for compliance with specification requirements.

In keeping with the intent of Executive Order 13101, "Greening the Government through Waste Prevention, Recycling, and Federal Acquisition", products certified by SCS as meeting SCS SP01-01 shall be given preferential consideration over registered products. Products that are registered shall be given preferential consideration over products not carrying any EPP designation.

SD-03 Product Data

Coatings; G
Local/Regional Materials; G(LEED)

Submit documentation indicating distance between manufacturing facility and the project site. Indicate distance of raw material origin from the project site. Indicate relative dollar value of local/regional materials to total dollar value of products included in project.

Manufacturer's technical data sheets; G (LEED)

Indicate VOC content.

SD-04 Samples

Color; G

Submit manufacturer's samples of paint colors. Cross reference color samples to color scheme as indicated.

SD-08 Manufacturer's Instructions

Mixing

Detailed mixing instructions, minimum and maximum application temperature and humidity, pot life, and curing and drying times between coats.

Manufacturer's Material Safety Data Sheets

Submit manufacturer's Material Safety Data Sheets for coatings, solvents, and other potentially hazardous materials, as defined in FED-STD-313.

SD-11 Closeout Submittals

Local/Regional Materials; (LEED)

LEED documentation relative to local/regional materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

Materials; (LEED)

LEED Documentation relative to low emitting materials credit in accordance with LEED Reference Guide. Include in LEED Documentation Notebook.

1.3 QUALITY ASSURANCE

1.3.1 Field Samples and Tests

The Contracting Officer may choose up to two coatings that have been delivered to the site to be tested at no cost to the Government. Take samples of each chosen product as specified in the paragraph "Sampling Procedures." Test each chosen product as specified in the paragraph "Testing Procedure." Products which do not conform, shall be removed from the job site and replaced with new products that conform to the referenced specification. Testing of replacement products that failed initial testing shall be at no cost to the Government.

1.3.1.1 Sampling Procedure

The Contracting Officer will select paint at random from the products that have been delivered to the job site for sample testing. The Contractor shall provide one quart samples of the selected paint materials. The samples shall be taken in the presence of the Contracting Officer, and labeled, identifying each sample. Provide labels in accordance with the paragraph "Packaging, Labeling, and Storage" of this specification.

1.3.1.2 Testing Procedure

Provide Batch Quality Conformance Testing for specified products, as defined by and performed by MPI. As an alternative to Batch Quality Conformance Testing, the Contractor may provide Qualification Testing for specified products above to the appropriate MPI product specification, using the third-party laboratory approved under the paragraph "Qualification Testing" laboratory for coatings. The qualification testing lab report shall include the backup data and summary of the test results. The summary shall list all of the reference specification requirements and the result of each test. The summary shall clearly indicate whether the tested paint meets each test requirement. Note that Qualification Testing may take 4 to 6 weeks to perform, due to the extent of testing required.

Submit name, address, telephone number, FAX number, and e-mail address of the independent third party laboratory selected to perform testing of coating samples for compliance with specification requirements. Submit documentation that laboratory is regularly engaged in testing of paint samples for conformance with specifications, and that employees performing

testing are qualified. If the Contractor chooses MPI to perform the Batch Quality Conformance testing, the above submittal information is not required, only a letter is required from the Contractor stating that MPI will perform the testing.

1.4 REGULATORY REQUIREMENTS

1.4.1 Environmental Protection

In addition to requirements specified elsewhere for environmental protection, provide coating materials that conform to the restrictions of the local Air Pollution Control District and regional jurisdiction. Notify Contracting Officer of any paint specified herein which fails to conform.

1.4.2 Lead Content

Do not use coatings having a lead content over 0.06 percent by weight of nonvolatile content.

1.4.3 Chromate Content

Do not use coatings containing zinc-chromate or strontium-chromate.

1.4.4 Asbestos Content

Materials shall not contain asbestos.

1.4.5 Mercury Content

Materials shall not contain mercury or mercury compounds.

1.4.6 Silica

Abrasive blast media shall not contain free crystilline silica.

1.4.7 Human Carcinogens

Materials shall not contain ACGIH 0100Doc and ACGIH 0100Doc confirmed human carcinogens (A1) or suspected human carcinogens (A2).

1.4.8 Volatile Organic Compounds (VOCs)

Paints and coatings shall contain low VOCs in accordance with Green Seal Standards GS-11 and GC-03, and SCAQMD Rule 1168. Provide manufacturer's technical data sheets for all paints and coatings, showing VOC contents.

1.5 PACKAGING, LABELING, AND STORAGE

Paints shall be in sealed containers that legibly show the contract specification number, designation name, formula or specification number, batch number, color, quantity, date of manufacture, manufacturer's formulation number, manufacturer's directions including any warnings and special precautions, and name and address of manufacturer. Pigmented paints shall be furnished in containers not larger than 5 gallons. Paints and thinners shall be stored in accordance with the manufacturer's written directions, and as a minimum, stored off the ground, under cover, with sufficient ventilation to prevent the buildup of flammable vapors, and at temperatures between 40 to 95 degrees F. Do not store paint, polyurethane, varnish, or wood stain products with materials that have a high capacity to

absorb VOC emissions. Do not store paint, polyurethane, varnish, or wood stain products in occupied spaces.

1.6 SAFETY AND HEALTH

Apply coating materials using safety methods and equipment in accordance with the following:

Work shall comply with applicable Federal, State, and local laws and regulations, and with the ACCIDENT PREVENTION PLAN, including the Activity Hazard Analysis as specified in Section 01 35 14.11 40 DRYDEN SAFETY REQUIREMENTS and in Appendix A of EM 385-1-1. The Activity Hazard Analysis shall include analyses of the potential impact of painting operations on painting personnel and on others involved in and adjacent to the work zone.

1.6.1 Safety Methods Used During Coating Application

Comply with the requirements of SSPC Guide 3.

1.6.2 Toxic Materials

To protect personnel from overexposure to toxic materials, conform to the most stringent guidance of:

a. The applicable manufacturer's Material Safety Data Sheets (MSDS) or local regulation.

b. 29 CFR 1910.1000.

c. ACGIH 0100Doc, threshold limit values.

1.7 ENVIRONMENTAL CONDITIONS

1.7.1 Coatings

Do not apply coating when air or substrate conditions are:

a. Less than 5 degrees F above dew point;

b. Below 50 degrees F or over 95 degrees F, unless specifically pre-approved by the Contracting Officer and the product manufacturer. Under no circumstances shall application conditions exceed manufacturer recommendations.

1.8 SUSTANABLE DESIGN REQUIREMENTS

1.8.1 Local/Regional Materials

See Section 01 33 29 LEED(tm) Documentation for cumulative total material requirements. Paint and coating materials may be locally available.

1.9 SCHEDULING

Allow paint, polyurethane, varnish, and wood stain installations to cure prior to the installation of materials that absorb VOCs.

1.10 COLOR SELECTION

Colors of finish coats shall be as indicated or specified. Where not

indicated or specified, colors shall be selected by the Contracting Officer. Manufacturers' names and color identification are used for the purpose of color identification only. Named products are acceptable for use only if they conform to specified requirements. Products of other manufacturers are acceptable if the colors approximate colors indicated and the product conforms to specified requirements.

Tint each coat progressively darker to enable confirmation of the number of coats.

Color, texture, and pattern of wall coating systems shall be as indicated.

1.11 LOCATION AND SURFACE TYPE TO BE PAINTED

1.11.1 Painting Included

Where a space or surface is indicated to be painted, include the following unless indicated otherwise.

a. Surfaces behind portable objects and surface mounted articles readily detachable by removal of fasteners, such as screws and bolts.

b. New factory finished surfaces that require identification or color coding and factory finished surfaces that are damaged during performance of the work.

c. Existing coated surfaces that are damaged during performance of the work.

1.11.1.1 Exterior Painting

Includes new surfaces of the buildings and appurtenances. Also included are existing coated surfaces made bare by cleaning operations.

1.11.1.2 Interior Painting

Includes new surfaces of the buildings and appurtenances as indicated and existing coated surfaces made bare by cleaning operations. Where a space or surface is indicated to be painted, include the following items, unless indicated otherwise.

a. Exposed columns, girders, beams, joists, and metal deck; and

b. Other contiguous surfaces.

1.11.2 Painting Excluded

Do not paint the following unless indicated otherwise.

a. Surfaces concealed and made inaccessible by panelboards, fixed ductwork, machinery, and equipment fixed in place.

b. Surfaces in concealed spaces. Concealed spaces are defined as enclosed spaces above suspended ceilings, furred spaces, attic spaces, crawl spaces, elevator shafts and chases.

c. Steel to be embedded in concrete.

d. Copper, stainless steel, aluminum, brass, and lead except existing coated surfaces.

e. Hardware, fittings, and other factory finished items.

1.11.3 Mechanical and Electrical Painting

Includes field coating of interior and exterior new surfaces.

a. Where a space or surface is indicated to be painted, include the following items unless indicated otherwise.

(1) Exposed piping, conduit, and ductwork;

(2) Supports, hangers, air grilles, and registers;

(3) Miscellaneous metalwork and insulation coverings.

b. Do not paint the following, unless indicated otherwise:

(1) New zinc-coated, aluminum, and copper surfaces under insulation

(2) New aluminum jacket on piping

(3) New interior ferrous piping under insulation.

1.11.3.1 Fire Extinguishing Sprinkler Systems

Clean, pretreat, prime, and paint new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metalwork, and accessories. Apply coatings to clean, dry surfaces, using clean brushes. Clean the surfaces to remove dust, dirt, rust, and loose mill scale. Immediately after cleaning, provide the metal surfaces with one coat primer per schedules. Shield sprinkler heads with protective covering while painting is in progress. Upon completion of painting, remove protective covering from sprinkler heads. Remove sprinkler heads which have been painted and replace with new sprinkler heads. Provide primed surfaces with the following:

a. Piping in Unfinished Areas: Provide primed surfaces with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil in attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and spaces where walls or ceiling are not painted or not constructed of a prefinished material.

b. Piping in Finished Areas: Provide primed surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel applied to a minimum dry film thickness of 1.0 mil. Provide piping with 2 inch wide red enamel bands or self-adhering red plastic bands spaced at maximum of 20 foot intervals throughout the piping systems.

1.11.4 Definitions and Abbreviations

1.11.4.1 Qualification Testing

Qualification testing is the performance of all test requirements listed in the product specification. This testing is accomplished by MPI to qualify each product for the MPI Approved Product List, and may also be accomplished by Contractor's third party testing lab if an alternative to Batch Quality Conformance Testing by MPI is desired.

1.11.4.2 Batch Quality Conformance Testing

Batch quality conformance testing determines that the product provided is the same as the product qualified to the appropriate product specification. This testing shall only be accomplished by MPI testing lab.

1.11.4.3 Coatings

A film or thin layer applied to a base material called a substrate. A coating may be a metal, alloy, paint, or solid/liquid suspensions on various substrates (metals, plastics, wood, paper, leather, cloth, etc.). They may be applied by electrolysis, vapor deposition, vacuum, or mechanical means such as brushing, spraying, calendering, and roller coating. A coating may be applied for aesthetic or protective purposes or both. The term "coating" as used herein includes emulsions, enamels, stains, varnishes, sealers, epoxies, and other coatings, whether used as primer, intermediate, or finish coat. The terms paint and coating are used interchangeably.

1.11.4.4 DFT or dft

Dry film thickness, the film thickness of the fully cured, dry paint or coating.

1.11.4.5 DSD

Degree of Surface Degradation, the MPI system of defining degree of surface degradation. Five (5) levels are generically defined under the Assessment sections in the MPI Maintenance Repainting Manual.

1.11.4.6 EPP

Environmentally Preferred Products, a standard for determining environmental preferability in support of Executive Order 13101.

1.11.4.7 EXT

MPI short term designation for an exterior coating system.

1.11.4.8 INT

MPI short term designation for an interior coating system.

1.11.4.9 micron / microns

The metric measurement for 0.001 mm or one/one-thousandth of a millimeter.

1.11.4.10 mil / mils

The English measurement for 0.001 in or one/one-thousandth of an inch, equal to 25.4 microns or 0.0254 mm.

1.11.4.11 mm

The metric measurement for millimeter, 0.001 meter or one/one-thousandth of a meter.

1.11.4.12 MPI Gloss Levels

MPI system of defining gloss. Seven (7) gloss levels (G1 to G7) are generically defined under the Evaluation sections of the MPI Manuals. Traditionally, Flat refers to G1/G2, Eggshell refers to G3, Semigloss refers to G5, and Gloss refers to G6.

Gloss levels are defined by MPI as follows:

Gloss Level	Description	Units @ 60 degrees	Units @ 85 degrees
G1	Matte or Flat	0 to 5	10 max
G2	Velvet	0 to 10	10 to 35
G3	Eggshell	10 to 25	10 to 35
G4	Satin	20 to 35	35 min
G5	Semi-Gloss	35 to 70	
G6	Gloss	70 to 85	
G7	High Gloss		

Gloss is tested in accordance with ASTM D 523. Historically, the Government has used Flat (G1 / G2), Eggshell (G3), Semi-Gloss (G5), and Gloss (G6).

1.11.4.13 MPI System Number

The MPI coating system number in each Division found in either the MPI Architectural Painting Specification Manual or the Maintenance Repainting Manual and defined as an exterior (EXT/REX) or interior system (INT/RIN). The Division number follows the CSI Master Format.

1.11.4.14 Paint

See Coating definition.

PART 2 PRODUCTS

2.1 MATERIALS

Conform to the coating specifications and standards referenced in PART 3. Submit manufacturer's technical data sheets for specified coatings and solvents.

PART 3 EXECUTION

3.1 PROTECTION OF AREAS AND SPACES NOT TO BE PAINTED

Prior to surface preparation and coating applications, remove, mask, or otherwise protect, hardware, hardware accessories, machined surfaces, radiator covers, plates, lighting fixtures, public and private property,

and other such items not to be coated that are in contact with surfaces to be coated. Following completion of painting, workmen skilled in the trades involved shall reinstall removed items. Restore surfaces contaminated by coating materials, to original condition and repair damaged items.

3.2 SURFACE PREPARATION

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

3.3 PREPARATION OF METAL SURFACES

3.3.1 New Ferrous Surfaces

a. Ferrous Surfaces including Shop-coated Surfaces and Small Areas That Contain Rust, Mill Scale and Other Foreign Substances: Solvent clean or detergent wash in accordance with SSPC SP 1 to remove oil and grease. Where shop coat is missing or damaged, clean according to SSPC SP 2. Brush-off blast remaining surface in accordance with SSPC SP 7; Use inhibitor as recommended by coating manufacturer to prevent premature rusting. Shop-coated ferrous surfaces shall be protected from corrosion by treating and touching up corroded areas immediately upon detection.

3.3.2 Final Ferrous Surface Condition:

For tool cleaned surfaces, the requirements are stated in SSPC SP 2 and SSPC SP 3. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 3.

For abrasive blast cleaned surfaces, the requirements are stated in SSPC SP 7,and SSPC SP 6. As a visual reference, cleaned surfaces shall be similar to photographs in SSPC VIS 1.

3.3.3 Galvanized Surfaces

a. New Galvanized Surfaces With Only Dirt and Zinc Oxidation Products: Clean with solvent, steam, or non-alkaline detergent solution in accordance with SSPC SP 1. If the galvanized metal has been passivated or stabilized, the coating shall be completely removed by brush-off abrasive blast. New galvanized steel to be coated shall not be "passivated" or "stabilized" If the absence of hexavalent stain inhibitors is not documented, test as described in ASTM D 2092, Appendix X2, and remove by one of the methods described therein.

3.3.4 Non-Ferrous Metallic Surfaces

Aluminum and aluminum-alloy, lead, copper, and other nonferrous metal surfaces.

a. Surface Cleaning: Solvent clean in accordance with SSPC SP 1 and wash with mild non-alkaline detergent to remove dirt and water soluble contaminants.

3.4 PREPARATION OF CONCRETE AND CEMENTITIOUS SURFACE

3.4.1 Concrete and Masonry

a. Curing: Concrete, stucco and masonry surfaces shall be allowed to cure at least 30 days before painting, except concrete slab on grade, which shall be allowed to cure 90 days before painting.

b. Surface Cleaning: Remove the following deleterious substances.

(1) Dirt, Chalking, Grease, and Oil: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cuphousehold detergent, and 4 quarts of warm water. Then rinse thoroughly with fresh water. Wash existing coated surfaces with a suitable detergent and rinse thoroughly. For large areas, water blasting may be used.

(2) Fungus and Mold: Wash new surfaces with a solution composed of 1/2 cup trisodium phosphate, 1/4 cup household detergent, 1 quart 5 percent sodium hypochlorite solution and 3 quarts of warm water. Rinse thoroughly with fresh water.

(4) Efflorescence: Remove by scraping or wire brushing followed by washing with a 5 to 10 percent by weight aqueous solution of hydrochloric (muriatic) acid. Do not allow acid to remain on the surface for more than five minutes before rinsing with fresh water. Do not acid clean more than 4 square feet of surface, per workman, at one time.

c. Cosmetic Repair of Minor Defects: Repair or fill mortar joints and minor defects, including but not limited to spalls, in accordance with manufacturer's recommendations and prior to coating application.

d. Allowable Moisture Content: Latex coatings may be applied to damp surfaces, but not to surfaces with droplets of water. Do not apply epoxies to damp vertical surfaces as determined by ASTM D 4263 or horizontal surfaces that exceed 3 lbs of moisture per 1000 square feet in 24 hours as determined by ASTM F 1869. In all cases follow manufacturers recommendations. Allow surfaces to cure a minimum of 30 days before painting.

3.4.2 Gypsum Board

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

b. Repair of Minor Defects: Prior to painting, repair joints, cracks, holes, surface irregularities, and other minor defects with patching plaster or spackling compound and sand smooth.

c. Allowable Moisture Content: Latex coatings may be applied to damp

surfaces, but not surfaces with droplets of water. Do not apply epoxies to damp surfaces as determined by ASTM D 4263.

3.5 PREPARATION OF WOOD AND PLYWOOD SURFACES

3.5.1 New Plywood and Wood Surfaces, Except Floors:

a. Wood surfaces shall be cleaned of foreign matter.

   Surface Cleaning: Surfaces shall be free from dust and other deleterious substances and in a condition approved by the Contracting Officer prior to receiving paint or other finish. Do not use water to clean uncoated wood.

b. Moisture content of the wood shall not exceed 12 percent as measured by a moisture meter in accordance with ASTM D 4444, Method A, unless otherwise authorized.

c. Wood surfaces adjacent to surfaces to receive water-thinned paints shall be primed and/or touched up before applying water-thinned paints.

d. Cracks and Nailheads: Set and putty stop nailheads and putty cracks after the prime coat has dried.

e. Cosmetic Repair of Minor Defects:

   (1) Knots and Resinous Wood and Water, and Color Marker Stained Existing Coated Surface: Prior to application of coating, cover knots and stains with two or more coats of 3-pound-cut shellac varnish, plasticized with 5 ounces of castor oil per gallon. Scrape away existing coatings from knotty areas, and sand before treating. Prime before applying any putty over shellacked area.

   (2) Open Joints and Other Openings: Fill with whiting putty, linseed oil putty. Sand smooth after putty has dried.

   (3) Checking: Where checking of the wood is present, sand the surface, wipe and apply a coat of pigmented orange shellac. Allow to dry before paint is applied.

3.5.2 Interior Wood Surfaces, Stain Finish

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

3.6 APPLICATION

3.6.1 Coating Application

Painting practices shall comply with applicable federal, state and local laws enacted to insure compliance with Federal Clean Air Standards. Apply coating materials in accordance with SSPC PA 1. SSPC PA 1 methods are applicable to all substrates, except as modified herein.

At the time of application, paint shall show no signs of deterioration. Uniform suspension of pigments shall be maintained during application.

Unless otherwise specified or recommended by the paint manufacturer, paint may be applied by brush, roller, or spray. Rollers for applying paints and enamels shall be of a type designed for the coating to be applied and the surface to be coated.

Paints, except water-thinned types, shall be applied only to surfaces that are completely free of moisture as determined by sight or touch.

Thoroughly work coating materials into joints, crevices, and open spaces. Special attention shall be given to insure that all edges, corners, crevices, welds, and rivets receive a film thickness equal to that of adjacent painted surfaces.

Each coat of paint shall be applied so dry film shall be of uniform thickness and free from runs, drops, ridges, waves, pinholes or other voids, laps, brush marks, and variations in color, texture, and finish. Hiding shall be complete.

Touch up damaged coatings before applying subsequent coats. Interior areas shall be broom clean and dust free before and during the application of coating material.

Apply paint to new fire extinguishing sprinkler systems including valves, piping, conduit, hangers, supports, miscellaneous metal work, and accessories. Shield sprinkler heads with protective coverings while painting is in progress. Remove sprinkler heads which have been painted and replace with new sprinkler heads. For piping in unfinished spaces, provide primed surfaces with one coat of red alkyd gloss enamel to a minimum dry film thickness of 1.0 mil. Unfinished spaces include attic spaces, spaces above suspended ceilings, crawl spaces, pipe chases, mechanical equipment room, and space where walls or ceiling are not painted or not constructed of a prefinished material. For piping in finished areas, provide prime surfaces with two coats of paint to match adjacent surfaces, except provide valves and operating accessories with one coat of red alkyd gloss enamel. Upon completion of painting, remove protective covering from sprinkler heads.

a. Drying Time: Allow time between coats, as recommended by the coating manufacturer, to permit thorough drying, but not to present topcoat adhesion problems. Provide each coat in specified condition to receive next coat.

b. Primers, and Intermediate Coats: Do not allow primers or intermediate coats to dry more than 30 days, or longer than recommended by manufacturer, before applying subsequent coats. Follow manufacturer's recommendations for surface preparation if primers or intermediate coats are allowed to dry longer than recommended by manufacturers of subsequent coatings. Each coat shall cover surface of preceding coat or surface completely, and there shall be a visually perceptible difference in shades of successive coats.

c. Finished Surfaces: Provide finished surfaces free from runs, drops, ridges, waves, laps, brush marks, and variations in colors.

d. Thermosetting Paints: Topcoats over thermosetting paints (epoxies and urethanes) should be applied within the overcoating window recommended by the manufacturer.

3.6.2 Mixing and Thinning of Paints

Reduce paints to proper consistency by adding fresh paint, except when thinning is mandatory to suit surface, temperature, weather conditions, application methods, or for the type of paint being used. Obtain written permission from the Contracting Officer to use thinners. The written permission shall include quantities and types of thinners to use.

When thinning is allowed, paints shall be thinned immediately prior to application with not more than 0.125 L of suitable thinner per liter. The use of thinner shall not relieve the Contractor from obtaining complete hiding, full film thickness, or required gloss. Thinning shall not cause the paint to exceed limits on volatile organic compounds. Paints of different manufacturers shall not be mixed.

3.6.3 Two-Component Systems

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

3.6.4 Coating Systems

a. Systems by Substrates: Apply coatings that conform to the respective specifications listed in the following Tables:

Table

Division 5. Exterior Metal, Ferrous and Non-Ferrous Paint Table

Division 3. Interior Concrete Paint Table
Division 4. Interior Concrete Masonry Units Paint Table
Division 5. Interior Metal, Ferrous and Non-Ferrous Paint Table
Division 6. Interior Wood Paint Table
Division 9: Interior Plaster, Gypsum Board, Textured Surfaces Paint Table

b. Minimum Dry Film Thickness (DFT): Apply paints, primers, varnishes, enamels, undercoats, and other coatings to a minimum dry film thickness of 1.5 mil each coat unless specified otherwise in the Tables. Coating thickness where specified, refers to the minimum dry film thickness.

c. Coatings for Surfaces Not Specified Otherwise: Coat surfaces which have not been specified, the same as surfaces having similar conditions of exposure.

d. Existing Surfaces Damaged During Performance of the Work, Including New Patches In Existing Surfaces: Coat surfaces with the following:

(1) One coat of primer.

(2) One coat of undercoat or intermediate coat.

(3) One topcoat to match adjacent surfaces.

e. Existing Coated Surfaces To Be Painted: Apply coatings conforming to the respective specifications listed in the Tables herein, except that pretreatments, sealers and fillers need not be provided on surfaces where existing coatings are soundly adhered and in good condition. Do not omit undercoats or primers.

3.7 COATING SYSTEMS FOR METAL

Apply coatings of Tables in Division 5 for Exterior and Interior.

a. Apply specified ferrous metal primer on the same day that surface is cleaned, to surfaces that meet all specified surface preparation requirements at time of application.

b. Inaccessible Surfaces: Prior to erection, use one coat of specified primer on metal surfaces that will be inaccessible after erection.

c. Shop-primed Surfaces: Touch up exposed substrates and damaged coatings to protect from rusting prior to applying field primer.

d. Surface Previously Coated with Epoxy or Urethane: Apply MPI 101, 1.5 mils DFT immediately prior to application of epoxy or urethane coatings.

e. Pipes and Tubing: The semitransparent film applied to some pipes and tubing at the mill is not to be considered a shop coat, but shall be overcoated with the specified ferrous-metal primer prior to application of finish coats.

f. Exposed Nails, Screws, Fasteners, and Miscellaneous Ferrous Surfaces. On surfaces to be coated with water thinned coatings, spot prime exposed nails and other ferrous metal with latex primer MPI 107.

3.8 COATING SYSTEMS FOR CONCRETE AND CEMENTITIOUS SUBSTRATES

Apply coatings of Tables in Division 3, 4 and 9 for Exterior and Interior.

3.9 COATING SYSTEMS FOR WOOD AND PLYWOOD

a. Apply coatings of Tables in Division 6 for Exterior and Interior.

b. Prior to erection, apply two coats of specified primer to treat and prime wood surfaces which will be inaccessible after erection.

c. Apply stains in accordance with manufacturer's printed instructions.

3.10 PIPING IDENTIFICATION

Piping Identification, Including Surfaces In Concealed Spaces: Provide in accordance with MIL-STD-101. Place stenciling in clearly visible locations. On piping not covered by MIL-STD-101, stencil approved names or code letters, in letters a minimum of 1/2 inch high for piping and a minimum of 2 inches high elsewhere. Stencil arrow-shaped markings on piping to indicate direction of flow using black stencil paint.

3.11 INSPECTION AND ACCEPTANCE

In addition to meeting previously specified requirements, demonstrate mobility of moving components, including swinging and sliding doors, cabinets, and windows with operable sash, for inspection by the Contracting Officer. Perform this demonstration after appropriate curing and drying times of coatings have elapsed and prior to invoicing for final payment.

3.12 PAINT TABLES

All DFT's are minimum values.

3.12.1 EXTERIOR PAINT TABLES

DIVISION 5: EXTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

STEEL / FERROUS SURFACES

A. New Steel that has been hand or power tool cleaned to SSPC SP 2 or SSPC SP 3

1. Alkyd
   New; MPI EXT 5.1Q-G5 (Semigloss) Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 23	MPI 94	MPI 94

   System DFT: 5.25 mils

B. New Steel that has been blast-cleaned to SSPC SP 6:

2. Alkyd
   New; MPI EXT 5.1D-G5 (Semigloss) / Existing; MPI REX 5.1D-G5

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 94	MPI 94

   System DFT: 5.25 mils

D. New steel Surfaces:

1. Waterborne Light Industrial
   MPI EXT 5.1R-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 101	MPI 108	MPI 110-G5

   System DFT: 8.5 mils

2. Pigmented Polyurethane
   MPI EXT 5.1L-G6 (Gloss)

Primer:	Intermediate:	Topcoat:
MPI 101	MPI 108	MPI 72

   System DFT: 8.5 mils

EXTERIOR GALVANIZED SURFACES

F. New Galvanized surfaces:

1. Cementitious primer / Latex

   MPI EXT 5.3A-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 26	MPI 11	MPI 11

   System DFT: 4.5 mils

EXTERIOR GALVANIZED SURFACES

2. Waterborne Primer / Latex

MPI EXT 5.3H-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 134	MPI 11	MPI 11

System DFT: 4.5 mils

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)

I. Aluminum, aluminum alloy and other miscellaneous non-ferrous metal items not otherwise specified except hot metal surfaces, roof surfaces, and new prefinished equipment. Match surrounding finish:

1. Alkyd

MPI EXT 5.4F-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 94	MPI 94

System DFT: 5 mils

J. Surfaces adjacent to painted surfaces; Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. Alkyd

MPI EXT 5.1D-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 94	MPI 94

System DFT: 5.25 mils

2. Waterborne Light Industrial Coating

MPI EXT 5.1C-G5(Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 110-G5	MPI 110-G5

System DFT: 5 mils

K. Hot metal surfaces including smokestacks subject to temperatures up to 205 degrees C (400 degrees F):

1. Heat Resistant Enamel
MPI EXT 5.2A

Primer:	Intermediate:	Topcoat:
MPI 21	Surface preparation and number of coats per manufacturer's instructions.	

System DFT: Per Manufacturer

L. Ferrous metal subject to high temperature, up to 400 degrees C (750 degrees F):

1. Inorganic Zinc Rich Coating
MPI EXT 5.2C

Primer:	Intermediate:	Topcoat:
MPI 19	Surface preparation and number of coats per	

EXTERIOR SURFACES, OTHER METALS (NON-FERROUS)
manufacturer's instructions.
System DFT: Per Manufacturer

2. Heat Resistant Aluminum Enamel
MPI EXT 5.2B (Aluminum Finish)
Primer: Intermediate: Topcoat:
MPI 2 Surface preparation and number of coats per
manufacturer's instructions.
System DFT: Per Manufacturer

M. New surfaces and made bare cleaning to SSPC SP 10
subject to temperatures up to 593 degrees C (1100 degrees F):

1. Heat Resistant Coating
MPI EXT 5.2D
Primer: Intermediate: Topcoat:
MPI 22 Surface preparation and number of coats per
manufacturer's instructions.
System DFT: Per Manufacturer

3.12.2 INTERIOR PAINT TABLES

DIVISION 4: INTERIOR CONCRETE MASONRY UNITS PAINT TABLE

A. New Concrete masonry:

2. Institutional Low Odor / Low VOC Latex

New; MPI INT 4.2E-G3 (Eggshell)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 145	MPI 145

System DFT: 4 mils

New; MPI INT 4.2E-G4 (Satin)

Filler	Primer:	Intermediate:	Topcoat:
MPI 4	N/A	MPI 146	MPI 146

System DFT: 4 mils

DIVISION 5: INTERIOR METAL, FERROUS AND NON-FERROUS PAINT TABLE

INTERIOR STEEL / FERROUS SURFACES

A. Metal, Mechanical, Electrical, Fire extinguishing sprinkler systems including valves, conduit, hangers, supports, Surfaces adjacent to painted surfaces (Match surrounding finish), exposed copper piping, and miscellaneous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment:

1. Alkyd

MPI INT 5.1E-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 47	MPI 47

System DFT:

B. Ferrous metal in concealed damp spaces or in exposed areas having unpainted adjacent surfaces as follows:

INTERIOR STEEL / FERROUS SURFACES

1. Aluminum Paint
   MPI INT 5.1M

Primer:	Intermediate:	Topcoat:
MPI 79	MPI 1	MPI 1

   System DFT: 4.25 mils

C. Miscellaneous non-ferrous metal items not otherwise specified except floors, hot metal surfaces, and new prefinished equipment. Match surrounding finish:

1. Alkyd

   MPI INT 5.4J-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 95	MPI 47	MPI 47

   System DFT: 5 mils 5 mils

D. Hot metal surfaces subject to temperatures up to 205 degrees C (400 degrees F):

1. Heat Resistant Enamel
   MPI INT 5.2A

Primer:	Intermediate:	Topcoat:
MPI 21	Surface preparation and number of coats per manufacturer's instructions.	

   System DFT: Per Manufacturer

E. Ferrous metal subject to high temperature, up to 400 degrees C (750 degrees F):

1. Heat Resistant Aluminum Paint
   MPI INT 5.2B (Aluminum Finish)

Primer:	Intermediate:	Topcoat:
MPI 2	Surface preparation and number of coats per manufacturer's instructions.	

   System DFT: Per Manufacturer

DIVISION 6: INTERIOR WOOD PAINT TABLE

A. New Wood and plywood not otherwise specified:

B. New Wood and Plywood, except floors; natural finish or stained:

1. Stained, oil-modified polyurethane
   New; MPI INT 6.4E-G4

Stain:	Primer:	Intermediate:	Topcoat:
MPI 90	MPI 57	MPI 57	MPI 57

   System DFT: 4 mils

B. New Wood Doors; Natural Finish or Stained:

1. Natural finish, oil-modified polyurethane
   New; MPI INT 6.3K-G4 / Existing; MPI RIN 6.3K-G4

Primer:	Intermediate:	Topcoat:
MPI 57	MPI 57	MPI 57

   System DFT: 4 mils

DIVISION 6: INTERIOR WOOD PAINT TABLE

Note: Sand between all coats per manufacturers recommendations.

DIVISION 9: INTERIOR PLASTER, GYPSUM BOARD, TEXTURED SURFACES PAINT TABLE

A. New Wallboard not otherwise specified:

1. Institutional Low Odor / Low VOC Latex

New; MPI INT 9.2M-G3 (Eggshell) / Existing; MPI RIN 9.2M-G3 (Eggshell)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 145	MPI 145

System DFT: 4 mils

B. New Wallboard in toilets, food-preparation, food-serving, restrooms, laundry areas, shower areas, and other high humidity areas not otherwise specified.:

1. Alkyd

New; MPI INT 9.2C-G5 (Semigloss) / Existing; MPI RIN 9.2C-G5 (Semigloss)

Primer:	Intermediate:	Topcoat:
MPI 50	MPI 47	MPI 47

System DFT: 4 mils

SECTION 10 28 13

TOILET ACCESSORIES
07/06

PART 1 GENERAL

1.1 REFERENCES

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

ASTM INTERNATIONAL (ASTM)

ASTM C 1036 (2001) Flat Glass

1.2 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for Contractor Quality Control approval. Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-03 Product Data

Finishes
Accessory Items

Manufacturer's descriptive data and catalog cuts indicating materials of construction, fasteners proposed for use for each type of wall construction, mounting instructions, operation instructions, and cleaning instructions.

SD-04 Samples

Finishes; G
Accessory Items

One sample of each accessory proposed for use. Incorporate approved samples into the finished work, provided they are identified and their locations noted.

SD-07 Certificates

Accessory Items

Certificate for each type of accessory specified, attesting that the items meet the specified requirements.

1.3 DELIVERY, STORAGE, AND HANDLING

Wrap toilet accessories for shipment and storage, then deliver to the jobsite in manufacturer's original packaging, and store in a clean, dry area protected from construction damage and vandalism.

1.4 WARRANTY

Provide manufacturer's standard performance guarantees or warranties that extend beyond a 1 year period.

PART 2 PRODUCTS

2.1 MANUFACTURED UNITS

Provide toilet accessories shall be provided where indicated in accordance with paragraph SCHEDULE. Porcelain type, tile-wall accessories are specified in Section 09 30 00 CERAMIC TILE QUARRY TILE, AND PAVER TILE. Provide each accessory item shall be complete with the necessary mounting plates of sturdy construction with corrosion resistant surface.

2.1.1 Anchors and Fasteners

Provide anchors and fasteners capable of developing a restraining force commensurate with the strength of the accessory to be mounted and suited for use with the supporting construction. Provide tamperproof design exposed fasteners with finish to match the accessory.

2.1.2 Finishes

Except where noted otherwise, provide the following finishes on metal:

Metal	Finish
Stainless steel	No. 4 satin finish

2.2 ACCESSORY ITEMS

Conform to the requirements for accessory items specified below.

2.2.1 Grab Bar (GB)

Provide an 18 gauge, 1-1/4 inch grab bar OD Type 304 stainless steel. Provide form and length for grab bar as indicated. Provide concealed mounting flange. Provide grab with satin finish. Furnish installed bars capable of withstanding a 500 pound vertical load without coming loose from the fastenings and without obvious permanent deformation. Allow 1-1/2 inch space between wall and grab bar.

2.2.2 Mirrors, Glass (MG)

Provide Type I transparent flat type, Class 1-clear glass for mirrors. Glazing Quality q1 1/4 inch thick conforming to ASTM C 1036. Coat glass on one surface with silver coating, copper protective coating, and mirror backing paint. Provide highly adhesive pure silver coating of a thickness which provides reflectivity of 83 percent or more of incident light when viewed through 1/4 inch thick glass, free of pinholes or other defects. Provide copper protective coating with pure bright reflective copper, homogeneous without sludge, pinholes or other defects, of proper thickness to prevent "adhesion pull" by mirror backing paint. Provide mirror backing paint with two coats of special scratch and abrasion-resistant paint and baked in uniform thickness to provide a protection for silver and copper coatings which will permit normal cutting and edge fabrication.