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USACE / NAVFAC / AFCEC **UFGS-07 42 13 (August 2025)**

Preparing Activity: NAVFAC **Superseding**
UFGS-07 42 13 (May 2011)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated April 2026
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SECTION TABLE OF CONTENTS

DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 42 13

METAL WALL PANELS

08/25

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USACE / NAVFAC / AFCEC **UFGS-07 42 13 (August 2025)**

Preparing Activity: NAVFAC **Superseding**
UFGS-07 42 13 (May 2011)

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SECTION 07 42 13

METAL WALL PANELS
08/25

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NOTE: This guide specification covers the requirements for both factory color and mill finish aluminum or steel non-structural metal wall panels.

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 item(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).
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NOTE: This section does not include light gage siding for temporary construction, housing, or pre-engineered metal buildings, or decorative wall panels.

Coordinate this section with other system components specifications such as framing, insulation and sheet metal flashing. Also coordinate with applicable Unified Facilities Criteria as it relates to the specific project.
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PART 1 GENERAL

1.1 REFERENCES

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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 Reference Identifier (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	(2020) Aluminum Design Manual
AA ASD1	(2024) Aluminum Standards and Data

AMERICAN ARCHITECTURAL MANUFACTURERS ASSOCIATION (AAMA)

AAMA 501.1	(2017) Standard Test Method for Water Penetration of Windows, Curtain Walls and Doors Using Dynamic Pressure
AAMA 800	(2016) Voluntary Specifications and Test Methods for Sealants

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

ANSI/AISC 341	(2022) Seismic Provisions for Structural Steel Buildings

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI S100	(2016) North American Specification for the Design of Cold-Formed Steel Structural Members
AISI SG03-3	(2002; Suppl 2001-2004; R 2008) Cold-Formed Steel Design Manual Set

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

ASCE 7-22	(2022; Supp 1 2023; Supp 2 2023; Supp 3 2025) Minimum Design Loads and Associated Criteria for Buildings and Other Structures

ASTM INTERNATIONAL (ASTM)

ASTM A36/A36M	(2019) Standard Specification for Carbon Structural Steel
ASTM A123/A123M	(2024) Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
ASTM A463/A463M	(2025b) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
ASTM A606/A606M	(2025) Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance
ASTM A653/A653M	(2025a) Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A755/A755M	(2018; R 2024) Standard Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
ASTM A780/A780M	(2020) Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
ASTM A792/A792M	(2025a) Standard Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
ASTM A924/A924M	(2022a) Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
ASTM A1008/A1008M	(2025) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Required Hardness, Solution Hardened, and Bake Hardenable
ASTM B117	(2025) Standard Practice for Operating Salt Spray (Fog) Apparatus
ASTM B209	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate

ASTM B209M	(2014) Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate (Metric)
ASTM C920	(2018; R 2024) Standard Specification for Elastomeric Joint Sealants
ASTM D522/D522M	(2017; R 2021) Mandrel Bend Test of Attached Organic Coatings
ASTM D523	(2014; R 2018) Standard Test Method for Specular Gloss
ASTM D610	(2025) Standard Practice for Evaluating Degree of Rusting on Painted Steel Surfaces
ASTM D714	(2002; R 2017) Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D822	(2013; R 2018) Filtered Open-Flame Carbon-Arc Exposures of Paint and Related Coatings
ASTM D968	(2022) Standard Test Methods for Abrasion Resistance of Organic Coatings by Falling Abrasive
ASTM D1056	(2020) Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber
ASTM D1308	(2020) Standard Test Method for Effect of Household Chemicals on Clear and Pigmented Coating Systems
ASTM D1654	(2008; R 2016; E 2017) Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments
ASTM D1667	(2022) Standard Specification for Flexible Cellular Materials - Poly (Vinyl Chloride) Foam (Closed-Cell)
ASTM D2244	(2025) Standard Practice for Calculation of Color Tolerances and Color Differences from Instrumentally Measured Color Coordinates
ASTM D2247	(2025) Standard Practice for Testing Water Resistance of Coatings in 100 Percent Relative Humidity
ASTM D2794	(1993; R 2024) Standard Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)
ASTM D3359	(2017) Standard Test Methods for Rating Adhesion by Tape Test

ASTM D3363	(2022) Standard Test Method for Film Hardness by Pencil Test
ASTM D4214	(2023) Standard Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
ASTM D4587	(2011; R 2019; E 2019) Standard Practice for Fluorescent UV-Condensation Exposures of Paint and Related Coatings
ASTM D5894	(2016) Standard Practice for Cyclic Salt Fog/UV Exposure of Painted Metal, (Alternating Exposures in a Fog/Dry Cabinet and a UV/Condensation Cabinet)
ASTM E72	(2025) Standard Test Methods of Conducting Strength Tests of Panels for Building Construction
ASTM E84	(2026) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E283	(2019) Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
ASTM E331	(2000; R 2023) Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference
ASTM E1592	(2025) Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
ASTM G152	(2013; R 2021) Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials
ASTM G153	(2013; R 2021) Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials

METAL BUILDING MANUFACTURERS ASSOCIATION (MBMA)

MBMA MBSM	(2018) Metal Building Systems Manual

NATIONAL ASSOCIATION OF ARCHITECTURAL METAL MANUFACTURERS (NAAMM)

NAAMM AMP 500	(2006) Metal Finishes Manual

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

SMACNA 1793	(2012) Architectural Sheet Metal Manual, 7th Edition

UL SOLUTIONS (UL)

UL Bld Mat Dir	(updated continuously online) Building Materials Directory

1.2 DEFINITIONS

Metal Wall Panel: Metal wall panels, attachment system components and accessories necessary for a complete weather-tight wall system.

1.3 SUBMITTALS

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NOTE: Review Submittal Description (SD) definitions in Section 01 33 00 SUBMITTAL PROCEDURES and edit the following list, and corresponding submittal items in the text, to reflect only the submittals required for the project. The Guide Specification technical editors have classified 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 Army projects, fill in the empty brackets following the "G" classification, with a code of up to three characters 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 and Air Force projects.

The "S" classification indicates submittals required as proof of compliance for sustainability Guiding Principles Validation or Third Party Certification and as described in Section 01 33 00 SUBMITTAL PROCEDURES.

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Government approval is required for submittals with a "G" or "S" classification. Submittals not having a "G" or "S" classification are for Contractor Quality Control approval. Submittals not having a "G" or "S" classification are for information only. When used, a code following the "G" classification 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

Qualification of Manufacturer; G, [_____]

Qualification of Installation Contractor; G, [_____]

Sample Warranty; G, [_____]

SD-02 Shop Drawings

Installation Drawings ; G, [_____]

SD-03 Product Data

Recycled Content; S

[Aluminum Sheet Panels ; G, [_____]

][Steel Sheet Panels; G, [_____]

] Factory Color Finish

Closure Materials

Pressure Sensitive Tape

Sealants and Caulking

Galvanizing Repair Paint

Enamel Repair Paint

[Aluminized Steel Repair Paint

] Accessories

SD-04 Samples

[Aluminum Sheet Panels; G, [_____]

][Steel Sheet Panels; G, [_____]

] Fasteners; G, [_____]

Metal Closure Strips; G, [_____]

[Color Chart and chips; G, [_____]

] SD-05 Design Data

Wind Load Design Analysis; G, [_____]

SD-06 Test Reports

Leakage Tests; G, [_____]

Wind Load Tests; G, [_____]

Coating Tests; G, [_____]

Chalking Tests; G, [_____]

Seismic Tests; G, [_____]

SD-07 Certificates

Coil Stock; G, [_____]

Fasteners; G, [_____]

Galvanizing Repair Paint; G, [_____]

Enamel Repair Paint; G, [_____]

SD-08 Manufacturer's Instructions

Installation of Wall panels; G, [_____]

SD-09 Manufacturer's Field Reports

Manufacturer's Field Inspection Reports; G, [_____]

SD-11 Closeout Submittals

Warranty; G, [_____]

Maintenance Instructions; G, [_____]

20 Year "No Dollar Limit" Warranty for Labor and Material

1.4 QUALITY CONTROL

1.4.1 Pre-Installation Conference

Upon notification of submittal receipt and approval by the Contracting Officer; and prior to the commencement of the work, attend a pre-installation conference to review the following:

a. Drawings and Specifications.

b. Qualification of Installer[, Qualification of Welders].

c. Sustainable acquisition

d. Approved Warranty

e. Sample wall panels, 30.5 cm 12 inches long by actual panel width

f. Sample metal closure strips, 2.50 cm 10 inches long of each type

g. Color charts and chips

h. Coatings and base metal tests, chalking tests

i. Construction schedule, availability of materials, Installer's personnel, equipment, and facilities required to progress with the work without delay.

j. Methods and procedures related to installation of wall panels, including manufacturer's written instructions. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

k. Support conditions for compliance with requirements, including alignment between and attachment to structural members.

l. Flashing, special siding details, wall penetrations, openings, and condition of other construction that affect metal wall panels.

m. Governing regulations and requirements for insurance, certificates, and tests and inspections if applicable.

n. Temporary protection requirements for metal wall panel assembly during and after installation.

o. Wall panel observation and repair procedures after metal wall panel installation. Provide detailed written instructions including copies of Safety Data Sheets for maintenance and repair materials, and manufacturer's maintenance instructions.

1.4.1.1 Installation Drawings

Provide installation shop drawings for wall panels, flashing, accessories, and anchorage systems showing completely dimensioned structural frame and erection layouts, openings in the wall, special framing details, and construction details at corners, building intersections and flashing, location and type of mastic and metal filler strips.

1.4.1.2 Wind Load Design Analysis

Include in the wind design analysis a wall plan delineating dimensions and attachment patterns for each zone. Wind design analysis is required to be prepared and sealed by Registered Professional Engineer in the geographic area where the construction takes place. As applicable, submit the following wind load design analysis data, to include, but not limited to:

wind speed

exposure category, co-efficient, importance factor

type of facility

negative pressures for each zone

methods and requirements of attachment

1.4.2 Manufacturer's Technical Representative

The representative is required to receive authorization from manufacturer to approve field changes and is to be thoroughly familiar with the products and installations in the geographical area where construction takes place.

1.4.3 Qualification of Manufacturer

Certify that metal wall panel system manufacturer has a minimum of five years experience in manufacturing metal wall system and accessory products.

Manufacturer is required to provide engineering services by an authorized Registered Professional Engineer; currently licensed in the State where construction takes place, having a minimum of 4 years experience as an engineer knowledgeable in wind load design analysis, protocols, and procedures per MBMA MBSM, "Metal Building Systems Manual"; ASCE 7-22, and ASTM E1592[and seismic design conforming to ANSI/AISC 341].

Provide certified engineering calculations, using the products submitted, for Wind load requirements in accordance with ASCE 7-22.

1.4.3.1 Manufacturer's Certificates

Also provide the following certifications from the manufacturer:

Coil Stock

Fasteners

Galvanizing Repair Paint

Enamel Repair Paint

Submit certification from coil stock manufacturer or supplier that the machinery used forms the provided coil stock without warping, waviness, or rippling that is not a part of the panel profile, and without damage, abrasion or marring of the finish coating.

Provide evidence that products used within this specification are manufactured in the United States.

1.4.4 Certified Qualification of Installation Contractor

The installation contractor is to be approved and certified by the metal wall panel manufacturer prior to beginning the installation of the metal wall panel system. Subcontracting by Certified Contractor for the metal wall panel work is not permitted.

1.4.5 Single Source

Obtain each type of metal wall panels, clips, closure materials, 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.

1.4.6 Manufacturer's Maintenance Instructions

Provide manufacturer's detailed written instructions including copies of Safety Data Sheets for maintenance and repair materials.

1.5 DELIVERY, HANDLING, AND STORAGE

Deliver and protect package components, sheets, metal wall panels, and other manufactured items to prevent damage or deformation during transportation and handling. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage. Always lift and carry panels by the long edge to prevent twisting and damage to the panels.

Stack and store metal wall panels horizontally on platforms or pallets,

covered with suitable weather-tight and ventilated covering to ensure dryness, with positive slope for drainage of water. Do not store metal wall panels in contact with other materials that might cause staining, denting, or other surface damage. Ensure panels are stored in a dry environment, and minimize the amount of handling to minimize opportunities for damaging panels. Retain strippable protective covering on metal wall panel until actual installation.

1.6 PROJECT CONDITIONS

1.6.1 Field Measurements

Verify locations of wall framing and opening dimensions by field measurements before metal wall panel fabrication and indicate measurements on Shop Drawings.

1.6.2 Weather Limitations

Proceed with installation preparation only when existing and forecasted weather conditions permit Work to proceed without water entering into wall system or building.

1.7 WARRANTY

Final Warranty provided is required to conform to the Sample Warranty as reviewed and approved by the Contracting Officer.

1.7.1 20 Year "No Dollar Limit" Warranty for Labor and Material

Furnish manufacturer's no-dollar-limit warranty for the metal wall panel system. The warranty period is to be no less than 20 years from the date of Government acceptance of the work. Write warranty directly to the Government, commencing at time of Government's acceptance of the wall panel work. The warranty is to provide that if within the warranty period the metal wall panel system shows evidence of corrosion, perforation, rupture, or excess weathering due to deterioration of the wall panel system resulting from defective materials, then correction of the defective workmanship be the responsibility of the metal wall panel system manufacturer. Repairs that become necessary because of defective materials and workmanship while metal wall panel system is under warranty are to be performed within 72 hours after notification, unless additional time is approved by the Contracting Officer. Failure to perform repairs within 72 hours of notification constitutes grounds for having emergency repairs performed by others and does not void the remaining warranty.

PART 2 PRODUCTS

2.1 SYSTEM DESCRIPTION

****

NOTE: Coordinate with paragraph MATERIALS.

In the first sentence, select finish type, metal type, attachment type, and delete other options.

In the second sentence, select a combination of options as necessary to describe the generic profile required. Include the last bracketed option of the second sentence when generic profile is shown on

drawings. Show panel profile and dimensions on the drawings when a particular aesthetic appearance is desired.

In environments with an Environmental Severity Classification (ESC) C3 thru C5, aluminum metal panels with PVDF coating is the preferred material. Steel with AZ55 (galvalume) with PVDF coating is also acceptable. Galvanized steel (G90) with or without a coating is not acceptable unless the building is temporary. See UFC 1-200-01 for determination of ESC for project locations.

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[Factory color finished,][Mill finish][galvanized][galvalume][aluminum]metal wall panel system with[concealed fastening][exposed fastener] attachment. Panel profile is to be[embossed][recessed seam lock][flush face][smooth face][recessed bead][raised bead][striated][square ribbed][beaded rib][roll lock seam][snap lock seam][box rib][corrugated][standing seam][batten seam][and with stiffening ribs in the flat of the panel][as shown on drawings].

2.1.1 Metal Wall Panel General Performance

Comply with performance requirements, conforming to AISI S100, without failure due to defective manufacture, fabrication, installation, or other defects in construction. Ensure wall panels and accessory components conform to the following standards:

ASTM A1008/A1008M

ASTM A123/A123M

ASTM A36/A36M

ASTM A653/A653M

[ASTM A463/A463M for aluminum coated steel sheet

] ASTM A606/A606M

[ASTM A755/A755M for metallic coated steel sheet for exterior coil pre-painted applications.

][ASTM A780/A780M for repair of damage or uncoated areas of hot-dipped galvanized coating.

][ASTM A924/A924M for metallic coated steel sheet

] ASTM D522/D522M for applied coatings

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2.1.2 Structural Performance

Ensure maximum calculated fiber stress will not exceed the allowable value in the AISI or AA manuals; a one third overstress for wind is allowed. Midspan deflection under maximum design loads is limited to L/180. Contract drawings show the design wind loads and the extent and general

assembly details of the metal siding. Provide design for members and connections not shown on the drawings. Provide siding panels and accessories products by the same manufacturer.

Provide metal wall panel assemblies complying with the load and stress requirements in accordance with ASTM E1592. Wind Load force due to wind action governs the design for panels. Wall systems and attachments are required to resist the wind loads as determined by ASTM E72 and ASCE 7-22 in the geographic area where the construction takes place, in pounds per square foot. Submit [five][_____] copies of wind load tests and seismic tests to the Contracting Officer. Provide metal wall panel assembly for seismic conditions complying with the applicable requirements of ANSI/AISC 341.

2.1.3 Air Infiltration

Air leakage is required to conform to the air leakage limits through the wall assembly area when tested according to ASTM E283.

2.1.4 Water Penetration Under Static Pressure

No water penetration is allowed when tested according to ASTM E331.

2.1.5 Water Penetration Under Dynamic Pressure

No evidence of water leakage is allowed when tested according to AAMA 501.1.

2.2 FABRICATION

Unless approved otherwise, fabricate and finish metal wall panels and accessories at the factory, by manufacturer's standard procedures and processes and as necessary to fulfill indicated and specified performance requirements. Comply with indicated profiles and with dimensional and structural requirements. Submit manufacturer's data indicating recycled content percentages.

Provide panel profile, including major ribs and intermediate stiffening ribs, if any, for full length of panel. Fabricate metal wall panel side laps with factory-installed captive gaskets or separator strips that provide a tight seal and prevent metal-to-metal contact, in a manner that seals weather-tight and minimize noise from movements within panel assembly.

2.2.1 Sheet Metal Accessories

Fabricate flashing and trim to comply with recommendations in SMACNA 1793 that apply to the design, dimensions, metal, and other characteristics of item indicated:

a. Form exposed sheet metal accessories that are without excessive oil canning, buckling, and tool marks and that are true to line and levels indicated, with exposed edges folded back to form hems.

b. End Seams: fabricate nonmoving end seams with flat-lock seams. Form seams and seal with epoxy seam sealer. Rivet joints for additional strength.

c. Sealed Joints: form non-expansion but movable joints in metal to accommodate elastomeric sealant to comply with SMACNA 1793.

d. Conceal fasteners and expansion provisions where possible. Exposed fasteners are not allowed on faces of accessories exposed to view.

e. Fabricate cleats and attachment devices of size and metal thickness recommended by SMACNA 1793 or by metal wall panel manufacturer for application, but not less than thickness of metal being secured.

2.3 MATERIALS

[2.3.1 Aluminum Sheet Panels

Submit a sample Aluminum Sheet Panel, 30.5 cm 12 inches long by actual panel width, of each panel proposed to be used on the project.

Roll-form aluminum wall panels to the specified profile, with fy = [2.12][2.81][3.52][5.63] kscm [30][40][50][80] ksi, [0.81][1.02][1.27] mm [.032][.040][.050] inches thickness and depth as indicated. Provide material plumb and true, and within the tolerances listed:

a. Aluminum Sheet conforming to ASTM B209M ASTM B209, AA ASD1 and AA ADM.

b. Individual panels are to have continuous length to cover the entire length of any wall area with no joints or seams and formed without warping, waviness, or ripples that are not part of the panel profile and free of damage to the finish coating system.

c. Provide panels with thermal expansion and contraction consistent with the type of system specified.

[(1) Profile and coverage to be a minimum height and width from manufacturer's standard for the indicated wall area.

][(2) Profile to be a [2.54][4.45][5.08][6.35] cm [1][1-3/4][2][2-1/2] inch high standing seam, [30.5][40.64][45.72] cm [12][16][18] inch coverage, with mechanical crimping or snap-together seams with concealed clips and fasteners.

][(3) [Smooth, flat][Embossed]surface texture.

]][2.3.2 Steel Sheet Panels

Submit a sample Steel Sheet Panel, 30.5 cm 12 inches long by actual panel width, of each panel proposed to be used on the project.

Roll-form steel wall panels to the specified profile, with fy= [2.12][2.81][3.52][5.63] kscm [30][40][50][80] ksi, [26][24][22][20][18] gauge and depth as indicated. Provide material plumb and true, and within the tolerances listed:

[a. Galvanized Steel Sheet conforming to ASTM A653/A653M and AISI SG03-3.

][b. Aluminum-Zinc Alloy-coated Steel Sheet conforming to ASTM A792/A792M and AISI SG03-3.

] c. Individual panels of a continuous length sufficient to cover the entire length of any unbroken wall area with no joints or seams and formed without warping, waviness, or ripples that are not part of the panel profile and free of damage to the finish coating system.

d. Provide panels with thermal expansion and contraction consistent with the type of system specified.

[(1) Profile and coverage to be a minimum height and width from manufacturer's standard for the indicated wall area.

][(2) Profile to be a [2.54][4.45][5.08][6.35] cm [1][1-3/4][2][2-1/2] inch high standing seam, [30.5][40.64][45.72] cm [12][16][18] inch coverage, with mechanical crimping or snap-together seams with concealed clips and fasteners.

][(3) [Smooth, flat][Embossed]Surface Texture.

]]2.3.3 Factory Color Finish

Comply with NAAMM AMP 500 for recommendations for applying and designating finishes. Noticeable variations in same piece 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.

All panels are to receive a factory-applied polyvinylidene fluoride finish consisting of a baked-on top-coat with a manufacturer's recommended prime coat conforming to the following:

2.3.3.1 Metal Preparation

Carefully prepare all metal surface for painting on a continuous process coil coating line by alkali cleaning, hot water rinsing, application of chemical conversion coating, cold water rinsing, sealing with acid rinse, and thorough drying.

2.3.3.2 Prime Coating

Apply a base coat of epoxy paint, specifically formulated to interact with the top-coat, to the prepared surfaces by roll coating to a dry film thickness of 0.20 plus 0.05 mils. Prime coat is to be oven cured prior to application of finish coat.

2.3.3.3 Exterior Finish Coating

Roll coat the finish coating over the primer by roll coating to dry film thickness of 0.80 plus 5 mils for a total dry film thickness of 1.00 plus 0.10 mils. Oven-cure finish coat.

2.3.3.4 Interior Finish Coating

Apply a wash-coat on the reverse side over the primer by roll coating to a dry film thickness of 0.30 plus 0.05 mils for a total dry film thickness of 0.50 plus 0.10 mils. Oven-cured the wash coat.

2.3.3.5 Color

Provide exterior finish color as[selected by the Government from the manufacturer's standard color chart][as specified]. Submit manufacturer's color charts and chips, approximately 4 by 4 inches, showing full range of colors, textures, and patterns available for wall panels with factory applied finishes.

2.3.3.6 Physical Properties

Coating is to conform to the industry and manufacturer's standard performance criteria as listed by the following certified test reports:

General:	ASTM D5894 and ASTM D4587
Abrasion:	ASTM D968
Adhesion:	ASTM D3359
Chalking:	ASTM D4214
Chemical Pollution:	ASTM D1308
Color Change and Conformity:	ASTM D2244
Creepage:	ASTM D1654
Cyclic Corrosion Test:	ASTM D5894
Flame Spread:	ASTM E84
Flexibility:	ASTM D522/D522M
Formability:	ASTM D522/D522M
Gloss at 60 and 85 degrees:	ASTM D523
Humidity:	ASTM D2247 and ASTM D714
Oxidation:	ASTM D610
Pencil Hardness:	ASTM D3363
Reverse Impact:	ASTM D2794
Salt Spray:	ASTM B117
Weatherometer:	ASTM G152, ASTM G153 and ASTM D822

2.3.4 Miscellaneous Metal Framing

Cold-formed metallic-coated steel sheet conforming to ASTM A653/A653M and specified in Section 05 40 00 COLD-FORMED METAL FRAMING unless otherwise indicated.

2.3.4.1 Fasteners for Miscellaneous Metal Framing

Type, material, corrosion resistance, size, and sufficient length to penetrate the supporting member a minimum of 2.54 cm 1 inch with other properties required to fasten miscellaneous metal framing members to supporting members and substrates in accordance with the wall panel manufacturer's and ASCE 7-22 requirements.

2.3.5 Fasteners

****

NOTE: Select series 304 stainless steel, series 304 stainless cast head, or series 304 stainless Bi-metal for humid project locations or locations with Environmental Severity Classifications (ESC) of C3 thru C5; zinc-coated steel, multi coated (zinc plus anti-corrosion coating), series 410 stainless steel, duplex coated and zinc cast head are acceptable options for steel panels at project locations with ESC C1 or C2; multi coated (zinc plus anti-corrosion coating) is an acceptable option for aluminum panels at project locations with ESC C1 or C2. Humid locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations.

Electroplated zinc fasteners are not permitted for use at any location.

Series 410 stainless steel fasteners are not permitted for use with aluminum panels.

Series 304 stainless steel fasteners may corrode base metal (structural member or decking being attached to) consisting of steel, cast iron, zinc, galvanized, galvalume or coated steel. Consult with manufacturer for specific conditions.

Series 410 stainless steel fasteners may corrode base metal (structural member or decking being attached to) consisting of steel, cast iron, zinc, galvanized, galvalume or coated steel. Consult with manufacturer for specific conditions.

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2.3.5.1 Exposed Fasteners

Provide corrosion resistant fasteners for wall panels, made of[zinc-coated steel,][multi coated (zinc plus anti-corrosion coating),][Series 410 stainless steel,][Series 304 stainless steel,][Series 304 stainless cast head,][Series 304 stainless bi-metal,][zinc cast head,] compatible with the sheet panel and flashing and of a type and size recommended by the manufacturer to meet the performance requirements and design loads.

Fasteners for accessories are to be the manufacturer's standard. Provide an integral metal washer matching the color of attached material with compressible sealing EPDM gasket approximately 0.24 cm 3/32 inch thick.

2.3.5.2 Hidden Fasteners

Provide corrosion resistant fasteners recommended by the manufacturer to meet the performance requirements and design loads.

2.3.5.3 Screws

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NOTE: For paragraphs SCREWS, RIVETS, and ATTACHMENT CLIPS, select zinc-coated or hot-dip galvanized steel for steel panels and multi-coated or aluminum options for aluminum panels in project locations with ESC C1 or C2. Select series 304 stainless steel for panels at humid locations and project locations with ESC C3 thru C5. Humid locations are those in ASHRAE climate zones 0A, 1A, 2A, 3A, 3C, 4C and 5C (as identified in ASHRAE 90.1). See UFC 1-200-01 for determination of ESC for project locations.

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Screws to be corrosion resistant[zinc-coated steel,][multi coated (zinc plus anti-corrosion coating),][or][304 stainless steel] being the type and size recommended by the manufacturer to meet the performance requirements.

2.3.5.4 Rivets

Rivets to be closed-end type, corrosion resistant coated[zinc-coated steel][, aluminum,][or][Series 304 stainless steel] where watertight connections are required.

2.3.5.5 Attachment Clips

Fabricate clips from steel hot-dipped galvanized in accordance with ASTM A653/A653M, Z275 G 90, or Series 300 stainless steel. Size, shape, thickness, and capacity as required meeting the insulation thickness and design load criteria specified.

2.3.6 Accessories

All accessories to be compatible with the metal wall panels. Sheet metal flashing, trim, metal closure strips, caps, and similar metal accessories to not be less than the minimum thickness specified for the wall panels. Exposed metal accessories/finishes to match the panels furnished, except as otherwise indicated. Provide molded foam rib, ridge, and other closure strips of non-absorbent closed-cell, solid-cell synthetic rubber, or pre-molded neoprene to match configuration of the panels.

2.3.6.1 Rubber Closure Strips

Provide closed-cell, expanded cellular rubber conforming to ASTM D1056 and ASTM D1667; extruded or molded to the configuration of the specified wall panel and in lengths supplied by the wall panel manufacturer.

2.3.6.2 Metal Closure Strips

Submit sample metal closure strips, 2.50 cm 10 inches long of each type proposed to be used on the project.

Provide factory fabricated[aluminum][steel] closure strips to be the same[gauge][thickness], color, finish, and profile of the specified wall panel.

2.3.6.3 Sealants and Caulking

Provide approved gun type sealants for use in hand- or air-pressure caulking guns at temperatures above 4 degrees C 40 degrees F or frost-free application at temperatures above minus 12 degrees C 10 degrees F with minimum solid content of 85 percent of the total volume. Sealants are required to dry with a tough, durable surface skin which permit remaining soft and pliable underneath, providing a weather-tight joint. No migratory staining is permitted on painted or unpainted metal, stone, glass, vinyl, or wood.

Prime all joints receiving sealants with a compatible one-component or two-component primer as recommended by the wall panel manufacturer.

2.3.6.4 Shop-Applied Caulking

Sealant for shop-applied caulking is to be non-curing butyl compliant with AAMA 800 to ensure the sealant's plasticity at the time of field erection.

2.3.6.5 Field-Applied Caulking

Sealant for field-applied caulking is to be an approved gun grade, non-sag sealant with an initial maximum Shore A durometer hardness of 25, and conforming to ASTM C920, Type II. Color to match panel colors.

2.3.6.6 Pressure Sensitive Tape

Provide pressure sensitive tape sealant, 100 percent solid with a release paper backing; permanently elastic, non-sagging, non-toxic and non-staining as approved by the wall panel manufacturer.

2.3.7 Sheet Metal Flashing and Trim

Shop fabricate sheet metal flashing and trim where practicable to comply with recommendations in SMACNA 1793 that apply to design, dimensions, metal, and other characteristics of item indicated. Obtain field measurements for accurate fit before shop fabrication.

Fabricate sheet metal flashing and trim without excessive oil canning, buckling, and tool marks and true to line and levels indicated, with exposed edges folded back to form hems.

2.3.8 Repair of Finish Protection

Repair paint for color finish enameled wall panel is required to be compatible paint of the same formula and color as the specified finish furnished by the wall panel manufacturer. Provide [_____][pints][quarts] of[aluminized steel repair paint][repair paint matching the specified wall panels].

PART 3 EXECUTION

3.1 EXAMINATION

Examine the following:

a. Examine substrates, areas, and conditions, with Installer present, for compliance with requirements for installation tolerances, metal wall panel supports, and other conditions affecting performance of the Work.

b. Examine primary and secondary wall framing to verify that rafters, purlins, angles, channels, and other structural panel support members and anchorages have been installed within alignment tolerances required by metal wall panel manufacturer, UL, ASTM, ASCE 7-22 and as required for the geographical area where construction takes place.

c. Examine solid wall sheathing to verify that sheathing joints are supported by framing or blocking and that installation is within flatness tolerances required by metal wall panel manufacturer.

d. Examine roughing-in for components and systems penetrating metal wall panels to verify actual locations of penetrations relative to seam locations of metal wall panels before metal wall panel installation.

Submit to the Contracting Officer a written report, endorsed by Installer, listing conditions detrimental to performance of the Work. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment. Install miscellaneous framing installation, including sub-purlins, girts, angles, furring, and other miscellaneous wall panel support members and anchorage are to be according to metal wall panel manufacturer's written instructions.

3.3 INSTALLATION

3.3.1 Wall Panel Installation

Provide full length metal wall panels, from sill to eave as indicated, unless otherwise indicated or restricted by shipping limitations. Anchor metal wall panels and other components of the Work securely in place, with provisions for thermal and structural movement in accordance with MBMA MBSM. Work is to allow for thermal movement of the wall panel, movement of the building structure, and to provide permanent freedom from noise due to wind pressure. Erect sheets true and plumb and in exact alignment with the horizontal and vertical edges of the building, securely anchored, and with the indicated eave, and sill. Ensure substrate is plumb and level prior to installation.

Erect wall panel system in accordance with the approved erection drawings, the printed instructions, and safety precautions of the manufacturer. Sheets are not to be subjected to overloading, abuse, or undue impact. Do not apply bent, chipped, or defective sheets. Field cutting metal wall panels by torch is not permitted.

[3.3.1.1 Steel Wall Panels

Use stainless-steel fasteners for exterior surfaces and galvanized steel fasteners for interior surfaces.

][3.3.1.2 Aluminum Wall Panels

Use aluminum or stainless-steel fasteners for exterior surfaces and aluminum or galvanized steel fasteners for interior surfaces.

][3.3.1.3 Anchor Clips

Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions.

]3.3.1.4 Metal Protection

Where dissimilar metals contact each other or corrosive substrates, protect against galvanic action by painting contact surfaces with bituminous coating, by applying rubberized-asphalt underlayment to each contact surface, or by other permanent separation as recommended by metal wall panel manufacturer.

3.3.1.5 Joint Sealers

Install gaskets, joint fillers, and sealants where indicated and where required for weatherproof performance of metal wall panel assemblies. Provide types of gaskets, fillers, and sealants indicated or, if not indicated, types recommended by metal wall panel manufacturer.

3.3.2 Fastener Installation

Anchor metal wall panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' written instructions. Never overdrive fasteners and ensure fasteners are installed straight and not at an angle.

3.3.3 Flashing, Trim, and Closure Installation

3.3.3.1 General Requirements

Comply with performance requirements, manufacturer's written installation instructions, and SMACNA 1793. Provide concealed fasteners where possible, and set units true to line and level as indicated. Install work with laps, joints, and seams to form permanently watertight and weather resistant.

Install sheet metal work is to form weather-tight construction without waves, warps, buckles, fastening stresses or distortion, and allow for expansion and contraction. Cutting, fitting, drilling, and other operations in connection with sheet metal required to accommodate the work of other trades is to be performed by sheet metal mechanics.

3.3.3.2 Metal Flashing

Install exposed metal flashing at building corners, sills and eaves, junctions between metal siding and walling. Exposed metal flashing to be the same material, color, and finish as the specified metal wall panel. Fasten flashing at a minimum of 20.3 cm 8 inches on center, except where flashing is held in place by the same screws that secure covering sheets. Flashing is to be furnished in at least 2.44 m 8 foot lengths. Exposed flashing is to have 2.54 cm 1 inch locked and blind-soldered end joints, and expansion joints at intervals of not more than 4.88 m 16 feet.

Exposed flashing and flashing subject to rain penetration to be bedded in the specified joint sealant. Isolate flashing which is in contact with dissimilar metals by means of the specified asphalt mastic material to prevent electrolytic deterioration. Form drips to the profile indicated,

with the edge folded back 1.27 cm 1/2 inch to form a reinforced drip edge.

3.3.3.3 Closures

Install metal closure strips at open ends of corrugated or ribbed pattern walls, and at intersection of wall and wall unless open ends are concealed with formed eave flashing; and in other required areas.

Install mastic closure strips at intersection of the wall with metal walling; top and bottom of metal siding; heads of wall openings; and in other required locations.

3.4 APPLICATION

3.4.1 Workmanship

Make lines, arises, and angles sharp and true. Free exposed surfaces from visible wave, warp, buckle, and tool marks. Fold back exposed edges neatly to form a 1.27 cm 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 which might affect the application. For installation of items not shown in detail or not covered by specifications conform to the applicable requirements of SMACNA 1793. 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.

3.4.2 Erection Tolerances

Erect metal wall panels straight and true with plumb vertical lines correctly lapped and secured in accordance with the manufacturer's written instructions.

3.5 FIELD QUALITY CONTROL

3.5.1 Leakage Tests

Finished application of metal wall panels are to be subject to inspection and test for leakage by request of the Contracting Officer, Architect/Engineer. Conduct inspection and tests at no cost to the Government.

Inspection and testing are to be made promptly after erection to permit correction of defects and the removal and replacement of defective materials.

3.5.2 Repairs to Finish

Scratches, abrasions, and minor surface defects of finish may be repaired with the specified repair materials. Finished repaired surfaces are to be uniform and free from variations of color and surface texture.

Repaired metal surfaces that are not acceptable to the project requirements [and][or] Contracting Officer are to be immediately removed and replaced with new material.

3.5.3 Paint-Finish Metal Siding

Paint-finish metal siding will be tested for color stability by the Government during the manufacturer's specified guarantee period.

Remove and replace panels that indicate color changes, fading, or surface degradation, determined by visual examination, with new panels at no expense to the Government. Subject new panels to the specified tests for an additional year from the date of their installation.

3.5.4 Construction Monitoring

Make visual inspections as necessary to ensure compliance with specified requirements. Additionally, verify the following:

a. Materials comply with the specified requirements.

b. All materials are properly stored, handled, and protected from damage. Damaged materials are removed from the site.

c. Framing and substrates are in acceptable condition, in compliance with specification, prior to application of wall panels.

d. Panels are installed without buckles, ripples, or waves and in uniform alignment and modulus.

e. Side laps are formed, sealed, fastened, or seam locked as required.

f. The proper number, type, and spacing of attachment clips and fasteners are installed.

g. Installer adheres to specified and detailed application parameters.

h. Associated flashing and sheet metal are installed in a timely manner in accord with the specified requirements.

[3.5.4.1 Manufacturer's Inspection

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NOTE: Include this paragraph when the manufacturer's inspection of work is required. Use bracketed option in second paragraph to specify minimum number of required visits. The minimum and default is three visits during installation. To help determine if more than three visits should be specified, divide the total project metal wall panel area in squares by 100 and round to the nearest whole number. Coordinate this requirement with Section 01 45 00 QUALITY CONTROL, paragraph QUALITY CONTROL (QC) SPECIALISTS - Experience Matrix.
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The metal wall panel manufacturer's technical representative must visit the work site to inspect ongoing work. Inspections are to include observing installation technique and verifying the quality of work-in-place for compliance with the manufacturer's instructions. Deficiencies identified by the manufacturer's technical representative must be corrected and re-inspected by the manufacturer's technical representative.

3.5.4.1.1 Frequency

The manufacturer's technical representative must visit the work site to inspect and document ongoing work a minimum of [three][_____] separate occasions during the course of the installation. One visit must occur during the first 20 squares of installation, one at substantial completion of the metal panel work, and all others during different periods of installation. Notify the Contracting officer a minimum of five working days prior to each visit by the manufacturer's technical representative.

3.5.4.1.2 Field Inspection Report

Document inspection results in a report prepared and signed by the manufacturer's technical representative for each visit. Submit the report to the Contracting Officer with the contractor's daily Quality Control report. The manufacturer's field inspection report must include a description of ongoing work observed and whether the inspected work was satisfactory or unsatisfactory. The final report must include certification by the manufacturer's technical representative that the work was performed in accordance with the manufacturer's instructions and contains no deficiencies. Submit the final manufacturer's field inspection reports to the Contracting Officer within five working days of the final visit.

]3.6 CLEAN-UP AND DISPOSAL

Clean all exposed sheet metal work at completion of installation. Remove metal shavings, filings, nails, bolts, and wires from work area. 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 are to be free of dents, creases, waves, scratch marks, solder or weld marks, and damage to the finish coating.

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 --