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USACE / NAVFAC / AFCEC **UFGS-07 42 63 (August 2025)**

Preparing Activity: NAVFAC **Superseding**
UFGS-07 42 63 (May 2011)

UNIFIED FACILITIES GUIDE SPECIFICATIONS

References are in agreement with UMRL dated July 2025
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DIVISION 07 - THERMAL AND MOISTURE PROTECTION

SECTION 07 42 63

FABRICATED WALL PANEL ASSEMBLIES

08/25

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USACE / NAVFAC / AFCEC | **UFGS-07 42 63 (August 2025)**

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SECTION 07 42 63

FABRICATED WALL PANEL ASSEMBLIES
08/25

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NOTE: This guide specification covers the requirements for both factory color and mill finish fabricated aluminum or steel structural metal wall panel assemblies.

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: 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. Design panel and insulation values to meet at a minimum the ASHRAE 90.1 requirements.

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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 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

AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC)

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

AMERICAN IRON AND STEEL INSTITUTE (AISI)

AISI D100	(2017) Cold-Formed Steel Design Manual
AISI S100	(2016) North American Specification for the Design of Cold-Formed Steel Structural Members

AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE)

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

AMERICAN WELDING SOCIETY (AWS)

AWS A5.1/A5.1M	(2025) Specification for Carbon Steel Electrodes for Shielded Metal Arc Welding

AWS D1.1/D1.1M (2025) Structural Welding Code - Steel

AWS D1.2/D1.2M (2014; Errata 1 2014; Errata 2 2020) Structural Welding Code - Aluminum

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 A424/A424M (2018) Standard Specification for Steel Sheet for Porcelain Enameling

ASTM A463/A463M (2025) Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process

ASTM A606/A606M (2023) Standard Specification for Steel Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Atmospheric Corrosion Resistance

ASTM A653/A653M (2023) 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 (2022) 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 (2024) Standard Specification for Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, Solution Hardened, and Bake Hardenable

ASTM B117 (2019) Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM B209/B209M (2021a) Standard Specification for

	Aluminum and Aluminum-Alloy Sheet and Plate
ASTM C273/C273M	(2020) Standard Test Method for Shear Properties of Sandwich Core Materials
ASTM C286	(2022) Standard Terminology Relating to Porcelain Enamel and Ceramic-Metal Systems
ASTM C553	(2024) Standard Specification for Mineral Fiber Blanket Thermal Insulation for Commercial and Industrial Applications
ASTM C612	(2014; R 2019) Standard Specification for Mineral Fiber Block and Board Thermal Insulation
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 D714	(2002; R 2017) Standard Test Method for Evaluating Degree of Blistering of Paints
ASTM D822/D822M	(2013; R 2018) Standard Practice for 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 D1621	(2016; R2023) Standard Test Method for Compressive Properties of Rigid Cellular Plastics
ASTM D1622	(2020) Standard Test Method for Apparent Density of Rigid Cellular Plastics
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 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 D6226	(2021) Standard Test Method for Open Cell Content of Rigid Cellular Plastics
ASTM E84	(2024) Standard Test Method for Surface Burning Characteristics of Building Materials
ASTM E119	(2024) Standard Test Methods for Fire Tests of Building Construction and Materials
ASTM E136	(2024c) Standard Test Method for Assessing Combustibility of Materials Using a Vertical Tube Furnace at 750 Degrees C
ASTM E283/E283M	(2019) Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Skylights, 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	(2017) 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

PORCELAIN ENAMEL INSTITUTE (PEI)

PEI 1001	(1996) Specification for Architectural Porcelain Enamel (ALS-100)
PEI CG-3	(2005) Color Guide for Architectural Porcelain Enamel

SCIENTIFIC CERTIFICATION SYSTEMS (SCS)

SCS	SCS Global Services (SCS) Indoor Advantage

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

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

UL ENVIRONMENT (ULE)

ULE Greenguard	UL Greenguard Certification Program

UL SOLUTIONS (UL)

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

1.2 DEFINITIONS

Fabricated Wall Panel Assembly: Metal wall and liner panels, attachment system components, miscellaneous metal framing, thermal insulation, and accessories shop fabricated for a complete weather-tight wall system.

1.3 DESCRIPTION OF FABRICATED WALL PANEL ASSEMBLY SYSTEM

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NOTE: Coordinate with PART 2 materials specification.

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, cross-section, and dimensions on the drawings when a particular aesthetic appearance is desired.

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[Factory color finished,][Mill finish][galvanized][galvalume][aluminum] metal wall panel system with[concealed fastening][exposed fastener] attachment. Panel profile must 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]. Interior finish of panel assembly to be [_____].

1.3.1 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. Provide wall panels and accessory components conforming to the following standards:

ASTM A1008/A1008M

ASTM A123/A123M

ASTM A36/A36M

[ASTM A424/A424M, ASTM C286, PEI 1001, PEI CG-3 for Porcelain and Ceramic Enameling.

] 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 C273/C273M

ASTM D522/D522M for applied coatings.

UL Bld Mat Dir

1.3.2 Structural Performance

Maximum calculated fiber stress must 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 to resist the wind loads as determined by ASCE 7-22 in the geographic area

where the construction will take place, in pounds per square foot. Submit electronic 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.]

1.3.3 Air Infiltration

Conform to the air leakage limits through the wall assembly area when tested according to ASTM E283/E283M.

1.3.4 Water Penetration Under Static Pressure

No water penetration when tested according to ASTM E331.

1.3.5 Water Penetration Under Dynamic Pressure

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

1.4 SUBMITTALS

****

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

Qualification of Installer

Qualifications for Welding Work

SD-02 Shop Drawings

Fabrication and Installation Drawings

Wall Panel Assemblies

Flashing and Accessories

Anchorage Systems

SD-03 Product Data

Certification

Recycled Content for Insulation; S

Manufacturer's Catalog Data

Closure Materials

Insulation

Tape Sealant

Sealants and Caulking

Rated Wall Assembly

Accessories

SD-04 Samples

****

NOTE: Confirm desire for sample submittals with field office prior to requiring these. These are typically not necessary on smaller or replacement projects, and many field offices may not have adequate storage capacity.

****

Wall Panel Assemblies

Fasteners

Metal Closure Strips

Insulation

Manufacturer's Color Charts and Chips

SD-05 Design Data

Wind Design Analysis

SD-06 Test Reports

Leakage Tests

Wind Load Tests

Seismic Tests

Factory Color Finish Performance Requirements

SD-07 Certificates

Fasteners

[Galvanizing Repair Paint

][Enamel Repair Paint

][Aluminized Steel Repair Paint

] Wall System Assembly Wind Load and Fire Rating Classification Listings

SD-08 Manufacturer's Instructions

Installation of Wall Panels

SD-09 Manufacturer's Field Reports

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

] SD-11 Closeout Submittals

Warranty

Safety Data Sheets

1.5 QUALITY ASSURANCE

1.5.1 Pre-Installation Conference

After submittals are received and approved but before wall panel and insulation work, including associated work, is performed, the Contracting Officer will hold a pre-siding conference to review the following:

a. The drawings, including Fabrication and Installation drawings, showing complete Wall Panel Assemblies, and specifications. Drawings are to indicate 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. Include details for the following for review:

(1) Flashing and accessories

(2) Anchorage systems

(3) Manufacturer's catalog data

(4) Factory Color Finish

(5) Manufacturer's color charts and chips

(6) Sub-girts and Formed Shapes

(7) Closure Materials, including metal closure strips

(8) Insulation

(9) Pressure Sensitive Tape

(10) Rated Wall Assembly test data

(11) Accessories

(12) Fasteners

b. Include samples of the following for Government review and approval:

(1) Manufacturer's color charts and chips, approximately 10 by 10 cm 4 by 4 inches, showing full range of colors, textures and patterns available for wall panels with factory applied finishes.

(2) Wall Panel Assemblies, 30.5 cm 12 inches long by actual panel width.

(3) Closure Materials, including metal closure strips, provide sample closure strips 250 millimeters 10 inches long of each type.

(4) Insulation, provide samples approximately 200 by 280 millimeters 8 by 11 inches.

c. Finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.

d. Methods and procedures related to metal wall panel installation, including manufacturer's written instructions for Installation of Wall panels, and verification of wall system assembly wind load and fire rating classification listings. Include detailed application instructions and standard manufacturer drawings altered as required by these specifications. Explicitly identify in writing, differences between manufacturer's instructions and the specified requirements.

e. Support conditions for compliance with requirements, including alignment between and attachment to structural members. Provide details of wind design analysis including wind speed, exposure category, co-efficient, importance factor, designates type of facility, negative pressures for each zone, methods and requirements of attachment. Include wall plan delineating dimensions and attachment patterns for each zone. Wind design analysis to be prepared and sealed by a Licensed Engineer with demonstrated project design experience in the geographic area where the construction will

take place.

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

g. Governing regulations and requirements for insurance, certificates, tests and inspections. Safety plan review must include applicable Safety Data Sheets for maintenance/repair materials.

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

i. Wall panel observation and repair procedures after metal wall panel installation. Include review of sample[Galvanizing Repair Paint][Enamel Repair Paint][Aluminized Steel Repair Paint].

j. Sample Warranty.

1.5.2 Manufacturer's Technical Representative

The representative must have authorization from manufacturer to approve field changes and be thoroughly familiar with the products and installations in the geographical area where construction will take place.

1.5.3 Qualification of Manufacturer

Metal wall panel system manufacturer must have:

a. A minimum of 5 years experience in manufacturing metal wall system and accessory products.

b. Provide engineering services by an engineer currently licensed with experience on projects in the geographical area where construction will take place, having a minimum of 4 years experience as an engineer knowledgeable in wind load design analysis, protocols, and procedures for the MBMA MBSM; ASCE 7-22, and ASTM E1592.

c. Provide certified engineering calculations using the products submitted for:

(1) Wind load requirements in accordance with FM Wind Design Guide and ASCE 7-22.

1.5.4 Qualification of Installer

The installation Contractor must be approved and certified by the wall panel manufacturer prior to beginning the installation of the metal wall system.

1.5.4.1 Qualifications for Welding Work

Welding procedures must conform to AWS A5.1/A5.1M, AWS D1.1/D1.1M for steel or AWS D1.2/D1.2M for aluminum.

1.5.5 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.

1.5.6 Surface-Burning Characteristics

Provide metal wall panels having insulation core material with the following surface-burning characteristics as determined by testing identical products according to ASTM E84 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

a. Flame-Spread Index: [25][_____] or less.

b. Smoke-Developed Index: [450][_____] or less.

1.5.7 Fire-Resistance Ratings

Where indicated, provide metal wall panels identical to those of assemblies tested for fire resistance in accordance with ASTM E119 by a qualified testing agency. Identify products with appropriate markings of applicable testing agency.

Indicate design designations from UL's "Fire Resistance Directory" or from the listings of another qualified testing agency.
Combustion Characteristics: ASTM E136.

1.5.8 Fabrication

Fabricate and finish metal wall panels and accessories at the factory by manufacturer's standard procedures and processes and as necessary to fulfill indicated performance requirements. Comply with indicated profiles and with dimensional and structural requirements.

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 will seal weather-tight and minimize noise from movements within panel assembly.

1.5.8.1 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 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 standards.

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 or by metal wall panel manufacturer for

application, but not less than thickness of metal being secured.

1.5.9 Finishes

Comply with NAAMM AMP 500 for recommendations for applying and designating finishes.

Appearance of Finished Work: 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.

[1.5.10 Sustainable Design Certification

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NOTE: This paragraph is tailored for use on ARMY projects only.
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NOTE: Products meeting the Gold standard will also meet the basic standard. Require Gold when the facility will be used by people sensitive to air quality conditions, such as child development centers and medical facilities. Confirm that the product(s) intended for use in the project can meet this certification prior to including this paragraph in the specification.
****

Product must be third party certified in accordance with ULE Greenguard[Gold], SCS Scientific Certification Systems Indoor Advantage[Gold] or equal. Provide current product certification from certification body..

]1.6 DELIVERY, HANDLING, AND STORAGE

1.6.1 Metal Wall Panels

Deliver and package components, sheets, metal wall panels, and other manufactured items so as not to be damaged or deformed and protected during transportation and handling. Unload, store, and erect metal wall panels in a manner to prevent bending, warping, twisting, and surface damage.

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. Retain strippable protective covering on metal wall panel for period of metal wall panel installation.

1.6.2 Foam-Plastic Insulation

Protect foam-plastic insulation as follows:

a. Do not expose to sunlight, except to extent necessary for period of installation and concealment.

b. Protect against ignition at all times. Do not deliver foam-plastic

insulation materials to Project site before installation time.

1.6.3 Plastic Materials

Complete installation and concealment of plastic materials as rapidly as possible in each area of construction.

1.7 PROJECT CONDITIONS

Weather Limitations: Proceed with installation preparation only when existing and forecasted weather conditions permit Work to proceed without water entering existing walling system or building.

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

1.8 WARRANTY

Provide 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 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 or workmanship, correction of the defective workmanship is to 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 will constitute grounds for having emergency repairs performed by others and not void the warranty.

PART 2 PRODUCTS

2.1 PANEL MATERIALS

****
NOTE: Use either aluminum panels or Aluminum-Zinc Alloy-coated Steel Sheet panels for project locations with Environmental Severity Classifications (ESC) C3 thru C5; ESC C1 and C2 locations can use other options. See UFC 1-200-01 for determination of ESC for project locations.
****

[2.1.1 Aluminum Sheet

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

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

b. Individual panels 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 [2.5][4.5][5][6.4] cm [1][1-3/4][2][2-1/2] inch high standing seam, [30.5][40.6][45.7] cm [12][16][18] inch coverage, with mechanical crimping or snap-together seams with concealed clips and fasteners.

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

][2.1.2 Steel Sheet

Roll-form steel wall and liner panels to the specified profile, with fy = [2.12][2.81][3.52][5.62] 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 D100.

][b. Aluminum-Zinc Alloy-coated Steel Sheet conforming to ASTM A792/A792M and AISI D100.

] c. Individual panels to have continuous length 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 [2.5][4.5][5][6.4] cm[1][1-3/4][2][2-1/2] inch high standing seam, [30.5][40.6][45.7] cm [12][16][18] inch coverage, with mechanical crimping or snap-together seams with concealed clips and fasteners.

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

][2.1.3 Foam-Insulation Core Wall Panel

Provide factory-formed[aluminum][G90 galvanized steel][aluminum-zinc alloy coated steel AZ50][Series 304 stainless steel] wall panel assembly fabricated from two sheets of metal with modified polyisocyanurate or polyurethane foam insulation core[foamed-in-place][board] during fabrication with joints between panels designed to form weather-tight seals. Include accessories required for weather-tight installation.

a. Closed-Cell Content: 90 percent when tested according to ASTM D6226.

b. Density: 32 to 42 kg/cu. m 2.0 to 2.6 lb/cu. ft. when tested according to ASTM D1622.

c. Compressive Strength: Minimum 140 kPa 20 psi when tested according to ASTM D1621.

d. Shear Strength: 179 kPa 26 psi when tested according to ASTM C273/C273M.

]2.1.4 Insulated Panel Construction

Shop fabricate insulated panel construction with specified exterior and interior[aluminum][G90 galvanized steel][Aluminum-zinc alloy coated steel AZ50][Series 304 stainless steel] sheet in accordance with manufacturer's printed instructions.

Insulation to be[glass-fiber][slag-wool-fiber][rock-wool-fiber] conforming to ASTM C553 and ASTM C612 of thickness and density as required for the geographical area where construction will take place. Glass-Fiber insulation must have minimum 20 percent total recycled content. Slag-Wool-Fiber insulation must have 75 percent recycled content. Mineral-Wool-Fiber insulation must have 70 percent recycled content. Provide data identifying percentage of recycled content for insulation.

Insulation fasteners to be adhesively attached, plate welded to projecting spindle anchors; capable of holding insulation of thickness indicated, secured in position with self-locking washer and complying with the following requirements:

a. Plate: Perforated galvanized carbon-steel sheet, 0.762 mm 0.030 inch thick by 50 mm 2 inches square.

b. Spindle: Copper-coated, low carbon steel; fully annealed; 2.67 mm 0.105 inch in diameter; length to suit depth of insulation indicated.

c. Insulation-Retaining Washers: Self-locking washers formed from 0.41 mm 0.016 inch thick galvanized steel sheet, with beveled edge for increased stiffness, sized as required to hold insulation securely in place, but not less than 38 mm 1-1/2 inches square or in diameter.

d. Anchor adhesive to be a product with demonstrated capability to bond insulation anchors securely to substrates indicated without damaging insulation, fasteners, and substrates.

2.1.5 Finish

All panels are to receive a factory-applied 70 percent resin polyvinylidene fluoride finish containing 100 percent inorganic pigments consisting of a baked-on top-coat with a manufacturer's recommended prime coat conforming to the following:

a. Metal Preparation: All metal is to have the surfaces carefully prepared 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.

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NOTE: For projects in humid locations and locations with Environmental Severity Classifications (ESC) of C3 thru C5, select the thicker option for prime

coating; for projects in ESC locations C1 or C2, utilize the thinner prime coating. 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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b. Prime Coating: A base coat of epoxy paint, specifically formulated to interact with the top-coat, is to be applied to the prepared surfaces by roll coating to a dry film thickness of [0.20][1.00] mils. Oven cure the prime coat prior to application of finish coat.

c. Exterior Finish Coating: Apply the finish coating over the primer by roll coating to dry film thickness of 0.80 mils. Oven cure this exterior finish coat.

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NOTE: For panels with bold colors, include a clear coat. Panels with neutral colors (such as white, tan or beige) do not require a clear coat. For projects in locations with Environmental Severity Classifications (ESC) of C1 or C2, select the thinner clear coating. For projects in humid locations and locations with Environmental Severity Classifications (ESC) of C3 thru C5, select the thicker option for clear coating.

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[d. Clear Coating: Apply the clear coating over finish coating to a dry film thickness of [0.50][0.80] mils.

] **********

NOTE: For projects in humid locations and locations with Environmental Severity Classifications (ESC) of C3 thru C5, select the thicker options for prime coating, backer coating, and total thickness; for projects in ESC locations C1 or C2, utilize the thinner coatings. 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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e. Interior Finish Coating: Apply a backer coat on the reverse side over [0.20][0.40] mils of primer by roll coating plus a backer coat to a dry film thickness of [0.30][0.40] mils for a total dry film thickness of [0.50][0.80] mils for the entire backer coat system. The backer coat must be oven-cured.

f. Color: The exterior finish chosen from the manufacturer's standard color chart.

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

Chalking:	ASTM D4214
Color Change and Conformity:	ASTM D2244
Weatherometer:	ASTM G152, ASTM G153 and ASTM D822/D822M
Humidity:	ASTM D2247 and ASTM D714
Salt Spray:	ASTM B117
Chemical Pollution:	ASTM D1308
Gloss at 60:	ASTM D523
Pencil Hardness:	ASTM D3363
Reverse Impact:	ASTM D2794
Flexibility:	ASTM D522/D522M
Abrasion:	ASTM D968
Flame Spread:	ASTM E84

2.2 MISCELLANEOUS METAL FRAMING

2.2.1 General

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 FASTENERS

2.3.1 General

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 substrates in accordance with the wall panel manufacturer's and ASCE 7-22 requirements.

2.3.2 Exposed Fasteners

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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. Fasteners for insulated wall panels within hidden panel joints to be Series 304 stainless steel, Series 304 stainless cast head or Series 304 stainless bi-metal in all 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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Fasteners for wall panels to be corrosion resistant[zinc-coated steel,] [multi coated (zinc plus anti-corrosion coating),][Series 410 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 to be the manufacturer's standard. Provide an integral metal washer that is compatible and matches the color of attached material with compressible sealing EPDM gasket approximately 2.3 mm 3/32 inches thick.

2.3.3 Screws

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NOTE: For paragraphs SCREWS and RIVETS, 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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Provide corrosion resistant[zinc-coated steel,][multi coated (zinc plus anti-corrosion coating),][Series 304 stainless steel] screws being the type and size recommended by the manufacturer to meet the performance requirements.

2.3.4 Rivets

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

2.3.5 Attachment Clips

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NOTE: Select Series 304 stainless steel for aluminum panels in all locations, and for steel panels in humid locations and project locations with Environmental Severity Classifications (ESC) of C3 thru C5; for steel panels in ESC locations C1 or C2, galvanized steel clips are acceptable. 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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Fabricate clips from[steel hot-dipped galvanized in accordance with ASTM A653/A653M][Series 304 stainless steel]. Size, shape, thickness and capacity as required meeting the insulation thickness and design load criteria specified.

2.4 ACCESSORIES

2.4.1 General

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

2.4.2 Closure Materials

2.4.2.1 Rubber Closure Strips

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.

2.4.2.2 Metal Closure Strips

Factory fabricated closure strips to be the samemetal, gauge/ thickness, color, finish and profile of the specified wall panel.

2.4.3 Joint Sealants

2.4.3.1 Sealants and Caulking

Sealants are to be an approved gun type 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. Sealant

is to dry with a tough, durable surface skin which permits it to remain 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 to receive sealants with a compatible one-component or two-component primer as recommended by the wall panel manufacturer.

2.4.3.2 Shop-Applied

Sealant for shop-applied caulking must be an approved gun grade, non-sag one-component polysulfide or silicone conforming to ASTM C920, and with a curing time to ensure the sealant's plasticity at the time of field erection.

2.4.3.3 Field-Applied

Sealant for field-applied caulking must be an approved gun grade, non-sag one-component polysulfide or two-component polyurethane with an initial maximum Shore A durometer hardness of 25, and conforming to ASTM C920. Color to match panel colors.

2.4.3.4 Tape Sealant

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

2.5 SHEET METAL FLASHING AND TRIM

2.5.1 Fabrication

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.

2.6 REPAIR OF FINISH PROTECTION

Repair paint for color finish enameled wall panel must be compatible paint of the same formula and color as the specified finish provided by the wall panel manufacturer.

PART 3 EXECUTION

3.1 EXAMINATION

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 will take 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.

e. Submit to the Contracting Officer a written report, endorsed by Installer, listing conditions detrimental to performance of the Work.

f. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

a. Clean substrates of substances harmful to insulation, including removing projections capable of interfering with insulation attachment.

b. Miscellaneous Framing: Install sub-purlins, girts, angles, furring, and other miscellaneous wall panel support members and anchorage according to metal wall panel manufacturer's written instructions.

3.3 WALL PANEL INSTALLATION

Provide metal wall panels of full length 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 Metal Building Systems Manual (MBMA MBSM).

[a. Steel Wall Panels: Use stainless-steel fasteners for exterior surfaces and galvanized steel fasteners for interior surfaces.

][b. Aluminum Wall Panels: Use aluminum or stainless-steel fasteners for exterior surfaces and aluminum or galvanized steel fasteners for interior surfaces.

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

] d. Metal Protection: Where dissimilar metals will 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.

e. 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.

f. Erect wall panel system in accordance with the approved erection drawings, the printed instructions and safety precautions of the manufacturer.

g. Sheets are not to be subjected to overloading, abuse, or undue impact. Do not apply bent, chipped, or defective sheets.

h. 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.

i. 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.

j. Field cutting metal wall panels by torch is not permitted.

3.4 FASTENER INSTALLATION

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

3.5 FLASHING, TRIM AND CLOSURE INSTALLATION

3.5.1 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 that will be permanently watertight and weather resistant.

Sheet metalwork is to be accomplished 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.

3.5.2 Metal Flashing

a. Exposed metal flashing is to be installed at building corners, sills and eaves, junctions between metal siding and walling.

b. Exposed metal flashing is to be the same material, color, and finish as the specified metal wall panel.

c. Flashing is to be fastened at not more than 20.3 cm 8 inches on center, except where flashing is held in place by the same screws that secure covering sheets.

d. Provide flashing in minimum 2.4 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 4.9 m 16 feet.

e. Exposed flashing and flashing subject to rain penetration to be bedded in the specified joint sealant.

f. Flashing which is in contact with dissimilar metals to be isolated by means of the specified asphalt mastic material to prevent electrolytic deterioration.

g. Drips to be formed to the profile indicated, with the edge folded back 12.7 mm 1/2 inch to form a reinforced drip edge.

3.5.3 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.

3.6 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 12.7 mm 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.

3.7 ACCEPTANCE PROVISIONS

3.7.1 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. Horizontal lines must not vary more than 3.175 mm in 12.2 m 1/8 inch in 40 feet.

3.7.2 Leakage Tests

Inspect and test finished application of metal wall panels when directed to do so by the Contracting Officer. Conduct inspections and tests at no additional cost to the Government.

Perform inspection and testing promptly after erection to permit correction of defects and the removal and replacement of defective materials.

3.7.3 Repairs to Finish

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

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

3.7.4 Paint-Finish Metal Siding

Paint-finish metal siding will be tested for color stability by the Contracting Officer 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. New panels will be subject to the specified tests for an additional year from the date of their installation.

[3.8 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.

3.8.1 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 5 working days prior to each visit by the manufacturer's technical representative.

3.8.2 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 5 working days of the final visit.

]3.9 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 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 --