

EXHIBIT B**SECTION 13120 - METAL BUILDING SYSTEMS**

PART 2 SPECIFICATIONS

2.1 SECTION INCLUDES

- A. Metal building systems, including the following:
 - 1. Metal framing components.
 - 2. Metal wall panels and trim.
 - 3. Metal roof panels and trim.
 - 4. Roof light transmitting panels
 - 5. Metal building accessories.
 - 6. Batt Insulation vinyl faced

2.2 REFERENCES

- A. AISC - American Institute of Steel Construction.
- B. AISI - American Iron and Steel Institute.
- C. AWS - American Welding Society.
- D. ASTM A 36 - Standard Specification for Carbon Structural Steel.
- E. ASTM A 529 - Standard Specification for High-Strength Carbon-Manganese Steel of Structural Quality.
- F. ASTM A 572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel.
- G. ASTM A 792 - Standard Specification for Steel Sheet, 55 Percent Aluminum-Zinc Alloy-Coated by the Hot-Dip Process.
- H. ASTM A 992 - Standard Specification for Structural Steel Shapes.
- I. ASTM A 1011 - Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
- J. ASTM E 283 - Standard Test Method for Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
- K. ASTM E 331 - Standard Test Method for Water Penetration of Exterior Windows, Skylights, Doors, and Curtain Walls by Uniform Static Air Pressure Difference.
- L. MBMA - Metal Building Manufacturer's Association.
- M. IAS - International Accreditation Service.
- N. LGSI - Light Gauge Steel Institute.

2.3 DEFINITIONS

- A. Traditional Metal Building System: A building system that will use either continuous or simple span "Z" purlins for support of the roof covering material.
- B. Long Bay System (LBS): A building system that will use simple span, cold-formed, open web purlins to

support the roof covering material.

- C. Gable Symmetrical: A continuous frame building with the ridge in the center of the building, consisting of tapered or straight columns and tapered or straight rafters. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.
- D. Gable Unsymmetrical: A continuous frame building with an off-center ridge, consisting of tapered or straight columns and tapered or straight rafters. The eave height and roof slope may differ on each side of the ridge. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.
- E. Single Slope: A continuous frame building which does not contain a ridge, but consists of one continuous slope from side to side. The building consists of straight or tapered columns and tapered or straight rafters. The sidewall girts may be continuous (by-passing the columns) or simple span (flush in the column line). The rafters may or may not have interior columns.
- F. Lean-to (LT): A building extension, which does not contain a ridge, but consists of one continuous slope from side to side. These units usually have the same roof slope and girt design as the building to which they are attached.
- G. Roof slope: Pitch expressed as inches of rise for each 12 inches (305 mm) of horizontal run.
- H. Building Width: Measured from outside to outside of sidewall secondary structural member (girt).
- I. Building Eave Height: A nominal dimension measured from the finished floor to top flange of eave strut.
- J. Building Length: Measured from outside to outside of endwall secondary structural member.
- K. Acrylic-Coated Galvalume: Galvalume with a light acrylic coating such as Galvalume Plus by Bethlehem, Acrylume by National or Galvalume Plus by U.S. Steel. This coating eliminates the need for roll-forming oil and reduces the incidence of field marking by handling or foot traffic.
- L. Auxiliary Loads: Dynamic loads induced by cranes, conveyors, or other material handling systems.
- M. Collateral Loads: The weight of any non-moving equipment or material, such as ceilings, electrical or mechanical equipment, sprinkler systems, plumbing, or ceilings.
- N. Dead Load: The actual weight of the building system (as provided by Metallic Building Company) supported by a given member.
- O. Floor Live Loads: Loads induced on a floor system by occupants of a building and their possessions including but not limited to furniture and equipment.
- P. Roof Live Loads: Loads produced by maintenance activities, rain, erection activities, and other movable or moving loads but not including wind, snow, seismic, crane, or dead loads.
- Q. Roof Snow Loads: Gravity load induced by the weight of snow or ice on the roof, assumed to act on the horizontal projection of the roof.
- R. Seismic Loads: Loads acting in any direction on a structural system due to the action of an earthquake.
- S. Wind Loads: The loads on a structure induced by the forces of wind blowing from any horizontal direction.

2.4 DESIGN REQUIREMENTS

- A. General

1. The building manufacturer will use standards, specifications, recommendations, findings and/or interpretations of professionally recognized groups such as AISC, IAS, AISI, AWS, ASTM, MBMA, Federal Specifications, and unpublished research by MBMA as the basis for establishing design, drafting, fabrication, and quality criteria, practices, and tolerances. The Manufacturer's design, drafting, fabrication and quality criteria, practices, and tolerances shall govern, unless specifically countermanded by the contract documents.
 2. Design structural mill sections and welded up plate sections in accordance with the latest edition of AISC's "Specification for the Design, Fabrication and Erection of Structural Steel for Buildings", ASD method or LRFD method.
 3. Cold-formed steel structural members and panels will generally be designed in accordance with "Specifications for the Design of Cold-formed Steel Structural Members", 2001 Edition with 2004 Supplement.
- B. Design Loads (**shall meet all local, state and federal building codes**)
1. Specify design loads and set forth in the contract in accordance with the manufacturer's standard design practices. Design loads may include dead load, roof live loads, wind loads, seismic loads, collateral loads, auxiliary loads, floor live loads and/or other applied or specified loads.

2.5 SUBMITTALS

- A. Product Data: Manufacturer's data sheets on each product to be used, including:
1. Preparation instructions and recommendations.
 2. Storage and handling requirements and recommendations.
 3. Installation methods.
- B. Shop Drawings: Provide complete erection drawings for the proper identification and assembly of all building components. Drawings will show anchor bolt settings, transverse cross-sections, sidewall, endwall and roof framing, flashing and sheeting, and accessory installation details.
- C. Selection Samples: for each finish product specified, two complete sets of color chips representing manufacturer's full range of available colors and patterns.
- D. Verification Samples: for each finish product specified, two samples, representing actual product, color, and patterns.
- E. Certifications: Shop drawings and design analysis shall bear the seal of a registered professional engineer. Design analysis shall be on file and furnished by manufacturer.
- F. Bill of Materials: Bills of material shall be furnished and shall include item weights, if requested.
- G. Welder's Certifications: Certification of welder qualifications shall be furnished as specified by the Project Engineer.

2.6 QUALITY ASSURANCE

- A.** Manufacturer / Fabricator Qualifications: All primary products specified in this section will be supplied by a single IAS certified **Manufacturer /Fabricator with a minimum of five (5) years experience.**
- B.** Erector Qualifications: All products listed in this section are to be installed by a single installer with a **minimum of five (5) years demonstrated experience in installing products of the same type and scope as specified.**
- C. Design: Standard drawings and design analysis must bear the seal of a registered Professional Engineer. Design analysis must be on file and furnished by manufacturer upon request.

2.7 DELIVERY, STORAGE, AND HANDLING

- A. Store products in manufacturer's unopened packaging until ready for installation. Long term storage is not recommended.
- B. Store and dispose of hazardous materials, and materials contaminated by hazardous materials, in accordance with requirements of local authorities having jurisdiction.

2.8 PROJECT CONDITIONS

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

2.9 WARRANTY

- A. At project closeout, provide to Owner or Owners Representative an executed copy of the manufacturer's standard limited warranty against manufacturing defect, outlining its terms, conditions, and exclusions from coverage.

PART 3 PRODUCTS

3.1 MANUFACTURERS

- A. Acceptable Manufacturers:
 1. Anthem Steel Corporation.
 2. Buck Steel Buildings.
 3. Butler Steel Buildings.
 4. Gulf States Manufacturing.
 5. Nucor Building Systems.
 6. Olympia Steel Buildings.
 7. Trident Building Systems, Inc.
 8. Standard Steel Buildings.
 9. Owner approved equal.

3.2 MATERIALS

- A. Primary Framing Steel:
 1. Steel for hot rolled shapes must conform to the requirements of ASTM Specifications A 36 or A 992, with minimum yield of 36 or 50 ksi.
 2. Steel for built-up sections must conform to the requirements of ASTM A 1011, A1018, A 529, A 572 or A 36 as applicable, with minimum yield of 42, 46, 50, or 55 ksi as indicated by the design requirements.
 3. Pipe must conform to the requirements of ASTM A 53 Grade B with a minimum yield strength of 35 ksi.
 4. Round Tube must conform to the requirements of ASTM A 500 Grade B with a minimum yield strength of 42 ksi.
 5. Square and Rectangular Tube must conform to the requirements of ASTM A 500 Grade B with a minimum yield strength of 46 ksi.
 6. Steel for Cold-formed endwall "C" sections must conform to the requirements of ASTM A 1011 Grade 55, or ASTM A 653 Grade 55.
 7. X-bracing as required by the purchase order will conform to ASTM A 529, A 572 for rod bracing, ASTM A 36 for angle bracing, or ASTM A 475 for cable bracing.
- B. Secondary Framing Steel:

1. Steel used to form purlins, girts and eave struts must meet the requirements of ASTM A 1011 Grade 55, or ASTM A 653 Grade 55.
 2. Design Thickness - Unless otherwise noted in these specifications, the following Design Thickness shall be used:
 - a. Gauge: 16 - 0.059 inches (1.50 mm).
 - b. Gauge: 14 - 0.070 inches (1.78 mm).
 - c. Gauge: 13 - 0.085 inches (2.16 mm).
 - d. Gauge: 12 - 0.105 inches (2.67 mm).
- C. Panels:
1. UL-580 Class 90, roll-formed acrylic coated Galvalume or pre-painted Galvalume.
 2. Finish: Fluoropon coating produced with either Kynar 500 or Hylar 5000 resins carrying a 20 year warranty.
 3. Design Thickness - Unless otherwise noted in these specifications, the following Design Thickness shall be used:
 - a. Gauge: 29 - 0.0133 inches (0.338 mm).
 - b. Gauge: 26 - 0.0181 inches (0.460 mm).
 - c. Gauge: 24 - 0.0223 inches (0.566 mm).
 - d. Gauge: 22 - 0.0286 inches (0.726 mm).
- D. Fasteners:
1. Eave: #12-14 x 1-1/4 inch (32 mm) long life self-drilling with sealing washer.
 2. Endlaps: #12-14 x 1-1/4 inch (32 mm) long life self-drilling with sealing washer.
 3. Ridge: 1/4 -14 x 7/8 inch (22 mm) Lap Tek long life self-drilling with sealing washer.
 4. Clips to Purlin: 1/4-14 x 1-1/4 inch (32 mm) Tek 2 long life self-drilling with Hex Washer Head and 5/8 inch (15 mm) O.D. washer.
 5. Clips to Bar Joists - #12-24 x 1-1/4 inch (32 mm) Tek 4.5 self-drilling with Washer Head and 5/8 inch (15 mm) O.D. washer.
 6. Long Life fasteners are used as a standard for all standing seam panels and on any through-fastened panel application for which a product warranty is desired.
 7. Stainless steel fasteners and non-long life carbon steel fasteners for roof attachment are also available upon request.
- E. Clips:
1. All clips must have factory-applied mastic and designed so that movement between the panel and the clip does not occur.
 2. Low or High Fixed clips; shall be either 3-3/8 inches (86 mm) or 4-3/8 inches (111 mm) in height. Used for applications where only a moderate amount of thermal expansion and contraction in the roof panel is expected.
 3. Low or High Sliding clips: shall be either 3-3/8 inches (86 mm) or 4-3/8 inches (111 mm) in height and provide either 2 inches or 4 inches (51 mm to 102 mm) of travel for panel thermal expansion and contraction, depending on clip choice.
- F. Batt Insulation:
1. Wall insulation shall be 6" batt insulation with vinyl backing, R-19.
 2. Roof Insulation shall be 8" batt insulation with vinyl backing, R-30.
- G. Sealant and Closures:
1. Sidelaps: Factory applied, hot melt, foamable mastic - Q41A.
 2. Endlaps, Eave, Ridge Assembly, and Gable Flashings: Field applied 100 percent solids butyl-based elastomeric tape sealant, furnished in roll form or pre-cut to length.
 3. Outside Closures: Manufactured from the same materials as the roof panels.

4. Inside Closures: 18 gauge - 0.040 inches (1.024 mm), Galvalume or galvanized coated metal.

3.3 PRIMARY FRAMING

- A. Frame Type:
 1. Clear Span Gable Symmetrical Rigid Frames
- B. Frame Design:
 1. Slope: 2/12
- C. Sidewall Column Profile:
 1. Tapered.
- D. Frame Span:
 1. All frames are Clear Span.
- E. Bracing Option:
 1. Standard (X-Bracing or Portal Frames)

3.4 SECONDARY FRAMING

- A. Roof Zee Purlins (Excluding Long Bay): Horizontal structural members which support roof coverings.
 1. Depth:
 - a. As required by design, 8 inches (203 mm) minimum.
 2. Gauge:
 - a. As required by design, 16 gauge 0.059 inches (1.50 mm) minimum.
- B. Long Bay Purlins: Horizontal structural members which support roof systems with virtual square shaped top and bottom chords, and web members.
 1. Open Web Purlins for Long Bay Applications.
 2. Finish: Gray Primer.
- C. Wall Zee Girts: Horizontal structural members that support vertical panels.
 1. Depth:
 - a. As required by design, 8 inches (203 mm) minimum.
 2. Gauge:
 - a. As required by design, 16 gauge 0.059 inches (1.50 mm) minimum.
- D. Spandrel Beams: Support of conventional wall systems.
 1. As required by design.

3.5 MATERIALS

- A. Primary Framing Shop Finish:
 1. Red Oxide Primer.
- B. Welding Requirements:
 1. Standard or as required by design.
- C. Purlin and Girt Finishes:
 1. Red Oxide Primer.
- D. Bolts - Coating and Finish:
 1. Cad Plated.

3.6 ROOF SYSTEMS

- A. Roof Type: Through Fastened Panels (Single skin ribbed panels with exposed fasteners.)
 - 1. Panel Profile:
 - a. PBR; 1-1/4 inch (32 mm) ribs at 12 inch (305 mm) centers (1/2:12 minimum slope).
 - b. Light Transmitting Panel, 11'-0" L. (insulated), Acrylic GC panels 100% Acrylic Resin and Acrylic Gel Coat. Provide four (4) panels per bay.
 - 2. Gauge:
 - a. Gauge: 26 - 0.0181 inches (0.460 mm).
 - 3. Finish:
 - a. Kynar 500/Hylar 5000 with 25 year finish warranty:
 - 1) To be selected from Cool Roof Colors.
 - 4. Closure Strips: (used on the base, eave, and rake)
 - a. Closed cell, high density, foam strips-in matching PBR profile
 - 5. Panel Fasteners:
 - a. 410 Stainless Heads (Self Drilling) and warranty.
 - 6. Sidelap Mastic:
 - a. 1 inch x 3/32 inch (25 mm x 2.4 mm) (recommended for slopes < 1:12 or upgrade on all slopes).

3.7 WALL/LINER/SOFFIT/FASCIA PANEL SYSTEMS

- A. Application Codes:
 - 1. WP - Exterior Wall Panels.
 - 2. LP - Liner Panels on Interior Walls or Ceilings.
 - 3. SP - Soffit Panels (Underside of Canopies, Purlin Extensions, Recessed Entries).
 - 4. UP - Utility Panels (Parapet Back Panels, Substrate for Stucco/EIFS, Draft Curtains).
 - 5. FP - Facade Panels (Facades and Equipment Screens).
 - 6. HW - Horizontal Wall Panels (Sub-Framing and Special Detailing Required).
 - 7. N/A - Wall Panels Are Not Required (Open Walls or Conventional Wall Construction).
- B. Through Fastened Wall Panels (Single Skin Ribbed Panels with Exposed Fasteners):
 - 1. Panel Finish:
 - a. Painted:
 - 1) Kynar 500/Hylar 5000 with 25 year finish warranty:
 - a) To be selected from Standard Colors.
 - 2. Panel Fasteners:
 - a. Stainless Steel Finish and Warranty.
- C. Concealed Fastener Wall Panels (Single Skin Panels with Concealed Fasteners):
 - 1. Panel Finish:
 - a. Painted:
 - 1) Kynar 500/Hylar 5000 with 25 year finish warranty:
 - a) To be selected from Standard Colors.

3.8 ACCESSORIES AND OPTIONS

- A. Base Condition:
 - 1. Base Member:
 - a. Angle recessed 1-1/2" below floor slab.
- B. Framed Opening (Jambs, Headers, Sills):
 - 1. Finish:
 - a. Match Girt Finish.
 - 2. Framed Opening Trim:
 - a. Standard Jamb, Head, Sill Trim Package.

- C. Parapet Gutters: Manufacturer's Standard Profiles.
- D. Eave Trim Condition, where applicable (non-parapet conditions):
 - 1. Standard Gutters and Downspouts.
- E. Trim Profiles:
 - 1. Manufacturer's Standard Profiles.
- F. Walk Doors
 - 1. Supplier:
 - a. Walk Door Models by Manufacturer:
 - 1) As Indicated on Drawings.

3.9 FABRICATION

- A. General:
 - 1. Shop fabricate all framing members for field bolted assembly. The surfaces of the bolted connections must be smooth and free from burrs or distortions.
 - 2. Shop connections must conform to the manufacturer's standard design practices as defined in this section. Certification of welder qualifications will be furnished when required and specified in advance.
 - 3. All framing members must carry an identifying mark.
- B. Primary Framing:
 - 1. Plates, Stiffeners and Related Members.: Factory weld base plates, splice plates, cap plates, and stiffeners into place on the structural members.
 - 2. Bolt Holes and Related Machining: Shop fabricate base plates, splices and flanges to include bolt connection holes. Shop fabricate webs to include bracing holes.
 - 3. Secondary structural connections (purlins and girts) to be ordinary bolted connections, which may include welded clips.
 - 4. Manufacturer is responsible for all welding inspection in accordance with the manufacturer's AISC - MB category and IAS certifications. Special inspection by the buyer or owner may be done in the manufacturer's facility and must be noted on the Contract Documents.
 - 5. Non-Destructive Testing (NDT) - NDT is not required on this project.
- C. Long Bay Purlins:
 - 1. Fabricate purlins from cold-formed open web Long Bay System assemblies with stiffened chords.
 - 2. Designed as simple span. Connection bolts will install through the purlin seats. Pre-punch LBS assemblies to allow for attachment of frame flange brace angles, compression strut extensions and diagonal X-bridging at the centerline. Furnish all other bridging as light-gage cold-formed angles secured using self-drilling fasteners. Manufacture LBS sections in a facility that holds a current, valid MB Quality Certificate issued by the American Institute of Steel Construction.
 - 3. Top and bottom chords of all LBS sections must have a nominal width of 4 inches (102 mm) and be formed so that the top surface is continuous and flat to facilitate easy assembly of the roof system.
 - 4. All elements of the LBS assembly must be a minimum of 16 gauge. The finished assemblies are subject to periodic testing to loads equal to 110 percent of the design loads.
- D. Zee Purlins:
 - 1. Fabricate girts from cold-formed "Z" sections with stiffened flanges. Size flange stiffeners to comply with the requirements of the latest edition of AISI. Purlin flanges must be unequal in width to allow for easier nesting during erection and purlins are pre-punched at the factory to provide for field bolting to the rigid frames.
- E. Girts:

1. Girts must be simple or continuous span as required by design. Connection bolts will install through the webs, not the flanges.

F. Bracing:

1. Diagonal Bracing:
 - a. Wind bracing in the roof and/or walls need not be furnished where it can be shown that the diaphragm strength of the roof and/or wall covering is adequate to resist the applied wind or seismic forces. Diagonal bracing in the roof and sidewalls may be used to resist longitudinal loads (including but limited to wind, crane load) in the structure if diaphragm action cannot be used.
 - b. Diagonal bracing will be furnished to length and equipped with hillside washers and nuts at each end. It may consist of rods threaded each end or galvanized cable with suitable threaded end anchors. If load requirements so dictate, bracing may be of structural angle and/or pipe, bolted in place.
2. Special Bracing: When diagonal bracing is not permitted in the sidewall, a rigid frame type portal or fixed base column will be used. Shear walls can also be used where adequate to resist the applied wind or seismic forces.
3. Flange Braces: The compression flange of all primary framing must be braced laterally with angles connecting to the purlin or girt webs so that the flange compressive stress is within allowable limits for any combination of loading.
4. Bridging:
 - a. Laterally brace the top chord of the LBS purlins with horizontal bridging if the roof system being used will not supply adequate lateral support to the top chord.
 - b. Horizontally bridge the bottom chord for lateral bracing. One row of bolted diagonal bridging is required for all LBS purlins 40 ft (12192 mm) long and greater.

G. Standing Seam Panels - General:

1. One side of the panel is configured as female, having factory applied hot-melt mastic inside the female seam. The female side will snap over the male side and when seamed creates a continuous lock, forming a 360-degree Pittsburgh Seam.
2. Panels are factory notched at both ends so that field installation can commence or terminate from either end of the building. Panels cannot start at both ends of the building and work towards each other.
3. Maximum panel length is 45 feet (13716 mm) unless otherwise noted in the Contract Documents.

H. Endlaps:

1. Endlaps must have a 16 gauge backup plate and have the eight endlap joint fasteners installed in six pre-punched holes in the flat and in the dimples in the trapezoidal legs.
2. Apply mastic between the panels and secured with 1/4 inch (6mm) - #14 x 1-1/4 inch (32 mm) self-drilling fasteners through the panels, and backup plate to form a compression joint.
3. "Through the roof" fasteners may only be used at endlaps and eaves.

PART 4 EXECUTION

4.1 EXAMINATION

- A. Do not begin installation until substrates have been properly prepared.
- B. If substrate preparation is the responsibility of another installer, notify Project Manager of unsatisfactory preparation before proceeding.

4.2 PREPARATION

- A. Clean surfaces thoroughly prior to installation.

- B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

4.3 INSTALLATION

- A. Install in accordance with manufacturer's instructions.

4.4 PROTECTION

- A. Protect installed products until completion of project.
- B. Touch-up, repair or replace damaged products before Substantial Completion.

END OF SECTION