



ENGINEERED METAL BUILDING STANDARD SPECIFICATION

For over 44 years, Alliance Steel has been your “Go To” partner for high quality Metal Building Systems. From the very simple to the extremely complex, your partners at TEAM ALLIANCE stand ready to exceed your expectations.

Feel free to give us a call today with any questions.

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SECTION 133419
METAL BUILDING SYSTEMS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Metal Building System:
1. Structural steel framing system.
 2. Secondary structural framing members.
 3. Metal roof systems.
 4. Metal wall systems.
 5. Flashings, closures and trims.
 6. Eave gutters and downspouts.
 7. Roof and wall materials.
 8. Roof and wall coating systems.
 9. Light transmitting panels.
 10. Fasteners.
 11. Roof and wall insulation systems.
 12. Roof curbs.

1.2 REFERENCE STANDARDS

- A. American Institute of Steel Construction (AISC):
1. AISC S326 Specifications for the Design, Fabrication and Erection of Structural Steel Buildings. (Allowable Stress Design)
- B. International Accreditation service (IAS):
1. AC472 Accreditation Criteria for Inspection Programs for Manufacturer of Metal Building Systems, latest edition.
- C. American Welding Society (AWS):
1. AWS D1.1 Structural Welding Code-Steel (Latest Edition Unless Noted)
- D. ASTM International (ASTM):
1. ASTM A36/A572/A992 Structural Steel Shapes
 2. ASTM A653 Steel Sheet, Zinc-Coated (G-90 Galvanized) by Hot-Dip Process, Structural (Physical) Quality.
 3. ASTM A475 Extra High Strength Grade Cable.
 4. ASTM A529 High-Strength Structural Steel Flat Bars
 5. ASTM A1011 SS/HSLAS Cold-Formed Structural Shapes
 6. ASTM A792 SS Steel Sheet (For Cladding Panels), Aluminum-Zinc Alloy Coated by Hot-Dip Process
 7. ASTM A53/A500, Gr B Hollow Structural Shapes
 8. ASTM A307 Common Bolts
 9. ASTM A325/A490 High Strength Bolts
 10. ASTM B117 Salt Spray (Fog) Testing
 11. ASTM C1371 Measuring Thermal Emittance of Exterior Coatings
 12. ASTM C1549 Measuring Solar Reflectance of Exterior Coatings.

- 13. ASTM D523 Specular Gloss
- 14. ASTM D659 Measuring Degree of Fade of Exterior Coatings.
- 15. ASTM D4214 Evaporating Degree of Chalking of Exterior Paints
- 16. ASTM D968 Abrasion Resistance of Organic Coatings by Falling Abrasive
- 17. ASTM D2244 Calculation of Color Differences from Instrumentally Measured Color Coordinates
- 18. ASTM D2247 Testing Water Resistance of Coatings in 100% Relative Humidity.
- 19. ASTM D2794 Testing Impact resistance of Coating with Direct Impact.

E. Metal Building Manufacturers Association (MBMA)

- 1. MBMA-01 Metal Buildings System Manual, 2012 edition.

F. Underwriters Laboratories, Inc. (UL)

- 1. UL 580 Test for Uplift Resistance of Roof Assemblies
- 2. UL 790 Standard Test Methods for Fire Tests Of Roof Coverings.
- 3. UL 2218 Impact Resistance of Prepared Roof Covering Materials.

G. Federal Specifications (FS)

- 1. FS TT-P-664 Protective Coatings for Fabricated Structural Members.

H. Steel Structures Painting Council (SSPC)

- 1. SP-2 Hand Tool Cleaning

I. FM Global:

- 1. FM 4471 Approval Standard For Class 1 Panel Roofs.

J. Cool Roof Rating Council (CRRC):

- 1. CRRC-1 Product Rating Program Manual, November 2013

1.3 SUBMITTALS

- A. Product Data: Submit metal building system manufacturer's product information, specifications, and installation instructions for building components and accessories.
- B. Erection Drawings: Submit metal building system manufacturer's erection drawings, including plans, elevations, sections, and details, indicating roof framing, transverse cross-sections, covering and trim details, and accessory installation details to clearly indicate proper assembly of building components.
- C. Certification: Submit written "Letter of Certification" prepared and signed by a Professional Engineer, registered to practice in (PROJECT STATE) verifying that the metal building system design and metal roof system design (including panels, clips, and support system components) meet indicated loading requirements and codes of authorities having jurisdiction.
 - 1. Certification shall reference specific dead loads, live loads, snow loads, wind loads/speeds, tributary area load reductions (if applicable), concentrated loads, collateral loads, seismic loads, end-use categories, governing code bodies, including year, and load applications.
- D. Submit certification verifying that the metal roof system has been tested and approved by Underwriter's Laboratory as UL 580 Class 90 or;

verifying that the metal roof system has been tested and approved by
Class (1-90, 1-120, 1-135, 1-150, or 1-165).

Provide documentation for the following:

Heat Island Effect: product data indicating compliance with solar
index requirement.

2. Credit MR 4 Recycled Content: product data indicating the following:
 - a. Material costs for each product having recycled content
 - b. Percentages by weight of pre and post-consumer recycled content.
 - c. Total weight of products provided.

G. Warranty Documentation: Submit manufacturer's standard warranties.

1.4 QUALITY ASSURANCE

A. Manufacturer's Qualifications:

1. Manufacturer regularly engaged, for a minimum of 20 years, in the manufacture of metal building systems of similar type and scope of that specified.
2. Accredited based on IAS Accreditation Criteria AC472 and requirements in International Building Code (IBC), Chapter 17.

B. Installer's Qualifications:

1. Installer regularly engaged, for a minimum of 5 years, in installation of metal building systems of similar type and scope of that specified.

C. Certificate of design and manufacturing conformance:

1. Refer to Submittals article of this specification section.

D. Material Test Reports:

1. In addition to material certifications of structural steel, metal building system manufacturer shall provide, upon request at time of order, evidence of compliance with specifications through testing.
2. This quality assurance testing shall include testing of structural bolts, nuts, screw fasteners, mastics, and metal coatings (primers, metallic coated products, and painted coil products).

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery and Acceptance Requirements: Deliver materials to site in manufacturer's original, unopened containers and packaging, with labels clearly identifying product name and manufacturer.

B. Storage and Handling Requirements:

1. Store and handle materials in accordance with manufacturer's instructions.
2. Keep materials in manufacturer's original, unopened containers and packaging until installation.
3. Do not store materials directly on ground.
4. Store materials on flat, level surface, raised above ground, with adequate support to prevent sagging.
5. Protect materials and finish during storage, handling, and installation to prevent damage.

1.6 WARRANTY

- A. Standard Weathertightness Warranty (Available only on Standing Seam Roof Systems)
1. This is Alliance's standard 5, 10, 15 or 20 year limited liability weathertightness warranty which covers the roof panels, clips and related accessories. It is prorated and does not include flashings. Additional exclusions apply. The warranty includes one (1) inspection visit.
 2. Liability, as combined to Alliance and our customer, is limited to 1X the original cost of the metal roofing system (square foot of roofing, not building footprint).
- B. Standard 1 Weathertightness Warranty (Available only on Standing Seam Roof Systems)
1. This is Alliance's standard 5, 10, 15 or 20 year limited weathertightness warranty which covers the roof panels, clips and related accessories. It is prorated and does not include flashings. Additional exclusions apply. The warranty includes one (1) inspection visit.
 2. Liability, as combined to Alliance and our customer is limited to 2X the original cost of the metal roofing system (square foot of roofing, not building footprint).
- C. Standard 2 Weathertightness Warranty (Available only on Standing Seam Roof Systems)
1. This is Alliance's standard 5, 10, 15 or 20 year limited weathertightness warranty which covers the roof panels, clips and related accessories. It is prorated and does not include flashings. Additional exclusions apply. The warranty includes one (1) inspection visit.
 2. Liability, as combined to Alliance and our customer is limited to 3X the original cost of the metal roofing system (square foot of roofing, not building footprint).
- D. Standard 3 Weathertightness Warranty (Available only on Standing Seam Roof Systems)
1. This is Alliance's standard "No Dollar Limit" 5, 10, 15 or 20 year limited weathertightness warranty which covers the roof panels, clips and related accessories. It is prorated and does not include flashings. Additional exclusions apply. The warranty includes two (2) inspection visits.
 2. Liability, as combined to Alliance and our customer is not limited to the original cost of the metal roofing system (square foot of roofing, not building footprint).
- E. Alliance 1 Weathertightness Warranty (Available only on Standing Seam Roof Systems)
1. This is Alliance's standard single source 5, 10, 15 or 20 year limited weathertightness warranty which covers the entire roofing system. It is prorated and includes flashings. The warranty includes three (3) inspection visits.
 2. Liability, as combined to Alliance and our customer is limited to 2X the original cost of the metal roofing system (square foot of roofing, not building footprint).
- F. Alliance 2 Weathertightness Warranty (Available only on Standing Seam Roof Systems)
1. This is Alliance's standard single source 5, 10, 15 or 20 year limited weathertightness warranty which covers the entire roofing system. It is prorated and includes flashings. The warranty includes three (3) inspection visits.
 2. Liability, as combined to Alliance and our customer is limited to 4X the original cost of the metal roofing system (square foot of roofing, not building footprint).
- G. Alliance 3 Weathertightness Warranty (Available only on Standing Seam Roof Systems)

1. This is Alliance's standard single source "No Dollar Limit" 5, 10, 15 or 20 year limited weathertightness warranty which covers the entire roofing system. It is prorated and includes flashings. The warranty includes three (3) inspection visits.
2. Liability, as combined to Alliance and our customer is not limited to the original cost of the metal roofing system (square foot of roofing, not building footprint).

H. One Year Workmanship Warranty

1. This warranty provides additional reassurance that Alliance stands behind our products warranting the workmanship of the materials manufactured by Alliance for a period of one year from date of substantial completion.
2. This warranty is supplied at no cost to our customer.

I. Finish Warranties

1. Bare Acrylic-Coated Galvalume™:
 - a. Warrant that products will not rupture, fail structurally or perforate within 25 years due to normal atmospheric corrosion.
2. WeatherXL Modified silicone-Polyester Two-Coat System (SMP):
 - a. 2,000 hours salt spray resistance per ASTM B117.
 - b. Thermal emittance per ASTM C1371 (varies by color).
 - c. Solar reflectance per ASTM C1544 (varies by color).
 - d. SRI values calculated per ASTM 1980 for LEED cool roof credits.
 - e. Specular gloss of 20 to 80 at 60-degree viewing per ASTM D523.
 - f. 35 liters abrasion resistance per ASTM D968.
 - g. Color fading in excess of five (5) Hunter units per ASTM D2244, for vertical applications for 30 years.
 - h. 2,000 hours humidity resistance per ASTM D2247.
 - i. Reverse impact resistance of 1.5X per ASTM D2794.
 - j. Chalking in excess of a No. 8 rating per ASTM D4214, for vertical applications for 30 years.
 - k. Failure of adhesion, peeling, checking or cracking for 40 years.
3. Fluoropolymer Two-Coat System (PVDF/Kynar-500):
 - a. 3,000 hours salt spray resistance per ASTM B117.
 - b. Thermal emittance per ASTM C1371 (varies by color).
 - c. Solar reflectance per ASTM C1544 (varies by color).
 - d. SRI values calculated per ASTM 1980 for LEED cool roof credits.
 - e. Specular gloss of 20 to 35 at 60-degree viewing per ASTM D523.
 - f. 65 liters abrasion resistance per ASTM D968.
 - g. Color fading in excess of five (5) Hunter units per ASTM D2244, for vertical applications for 20 years.
 - h. 3,000 hours humidity resistance per ASTM D2247.
 - i. Reverse impact resistance of 1.5X per ASTM D2794.
 - j. Chalking in excess of a No. 8 rating per ASTM D4214, for vertical applications for 20 years.
 - k. Failure of adhesion, peeling, checking or cracking for 35 years.
4. These warranties are "pass through" warranties in that Alliance is only able to supply because the raw material manufacturer (steel mill) or coil paint manufacturer (Valspar) is

F. Where metal panels must be painted, use coating system as specified in this section.

1.9 DESIGN LOADS

A. Governing Design Code:

1. Structural design for the building structural system shall be provided by the metal building system manufacturer for the following design criteria:
 - a. Governing Building Code: _____.
 - b. Year/Version: _____.
 - c. Occupancy Category: _____.

B. Roof Live Load:

1. Roof live loads are loads produced during the life of the structure by moveable objects.
2. Wind, snow, seismic, or dead loads are not live loads.
3. Roof live loads are applied based on the Tributary Area as follows:
 - a. 0 to 200 Square Feet: _____psf.
 - b. 201 to 600 Square Feet: Interpolation between 200 sq. ft. and 600 sq. ft. numbers.
 - c. 601 Square Feet or Greater: _____psf.

C. Roof Snow Load:

1. Roof snow load used for designing the structure shall not be reduced and shall be the product of the following criteria:
 - a. Snow Load Coefficient (C_e): _____.
 - b. Thermal Factor (C_t): _____.
 - c. Snow Importance Factor (I): _____.
 - d. Ground Snow Load (P_g): _____.
 - e. Roof Snow Load (P_f): _____psf.
2. Design snow load shall include the effects of minimum flat roof load limits, rain on snow, drifting snow, and unbalanced snow load as defined in the governing building code specified above.

D. Wind Load:

1. Wind load used for designing the structure shall be the product of the following criteria:
 - a. Wind Exposure Category: _____.
 - b. Wind Velocity Pressure Exposure Coefficient (K_z): _____.
 - c. Wind Topographic Factor (K_{zt}): _____.
 - d. Wind Directionality Factor (K_d): _____.
 - e. Wind Velocity (V), miles per hour: _____.
 - f. Wind Importance Factor (I_w): _____.
 - g. Building Wind Load (q_z): _____psf.
2. Wind Pressure Coefficients and the design pressures shall be applied in accordance with the governing code.

E. Seismic Load:

1. Seismic load used for designing the structure shall be based on the following criteria:
 - a. Spectral response acceleration for short periods (S_s): _____% g.
 - b. Spectral response acceleration for 1-sec. period (S_1): _____% g.
 - c. Site Class: _____.
 - d. Seismic Importance Factor (I): _____.
2. Seismic loads shall be applied in accordance with the governing code.

F. Dead Load: Dead load shall consist of the weight of building system construction, such as roof,

framing, and covering members.

G. Collateral Load:

1. Collateral load in pounds per square foot shall be applied to the entire structure to account for the weight of additional permanent materials other than the building system, such as sprinklers, mechanical systems, electrical systems, hung partitions, and ceilings.
2. This allowance does not include the weight of hung equipment weighing 50 pounds or more.
3. Equipment loads of 50 pounds or more shall be indicated on the Drawings and the structure shall be strengthened as required.
4. Architect will provide the metal building system manufacturer with the magnitude and approximate location of concentrated loads greater than 50 pounds before design of the building starts.

H. Auxiliary Loads: Auxiliary loads shall include dynamic loads, such as cranes and material handling systems, and will be defined in the Contract Documents.

I. Crane Loads:

1. Crane loads shall be a function of the Service Class as defined by the governing code and Crane Manufacturers Association of America (CMAA) and the rated tonnage (A- Standby or Infrequent service, B- Light service, C- Moderate service, D- Heavy Service, E- Severe Service, F- Continuous Severe Service).
2. Cranes in Service Class E or F shall be in accordance with AISE 13.
 - a. Service Class of Crane: _____.
 - b. Deflection Criterion for Crane: _____.
3. Crane loads will be obtained from the crane manufacturer and supplied by the Architect to the metal building system manufacturer at the time of bid.
4. Building structure shall be designed for the crane loads in accordance with the governing code.
5. Multiple cranes in the same bay or aisle shall be designed in accordance with the governing code.
6. If the governing code does not address multiple crane design practices, MBMA Metal Building Systems Manual shall be used.

J. Load Combinations: Load combinations used to design primary and secondary structural members shall be in accordance with the governing code.

1.10 DEFLECTIONS

A. Structural Members:

1. Maximum deflection of main framing members shall not exceed $1/$ _____of their respective spans.
2. Maximum deflection due to snow load in roof panels and purlins shall not exceed $1/$ _____of their respective spans.
3. Maximum deflection due to wind load in wall panels and girts shall not exceed $1/$ _____of their respective spans.

B. Lateral deflections, or drift, at the roof level of the structure in relation to the floor or slab on grade, caused by deflection of horizontal force resisting elements, shall not exceed $H/$ _____.

C. Calculations for deflections shall be done using only the bare frame method.

1. Reductions based on engineering judgment using the assumed composite stiffness of the building envelope shall not be allowed.
2. Drift shall be in accordance with AISC Serviceability Design Considerations for Low-Rise Buildings.
3. Use of composite stiffness for deflection calculations is permitted only when actual calculations for the stiffness are included with the design for the specific project.
4. When maximum deflections are specified, calculations shall be included in the design data.

PART 2 PRODUCTS

2.1 STRUCTURAL STEEL FRAMING SYSTEM

A. General:

1. Design of Structural System: Clear or multi-span rigid frame with tapered or straight columns and roof beams, with gable or single-slope roof.
2. Actual Building Length:
 - a. Structural line to structural line.
 - b. Same as nominal; i.e., number of bays times the length of the bays.
 - c. Structural Line: Defined as inside face of wall sheets.
3. Actual Building Width:
 - a. Structural line to structural line.
 - b. Nominal building width.
4. Minimum Roof Slope: _____ inch in 12 inches.
5. Maximum Roof Slope: _____ inch in 12 inches.
6. Components and Parts of Structural System:
 - a. Indicated on the Drawings or the Specifications.
 - b. Clearly marked.
 - c. Erection Drawings: Supply for identification and assembly of parts.
 - d. Drawings: Carry stamp of a registered professional engineer.
7. Foundations:
 - a. Foundations, Including Anchor Bolt Embedment Length: Properly designed by qualified engineer, retained by other than metal building system manufacturer, in accordance with specific soil conditions for building site.
 - b. Reactions for Proper Design of Foundations: Supplied by metal building system manufacturer.
 - c. Anchor Bolts:
 - 1) Anchor Bolt Diameter: Indicated on anchor bolt layout drawings furnished by metal building system manufacturer.
 - 2) Anchor Bolts: Supplied by Contractor, not metal building system manufacturer.
 - 3) Anchor Bolts on Moment-Resisting Column Bases: Nuts above and below base plates.

B. Structural Steel Design:

1. Structural Mill Sections or Welded-up Plate Sections: Design in accordance with AISC Specification for Structural Steel Buildings.
2. Cold-Formed Steel Structural Members: Design in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members.
3. Structural System: Design in accordance with specified building code (Refer to Design Loads and Building Codes).

C. Primary Framing:

1. Rigid Frames:
 - a. Frames: Welded-up plate section columns and roof beams, complete with necessary splice plates for bolted field assembly.
 - 1) Base Plates, Cap Plates, Compression Splice Plates, and Stiffener Plates: Factory welded into place and connection holes factory fabricated.
 - 2) Columns and Roof Beams: Fabricated complete with holes in webs and flanges for attachment of secondary structural members and bracing, except for fieldwork as noted on erection drawings furnished by metal building system manufacturer.
 - b. Bolts for Field Assembly of Frame Members: ASTM A-325 high-strength bolts as indicated on erection drawings furnished by metal building system manufacturer.
 2. Endwall Structural Members: Cold-formed channel members designed in accordance with AISI North American Specification for the Design of Cold-Formed Steel Structural Members or welded-up plate sections designed in accordance with AISC Specification for Structural Steel Buildings.
 - a. Endwall Frames: Endwall corner posts, endwall roof beams, and endwall posts as required by design criteria.
 - 1) Splice Plates and Base Clips: Shop fabricated complete with bolt connection holes.
 - 2) Base Plates, Cap Plates, Compression Splice Plates, and Stiffener Plates: Factory welded into place and connection holes shop fabricated.
 - 3) Beams and Posts: Factory fabricated complete with holes for attachment of secondary structural members, except for field work as noted on erection drawings furnished by metal building system manufacturer.
 - b. Intermediate Frames: Substituted for end-wall roof beams, when specified.
 - 1) Factory fabricate necessary endwall posts and holes for connection to intermediate frame used in endwall.
- D. Secondary Structural Framing Members:
1. Purlins, Girts and Eave Members: ASTM A 1011 Grade 55 (380), or ASTM A 653 Grade 55 (380).
 2. Recycled Content: post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
 3. Finish: red oxide primed (G-90 galvanized available at extra cost).
 4. Thickness
 - a. 16 gauge: 0.056 inch (1.421 mm) minimum uncoated thickness.
 - b. 14 gauge: 0.067 inch (1.689 mm) minimum uncoated thickness.
 - c. 13 gauge: 0.081 inch (2.051 mm) minimum uncoated thickness.
 - d. 12 gauge: 0.100 inch (2.534 mm) minimum uncoated thickness.
 5. Purlins:
 - a. Purlins:
 - 1) "ZEE"-shaped, precision-roll-formed, in different gauges to meet specified loading conditions.
 - 2) 8-inch, 10-inch, or 12-inch-deep "ZEE" sections.
 - b. Attach purlins to main frames and endwalls with ½-inch-diameter bolts.
 - c. Brace purlins at intervals indicated on erection drawings furnished by metal building system manufacturer.
 - d. Concentrated Loads: Hung at purlin panel points.
 6. Eave Members:
 - a. Eave Struts: Factory punched, 8-inch, 10-inch, or 12-inch-deep "CEE" sections, precision-roll-formed, in different gauges to meet specified loading conditions.

7. Girts:
 - a. "ZEE" or "CEE"-shaped, precision-roll-formed, in different gauges to meet specified loading conditions.
 - b. 8-inch, 10-inch, or 12-inch-deep "ZEE" or "CEE" sections.
 8. Bracing:
 - a. Locate bracing as indicated on the Drawings.
 - b. Diagonal Bracing:
 - 1) Cable Bracing conforming to ASTM A475-78 for extra high strength grade or
 - 2) Structural Angle Bracing or
 - 3) Hot-rolled rods of sizes indicated on the Drawings.
 - 4) Attach to columns and roof beams as indicated on the Drawings.
 - c. Optional fixed-base wind posts or pinned-base portal frames may be substituted as required.
 - d. Flange Braces and Purlin Braces: Cold formed and installed as indicated on the Drawings.
- E. Welding:
1. Welding Procedures, Operator Qualifications, and Welding Quality Standards: AWS D1.1 - Structural Welding Code – Steel and AWS D1.3 - Structural Welding Code – Sheet Steel.
 2. Welding inspection, other than visual inspection as defined by AWS D1.1, paragraph 6.9, shall be identified and negotiated before bidding.
 3. Certification of Welder Qualification: Supply when requested.
- F. Priming of Structural Steel Framing System:
1. General:
 - a. Structural Steel: Prime paint as temporary protection against ordinary atmospheric conditions.
 - b. Perform subsequent finish painting, if required, in field as specified in the painting section.
 - c. Before priming, clean steel of loose rust, loose mill scale, dirt, and other foreign materials.
 - d. Steel Fabricator: Not required to sand blast, flame clean, or pickle steel before painting, unless otherwise specified.
 2. Primary Frames:
 - a. Clean steel in accordance with SSPC-SP2.
 - b. Factory cover steel with 1 coat of Alliance Steel's standard Red oxide primer formulated to equal or exceed Federal Specification TTP-664
 - c. Minimum Dry Film Thickness: 1.0 mil.
 3. Secondary Structural Framing Members – Roll-Formed:
 - a. Pre-coated cold form material, red oxide primed, by commercial coater using a preparation process equal to SSPC-SP10.
 - b. Minimum Dry Film Thickness: 0.5 mil.
 - c. G-90 Galvanized available for extra cost.

2.2 METAL ROOF SYSTEMS

- A. Roof covering shall consist of the roof panels, their attachments, trim and sealants for use on the exterior of the roof.
1. Alliance "PBR" shall be a system of exposed fastener roof panels providing a 36" wide

net coverage having 1 ¼” high major ribs at 12” centers and two minor ribs between the major ribs. Sidelaps shall be one full major rib and shall utilize the bearing edge of the underlying major rib for support. Panels shall be continuous from ridge to eave until panel length exceeds 40’ and/or the panel becomes prohibitive of handling, in which case endlaps are provided. Endlaps shall be 6” and occur over a supporting member. Roof panels shall be UL 580 Class 90 uplift and UL 2218 Class 4 impact resistant rated.

2. Alliance “PBM” shall be a system of exposed fastener roof panels providing a 36” wide net coverage having ¾” high major ribs at 6” centers. Sidelaps shall be one full major rib and shall utilize the bearing edge of the underlying major rib for support. Panels shall be continuous from ridge to eave until panel length exceeds 40’ and/or the panel becomes prohibitive of handling, in which case endlaps are provided. Endlaps shall be 6” and occur over a supporting member. Roof panels shall be UL 580 Class 90 uplift and UL 2218 Class 4 impact resistant rated.
3. Alliance “LT 3.3” shall be a system of exposed fastener roof panels providing a 36” wide net coverage having 1-1/2” high major ribs at 7.2” centers. Sidelaps shall be one full major rib. Panels shall be continuous from ridge to eave until panel length exceeds 40’ and/or the panel becomes prohibitive of handling, in which case endlaps are provided. Endlaps shall be 6” and occur over a supporting member. Roof panels shall be UL 580 Class 90 uplift and UL 2218 Class 4 impact resistant rated.
4. Alliance “AS-24” shall be a system of standing seam roof panels with either a fixed clip system for rigid construction or a floating clip system to provide for thermal movement of the panel and have a roof slope of ¼:12 or greater. The 24” wide net coverage has 3” high major ribs at 24” centers, and three minor ribs between the major ribs. The AS-24 roof system shall be installed utilizing concealed steel clips, snap-locked at the side joints and weatherproofed by factory applied sealant and is field seamed with either a TripleLok or QuadLok seam. AS-24 panels shall be continuous from ridge to eave until the panel length exceeds 40’ and/or the panels become prohibitive for handling, in which case endlaps are provided. Endlaps shall be 3” and occur 7” above a supporting member, utilizing 16 gage back-up plates. The AS-24 standing seam roof system shall be available for 3 different insulation conditions. The “UTILITY” system (fixed condition only) shall be for buildings without insulation up to 2” of blanket insulation and does not provide for clearance over the purlins. The “LOW” system shall be for buildings with no more than 4” of blanket insulation, but not requiring thermal blocks and will provide 3/8” of clearance over the purlins. The “HIGH” system shall be for buildings with more than 4” of blanket insulation that require thermal blocks and will provide 1 3/8” of clearance over the purlins. Roof panels shall be UL 580 Class 90 uplift and UL 2218 Class 4 impact resistant rated.
5. Alliance “ALok-16” shall be a system of standing seam roof panels with either a fixed clip system for rigid construction or a floating clip system to provide for thermal movement of the panel and have a roof slope of ½:12 or greater. The 16” wide net coverage has 2” vertical legs at 16” centers. The ALok-16 roof system shall be installed utilizing concealed steel clips, weatherproofed by factory applied sealant and is field seamed with either a TripleLok or QuadLok seam. ALok-16 panels shall be continuous from ridge to eave until the panel length exceeds 40’ and/or the panels become prohibitive for handling, in which case endlaps are provided. Endlaps shall be 3” and occur 7” above a supporting member, utilizing 16 gage back-up plates. The ALok-16 standing seam roof system shall be available for 3 different insulation conditions. The “UTILITY” system (fixed condition only) shall be for buildings without insulation and does not provide for clearance over the

purlins. The "LOW" system shall be for buildings with no more than 4" of blanket insulation, but not requiring thermal blocks and will provide 3/8" of clearance over the purlins. The "HIGH" system shall be for buildings with more than 4" of blanket insulation that require thermal blocks and will provide 1" of clearance over the purlins. Roof panels shall be UL 580 Class 90 uplift and UL 2218 Class 4 impact resistant rated.

6. Alliance "NFS-16" shall be a system of standing seam roof panels with a fixed clip system for rigid construction over a solid substrate and have a roof slope of 3:12 or greater. The 16" wide net coverage has 1-3/4" vertical legs at 16" centers and striated flat pans. The NFS-16" roof system shall be installed utilizing concealed steel clips, weatherproofed by factory applied sealant and a male/female snaplock rib connection. Field seaming is not required. NFS-16 panels shall be continuous from ridge to eave until the panel length exceeds 40' and/or the panels become prohibitive for handling, in which case endlaps are provided. endlaps shall be 6" and utilize 16 gage back-up plates. The NFS-16 standing seam roof system shall be available for use over rigid insulation with a bearing plate under the panel clips. Roof panels shall be UL 580 Class 90 uplift and UL 2218 Class 4 impact resistant rated.
7. Alliance Steel's roof covering systems (except for NFS-16) are designed for 6" maximum blanket insulation thickness over the purlin. Alliance acknowledges that there are proprietary methods of insulating where insulation of greater than 4" between the purlins may be utilized.

2.3 METAL WALL SYSTEMS

- A. Wall covering shall consist of the wall panels, their attachments, trim and sealants for use on the exterior of the walls or as interior liner walls.
 1. Alliance "PBR" shall be a system of exposed fastener wall panels providing a 36" wide net coverage having 1 1/4" high major ribs at 12" centers and two minor ribs between the major ribs. Sidelaps shall be one full major rib and shall utilize the bearing edge of the underlying major rib for support. Panels shall be continuous from eave to sill until panel length exceeds 35' and/or the panel becomes prohibitive of handling, in which case endlaps are provided. endlaps shall be 4" and occur over a supporting member.
 2. Alliance "PBM" shall be a system of exposed fastener wall panels providing a 36" wide net coverage having 3/4" high major ribs at 6" centers. Sidelaps shall be one full major rib and shall utilize the bearing edge of the underlying major rib for support. Panels shall be continuous from eave to sill until panel length exceeds 35' and/or the panel becomes prohibitive of handling, in which case endlaps are provided. endlaps shall be 4" and occur over a supporting member.
 3. Alliance "PBA" shall be a system of exposed fastener wall panels providing a 36" wide net coverage having 1 1/4" deep major ribs at 12" centers and one sculptured valley shape between major ribs. Sidelaps shall be one major rib and shall utilize the bearing edge of the underlying major rib for support. Alliance "PBA" panels shall be continuous from eave to sill until the panel length exceeds 35' and/or the panel becomes prohibitive of handling in which case endlaps are provided. endlaps shall be 4" and occur over a supporting member.
 4. Alliance "LT 3.3" shall be a system of exposed fastener wall panels providing a 36" wide

net coverage having 1-1/2" high major ribs at 7.2" centers. Sidelaps shall be one full major rib. Panels shall be continuous from eave to sill until panel length exceeds 35' and/or the panel becomes prohibitive of handling, in which case endlaps are provided. Endlaps shall be 6" and occur over a supporting member. This profile can alternatively be installed in a horizontal application.

5. Alliance "ABT-32" shall be a system of exposed fastener wall panels providing a 36" wide net coverage having 7/8" high symmetrically corrugated sine wave ribs at 2.67" on center. Sidelaps shall be one and one-half ribs. Panels shall be continuous from eave to sill until panel length exceeds 35' and/or the panel becomes prohibitive of handling, in which case endlaps are provided. Endlaps shall be 6" and occur over a supporting member.
6. Alliance "AW-16" shall be a system of concealed fastener wall panels providing 16" wide net coverage and 3" deep ribs with a 5-1/2" wide x 1-1/2" deep center reveal. Panel ribs are connected to the framework with a concealed clip system. Panels shall be continuous from eave to sill until panel length exceeds 35' and/or the panel becomes prohibitive of handling, in which case endlaps are provided. Endlaps shall be 6" and occur over a supporting member.
7. Alliance "A-12" shall be a system of concealed fastener soffit panels providing 12" wide net coverage and 1" deep ribs. Panel ribs are positively connected to the framework with concealed self-drilling screws spaced 24" on center. Panels shall be continuous from wall out to eave or gable.

2.4 FLASHINGS, CLOSURES AND SEALANTS:

A. Flashings

1. Flashing and/or trim shall be furnished at the rake, corners, eaves, framed openings and wherever necessary to provide weathertightness and a finished appearance.
2. A die-formed ridgcap panel, matching the adjoining roof panels, shall be provided along the building for roof slopes up through 6:12.
3. Colors of flashings/trims are to match the adjoining panel unless noted otherwise.
4. Eave gutters shall be sized and provided to remove the volume of water emanating from the roof. The face of the gutter will match the profile of the rake trim. All gutter sections will be securely fastened and contain sealed endlaps and terminations.
5. Downspouts shall be sized and spaced to remove the volume of water emanating from the roof. The color of the downspouts will match the adjoining panels unless otherwise noted. Downspouts shall be securely attached to the building. Water kick outs shall be provided at the bottom of each downspout.

B. Profiled panel closures: closures shall be an interlocking closed cell foam material of a gray or neutral color, and shall be die cut to the profile shape. Profile panel closures shall have a minimum service temperature of -100 to +180-degrees Fahrenheit.

C. Field-applied roof panel sealants shall normally be pre-formed roll-tape mastic sealants, tube sealants, and closures as required for weathertightness of the roof.

D. Mastic tape sealants for exposed fastener side lapped panels shall be of preformed butyl rubber base, and shall normally be supplied as a 3/32" x 1/2" extruded shape. 3/32" x 3/4" and 3/16" x

1" sizes are also available. The sealant shall be non-shrinking, non-drying, non-toxic and non-curing. The sealant shall adhere to roof surfaces from -40 to +200-degrees Fahrenheit.

- E. Field- applied gunnable sealants shall be TiteBond clear polymer sealant for non-exposed (non-curing) applications and Sonneborne NP-1 Urethane sealant for exposed (curing) applications.

2.5 ROOF AND WALL PANEL MATERIALS:

- A. Panel Materials: ASTM A 792.
- B. Recycled Content: Post-consumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- C. Thickness and Yield strength:
 - a. 26 gauge: 0.0172 inch (0.437 mm) minimum uncoated thickness, 80 ksi (550 MPa) yield strength.
 - b. 24 gauge: 0.212 inch (0.538 mm) minimum uncoated thickness, 50 ksi (340 MPa) yield strength.
 - c. 22 gauge: 0.0272 inch (0.690 mm) minimum uncoated thickness, 50 ksi (340 MPa) yield strength.
- D. Panel profiles shall be provided in accordance with the specifications below:
 - 1. PBR and PBM roof and wall panels: 26 or 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel is available for an additional cost.
 - 2. LT 3.3 roof and wall panels: 26 or 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel available for an additional cost.
 - 3. ABT-32 wall panels: 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel is available for an additional cost.
 - 4. PBA wall panels: 26 or 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel is available for an additional cost.
 - 5. AW-16 wall panels: 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted.
 - 6. ALok-16", and NFS-16" roof panels: 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel is available for an additional cost.
 - 7. AS-24" Standing seam: 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel is available for an additional cost.
 - 8. A-12 Soffit panels: 24 gauge steel, AZ-55 bare Galvalume, WeatherXL (SMP) and Kynar-500 painted. 22 gauge steel is available for an additional cost.

2.6 ROOF AND WALL COATING SYSTEMS

- A. Galvalume™: Aluminum-Zinc Alloy Coating, 55% Aluminum, 50% Zinc coated steel per ASTM A 792 AZ55.

- B. Galvalume-Plus™: Acrylic-Coated Aluminum-Zinc Alloy Coating, 55% Aluminum, 50% Zinc coated steel per ASTM A 792 AZ55 with acrylic finish.
- C. Exterior Paint Finishes:
 - 1. WeatherXL Modified Silicone-Polyester Two-Coat System (SMP): 0.20 – 0.25 mil primer with 0.7 – 0.8 mil color coat.
 - 2. Fluoropolymer Two-Coat System (PVDF/Kynar-500): 0.2 – 0.3 mil primer with 0.7 – 0.8 mil 70 percent PVDF fluoropolymer color coat.
 - 3. Fluoropolymer Two-Coat Metallic System (PVDF/Kynar-500 Metallic): 0.2 – 0.3 mil primer with 0.7 – 0.8 mil 70 percent PVDF metallic fluoropolymer color coat.
 - 4. Interior (backer side) paint: 0.5 mil total dry film thickness consisting of a primer coat and wash coat of manufacturer's standard light-colored acrylic or polyester backer finish.
- D. Roof panels shall normally be unfinished Galvalume™ or Acrylic-coated Galvalume™ zinc-aluminum alloy coated steel or provided prefinished with an exterior paint finish over zinc-aluminum alloy coated steel.
- E. Wall panels shall normally be provided prefinished with an exterior paint finish over zinc-aluminum alloy coated steel.
- F. Flashings shall normally be of 26 or 24 gauge Grade D steel and shall be provided in the same exterior paint finish as the adjoining roof or wall panel profile unless noted otherwise.

2.7 LIGHT TRANSMITTING PANELS

- A. Material: Provide UV-resistant, Woven fiber-reinforced acrylic light transmitting panels meeting the following requirements;
 - 1. Self-Ignition Temperature: 650 degrees Fahrenheit (343 degrees Celsius) when tested in accordance with ASTM D 1929.
 - 2. Diffuse Light transmission: not less than 50% when tested to ASTM D 1494.
 - 3. Burn Rate: Less than 2.5 inches per minute when tested in accordance with ASTM D 635.
 - 4. Smoke Developed Index: Not greater than 450 when tested in accordance with ASTM E 84.
 - 5. Haze Value: Not less than 90% in accordance with ASTM D 1003.

2.8 FASTENERS

- A. Exposed fastener roof panels: fasteners shall be self-drilling and self-tapping long life ZAC alloy coated with integral molded washers, painted to match the material when necessary.
- B. Exposed fastener wall panels: fasteners shall be self-drilling and self-tapping cadmium/zinc plated with integral molded washers, painted to match the wall panels when necessary.
- C. Standing seam roof panels: fasteners shall be self-drilling and self-tapping long life ZAC alloy

coated with integral molded washers, painted to match the material when necessary.

- D. Ridge: self-drilling and self-tapping long life ZAC alloy coated with integral molded washers, painted to match the material when necessary.
- E. Clips to purlin or bar joists: self-drilling and self-tapping cadmium/zinc plated with integral molded washers.
- F. Rivets for connecting light gauge flashings shall be stainless steel, painted to match the material when necessary.

2.9 ROOF AND WALL INSULATION (Available on request)

- A. Laminated fiberglass insulation shall have a density of 0.75 pounds per cubic foot and shall be available in thickness from 2" to 6". Fiberglass facings shall be laminated on one side, solar reflective laminates are available. Fiberglass insulation shall have a flame spread rating of 25 or less when tested per ASTM E 84.

2.10 ROOF CURBS (Available on request)

- A. Engineered and custom fabricated roof curbs shall be constructed from #3003 aluminum with continuously welded seams and integral water diverters. Minimum curb sidewall height is 12" and is insulated with foil-faced insulated sidewalls.

PART 3 EXECUTION

3.1 EXAMINATION

- A. Examine area to receive metal building system.
- B. Notify Architect of conditions that would adversely affect installation or subsequent use.
- C. Do not begin installation until unacceptable conditions are corrected.

3.2 ERECTION – STRUCTURAL STEEL FRAMING SYSTEM

- A. Erect structural steel framing system in accordance with the Drawings and metal building system manufacturer's erection drawings.
- B. Field Modifications:
 - 1. Require approval of metal building system manufacturer.
 - 2. Responsibility of building erector.
 - 3. Field Modifications to Truss Purlins: Not allowed, unless indicated on erection drawings furnished by metal building system manufacturer.
- C. Fixed Column Bases: Grout flush with floor line after structural steel erection is complete.

3.3 INSTALLATION – METAL ROOF SYSTEM

- A. Metal Roof System Installation:
 1. Install roof system in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
 2. Install roof system weathertight.

3.4 INSTALLATION – METAL WALL SYSTEM

- A. Metal Wall System Installation:
 1. Install wall system in accordance with metal building system manufacturer's instructions at locations indicated on the Drawings.
 2. Install wall system weathertight.
 3. Verify structural system is plumb before wall panels are attached.
 4. Align and attach wall panels in accordance with erection drawings furnished by metal building system manufacturer.
 5. Install side laps with minimum of 1 full corrugation.
 6. Flashings, Trim, Closures, and Similar Items: Install as indicated on erection drawings furnished by metal building system manufacturer.

3.5 INSTALLATION – INSULATION

- A. Insulation Installation: Install insulation in accordance with manufacturer's instructions at locations indicated on the Drawings.

3.6 PROTECTION

- A. Protect installed metal building system to ensure that, except for normal weathering, metal building system will be without damage or deterioration at time of Substantial Completion.

END OF SECTION