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USACE / NAVFAC / AFCEC / NASA **UFGS-05 72 00 February 2012)**

Preparing Activity: NASA **Superseding UFGS-05 70 00 (May 2011)**

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated January 2014
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SECTION 05 72 00

DECORATIVE METAL SPECIALTIES

02/12

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SECTION 05 72 00

DECORATIVE METAL SPECIALTIES
02/12

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NOTE: This guide specification covers the requirements for decorative metal products used in building construction for architectural and decorative effects.

In the project drawings include a complete design indicating the character of the work to be performed by providing the following:

Location and details of each metal item, indicating dimensions, shapes and sizes of members, connections, finishes, and the relation to other building components.

Anchorage and/or fastening devices embedded in other construction.

Adhere to UFC 1-300-02 Unified Facilities Guide Specifications (UFGS) Format Standard when editing this guide specification or preparing new project specification sections. Edit this guide specification for project specific requirements by adding, deleting, or revising text. For bracketed items, choose applicable items(s) or insert appropriate information.

Remove information and requirements not required in respective project, whether or not brackets are present.

Comments, suggestions and recommended changes for this guide specification are welcome and should be submitted as a Criteria Change Request (CCR).
****

PART 1 GENERAL

1.1 REFERENCES

****
NOTE: This paragraph is used to list the

publications cited in the text of the guide specification. The publications are referred to in the text by basic designation only and listed in this paragraph by organization, designation, date, and title.

Use the Reference Wizard's Check Reference feature when you add a RID outside of the Section's Reference Article to automatically place the reference in the Reference Article. Also use the Reference Wizard's Check Reference feature to update the issue dates.

References not used in the text will automatically be deleted from this section of the project specification when you choose to reconcile references in the publish print process.

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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 ADM	(2010) Aluminum Design Manual
AA ASM-35	(2000) Specifications for Aluminum Sheet Metal Work in Building Construction, Construction Manual Series Section 5
AA DAF45	(2003; Reaffirmed 2009) Designation System for Aluminum Finishes
AA PK-1	(2009) Pink Sheets: Designations and Chemical Composition Limits for Aluminum Alloys in the Form of Castings & Ingot

AMERICAN WELDING SOCIETY (AWS)

AWS A5.3/A5.3M	(1999; R 2007) Specification for Aluminum and Aluminum-Alloy Electrodes for Shielded Metal Arc Welding
AWS D1.2/D1.2M	(2008) Structural Welding Code - Aluminum

ASME INTERNATIONAL (ASME)

ASME B18.13	(1996; Addenda A 1998; R 2013) Screw and Washer Assemblies - Sems (Inch Series)
ASME B18.13.1M	(2011) Screw and Washer Assemblies-SEMS (Metric Series)
ASME B18.2.1	(2012; Errata 2013) Square and Hex Bolts and Screws (Inch Series)
ASME B18.2.2	(2010) Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex

	Flange, and Coupling Nuts (Inch Series)
ASME B18.2.3.8M	(1981; R 2005) Metric Hex Lag Screws
ASME B18.2.6	(2010; Supp 2011) Fasteners for Use in Structural Applications
ASME B18.21.1	(2009) Washers: Helical Spring-Lock, Tooth Lock, and Plain Washers (Inch Series)
ASME B18.21.2M	(1999; R 2005) Lock Washers (Metric Series)
ASME B18.22M	(1981; R 2010) Metric Plain Washers
ASME B18.24	(2004; Addenda A 2006; R 2011) Part Identifying Number (PIN) Code System Standard for B18 Fastener Products
ASME B18.3.3M	(1986; R 2008) Hexagon Socket Head Shoulder Screws (Metric Series)
ASME B18.6.1	(1981; R 2008) Wood Screws (Inch Series)
ASME B18.6.3	(2013) Machine Screws, Tapping Screws, and Machine Drive Screws (Inch Series)
ASME B18.6.5M	(2000; R 2010) Standard Specification for Metric Thread-Forming and Thread-Cutting Tapping Screws
ASME B18.6.7M	(1999; R 2010) Metric Machine Screws

ASTM INTERNATIONAL (ASTM)

ASTM A123/A123M	(2013) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A153/A153M	(2009) Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
ASTM A27/A27M	(2013) Standard Specification for Steel Castings, Carbon, for General Application
ASTM A283/A283M	(2013) Standard Specification for Low and Intermediate Tensile Strength Carbon Steel Plates
ASTM A47/A47M	(1999; R 2009) Standard Specification for Ferritic Malleable Iron Castings
ASTM B209	(2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
ASTM B209M	(2010) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM B211	(2012) Standard Specification for Aluminum

	and Aluminum-Alloy Bar, Rod, and Wire
ASTM B211M	(2012; E 2012) Standard Specification for Aluminum and Aluminum-Alloy Bar, Rod, and Wire (Metric)
ASTM B221	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
ASTM B221M	(2013) Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes (Metric)
ASTM B247	(2009) Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings
ASTM B247M	(2009) Standard Specification for Aluminum and Aluminum-Alloy Die Forgings, Hand Forgings, and Rolled Ring Forgings (Metric)
ASTM B26/B26M	(2012) Standard Specification for Aluminum-Alloy Sand Castings
ASTM B316/B316M	(2010) Standard Specification for Aluminum and Aluminum-Alloy Rivet and Cold-Heading Wire and Rods
ASTM C514	(2004; E 2009; R 2009) Standard Specification for Nails for the Application of Gypsum Board
ASTM C636/C636M	(2013) Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels
ASTM D1730	(2009) Standard Practices for Preparation of Aluminum and Aluminum-Alloy Surfaces for Painting
ASTM D1752	(2004a; R 2008) Standard Specification for Preformed Sponge Rubber Cork and Recycled PVC Expansion
ASTM G71	(1981; R 2009) Standard Guide for Conducting and Evaluating Galvanic Corrosion Tests in Electrolytes
ASTM G82	(1998; R 2009) Standard Guide for Development and Use of a Galvanic Series for Predicting Galvanic Corrosion Performance

THE SOCIETY FOR PROTECTIVE COATINGS (SSPC)

CS 23.00/AWS C2.23M/NACE #12	(2003) Specification for the Application of Thermal Spray Coatings (Metallizing) of Aluminum, Zinc, and Their Alloys and

	Composites for the Corrosion Protection of Steel
SSPC PA 1	(2000; E 2004) Shop, Field, and Maintenance Painting of Steel
SSPC PS 11.01	(1982; E 2004) Black (or Dark Red) Coal Tar Epoxy Polyamide Painting System

U.S. GENERAL SERVICES ADMINISTRATION (GSA)

CID A-A-344	(Rev B; Notice 1) Lacquer (Clear Gloss)

1.2 SUBMITTALS

****

NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list to reflect only the submittals required for the project.

The Guide Specification technical editors have designated those items that require Government approval, due to their complexity or criticality, with a "G." Generally, other submittal items can be reviewed by the Contractor's Quality Control System. Only add a "G" to an item, if the submittal is sufficiently important or complex in context of the project.

For submittals requiring Government approval on Army projects, a code of up to three characters within the submittal tags may be used following the "G" designation to indicate the approving authority. Codes for Army projects using the Resident Management System (RMS) are: "AE" for Architect-Engineer; "DO" for District Office (Engineering Division or other organization in the District Office); "AO" for Area Office; "RO" for Resident Office; and "PO" for Project Office. Codes following the "G" typically are not used for Navy, Air Force, and NASA projects.

Choose the first bracketed item for Navy, Air Force and NASA projects, or choose the second bracketed item for Army projects.

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Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are [for Contractor Quality Control approval.][for information only. When used, a designation following the "G" designation identifies the office that will review the submittal for the Government.] Submit the following in accordance with Section 01 33 00 SUBMITTAL PROCEDURES:

SD-01 Preconstruction Submittals

Existing Conditions[; G][; G, [_____]]

SD-02 Shop Drawings

Ornamental Metal Items[; G][; G, [_____]]

Installation Drawings[; G][; G, [_____]]

Shop and Field Connections[; G][; G, [_____]]

Construction Details[; G][; G, [_____]]

SD-03 Product Data

Installation Materials[; G][; G, [_____]]

Metals for Fabrication[; G][; G, [_____]]

Ornamental Metal Items[; G][; G, [_____]]

SD-04 Samples

Manufacturer's Standard Color Charts[; G][; G, [_____]]

Shop Paint[; G][; G, [_____]]

Finish Paint[; G][; G, [_____]]

Aluminum Finishes[; G][; G, [_____]]

Anchorage Devices and Fasteners[; G][; G, [_____]]

Architectural Metal Items[; G][; G, [_____]]

SD-06 Test Reports

Welding Tests[; G][; G, [_____]]

SD-07 Certificates

Welding Procedures[; G][; G, [_____]]

Ornamental Metal Items[; G][; G, [_____]]

Welder Qualifications[; G][; G, [_____]]

SD-08 Manufacturer's Instructions

Cleaning Materials[; G][; G, [_____]]

Preventative Maintenance and Inspection[; G][; G, [_____]]

Maintenance Instructions[; G][; G, [_____]]

Application Methods[; G][; G, [_____]]

1.3 QUALIFICATIONS FOR WELDING WORK

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NOTE: If Section 05 14 00.13 WELDING STRUCTURAL ALUMINUM FRAMING is not included in the project

specification, applicable requirements thereof should be inserted and the following paragraph deleted.
****

[Section 05 14 00.13 WELDING STRUCTURAL ALUMINUM FRAMING applies to work specified in this section.

][Submit Welding Procedures and Welding Tests in accordance with AWS D1.2/D1.2M. Prepare all Test specimens in the presence of Contracting Officer and have specimens tested by an approved testing laboratory at the Contractor's expense.

][Submit Certification of Welder Qualifications by tests in accordance with AWS D1.2/D1.2M. In addition, perform test on trail pieces in positions and with clearances equivalent to those actually encountered during construction. If a test weld fails to meet the requirements, complete an immediate retest of two test welds. Failure in either of the two immediate retests mandates the welder be retested after further practice or training, and provide a complete new set of tests welds.

]1.4 DELIVERY, STORAGE, AND HANDLING

Store all Architectural metal items off the ground on clean raised platforms or pallets one level high in dry locations with adequate ventilation, such as an enclosed building or closed trailer.

Keep materials free from dirt and grease and protected from corrosion.

Store packaged materials in their original, unbroken containers in a dry area, until ready for installation.

1.5 FIELD MEASUREMENTS

Records of Existing Conditions may be provided by the Contracting Officer prior to the start of work. Submit survey data showing Existing Conditions prior to preparation of shop drawings and fabrication.

PART 2 PRODUCTS

2.1 INSTALLATION MATERIALS

Submit manufacturer's catalog data for the following items listing all ornamental metal accessories including casting, forgings, fasteners and anchorage devices.

[2.1.1 Concrete Inserts

****
NOTE: Use concrete inserts for fastening ornamental metal items to cast-in-place concrete construction when the anchorage device will be subjected to direct pull-out loadings such as fascia flanges for ornamental features.

Select one of the paragraphs below and delete the other for pre-placed type inserts
****

[Use galvanized wedge-type concrete inserts , box-type, ferrous castings with integral anchor loop at back of box and designed to accept bolts having special wedge shape heads. Ferrous castings are to be malleable iron conforming to ASTM A47/A47M, Grade 32510 or Grade 35018, [Grade 22010 or Grade 24118,] or medium-strength cast steel conforming to ASTM A27/A27M, Grade U-60-30. Inserts are to be hot-dip galvanized after fabrication in accordance with ASTM A153/A153M. Provide hot-dip galvanized carbon steel bolts with special wedge shape heads, nuts, washers, and shims, in accordance with ASTM A153/A153M.

][Provide slotted-type concrete inserts, hot-dip galvanized, pressed steel plate, welded construction, box-type, with slot to receive square head bolt and to provide lateral adjustment of the bolt. Length of insert body less anchorage lugs is a minimum of 115 mm 4-1/2 inches. Provide inserts with knockout cover. Steel plate can not be less than 3 mm 1/8 inch thick conforming to ASTM A283/A283M, Grade C. Inserts are to be hot-dip galvanized after fabrication in accordance with ASTM A123/A123M.

] Provide concrete inserts which are non-removable when embedded in concrete of 20 Megapascal 3,000 pounds per square inch compressive strength and subjected to a 26.7 kilonewton 6,000-pound tension load test in an axial direction. Concrete can not indicate any evidence of failure attributable to the anchoring device itself.

][2.1.2 Masonry Anchorage Devices

****
NOTE: Use masonry anchorage devices for the fastening of ornamental metal items to solid masonry and concrete-in-place construction only when the anchorage device will not be subjected to direct pull-out loadings or to vibration. Masonry anchorage devices are to be used only for non-vibratory shear loads. Select the appropriate anchorage device, or insert an alternate type of masonry anchorage device, and delete the remaining options listed below.
****

Provide expansion shield masonry anchorage devices conforming to ASTM C514, Group, Type, and Class as follows:

[a. Lead expansion shields for machine screws and bolts 6 mm 1/4 inch and smaller, head-out embedded nut type, single-unit class, conforming to Group I, Type 1, Class 1.

][b. Lead expansion shields for machine screws and bolts larger than 6 mm 1/4 inch, head-out embedded nut type, multiple-unit class, conforming to Group I, Type 1, Class 2.

][c. Bolt anchor expansion shields for lag bolts, zinc-Alloy long-shield anchors class, conforming to Group II, Type 1, Class 1.

][d. Bolt anchor expansion shields for bolts, closed-end bottom bearing class, conforming to Group II, Type 2, Class 1.

][e. [_____] type anchorage [_____], conforming to [_____].

]][2.1.3 Toggle Bolts

****
NOTE: Specify toggle bolts for fastening ornamental metal items to hollow masonry and stud partitions.
****

Provide corrosion-resistant chromium-nickel steel conforming to AISI Type [302] [303] [304] [305] [or 316] toggle bolts of the class and style best suited for the work, conforming to ASTM C636/C636M, Type II.

][2.1.4 Standard Bolts and Nuts

Provide standard bolts, regular hexagon head, corrosion-resistant steel, coarse thread series, conforming to ASME B18.3.3M ASME B18.2.1, Type II.

Provide standard nuts, plain hexagon, regular style, corrosion-resistant steel, conforming to ASME B18.2.6 ASME B18.2.2, Type II, Style 4.

][2.1.5 Lag Bolts

Provide lag bolts, square head, gimlet point or cone point, corrosion-resistant steel, conforming to ASME B18.2.3.8M ASME B18.2.1, Type I, Grade C.

][2.1.6 Machine Screws

Provide machine screws, corrosion-resistant steel, cross-recess drive, flat head, conforming to ASME B18.6.7M ASME B18.6.3, Type III, Style [2C] [3C].

][2.1.7 Wood Screws

Provide wood screws, corrosion-resistant steel, single-thread, flat head with cross-recess drive, conforming to ASME B18.6.5M ASME B18.6.1.

][2.1.8 Plain Washers

Provide plain washers, round, general-assembly, corrosion-resistant steel, conforming to ASME B18.22M ASME B18.21.1, Type A, Grade I, Class B.

][2.1.9 Lock Washers

Provide lock washers, helical spring, corrosion-resistant steel (nonmagnetic), conforming to ASME B18.21.2M and ASME B18.13.1M ASME B18.13 and ASME B18.21.1.

][2.1.10 Welding Filler Metal

Provide aluminum-alloy welding filler metal for welding of aluminum alloys, conforming to AWS A5.3/A5.3M and as recommended by the aluminum producer for the work.

]2.2 METALS FOR FABRICATION

****
NOTE: Delete the following metals that are not required for the items specified in paragraph "Ornamental Metal Items." The specified metals are only those which are common to several architectural

metal items. Metals (and other materials) which are required only for a specific architectural metal item are specified in the paragraph for the item.

****

[2.2.1 Aluminum-Alloy Extrusions

Provide aluminum fabrications conforming to AA ADM, AA ASM-35, and AA PK-1.

Provide 6063, temper T5 extrusions conforming to ASTM B221 ASTM B221M.

Provide aluminum-alloy and tempered extrusions recommended by the aluminum producer with the specified finish of integral-color anodized coating having mechanical properties equal to, or exceeding, those of aluminum alloy 6063, temper T5, conforming to ASTM B221 ASTM B221M.

][2.2.2 Aluminum-Alloy Sheets and Plates

[Provide aluminum alloy 3003, temper H16 sheets and plates, conforming to ASTM B209M ASTM B209 unless otherwise specified.

][Provide aluminum alloy 5005, temper H16 sheets and plates to with a clear anodized coating conforming to ASTM B209M ASTM B209.

][Provide aluminum-alloy and tempered sheets and plates recommended by the aluminum producer with the specified finish of integral-color anodized coating having mechanical properties equal to, or exceeding, those of alloy 5005, temper H16, conforming to ASTM B209M ASTM B209.]

][2.2.3 Aluminum-Alloy Castings

[Provide aluminum alloy 5140, temper F, sand castings, conforming to ASTM B26/B26M.

][Provide aluminum-alloy castings as recommended by the Aluminum Association with a clear anodized coating.

][Provide aluminum-alloy castings containing the casting alloy and condition recommended by the aluminum producer with the specified finish of integral-color anodized coating having mechanical properties equal to, or exceeding, those of alloy 5140, temper F, conforming to ASTM B26/B26M.

]][2.2.4 Aluminum-Alloy Forgings

[Provide aluminum-alloy 6061, temper T6 forgings, conforming to ASTM B247M ASTM B247.

][Provide aluminum-alloy and tempered forgings recommended by the aluminum producer with the specified finish of integral-color anodized coating having mechanical properties equal to or exceeding those of aluminum alloy 6061, temper T6, conforming to ASTM B247M ASTM B247.

]]2.2.5 Metals for Fasteners

Provide fastener identification conforming to ASME B18.24.

Provide aluminum-alloy bolts and screws made from rod conforming to ASTM B211M ASTM B211, alloy 2024 and temper T351.

Provide aluminum-alloy nuts made from rod conforming to ASTM B211M ASTM B211, alloy 6061 and temper T6.

Provide aluminum-alloy washers made from sheet conforming to ASTM B209M ASTM B209, alloy 2024 and temper T4.

Provide aluminum-alloy rivets made from rod or wire conforming to ASTM B316/B316M, alloy 6053 and temper T61.

Provide corrosion-resistant steel fasteners made of chromium-nickel steel, AISI Type 302, 303, 304, 305, or 316, with form and condition best suited for the application.

2.2.6 Shop Paint for Aluminum

Provide shop paint with an inhibitive epoxy polyamide primer conforming to SSPC PS 11.01, CS 23.00/AWS C2.23M/NACE #12, ASTM G71 and ASTM G82.

2.3 ORNAMENTAL METAL ITEMS

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NOTE: Additional paragraph headings and paragraphs specifying special ornamental metal items, such as aluminum sills for other than aluminum windows, aluminum mullions that are not a part of a curtain wall system, and any other item not specified, can be added as required.

****

2.3.1 Aluminum Joint Cover Assemblies

Design aluminum joint cover assemblies for horizontal movement and the joint width indicated.

Provide floor joint cover assemblies consisting of continuous frame unit on each side of floor-to-floor joints or on one side of floor-to-wall joints as required by construction conditions. Include floor cover plates, filler strips, anchors, and other accessories as required to complete the installation, and as follows:

Fabricate floor frame units from aluminum-alloy extrusions with an integral curb edge bar for the expansion joint edges. Provide integral grooves to receive anchor bolts, and floor cover plate with filler strip surfaces that will finish flush to the finished floor elevation when the floor cover assembly is installed. Provide corrosion-resistant coated aluminum alloy or steel anchor bolts and nuts, spaced not more than 75 mm 3 inches from each end and not more than 450 mm 18 inches on center between end anchors. Furnish coated steel anchor bolts and nuts conforming to SSPC PA 1. Provide frame splice connectors as required to complete the installation.

[Provide plain type floor cover plates, aluminum-alloy extrusions with smooth surface.

][Provide recessed type floor cover plates, aluminum-alloy extrusions with recess to receive resilient floor covering, with a recess depth as required to provide a resilient floor covering surface flush with the finished floor elevation.

][Provide non-slip-type floor cover plates, aluminum-alloy castings with

abrasive grit embedded uniformly into the walking surface at the time of casting, with 20-grain aluminum oxide abrasive grit.

] Provide floor cover plates of the patterns and widths indicated, and lengths as long as practical, with metal thickness not less than 6 mm 1/4 inch. Drill and countersink fixed edge of floor cover plates to receive flathead screws, spaced not more than 75 mm 3 inches from each cover plate end and not more than 450 mm 18 inches on center between the end screw holes. Provide corrosion-resistant steel screws for securing floor cover plates.

Provide mill finish for exposed-to-view surfaces.

Provide rubber and cork composition tape filler strips with pressure-sensitive adhesive coating on one face and smooth suede surface on the exposed face, conforming to ASTM D1752, not less than 38 mm 1-1/2 inches wide and a depth as required to provide a surface flush with the finished floor elevation.

Provide wall and ceiling joint cover assemblies consisting of continuous anchor strips on one side of the wall or ceiling expansion joint; wall and ceiling cover plates; and seals, anchors, and other accessories as required to complete the installation, and as follows:

Provide aluminum-alloy wall and ceiling anchor strip extrusions fabricated to provide an integral curb bar edge and integral lugs to receive snap-on cover plates. Field drill fixed edge of anchor strips with holes to receive screws, spaced not more than 75 mm 3 inches from each end and not more than 300 mm 12 inches on center between the end screw holes. Provide cadmium-plated screws with masonry anchorage devices or toggle bolts as required by construction conditions.

Provide aluminum-alloy wall and ceiling cover plate extrusions of the patterns and widths indicated, designed for snap-on application over anchor strips, fabricated with integral grooves to receive sealing gaskets, and having a smooth exposed-to-view surface.

Provide vinyl sealing gaskets for [exterior wall joint cover assemblies] [wall and ceiling joint cover assemblies].

[Provide a frosted finish with Class II clear anodized coating for exposed-to-view surfaces.

][Provide a frosted finish with lacquer coating for interior wall and ceiling joint cover assembly that are exposed-to-view surfaces.]

[Provide a frosted finish with Class II clear anodized coating for exterior wall joint cover assembly that are exposed-to-view surfaces.

]2.4 FABRICATION IN GENERAL

Submit Manufacturer's Standard Color Charts for Shop Paint and Finish Paint for approval by the Contracting Officer prior to work. Submit fabrication drawings for Ornamental Metal Items.

Submit Installation Drawings for Ornamental Metal Items, Shop and Field Connections and Construction Details showing location, dimensions, size, and weight or gauge as applicable of each ornamental item; type and location of shop and field connections; and other pertinent construction

and erection details. Show on drawings location and details of anchorage devices embedded in cast-in-place concrete and masonry construction.

2.4.1 Workmanship

Fabricate metalwork to the shape and size, with lines, angles, and curves true to form. Provide necessary rabbets, lugs, and brackets so that the work can be assembled. Conceal fasteners where practical.

Design exterior ornamental metal items to withstand expansion and contraction of the component parts at an ambient temperature of 38 degrees C 100 degrees F without causing harmful buckling, opening of joints, overstressing of fasteners, or other harmful effects.

Welded fabrication to meet requirements as specified in AWS D1.2/D1.2M. Execute all welds behind finished surfaces without distortion or discoloration of the exposed side. Clean flux from welded joints and dress all exposed and contact surfaces.

Drill or punch holes for fasteners.

Mill all joints to a close fit. Cope or miter corner joints to a, well formed shape, and true alignment with the adjacent item. Fabricate and form joints exposed to weather to prevent water intrusion.

Ensure all castings are sound and free from warp or defects that impair their strength and appearance, with a smooth finish and sharp well-defined vertical and horizontal lines on all exposed surfaces.

2.4.2 Holes for Other Work

Provide holes where indicated for securing other work to metal work.

2.4.3 Protection of Aluminum from Dissimilar Materials

Protect aluminum surfaces that will come in contact with dissimilar metals, or masonry, concrete, or wood, with epoxy polyamide conforming to SSPC PS 11.01, and topcoated with aliphatic polyurethane conforming to ASTM G71 and ASTM G82

Prepare aluminum surfaces to be painted by the acid pickling method conforming to ASTM D1730, Type B, Method 2 or Method 3.

Apply paint to dry, clean surfaces by brush or spraying to provide a minimum dry-film thickness of 0.038 mm 1.5 mils.

2.4.4 Aluminum Finishes

Submit samples for Aluminum Finishes, one for each type used in the project. Provide samples of standard size as used in construction. After approval, full-sized samples may be used in construction, provided each sample is clearly identified and its location recorded.

Provide a finish for exposed-to-view aluminum surfaces of architectural metal items conforming to AA DAF45 and finished as specified for each of the following items:

****

NOTE: Select the appropriate finish from the

following, or insert alternate finish.

****

[a. Aluminum producer's "as-fabricated mill finish", conforming to AA M10, as specified in AA DAF45.

][b. Frosted finish with medium matte chemical etch finish with a clear, non-yellowing methacrylate lacquer coating, conforming to CID A-A-344 with a finish meeting the requirements to AA C22-R1X, as specified in AA DAF45, applied in two coats with interim drying, by brush, spraying, or other approved method to provide a continuous minimum dry film thickness of 0.015 mm 0.6 mil.

][c. Frosted finish Class II; clear anodized coating, medium matte chemical etch finish; Architectural Class II 0.010 to 0.018 mm 4- to 0.7-mil thick anodized coating producing natural aluminum color finish conforming to AA C22-A31, as specified in AA DAF45.

][d. Frosted finish Class I, clear anodized coating, medium matte chemical etch finish; Architectural Class I 0.018 mm 0.7 mil and greater thickness anodized coating producing natural aluminum color finish conforming to AA C22-A41, as specified in AA DAF45.

****

NOTE: The following polished, satin, and matte finishes generally are required for aluminum ornamental items only.

****

][e. Polished finish Class II, clear anodized coating, smooth specular buffed mechanical finish; Architectural Class II 0.010 to 0.018 mm 0.4- to 0.7-mil thick anodized coating producing natural aluminum color finish conforming to AA M21-A31, as specified in AA DAF45.

][f. Satin finish Class II; clear anodized coating, medium satin directional textured mechanical finish and Architectural Class II 0.010 to 0.018 mm 0.4- to 0.7-mil thick anodized coating producing natural aluminum color finish conforming to AA M32-A31, as specified in AA DAF45.

][g. Matte finish Class II; clear anodized coating, medium matte non-directional textured mechanical finish and Architectural Class II 0.010 to 0.018 mm 0.4- to 0.7-mil thick anodized coating producing natural aluminum color finish conforming to AA M42-A31, as specified in AA DAF45.

****

NOTE: The following polished-frosted finishes are the finishes specified for aluminum doors and frames and aluminum curtain wall systems and apply to exterior architectural metal items requiring a matching finish. Select the desired coating thickness.

****

][h. Polished-frosted finish Class II; clear anodized coating, smooth specular buffed mechanical finish, followed by a medium matte chemical etch finish, Architectural Class II 0.010 to 0.018 mm 0.4- to 0.7-mil thick anodized coating producing natural aluminum color finish conforming to AA M21-C22-A31, as specified in AA DAF45.

][i. Polished-frosted finish Class I, clear anodized coating smooth specular buffed mechanical finish, followed by a medium matte chemical etch finish, Architectural Class I 0.018 mm 0.7-mil and greater thickness of anodized coating producing natural aluminum color finish conforming to AA M21-C22-A41, as specified in AA DAF45.

****
NOTE: It is recommended that a sample of the required color be on display where it may be seen by bidders during the bidding period.
****

][j. Polished-frosted finish integral-color anodized coating, smooth specular buffed mechanical finish, followed by a nonetching inhibitive alkaline cleaning, medium matte, chemical etch finish, Architectural Class 1 0.018 mm 0.7-mil and greater thickness of anodized coating producing dark bronze integral color finish conforming to AA DAF45.

][k. Match finish color and appearance to that of the aluminum finish sample approved for each Architectural metal item within the aluminum producer's standard color range.

]2.4.4.1 Preventative Maintenance and Inspection

Perform all Preventative Maintenance and Inspection in accordance with the aluminum producer's recommended Cleaning Materials and Application Methods including precautions in the use of cleaning materials that maybe detrimental to the aluminum finish when improperly applied.

PART 3 EXECUTION

3.1 GENERAL PROVISIONS

Install decorative metal work in accordance with the approved shop drawings and descriptive data for each ornamental metal item, as specified.

Securely fasten decorative metal items plumb and true to horizontal and vertical lines and levels.

3.2 ANCHORAGE DEVICES EMBEDDED IN OTHER CONSTRUCTION

Deliver anchorage devices, such as concrete inserts, anchor bolts, and ornamental metal items having integral anchors that are to be embedded in cast-in-place concrete and masonry construction, to the project site in time for installation before the start of cast-in-place concrete operations and masonry work. Provide setting drawings, templates, instructions, and directions for the installation of the anchorage items.

3.3 FASTENING TO CONSTRUCTION-IN-PLACE

Submit samples for each type of Anchorage Devices and Fasteners.

Provide Anchorage devices and fasteners where necessary for fastening ornamental metal items to construction-in-place. Include threaded fasteners for concrete inserts embedded in cast-in-place concrete; masonry anchorage devices and threaded fasteners for solid masonry and concrete-in-place; toggle bolts for hollow masonry and stud partitions; through bolting for masonry and wood construction; lag bolts and wood

screws for wood construction; and threaded fasteners for structural steel. Provide fastening as indicated and as specified. Fastening to wood plugs in masonry or concrete-in-place is not permitted.

3.4 CUTTING AND FITTING

Perform required cutting, drilling, and fitting for the installation of ornamental metal work. Execute cutting, drilling, and fitting carefully; when required, fit in place work before fastening.

3.5 SETTING MASONRY ANCHORAGE DEVICES

Set all masonry anchorage devices in masonry or concrete-in-place construction in accordance with the anchorage device manufacturer's printed instructions. Drill anchorage holes to the recommended depth, diameter, and size recommended by the manufacturer of the particular anchorage device used. Leave drilled anchorage holes rough, not reamed, and free of drill dust.

3.6 WELDING PROCEDURES

Ensure procedures for welding, appearance, quality of welds made, and the methods used in correcting welding work conform to AWS D1.2/D1.2M.

Ground all exposed welds smooth.

3.7 THREADED CONNECTIONS

Countersink and provide flat bolt and screw heads where anchors are exposed to view, and tightly secure threaded connections so that the threads are entirely concealed by fitting, unless otherwise specified.

3.8 CLEANING

Before final acceptance, wash exposed-to-view aluminum surfaces with clean water and soap and rinse with clean water. Do not use acid solutions, steel wool, or other harsh abrasives. Remove stains that remain after cleaning or restore the finish in accordance with the aluminum producer's recommendations.

3.9 INSPECTION AND ACCEPTANCE PROVISIONS

3.9.1 Finished Ornamental Metal Work Requirements

Ornamental metal work will be rejected for any of the following deficiencies:

a. Finish of exposed-to-view aluminum surfaces having color and appearance that are outside the color and appearance range of the approved samples for aluminum finish.

b. Installed ornamental metal items having stained, discolored, abraded, or otherwise damaged exposed-to-view aluminum surfaces that cannot be removed by cleaning or repairing.

c. Installed ornamental metal items that do not match the approved sample.

d. Aluminum surfaces in contact with dissimilar materials that are not protected as specified.

3.9.2 Repair of Defective Work

Remove and/or replace defective work with ornamental metal materials that meet the requirements of this section.

3.10 MAINTENANCE INSTRUCTIONS

Submit maintenance instructions as follows:

Aluminum producer's recommended cleaning materials and application methods including precautions in the use of cleaning materials that may be detrimental to the aluminum finish when improperly applied.

-- End of Section --