

SPECIAL CONDITION

PRE-ENGINEERED METAL T-HANGAR BUILDING SYSTEM

DESCRIPTION

This specification describes the materials, fabrication, and the design criteria for a standard pre-engineered metal T-hangar building system of the nominal length, width, and eave height indicated on the drawings.

The T-hangar building shall be as supplied by a pre-approved equal with not less than five (5) years successful experience in the design and fabrication of pre-engineered metal T-hangar buildings of the type and quality required. The manufacturer must submit with the bid, evidence of five (5) years successful experience in the design and fabrication of pre-engineered metal T-hangar buildings.

The T-hangar package should be supplied as a complete system and furnished by a manufacturer who provides hangar doors and buildings as an integral hangar building package.

The standards, specifications, and/ or interpretations and recommendations of professionally recognized groups and agencies, such as MBMA, (Design Practices sections of the Metal Building Manufacturers Association (MBMA) 1986 "Low Rise Building Systems Manual,") AISC, AISI, AWS, ASTW are used as the basis in establishing the design, quality criteria, standards, practices, methods, and tolerances.

In addition to complying with all pertinent codes and regulations, Contractor shall acquire any and all permits and/ or licenses to perform the work and shall provide coverage for this work.

SUBMITTALS

All submittals shall be submitted to the project engineer for review and comment prior to releasing the job for final steel detailing and fabrication. Each submittal shall be furnished with appropriate stamps, seals, dates, etc. clearly indicated. Four copies of each submittal shall be furnished by the Contractor, with each submittal bound and clearly labeled on the outside to indicate what that submittal includes.

Required submittals shall include the following:

- A. **Product Data:** The contractor shall submit the manufacture's product information, specifications, and installation instructions for building components and accessories.
- B. **Shop Drawings:** The contractor shall submit complete erection drawings showing anchor bolt settings, sidewall, endwall, and roof framing, transverse cross sections, covering and trim details, and accessory installation details to clearly indicate the proper assembly of building components.
- C. **Certification:** The Contractor shall submit written certification prepared and signed by a Professional Engineer, registered to practice in the State of South Carolina, verifying that the design of the entire building meets indicated loading requirements and codes of authorities having jurisdiction over the erection and construction of the building.

MATERIALS

STANDARD MATERIALS. Standard materials furnished for metal building systems shall include primary and secondary structural framing members, bracing, metal panels for roofing and siding, flashing, fasteners,

sealants, accessories, and all other miscellaneous component parts required for a complete building (except that anchor bolts and other embedded items are excluded).

BUILDING NOMENCLATURE & DESCRIPTION. The nomenclature and description in the MBMA design practices manual shall govern building. Bay spacing shall be as indicated on plan drawing.

DRAWINGS, CERTIFICATION, AND CALCULATIONS. Building Manufacturer shall furnish drawings consisting of the following:

- A. An anchor bolt setting plan, containing horizontal and vertical main frame column reactions, and erection drawings to indicate the correct assembly and installation of the building components. Detailed shop drawings of the individual building components shall not be furnished.
- B. Building Manufacturer shall provide sealed approval drawings for customer review, with a letter of certification signed and sealed by a Registered Professional Engineer licensed to practice in the State of South Carolina. The pre-engineered T-hangar manufacturer shall not proceed with final steel detailing and fabrication until these drawings are approved and returned.

DESIGN CRITERIA. The basic design criteria applied to the structure and its components specified herein shall conform to the applicable sections of the latest editions of the following approved and accepted designed specifications:

- A. Structural mill shapes and built-up sections shall be in accordance with the latest edition of the American Institute of Steel Construction (AISC) "Specifications for the Design of Cold-Formed Structural Members."
- B. Cold-Form steel members shall be designed in accordance with American Iron and Steel Institute (AISI) "Specifications for the Design of Cold Formed Steel Structural members."
- C. Metal Building Manufacturer's Association (MBMA) "Metal Building Systems Manual", and/ or International Building Code (IBC) "Southern Building Code Congress International, Inc."
- D. American Welding Society (AWS) "Code for Submerged Arc and Gas Welding". All manual shop welding shall be done by welders possessing an AWS D1.1 certification or better.

DESIGN LOADS. The Primary and secondary framing and covering shall comply, where applicable, with the loads and combinations of these loads, as set forth in these specifications, or in the MBMA "Metal Buildings Systems Manual", or the International Building Code; 2013 Edition.

The basic design loads shall include live, wind, dead, and auxiliary loads; and shall be combined in accordance with the applicable local building code, or as required by the International Building Code; 2013 Edition.

The design loads shall be 20 psf reducible roof live load and 90 MPH wind load. Application of design loads shall be in accordance with the Design Practices sections of the Metal Building Manufacturer Association (MBMA) 1986 "Low Rise Building Systems Manual", unless specified otherwise.

STRUCTURAL MATERIALS. Structural materials shall comply with the following requirements:

- A. Framing members shall be shop fabricated for bolted field assembly.

- B. Welded plate actions, and hot rolled sections, shall be designed in accordance with AISC specifications. Plate and bar stock shall conform to ASTM Specifications, a-572, Grade 50, or A-36, as applicable.**
- C. Secondary structural framing shall include the purlins, girts, eave struts, flange bracing, clips, and other miscellaneous structural parts.**
- D. Cold-Formed structural members shall be designed in accordance with AISI Specifications and shall have minimum yield strength of 55,000 PSI. Light gauge cold-formed sections shall be manufactured by precision roll forming.**
- E. Cold-Formed connections shall be welded in accordance with AWS “Code for Submerged Arc and Gas Welding”. The flange-to-web welds will be on one side, continuous submerged arc, partial penetration fillet welds. Other welds shall be manual shielded metal arc, gas metal arc, or flux-cored semi-automatic. Butt welds in flange plates shall be full penetration.**
- F. Field cutting, drilling, or welding, if required, for minor modification of field location accessories, shall be noted on the Drawings.**
- G. Primary and main secondary framing members shall carry an identifying mark, either stamped, stenciled, or painted.**
- H. Field connections shall be bolted with ASTM-A-307, or ASTM-A-325 bolts pursuant to Building Manufacturer design.**

PRIMARY STRUCTURAL FRAMING MEMBERS. Primary structural framing shall refer to the Primary Frames (transverse rigid frames and lean-to rafters/ columns), expandable and nonexpandable End Frames (rafters/ corner post/ end post), Wind/Seismic Bracing.

Tapered Beam Frame shall consist of a tapered beam with a built-up or structural column.

Multi-span Frame shall consist of a continuous beam with built-up or structural columns.

Rigid Frame shall consist of a continuous frame with tapered or straight rafters and columns.

End Wall Framing shall consist of either an end rafter, supported by the endwall columns, and carrying a half bay loading’ or a full primary frame, the same as an interior frame and capable of carrying full bay loading, and shall be either structural mill shapes, welded built-up sections, or precision cold-form sections.

Wind Bracing – Longitudinal wind bracing shall be accomplished by diagonal cable bracing, both in the roof and the sidewalls acting in tension, and compression strut consisting of either purlins, girts, or eave struts. Fixed base corner columns, or other suitable designed bracing may be used where sidewall bracing is undesirable or unacceptable.

SECONDARY FRAMING MEMBERS. Secondary structural framing shall refer to purlins, girts, eave struts, base members, flange bracing, gable angles, clips, and other miscellaneous structural parts.

Purlins shall be cold-formed “Z” shape and shall be designed from U.S. standard 16, 14, or 12 gauge steel, having a minimum yield strength of 55,000 PSI. Purlins shall be designed as simple or continuous span beams for the stated loads.

Girts shall be cold-formed “Z” shape and shall be designed from U.S. standard 16, 14, or 12 gauge steel, having a minimum yield strength of 55,000 PSI. Girts shall be designed as simple or continuous beams for the stated load.

Eave struts shall be U.S. standard 14 gauge steel, having a minimum yield strength of 55,000 PSI, and designed to accept roof and wall sheets at the eave. Eave struts shall be designed as simple span beams for the stated loads.

Structural framing members for all openings shall be adequate for the specified design loads and shall consist of cold-formed members, prime painted.

Base support shall be standard 16 gauge using either (1) Base Angle, attached to the concrete foundation using accepted field practices, or (2) Base Girt, located 8” above finished floor at all exterior walls.

Interior partition base supports shall be a standard 16 gauge Galvanized base angle with a 6” vertical leg.

SHOP PAINTING. Structural members shall be cleaned of excess oil, dirt, loose scale, and foreign matter prior to painting. Structural members shall receive on shop coat of red primer to equal or exceed the performance standards of Federal Specifications TT-636C.

ROOF, FULL HEIGHT INTERIOR PARTITION, AND WALL COVERINGS. Panels shall be precision roll-formed having 36” net coverage with major ribs 1 ¼” high at one-third points, and intermediate ribs between the major ribs. Panels shall be roll-formed from 26 gauge steel, conforming to ASTM A-446E-75, having a minimum yield of 80,000 PSI

ROOF COVERING. Roof panels shall be 26 gauge Galvalume in accordance with ASTM Specifications A-792, with an aluminum-zinc alloy coating, unpainted.

WALL AND FULL HEIGHT PARTITION PANELS. Exterior wall and door panels shall be 26 gauge galvanized in accordance with ASTM specification A-525 with a G-90 galvanized coating prior to painting. See paragraph 5-3.17 for the paint specification requirements. Painted wall color shall be selected from the manufacturer’s standard colors, selected by the Owner. Painted panels shall have a 20 year warranty.

Interior partitions shall be full height from the finished floor level to the bottom of the frame or to the purlins as applicable. The partition panels shall be 29 gauge Galvalume in accordance with ASTM specification A-792, with an aluminum-zinc coating.

FASTENERS. Fasteners shall comply with the following requirements:

- A. Standard wall fasteners shall be #12, self-drilling carbon steel screws with hex-head, and with a sealing washer. Minimum length of fasteners shall be 1 ¼” for panel-to-structural application and ¾” for stitch screws. Fasteners shall be painted to match panel and trim color.**
- B. Standard roof fasteners shall be #12 self-tapping, carbon steel screws with an “extended life” hexagon head that is compatible with Galvalume or color-coated panels. A sealing washer shall be**

provided. Minimum length of fasteners shall be 1 ¼” for panel-to-structural and ¾” for stitch applications.

- C. Blind rivets for trim installation will be pull-type with aluminum body and mandrel. When installed, the body shall deform in such a manner as to securely clinch the joined surfaces together.

SEALANT AND CLOSURES. Sealant for roof sidelaps and endlaps shall be an off-white, ¼” wide x 3/32” thick, non-hardening butyl rubber base product. It shall have superior cohesion, adhesion, tack, and elongation properties, with resistance to ultraviolet light, ozone, and long-term ageing. The tape shall be formulated without solvents, eliminating any fire hazard or shrinkage, and shall deform under slight pressure to full irregularities, voids, and spaces. The tape shall be non-corrosive to metals, non-crazing with plastics, and be painted without bleeding through the paint film.

Sealant tape shall be supplied in rolls in the form of extruded ribbons with are interleaved with release paper to facilitate rapid and clean application of the sealant tape to the desired area. All Sealant Tape shall comply with the Federal Food, Drug, and Cosmetic Act, Title 21, Chapter 1, Subchapter B, Part 121, Subpart F, and shall be chemically acceptable to the U.S. Department of Agriculture for use in processing, transporting, or storage areas for meat or poultry food products prepared under Federal Inspection.

Standard Closures shall be semi-rigid, cross linked, laminated polyethylene foam. The closure shall conform to the configurations and shall have interlocking dove-tail joints. Closures shall be installed along the eave, as required, to provide a weather-tight building.

FLASHING AND TRIM. Flashing and/ or trim shall be furnished at the rake, corners, and eaves; at framed openings, and as necessary to provide a weather-tight and finished appearance. Galvanized steel for flashing and trim shall conform to ASTM Specification A-525, coating class G-90, and shall be 26 gauge, 55,000 PSI yield strength. Flashing and trim shall be available in standard colors. Profiles and dimensions of all flashing/trim will be standard.

COLOR FINISH. The exposed surfaces of all hangar doors and wall panels, flashing and trim shall be color coated. The color coating system shall be Silicon Polyester topcoat over a polyester washcoat primer for the exterior, finished side of the sheet, and a polyester washcoat primer for the unfinished side. The color coating system shall be equal to Dexstar 850 system with a 20 year warranty.

INSTALLATION OF PANELS. Roof panels shall be continuous from ridge to eave for buildings 70’ wide or less. Where end laps are required, they shall be a minimum of 6” and shall occur at a roof purlin. Roof panels shall sidelap one major rib. The inner panel, at the sidelaps, shall have a full major rib with a purlin bearing edge to provide bearing support of the lap. Roof panels shall overhang the building line at the sidewall to cover the doors.

Wall panels shall be continuous from the column base to the roofline, except where the required length would exceed 32’. When endlaps are required they shall occur at, and be fastened through, the secondary framing member.

ACCESSORIES. Hollow metal personnel doors, skylights, and bottom roll, top guided hangar doors will be required for this project.

A. HOLLOW METAL PERSONNEL DOORS

1. DOOR LEAVE

- a. Personnel door shall be 36" wide 84" tall. Door leaves shall be 1 3/4" thick, full flush with 20 gauge steel face sheets. The leaves shall have a honey comb core securely bonded to both face sheets. Leaves shall be reversible to work with non-handed frames.**
- b. The leaves will be reinforced for surface type door closures. Each hinge reinforcement shall be 9 gauge steel minimum projection welded in six places. The leaves shall be mortised for three 4 1/2" x 4 1/2" template hinges, one with non-removable pin.**
- c. Leaves shall be prime painted and oven dried.**

2. DOOR FRAMES

- a. Frames will be fabricated from commercial quality 16 gauge steel with butted corners and tabs and with floor anchors welded flush with the frame sill to assure positive anchorage.**
- b. Hinge reinforcements on the frames will be 9 gauge steel minimum and the frame will be prepared for the Universal A.S.A strike and 4 1/2" x 4 1/2" hinges.**
- c. All doors will be self-framing and include extruded aluminum threshold.**

B. BOTTOM ROLLING, TOP GUIDED HANGAR DOORS. Bottom rolling, top guided hangar doors shall be as supplied by OSI Building Systems (800) 844-3500 or a pre-approved equal with not less than five (5) years successful experience in the design and fabrication of bottom rolling, top guided hangar door systems.

- 3. The clear door opening shall be as shown on the drawings.**
- 4. The hangar door shall be designed and manufactured by the manufacturer of the T-hangar building.**
- 5. The door leaf thickness shall be determined by the design requirements. Framing members shall be prime painted and punched for bolted assembly.**
- 6. The top track and bottom track systems shall be included and designed for the load requirements.**
- 7. The top door guide shall have ball bearing guides and be adjustable up and down and also in and out.**
- 8. The bottom roller system shall have ball bearing wheels and a grease bolt axle. Adjustment for up and down, in and out must be available.**
- 9. The vertical jambs of the rolling hangar door leaves shall have 4" wide extruded neoprene weather seals where required for a weather tight installation.**

10. The base of the rolling door leaves shall have 3” brush sweeps.
11. Each door leaf shall have two 5/8” diameter cane bolts for locking.
12. Each T-hangar unit shall one 3’ x 7’ access door (to be mounted in one of the two rolling door leaves) with crash chain, deadbolt lockset, and pull handle.

ANCHORAGE. The building anchor bolts and related anchorage shall be designed to resist the column reactions resulting from the specified loads, as applied in the specified loading combination. The size and design shall be as specified on the approved anchor bolt plan and in accordance with the latest edition of the AISC. The anchor bolts shall be set in strict accordance with manufacturer’s anchor bolt drawings.

EXECUTION

ERECTION AND INSTALLATION. The following requirements shall apply:

- A. The building erector shall be responsible for careful study of, and adherence to, building manufacturer’s erection drawings and details, and shall be responsible for accurate and good quality workmanship in erection and installation of the building components.
- B. Erection and installation of building components shall conform to the applicable actions of MBMA “Code of Standard Practices”.
- C. Erector shall not make any field modifications to any structural member except as authorized by building manufacturer.

CONDITIONS. The Building shall comply with the 2006 edition of the International Building Code in effect at the time of construction in all respects.

METHOD OF MEASUREMENT

The foundation of the T-hangar building to be paid for under this items shall consist of reinforced concrete slab, as called for in the plans, including excavation, granular base placement and compaction, a waterproofing membrane atop the granular base, the reinforcing steel and concrete, the concrete finishing (in accordance with specification section P-610), removal of formwork and backfill around the finished foundation.

The T-hangar building to be paid for under this item shall consist of the total structure, complete as designed, with selected upfit items, excluding foundation, constructed in place and accepted as a complete unit. Any and all equipment to be installed within the confines of the T-Hangar shall be included in the cost of the T-hangar building itself, with no separate measurement made.

Utility services and upfit items that may be added to the scope of the project will be measured on a lump sum basis, complete and accepted as a functional unit for that particular item of work.

BASIS OF PAYMENT

Payment will be made at the contract price for the completed and accepted t-hangar buildings, complete in place, and accepted and certified for occupancy by local building inspector(s). This price shall be full compensation for Design, Civil engineering, MEP engineering, Structural engineering, furnishing all

materials and for all preparation, assembly, and installation of these materials, and for all labor, equipment, tools, and incidentals necessary to complete the item.

Payment will be made under:

- Item SC-4-6.1 Construction of Reinforced Concrete Foundation for T-hangar Building, Complete-In-Place and Accepted, including Stub-outs for electrical service, water service, and restroom plumbing, per square yard.**

- Item SC-4.6.2 Construction of T-hangar Building, Complete-In-Place and Accepted, per lump sum.**

- Item SC-4.6.3 Electrical Service to Building and Interior Electrical Upfit (Bay lighting, Outlets, Power Panel, etc.), Complete-In-Place and Accepted, per lump sum**

- Item SC-4-6.4 Restroom Upfit, Including Water Service to Restroom, Toilet, Wash Basin (lavatory) Metal Partitions, Heaters, Fans, etc., Complete-In-Place and Accepted, Plus gravity Sewer and septic tank system as shown on plans from building slab stub out – per lump sum**