

## Guide Specification

This Guide Specification is intended to be used in the preparation of specifications for a particular project. The Guide Specification must be edited to fit the conditions of use. Particular attention should be given to the deletion of inapplicable provisions, choosing appropriate options where indicated, and including necessary items related to a particular project.

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## SECTION 13000 – METAL BUILDING SYSTEMS

### PART 1 - GENERAL

#### 1.01 SECTION INCLUDES

- A. Design, fabricate and erect the metal building systems, including
  - a. Structural steel main building frames
  - b. Secondary framing including purlins and girts
  - c. Roof and wall panels and trims
  - d. Gutter and downspouts
  - e. Overhangs
  - f. Walkdoors and windows
  - g. Roof ventilators
  - h. Translucent panels
  - i. Insulation

#### 1.02 RELATED SECTIONS

#### 1.03 REFERENCES

- A. AISI-S100 – North American Specification for the Design of Cold-Formed Steel Structural Members – applicable edition per required building code.
- B. ANSI/AISC 360 - Specification for Structural Steel Buildings, applicable edition per required building code, and Steel Design Guide Series 3 - Serviceability Design Considerations for Low-Rise Building – current edition.
- C. ASTM A36 - Specification for Carbon Structural Steel
- D. ASTM A123 - Specification for Zinc Coatings on Iron Steel Products
- E. ASTM A307 - Specification for Carbon Steel Bolts
- F. ASTM A475 - Specification for Zinc-Coated Steel Wire Strand
- G. ASTM A500 Grade B - Specification for Carbon Steel Tube Stock
- H. ASTM A501 - Specification for Hot Formed Welded Seamless Carbon Steel Structural Tubing
- I. ASTM A529 - Specification for High-Strength Carbon-Manganese Steel of Structural Quality
- J. ASTM A572 - Specification for High Strength Low-Alloy Columbium-Vanadium Steel
- K. ASTM A653 - Specification for Sheet Steel, Zinc Coated by the Hot Dip Process.
- L. ASTM A792 - Specification for Steel Sheet, 55% Aluminum-Zinc Alloy-Coated by the Hot Dip Process
- M. ASTM A924 - Specification for Sheet Steel, Metallic Coated by the Hot Dip Process.
- N. ASTM A992 - Specification for Structural Steel Shapes
- O. ASTM A1011 - Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability
- P. ASTM D1494 - Test Method for Diffuse Light Transmission Factor of Reinforced Plastic Panels

- Q. ASTM D2244 - Practice for Calculation of Color Differences from Instrumentally Measured Color Coordinates
  - R. ASTM D4214 - Test Method for Evaluating the Degree of Chalking of Exterior Paint Films
  - S. ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials
  - T. ASTM E283 - Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen
  - U. ASTM E331 - Test Method for Water Penetration of Exterior Windows, Skylights, Doors and Curtain Walls by Uniform Static Air Pressure Difference
  - V. ASTM E1592 - Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference
  - W. ASTM E1646 - Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference
  - X. ASTM E1680 - Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems
  - Y. ASTM F3125 - Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi and 150 ksi Minimum Tensile Strength
  - Z. AWS A2.4 - Standard Welding Symbols
  - AA. AWS D1.1 - Structural Welding Code - Steel
  - BB. AWS D1.3 - Structural Welding Code - Sheet Steel
  - CC. FM4471 - Factory Mutual Research Corporation Standard 4471 Class 1
  - DD. IAS AC472- International Accreditation Service, Inc. - Criteria for Inspection Programs for Manufacturers of Metal Buildings
  - EE. MBMA Metal Building Systems Manual - current edition.
  - FF. NAIMA 202 - Standard for Flexible Fiberglass Insulation Systems in Metal Buildings
  - GG. UL 580 - Underwriters Laboratory - Tests for Uplift Resistance of Roof Assemblies
  - HH. SSPC SP-2 - Steel Structures Painting Council, Surface Preparation Specification No. 2, Hand Tool Cleaning
- II. SSPC Paint 15 - Steel Joist Shop Primer/Metal Building Primer

#### 1.04 SYSTEM DESCRIPTION

The building shall include all primary and secondary structural framing members, connection bolts, roof and wall covering, trim, fasteners, closures, sealer, canopies, roof extensions, windows, doors, skylights, insulation, gutters, downspouts, ventilators and other miscellaneous items as stated in the specifications and/or shown or called for on the drawings.

- A. Primary framing shall consist of transverse rigid frames of rafters and columns with solid webs. The rigid frame shall be fabricated of shop-welded steel plate and designed for erection by field bolting. Frames shall be:
  - a. clear span or modular with intermediate columns
  - b. gabled or single sloped
  - c. with tapered or uniform depth exterior columns.
- B. Secondary framing shall consist of purlins, girts, eave struts, flange braces and other braces as required for erection by field bolting or screwing.
- C. Horizontal loads not resisted by main frame action shall be resisted by
  - a. Panel diaphragm, standard cable or rod x-bracing in the roof
  - b. panel diaphragm, standard cable or rod x-bracing, fixed base columns, rigid portal frames, or shearwall by others in the sidewalls
  - c. panel diaphragm, standard cable or rod x-bracing, fixed base columns, rigid portal frames, or shearwall by others in the endwalls
- D. Roof and Wall System consists of preformed steel panels, trim, accessories, sealants and fasteners as required for a complete installation.
- E. Building overall dimensions, bay spacing, post spacing, eave height, clear dimensions and roof pitch shall be as indicated on the drawings and as defined here.

- a. The building "Width" shall be the measurement from outside face to outside face of the sidewall girts.
- b. The building "Length" shall be the measurement from outside face to outside face of the endwall girts.
- c. "Eave" to be determined as the line along the sidewall formed by the intersection of the planes of the outside face of the roof purlins and the outside face of the sidewall girts.
- d. "Eave Height" is defined as the vertical dimension as measured from the finished floor to the intersection of the planes of the roof and sidewall.
- e. The "Bay Spacing" shall be the distance between the centerlines of frames for interior bays and the distance from the outside face of endwall girt to the centerline of the adjacent interior frame for end bays.
- f. The "Module Spacing" shall be measured between the centerlines of interior columns for interior modules and the distance from the outside face of sidewall girts to the centerline of the adjacent interior column
- g. "Roof Pitch" shall be the inches of vertical rise per inches of horizontal run, expressed as inches of rise per 12 inches of run.

#### 1.05 DESIGN REQUIREMENTS

- A. Design primary and secondary structural members and exterior covering materials for applicable load and combinations of loads in accordance with the \_\_\_\_\_ edition of the International Building Code. Design loads shall be combined to produce maximum stresses within the structure in accordance with AISC and/or AISI as they apply. The Building Use Category shall be \_\_\_\_\_.
- B. The design loads plus Dead Load shall be used in the structure design.
  - a. Roof Live Load shall be a minimum of 20 PSF and shall be applied on the horizontal projection of the roof. Roof Live Load reduction shall be applied according to the code specified above.
  - b. Wind Load shall be based on a wind speed of \_\_\_\_\_ MPH and applied as pressure and suction in accordance with the code specified above.
  - c. The Ground Snow Load shall be \_\_\_\_\_ PSF; the Snow Exposure Factor,  $C_e$ , shall be \_\_\_\_\_; the Snow Thermal Factor,  $C_t$ , shall be \_\_\_\_\_ and used to determine the Roof Snow Load.
  - d. The Roof Snow Load shall be applied on the horizontal projection of the roof.
  - e. The metal building system shall be designed for snowdrift conditions if required based on the building geometry and location of the facility in accordance with the code specified above.
  - f. Collateral loads shall be those other than the basic design loads for which the building must be adequately designed. Loads of this type include, but shall not be limited to, suspended ceilings, sprinkler, electrical or mechanical systems, or any suspended or roof mounted HVAC units.
- C. The building components shall be designed to the following minimum deflection requirements, unless a specific deflection is required by the building code. Deflection based on wind shall be based on a 10 year mean recurrence interval, or 75% or the design pressure for a 50 year mean recurrence interval.
  - a. Frame rafters – L/180
  - b. Frame sidesway – H/60
  - c. Purlins – L/150
  - d. Girts – L/120
  - e. Endwall posts – L/120
  - f. Roof panel – L/150
  - g. Wall panel – L/120

#### 1.06 SUBMITTALS

- A. Erection Drawings including:
  - a. Anchor Bolt setting plan, base plate details and column reactions
  - b. Roof framing plan
  - c. Wall framing elevations
  - d. Transverse cross sections
  - e. Panel layout
  - f. Exact location of factory located openings
  - g. Approximate location of field located openings

- h. Framing details
- i. Flashing details
- j. Accessory details
- B. Design calculations upon request, stamped by a Professional Engineer registered in the state where building will be erected, including:
  - a. Stress analysis
  - b. Deflection analysis
  - c. Column base reactions for each loading case
- C. Letter of Certification, prepared and signed by a Professional Engineer, verifying that building design meets indicated loading requirements and building code as requested.

#### 1.07 QUALIFICATIONS

- A. The company manufacturing the products specified in this Section shall:
  - a. be a member of MBMA
  - b. be in compliance with the International Accreditation Service, Inc., Accreditation Criteria for Inspection Programs for Manufactures of Metal Building Systems (IAS AC472)
  - c. have a minimum of 20 years experience in the manufacture of steel building systems
- B. Acceptable Manufacturers
  - a. Behlen Building Systems
- C. Erector's Qualifications
  - a. Minimum of 5 years experience in this or similar trade
  - b. Five similar installation references in past 3 years

#### 1.08 WARRANTY

- A. The metal building manufacturer shall warrant for 5 years that components fabricated by the manufacturer are free from defects in composition of material and workmanship and in accordance with industry standards for such components.
- B. Unpainted Galvalume® panels shall be warranted by the metal building manufacturer to the extent warranted by the steel supplier for 25 years against rupture, perforation, or structural failure as a result of corrosion caused by exposure to normal atmospheric conditions.
- C. The exterior color finish of factory coated roof panels shall be warranted by the metal building manufacturer to the extent warranted by the paint supplier for 30 years against peeling, cracking, checking, and flaking. The panel shall not color change more than 7 NBS units as per ASTM D2244. Chalking shall not exceed a number 8 rating when measured per ASTM D 4214, method A.
- D. The exterior color finish of factory coated wall panels shall be warranted by the metal building manufacturer to the extent warranted by the paint supplier for 30 years against peeling, cracking, checking, and flaking. The panel shall not color change more than 5 NBS units as per ASTM D 2244. Chalking shall not exceed a number 8 rating when measured per ASTM D 4214, method A.
- E. Provide the owner with a copy of all warranties.

### PART 2 - PRODUCTS

#### 2.01 MATERIALS – STRUCTURAL FRAMING

- A. General
  - a. Structural steel members shall be sheared, plasma cut, formed, punched, welded and painted in the plant of the manufacturer. All shop connections shall be welded in accordance with the AWS "Standard Code for Welding in Building Construction".
  - b. All structural members shall be designed for the minimum yield and tensile strength specified for the specific grade referenced in the appropriate ASTM Specification; higher yield or tensile strengths listed in the material test reports shall only be used to verify compliance with the ASTM physical properties requirements.

- c. All structural framing members shall be prepared according to SSPC SP-2 and given one coat of shop primer formulated to meet the requirements of SSPC-15.
  - d. All framing members shall carry an easily visible identifying mark to aid the erector in the erection of the building.
  - e. Field connections shall be bolted with high strength or carbon steel bolts and nuts.
- B. Primary Structural Members
- a. The primary structural members shall be rigid frames manufactured of solid web members having tapered or uniform depth rafters rigidly connected to tapered or uniform depth columns.
  - b. Steel used to fabricate built up framing members shall be 55,000 PSI minimum yield point material and shall conform to the physical characteristics of ASTM A1011, ASTM A572 or ASTM A529, Grade 55.
  - c. Steel used for interior columns, if required, shall conform to ASTM A500, Grade B, 42,000 PSI minimum yield point material.
  - d. The building manufacturer shall have on file certified mill test reports that verify that these requirements have been met.
- C. Secondary Structural Members
- a. Secondary structural framing shall distribute the loads to the primary structural system and shall include endwall columns and rafters, purlins, girts, eave struts, base support, headers, jambs, flange bracing, clips, and other miscellaneous structural framing.
  - b. Steel used for cold-formed members shall be 55,000 PSI minimum yield point material and shall conform to the physical characteristics of ASTM A653 and ASTM A924 Grade 55, Coating Designation G40.
  - c. Light gauge cold-formed sections shall be manufactured by precision roll or brake forming. All dimensions shall be true, and the formed member shall be free of fluting, buckling or waviness.
  - d. Endwall rafters shall be manufactured from built-up or hot rolled sections of adequate size and thickness as determined by the design criteria.
  - e. Endwall columns shall consist of built-up, hot rolled or cold formed "C" sections of adequate size and thickness as determined by the design criteria.
  - f. Steel used for hot rolled sections shall conform to ASTM A992 Grade 50 steel
  - g. Purlins and girts shall be precision roll-formed 8" or 10" deep "C" sections or "Z" sections of adequate size and thickness as determined by the design criteria, minimum 16 gauge. Purlins and girts shall be either simple span or continuous span members.
  - h. Eave struts shall be precision roll-formed and/or press brake formed "C" sections, minimum 14 gauge. The upper flange shall slope with the normal roof slope, and the web shall be vertical and free to receive the sidewall covering.
  - i. Base support shall consist of a continuous base angle, base "C", or an 18 gauge one piece base member to which the base of the wall covering shall be attached. The base support shall be securely fastened into the concrete by the erector.
  - j. Headers and jambs shall be precision roll-formed "C" sections of the same depth as the girts.
  - k. Flange bracing shall consist of angle or tube members connected to the web of the purlin or girt and to the rigid frame web adjacent to the compression flange of the primary structural member.
  - l. Clips shall be fabricated from 55,000 PSI minimum yield point material and be factory punched for field bolted connections.
- D. Bracing
- a. Horizontal load resisting bracing shall be accomplished by diagonal cable bracing, rod bracing, portal frames, fixed-base columns and/or diaphragm action of the roof and wall covering.

- b. All cables for diagonal bracing shall be fabricated from extra high strength Grade-7 wire Class A coating, left hand lay, galvanized steel strand, conforming to the provisions of ASTM A475. Adjustment shall be provided by an eyebolt assemble.
- c. Rod bracing shall be fabricated from minimum 1/2" diameter steel rod conforming to the provisions of ASTM A36 or A572 Grade 50.
- d. Portal frames and fixed-base columns shall be fabricated of built-up sections and conform to the same specifications as primary framing.

## 2.02 MATERIALS – ROOF SYSTEM

Roof panel shall be one of the following types.

### A. Ribbed roof panel

- a. Panels shall have 1 3/16" deep major ribs spaced at 12" on center, with minor ribs between major ribs. Each panel shall provide a net coverage width of 36".
- b. Panels shall be manufactured from 26 gauge 80,000 PSI material **OR** 24 gauge, 50,000 PSI material.
- c. Provide roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.005 cfm/sf of fixed roof area when tested according to ASTM E1680 at a static pressure differential of 6.24 psf.
- d. Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E1646 at a static pressure differential of 12.0 psf.
- e. Provide roof panel assemblies with UL 90 uplift rating in accordance with UL 580 "Tests for Uplift Resistance of Roof Assemblies".
- f. Panels shall be one piece for slope lengths less than 41'-6". Endlaps, if required, shall be 6" and occur at a purlin.
- g. Panel finish shall be acrylic coated Galvalume® AZ55 coating in accordance with ASTM A792.

**OR**

- g. Substrate shall be Galvalume® AZ50 coating in accordance with ASTM A792. Sheets shall be coated with a silicone-modified polyester (SMP) topcoat over primer with total DFT of 0.8 – 1.0. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.

**OR**

- g. Substrate shall be Galvalume® AZ50 coating in accordance with ASTM A792. Sheets shall be coated with a fluoropolymer topcoat containing not less than 70% polyvinylidene fluoride (PVDF) over primer with total DFT of 0.8 – 1.0. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.

**OR**

### A. Standing seam roof system

- a. Panels shall have an interlocking seam with 3 1/16" deep trapezoidal rib spaced at 24" on center, with minor ribs between major ribs. Each panel shall provide a net coverage width of 24".
- b. High ribs shall be sealed with factory-applied non-skinning, non-hardening mastic sealant and shall be manually roll and locked into place and mechanically seamed as required by the plan documents to achieve the required wind uplift resistance.
- c. Panels shall be manufactured from 24 gauge, 50,000 PSI material.
- d. The trapezoidal rib standing seam roof system shall have concealed clips. Clips shall be floating (sliding) to allow for a 3 1/2" total thermal movement.
- e. Panels shall be one piece for slope lengths less than 52'-0". The panel endlap, if required, shall have tape sealer sandwiched between the top and bottom panel with a rigid metal backer plate.

- f. Provide roof panel assemblies with UL Class 90 uplift rating in accordance with UL 580 "Tests for Uplift Resistance of Roof Assemblies".
- g. Roof system must have been tested according to the procedures in ASTM E 1592 (structural performance by uniform static air pressure differential).
- h. Panel finish shall be acrylic coated Galvalume® AZ55 coating in accordance with ASTM A792.

**OR**

- h. Substrate shall be Galvalume® AZ50 coating in accordance with ASTM A792. Sheets shall be coated with a fluoropolymer topcoat containing not less than 70% polyvinylidene fluoride (PVDF) over primer with total DFT of 0.8 – 1.0. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.

**OR**

- A. Standing seam roof system
  - a. Vertical Leg Panels shall have an interlocking 2 1/16" deep vertical leg spaced at 16" center. Each panel shall provide a net coverage width of 16".
  - b. Side laps shall be sealed with factory-applied non-skinning, non-hardening mastic. The side laps shall be mechanically seamed as required by the plan documents to achieve the required wind resistance.
  - c. Panels shall be manufactured from 24 gauge, 50,000 PSI material.
  - d. The vertical leg standing seam roof system shall have concealed clips. Clips shall be floating (sliding) to allow for a 3 1/2" total thermal movement.
  - e. Panels shall be one piece for slope lengths less than 52'-0". The panel endlap, if required, shall have butyl sealant sandwiched between the top and bottom panel with a heavy gage factory supplied metal backer plate.
  - f. Provide roof panel assemblies with UL Class 90 uplift rating in accordance with UL 580 "Tests for Uplift Resistance of Roof Assemblies".
  - g. Roof system shall have been tested in accordance with the procedures in ASTM E1592 (Structural Performance by Uniform Static Air Pressure Differential).
  - h. Provide roof panel assemblies with permanent resistance to air leakage through assembly of not more than 0.0026 cfm/sf of fixed roof area when tested according to ASTM E1680 at a static pressure differential of 6.25 psf.
  - i. Provide roof panel assemblies with no water penetration as defined in the test method when tested according to ASTM E1646 at a static pressure differential of 12.0 psf.
  - j. Panel finish shall be acrylic coated Galvalume® AZ55 coating in accordance with ASTM A792.

**OR**

- j. Substrate shall be Galvalume® AZ50 coating in accordance with ASTM A792. Sheets shall be coated with a fluoropolymer topcoat containing not less than 70% polyvinylidene fluoride (PVDF) over primer with total DFT of 0.8 – 1.0. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.

## 2.02 MATERIALS – WALL SYSTEMS

- A. Wall panel
  - a. Rollformed profile shall be the manufacturer's architectural panel configuration (ribs pointing in or reverse roll configuration). Panels shall have 1 3/16" deep major ribs spaced at 12" on center, with minor ribs between major ribs. Each panel shall provide a net coverage width of 36".
  - b. Manufactured from 26 gauge 80,000 PSI **OR** 24 gauge 50,000 PSI material.
  - c. Provide wall panel assemblies (when installed with mastic in the walls) with permanent resistance to air leakage through assembly of not more than 0.006 cfm/sf of fixed

wall area when tested according to ASTM E283 at a static pressure differential of 6.24 psf.

- d. Provide wall panel assemblies (when installed with mastic in the walls) with no water penetration as defined in the test method when tested according to ASTM E331 at a static pressure differential of 12.0 psf .
- e. Substrate shall be Galvalume® AZ50 coating when painted and acrylic coated AZ55 when unpainted in accordance with ASTM A792.
- f. Sheets shall be coated with a silicone-modified polyester (SMP) over primer. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from the manufacturer's standard color choices.

**OR**

- f. Sheets shall be coated with a fluoropolymer topcoat containing not less than 70% polyvinylidene fluoride (PVDF) over primer with total DFT of 0.8 – 1.0. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.
  - g. Panels shall be one piece from base to eave for lengths less than 32'-0". Endlaps, if required, shall be 4" and occur at a girt.
- B. Liner panel, if required, shall be 26 gauge with a manufacturer's standard color finish, rollformed to manufacturer's standard ribbed profile.

#### 2.04 MATERIALS – SOFFIT

A. Soffit Panel

- a. Rollformed profile shall be the manufacturer's standard ribbed configuration (ribs pointing out) the manufacturer's architectural panel configuration (ribs pointing in or reverse roll configuration). Panels shall have 1 3/16" deep major ribs spaced at 12" on center, with minor ribs between major ribs. Each panel shall provide a net coverage width of 36".
- b. Manufactured from 26 gauge 80,000 PSI or 24 gauge 50,000 PSI material.
- c. Substrate shall be Galvalume® AZ50 coating when painted and acrylic coated AZ55 when unpainted in accordance with ASTM A792.
- d. Sheets shall be coated with a silicone-modified polyester (SMP) over primer. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from the manufacturer's standard color choices.

**OR**

- d. Sheets shall be coated with a fluoropolymer topcoat containing not less than 70% polyvinylidene fluoride (PVDF) over primer with total DFT of 0.8 – 1.0. The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.

#### 2.04 MATERIALS – TRIM

- A. Trim shall be 26 gauge with a silicone-modified polyester (SMP) or fluoropolymer topcoat containing not less than 70% polyvinylidene fluoride (PVDF). The reverse side shall be coated with pigmented polyester. Exterior color to be selected from manufacturer's standard color choices.
- B. Provide all trim pieces necessary to achieve a finished appearance. Provide corner boxes to transition from gable trim to eave trim or gutter. Gutter, if required, shall have a nominally horizontal bottom leg and the front leg shall not project above the bottom of roof panel.
- C. Provide trim at all corners of the building and for all sides of framed openings. Provide trim for base of building if required.
- D. Provide two piece sculptured jamb trim to enhance appearance and durability.
- E. Metal flashing closures shall be used to close off wall to roof flashing.
- F. Downspouts, if required, shall have a minimum cross sectional area of 15.85 square inches. Downspouts shall terminate with an elbow at approximately 75°.



## 2.05 INSULATION

- A. Roof and wall insulation shall be fiberglass rolls with 0.6 lb. per cu. ft. density, thickness as indicated, with a flame spread rating of 25 or less in accordance with ASTM E84. Insulation shall comply with NAIMA 202 Standards.

## 2.06 METAL PERSONNEL DOORS AND WINDOWS

- A. Provide pre-assembled personnel doors and frame as follows:
  - a. Standard doors shall be manufactured from 20 gauge steel sheets, with smooth or textured finish. All doors shall be 1 3/4" thick.
  - b. Doors shall be fabricated rigid, neat in appearance, and free from defects, warpage, and buckle. Exposed welds shall be made smooth, flush and invisible. Core shall be rigid-cell polyurethane with 1.8 lbs/ft density conforming to ASTM D-1622. Door core shall have a U-factor not less than 0.07.
  - c. All doors shall have 16 gauge flush mounted top and bottom channels to prevent water penetration.
  - d. All doors shall be factory prepared with a galvanized steel reinforcement for closer installation.
  - e. Standard frames shall be made from galvanized steel sheets of 16 gauge material. Frames shall be double rabbeted. Frame stops shall be a minimum of 5/8". Standard frames shall be 5 3/4 in width.
  - f. The hinge jamb shall be reinforced with a 7 gauge plate, and prepared for a full mortise 4 1/2" template hinge. The strike jamb shall be prepared for a 4 7/8" ASA universal strike per ANSI standard A 115.2.
  - g. All doors, frame headers and frame jambs shall be thoroughly cleaned, prime coated and then top coated with a smooth, durable finish capable of passing a 200 hour salt spray test in accordance with ASTM specifications B-117 and a 500 hour humidity test in accordance with ASTM specifications D2247. Weatherometer test results - 1000 hrs. Color selection shall be white or bronze.
  - h. Subframing shall be factory installed to the door jambs and consist of two 16 gauge galvanized steel C-channels to match the specified girt depth.
  - i. LOCK SET shall be a commercial Grade I cylindrical lock with US26D finish having a 2 3/4" backset, comply with ANSI A 156.2, series 400 Grade 1 and conform to Federal Specifications FFH-106C, Type 161.
  - j. HINGES shall be (3) 4 1/2" non-removable pin template hinges with color coded finish and comply with Federal Specifications FF-H-116C and ANSI A156.1.
  - k. THRESHOLD shall be factory cut with an aluminum mill finish and meet ADA requirements.
  - l. WEATHER STRIP shall be kerf type and factory installed to the jamb and header stops.
  - m. SWEEP shall be provided at the bottom of the door.
  - n. JAMB CLIPS shall be of 12 gauge galvanized steel.
  - o. Preassembled door systems shall be packaged in heavy-duty wooden crates and skidded for forklift handling.

## 2.07 WINDOWS

- A. Provide aluminum horizontal sliding (rolling), fixed picture or fixed project-in windows as follows:
  - a. Window and sash members shall be 0.055 minimum thickness, AA6063-T5 aluminum alloy with thermal barrier.
  - b. Windows shall be finished in natural aluminum extruded mill finish with Bronze acrylic electrostatically applied enamel finish.
  - c. Insulated glass shall have an "A" level rating and sealed with polysulfide. Overall glass thickness shall be no less than 5/8".

- d. Weatherstripping shall be silicon treated, fungus, mildew and moth resistant poly bond fin seal.
- e. Frames shall be painted, roll-formed aluminum. Screen cloth shall be 18 x 16 mesh fiberglass or aluminum.
- f. Air, water and structural test unit sizes and configurations shall be in general conformance to requirements set forth in ANSI/AAMA 101-93.

## 2.08 TRANSLUCENT PANELS

- A. Provide translucent roof and wall panels matching the manufacturer's standard ribbed panel configuration.
  - a. Translucent panels shall be white and have a nominal weight of 8 oz. per square foot with 50% light transmission as per ASTM D 1494.
  - b. Insulated translucent roof panels shall have a standard 8 oz. per square foot exterior panel with a translucent insulation foam core and a 4 oz. per square foot interior panel. The interior and exterior panels shall be positively sealed with silicone sealant against air leakage and delamination. Light transmission shall be approximately 52%.
- B. Provide translucent roof panel assemblies for 24" wide trapezoidal ribbed standing seam roof system.
  - a. Translucent panels shall be factory installed in the manufacturer's standard 24" wide standing seam panel.
  - b. Translucent panels shall be white and have a nominal weight of 8 oz. per square foot with 55% light transmission as per ASTM D 1494.
  - c. Insulated translucent roof panels shall have a standard 8 oz. per square foot exterior panel and a 5 oz. per square foot interior panel to create an insulating dead air space. The interior and exterior panels shall be positively sealed with silicone sealant against air leakage and delamination. Light transmission shall be approximately 45%.

## 2.10 ACCESSORIES

- A. Fasteners shall be manufacturer's standard plated/painted or long life fasteners. Exposed fastener heads shall be factory colored to match the panel color. Self-drilling fasteners shall be used throughout. Structural screws shall be used to secure panels to structural components. Stitch screws shall be used to secure panel to panel connections and trim screws shall be used at trim endlaps.
- B. Closed cell foam closure strips, die cut to match ribbed panel configuration. Metal closures shall be used to close off wall to roof flashing. High density corrugation closures shall be used with trapezoidal standing seam roof panels.
- C. Mastic for roof sidelaps and endlaps shall be a non-hardening butyl tape, non-corrosive to the substrate, of 100% solids. Tape size shall be minimum 5/32" x 1/4" supplied in rolls. Flashing endlaps shall use Gun Grade urethane sealant.
- D. Caulk shall be manufacturer's standard product as appropriate for the applications.
- E. Thermal spacer blocks of expanded polystyrene shall be supplied with standing seam roof systems when required for the requested insulation thickness. The thickness of the thermal spacer block shall be compatible with the clip height and insulation thickness.
- F. Continuous gravity ventilators shall have 9" or 12" throat, supplied in 10' lengths, with birdscreen. Ventilators shall be of low profile design to provide gravity type ventilation and shall include flashing for either single unit or continuous-run installation. 9" x 10' unit shall have a base ventilating capacity of 2700 CFM and the 12" x 10' unit shall have a base ventilating capacity of 3600 CFM, assuming 10 degree temperature differential and 5 mph wind speed. Exterior parts shall be minimum 26 gauge in Galvalume® or painted galvanized. Interior parts shall be G90 galvanized.
- G. Roof curbs shall be used at all roof penetrations except pipes 13" diameter and less. Roof curbs shall have a structural subframes. Curbs and subframes shall be designed to support the weight of the roof top units. Curbs shall be designed specifically for the model

numbers of the roof top units. Curbs shall be supplied with rib covers and all necessary fasteners and mastic for a weathertight installation. The roof curbs shall be floating curbs when required by building conditions.

- H. Roof Jacks shall be used at all 13" diameter and less pipes that penetrate the roof. Roof jacks shall be EPDM with a flexible aluminum bases to form weathertight seals at the roof panels.

## 2.11 FABRICATION

- A. Fabricate built-up members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.
- B. Fabricate hot rolled members in accordance with AISC Specification for pipe, tube, and rolled structural shapes.
- C. Fabricate cold formed members in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.
- D. Provide factory drilled or punched framing members for field bolted connections.
- E. All framing members shall be prepared according to SSPC SP-2 and given one coat of shop primer formulated to meet the requirements of SSPC Paint 15.
- F. Clearly and legibly mark each piece to correspond with previously prepared erection drawings.

## PART 3 - EXECUTION

### 3.01 ERECTION – FRAMING

- A. Erect framing in accordance with MBMA Low Rise Building Systems Manual, Common Industry Practices.
- B. The erector shall furnish temporary guys and bracing where needed for squaring, plumbing, and securing the structural framing against loads, such as wind loads acting on the exposed framing and seismic forces, as well as loads due to erection equipment and erection operation, but not including loads resulting from the performance of work by others. Bracing furnished by the manufacturer for the metal building system shall not be assumed to be adequate during erection. Temporary guys, braces, falseworks and cribbing shall be removed immediately upon completion of erection.
- C. Structural members shall not be field cut or altered without the written approval of the metal building manufacturer.
- D. After erection, all welds, abrasions, and surfaces not shop primed shall be field primed.

### 3.02 ERECTION – WALL AND ROOFING SYSTEM

- A. Wall and roofing materials shall be installed in accordance with manufacturer's instructions.
- B. Care shall be exercised when cutting prefinished material to ensure cuttings do not remain on finish surface.
- C. Cladding systems shall be fastened to structural supports and shall be aligned level and plumb.

### 3.03 ERECTION – GUTTER AND DOWNSPOUTS

- A. Gutters and downspouts shall be installed in strict accordance with manufacturer's instructions.

### 3.04 INSTALLATION – ACCESSORIES

- A. Accessories shall be installed in accordance with manufacturer's instructions.
- B. Wall and roof accessories shall be sealed to be weathertight.