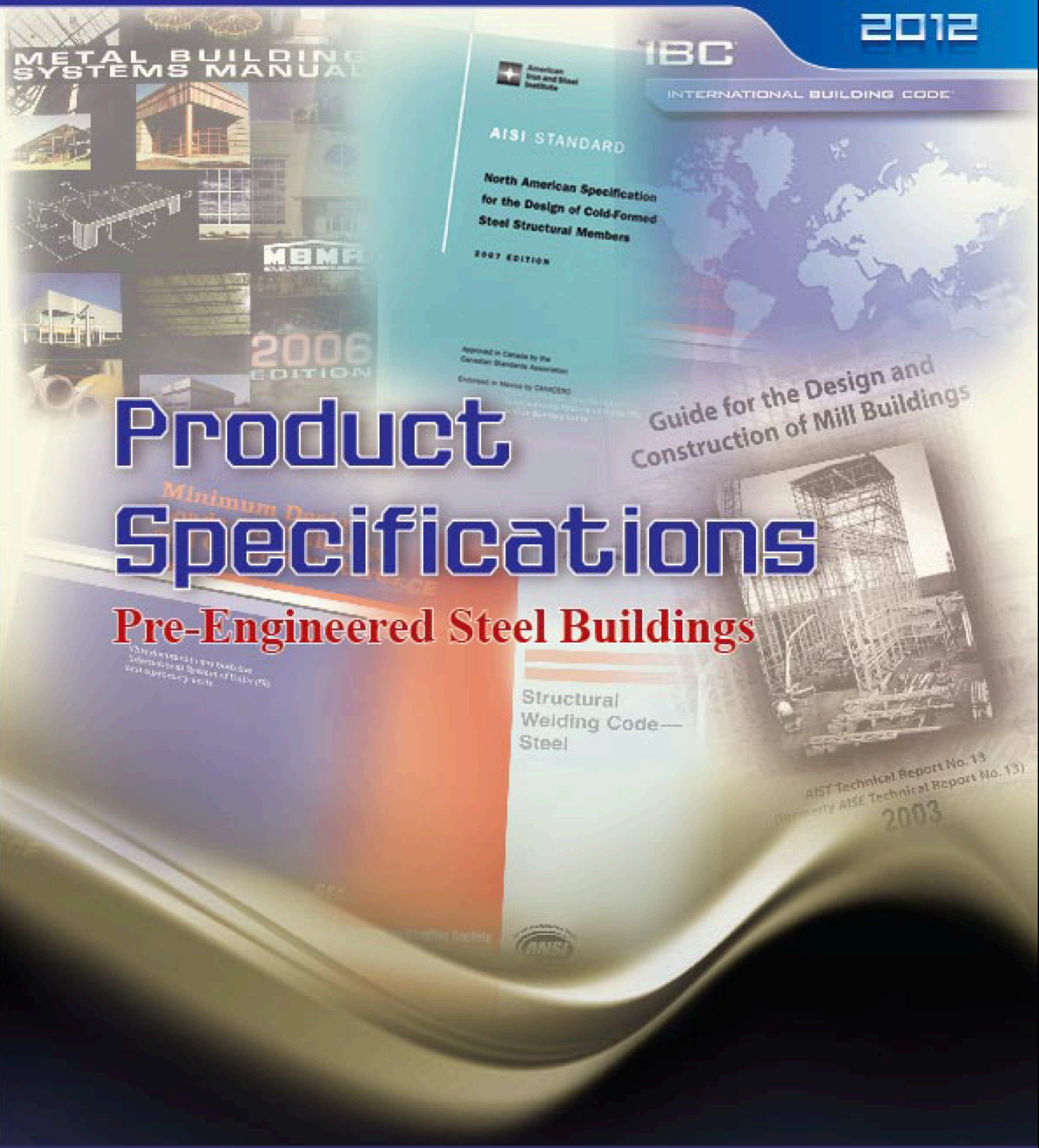


Product Specifications

Pre-Engineered Steel Buildings

Mabani STEEL

AL RAJHI BUILDING SOLUTIONS

Designers, Fabricators & Erectors of:

- **Pre-Engineered Steel Buildings “PEB”**
- **Hot Rolled Structural Steel “HRSS”**

product specifications

CONTENTS

1. General

1.1 Definitions

The standard Mabani Steel pre-engineered steel building consists of columns, rafters, bracing, connection clips, anchor bolts, roof purlins, wall girts, roof sheeting, wall sheeting flashing trims, etc. or as specified. All materials shall be new and free from defects.

The main building structure is comprised of single or multiple gable interior rigid frames and either "rigid" frames or "bearing" frames at the endwalls.

The standard roof slopes are 0.5 or 1.0 unit of vertical rise to 10 units of horizontal run. Other slopes are available upon request.

The sidewall steel line is defined as the plane of the inside vertical surface of the sidewall sheeting. This may also be defined as the plane of the outside vertical surface of the eave strut/sidewall girts.

The endwall steel line is defined as the plane of the inside vertical surface of the endwall sheeting. This may also be defined as the plane of the outside vertical surface of the endwall girts.

The building width is the distance between the steel lines of opposite sidewalls. Building width does not include the width of Lean-To buildings or roof extensions. The width of a Lean-To building is the distance from the steel line of the exterior sidewall of the Lean-To building to the sidewall (or endwall) steel line of the building to which the Lean-To building is attached.

The building length is the distance between the steel lines of opposite endwalls. Building length is the sum of all bay lengths. Building length does not include the width of endwall Lean-To buildings or roof extensions.

End bay length is the distance from the endwall steel line to the center line of the first interior rigid frame column.

Interior bay length is the distance between the center lines of two adjacent rigid frame columns along the building length. Interior bay lengths normally range from 6000 mm to 10000 mm.

The building eave height is the distance from finished floor level (FFL) to the top of the eave strut web at the sidewall steel line.

The building clear height is the distance between the finished floor level (FFL) to underside of the bottom flange of the rafter at the end plate connection to a sidewall rigid frame column.

1.2 Standard Structural Framing Systems

Clear Span (CS) structures have a single gable roof with vertical sidewalls and endwalls. Interior frames are clear span rigid frames without interior columns.

Multi-Span (MS) structures have a single gable roof with vertical sidewalls and endwalls. Interior frames are rigid frames typically having tapered sidewall columns and tapered rafters and constant depth interior columns. The designation "MS-1" designates a rigid frame with one interior column, "MS-2" designates a rigid frame with two interior columns, etc.

Multi-Gable (MG) structures have a roof consisting of two or more gables with vertical sidewalls and endwalls. Interior frames are rigid frames typically having tapered sidewall columns, tapered rafters and constant depth interior columns. The interior frames may be either "Clear Span" or "Multi Span" per gable.

Lean-To (LT) buildings are dependent structures attached to sidewall or endwall columns of buildings. A Lean-To consists of outer sidewall columns supporting simple span or multi span rafters attached to the main building. Lean-To columns are normally of constant depth but may occasionally be tapered.

1.3 Standard Framing Features

Rigid frames are typically constructed with either tapered or constant depth columns and rafters.

The top flanges of all frame rafters (rigid frame and bearing frame) are typically 204 mm below the bottom of the roof sheeting.

Outside flanges of Clear Span (CS) and Multi-Span (MS) rigid frame columns are typically inset 204 mm from the sidewall steel lines to allow in by-pass girt condition buildings.

End frames are normally load bearing frames. The center line of the bearing frame corner columns is inset 306 mm from the endwall steel line. As an option, rigid frames may be used at building ends. The center line of endwall rigid frame columns is recessed 400 mm from the end wall steel line.

Endwalls may be flush or by-pass. Girts of flush endwalls are flush framed to the outer flange line of endwall wind columns and are bolted to clips attached to the webs of endwall wind columns. Girts for by-pass conditions. Bearing frame corner columns are inset 204 mm from the endwall steel line. Endwall girts are bolted to clips that are welded to the outside flanges of these columns.

Wind column spacing for flush endwalls typically do not exceed 6000 mm. Endwall wind column spacing for by-pass endwalls can range from 6000 mm to 10000 mm.

1.4 PEB Steel Structure Components

Sidewall columns and rafters of rigid frames are typically tapered but occasionally constant depth, built-up welded plate I-sections. Interior columns of Multi-Span frames may be either built-up I-sections (usually constant depth) or tubular sections.

All rigid frame field connections are bolted. Columns and rafters are provided with shop welded end plates for member-to-member connection and for anchoring columns to foundations. Plate clips are welded to the outer flanges of rafters and columns for roof purlin and wall girt attachments.

Bearing endwall frames are fabricated from either hot rolled sections or built-up welded plate I-sections and are normally of constant depth.

Purlins and girts are pre-punched cold formed "Z" shaped sections 200 mm in depth with stiffened flanges.

Eave struts are pre-punched cold-formed "C" shaped sections with 200 mm web depths and 63 mm wide stiffened flanges. The eave strut serves both as a longitudinal structural bracing member and as a support points for fastening wall and roof sheeting connections.

Diagonal bracing provides longitudinal and transverse stability against wind, seismic, or other forces. It is attached to the web of rigid frame members near the outer flange of columns and rafters. Standard diagonal bracing are field installed bolted assemblies made of galvanized cable strand and high strength eye bolts. Solid round bars or hot rolled angles may be used when required by design.

Flange bracing, in the form of angles field bolted to purlins or girts, are provided to stabilize the interior flanges of rigid frame rafters and columns at locations determined by design.

Sheeting angles (Base, Gable & Sandwich panel endlap) are made of galvanized cold formed material and are supplied in 3100 mm lengths.

1.5 Panel & Trim Components

Panels (roof and wall) are rollformed to maximum practical lengths to minimize end laps in the field (generally less than 10000 mm). However standard practice restricts roof panels to 9000 mm and wall panels to 7500 mm.

The standard panel profile for roof panels is a "M24/230" having 8 high ribs. The standard panel profile for wall panels is an "M32/333" profile. It is a rollformed panels having 4 high ribs and 6 minor ribs. Both panel cover a width of 1000 mm center-to-center of outer high ribs.

Roof panels have minimum end laps of 100 mm over purlins and are fully protected from siphon action water intrusion at side laps by a continuous siphon break relief rollformed into the underlapping sidelap high rib. Roof end laps are weather sealed via field installed continuous bead mastic.

Wall panels have end laps of 100 mm. No mastic is required to weather proof the side or end laps of wall panels.

Sandwich Panels compise of an exterior metal skin, a polyurethane core and an interior micro-ribbed semi flat or flat skin that is made of metal or aluminum foil. The core thickness excludes the depth of exterior skin high ribs and is available in 50, 75 or 100 mm thickness. The density of the polyurethane is 35-40 kg/m3.

Profiled ridge panels, matching the profile of the roof panels, are provided at the ridge of all buildings and are shop pitched to match the roof slope.

Eave gutters are supplied in lengths up to 6100 mm and have a profiled cross-section that is 170 mm wide x 172 mm high. The interior water carrying surfaces are shop coated with white epoxy to extend their service life.

Downspouts for eave gutters are profiled. They are supplied in lengths up to 9000 mm and have a cross section of 125 mm x 150 mm. They are generally located at each sidewall rigid frame column.

Valley gutters are typically supplied in lengths up to 6000 mm and are available in two standard types. Type 1 is 400 mm wide x 190 mm high. TyPe 2 is 366 mm wide x 190 mm high. The interior water carrying surfaces are shop coated with epoxy paint to extend their service life.

Optional valley gutter downpipes in Multi-Gable (MG) buildings are 160 mm diameter PVC pipes. PVC outlets connecting the valley gutter to the downspouts are also optional. Downpipes are recommended to be located at each interior valley column. Provision must be made by Customer to receive water flow from valley gutters and channel it to outside the building.

2. Design

2.1 Design Codes

Mabani Steel's design and fabrication are in accordance with the latest editions of the following codes unless directed otherwise by the client or specifically mentioned in the offer.

Frame members (hot rolled or built-up) are designed in accordance with the Steel Construction Manual published by the American Institute of Steel Construction (AISC).

Cold-formed members (Z & C sections) are designed in accordance with the "Cold-Formed Steel Design Manual" published by the American Iron and Steel Institute (AISI).

All welding is done in accordance with the "Structural Welding Code-Steel D1.1" of American Welding Society (AWS). All welders are certified for the type and position of welding performed.

If required Mabani Steel will design in accordance with British Code (BS)

2.2 Building Codes

Mabani Steel's structural design, deflection control, and manufacturing dimensional tolerances comply with the guidelines defined in "Metal Buildings Systems Manual" (MBSM) published by Metal Building Manufacturers Association (MBMA) of the USA. MBMA is the world recognized authority on pre-engineered steel buildings and its guidelines are accepted as standard practice in this industry.

A more stringent code is the International Building Code ("IBC") published by International Code Council (ICC) of the USA. This code is followed by Mabani Steel if specified at time of request for quotation.

2.3 Loads

The building is designed to withstand the dead load (DL) of the structure plus a specified live load (LL) and wind load (WL).

Mabani Steel designs are based on a minimum roof live load of 0.57 kN/m2 and a minimum wind speed of 130 KPH. Higher live load and/or wind speed will be used if specified by a Customer. The wind pressure in kN/m2 is determined on the basis of 3 second gusts as described in the latest edition of MBMA and IBC.

Collateral loads, if any, must be specified by the customer at the time of request for quotation.

If snow load is specified, the higher value of either the snow load or the live load will be used in load combinations to produce the maximum adverse effect on the structure. Snow load is not additive in load combinations.

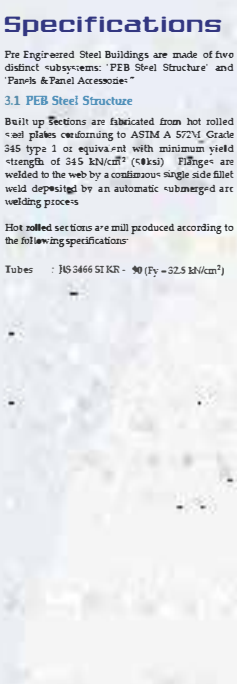
Seismic loads, if specified, are applied as per the latest edition of IBC (International Building code).

The load combinations used in Mabani Steel's designs comply with the requirements of the latest edition of the "Metal Buildings Systems Manual".

www.mabanisteel.com

3. Material

Specifications


Pre Engineered Steel Buildings are made of two distinct subsystems: 'PEB Steel Structure' and 'Panels & Panel Accessories'

3.1 PEB Steel Structure

Built up sections are fabricated from hot rolled steel plates conforming to ASTM A 572M Grade 345 type 1 or equivalent with minimum yield strength of 345 kN/cm² (50ksi). Flanges are welded to the web by a continuous single side fillet weld deposited by an automatic submerged arc welding process

Hot rolled sections are mill produced according to the following specifications

Tubes : JIS 3466 STKR - 90 (Fy = 32.5 kN/cm²)

4

I - shapes: EN 10025 S 355JR (Fy = 34.5kN/cm²)
Channels : EN 10025 S355 JR (Fy = 34.5kN/cm²)

Secondary members (purlins, girts, eave struts, channels, base angles and gable angles) are cold formed from galvanized steel coils ranging in thickness from 1.5 mm to 2.5 mm. Material conforms to ASTM A653M Grade SS 340 Class 1 or equivalent, with zinc coating to Z 275 designation (275 g/m²) having a minimum yield strength of 34.5 kN/cm². Purlins, girts, eave struts and channels are 200 mm deep. Base/gable angles are 1.5 mm x 100 mm x 72 mm.

Cable bracing is 12mm diameter (7 wire) strand in accordance with ASTM A475 having an ultimate breaking load of 119.7 kN.

Bracing rods are 24mm diameter solid plain round steel bars conforming to ASTM A36 Grade (or equivalent) with a minimum yield strength of 24.5kN/cm².

Sag rods, used to position purlins and girts in bays longer than 5500 mm or in buildings with slopes greater than 2.5 to 10, are 12 mm or 16 mm end threaded or fully threaded solid round steel bars conforming to ASTM A36 or equivalent with a minimum yield strength of 24.5kN/cm².

Flange braces used to stabilize the inner flanges of main frame columns and rafters are typically 40 mm x 40 mm x 4 mm steel angles conforming to ASTM A 36 or equivalent with a minimum yield strength of 24.8 kN/cm² (36 ksi).

Primary Connection Bolts are fully threaded hot dip galvanized high strength ASTM A325 bolts with nuts & washers. They are used for connecting primary structural members.

Secondary Connection Bolts are fully threaded 12mm diameter electro galvanized DIN 8.8 high strength bolts. They are used for connecting secondary members to primary members and secondary members to other secondary members.

Anchor bolts are hot dip galvanized, manufactured from rods conforming to ASTM A36 or equivalent with a minimum yield strength of 24.5 kN/cm² and an ultimate strength of 40.2 kN/cm².

3.2 Panels & Panel Accessories

Roof and wall panels manufactured by Mabani Steel are rollformed from either:

- 0.5 mm (nominal) thick AluZinc Coated Steel (AluZinc is an Aluminum / Zinc alloy) conforming to ASTM A 792M grade 345 classes having a minimum yield strength of 34.5 kN/cm² with a zinc/aluminum coating conforming to AZ 150 (or equivalent). The coating is achieved through a hot dip process of 55% aluminum and 45% zinc alloy. 0.7 mm (nominal) thick AluZinc Coated Steel is optional.
- 0.7 mm (nominal) thick cold rolled Aluminum conforming to alloy AA 3105 with a temper of H16 (for mill finish) and a temper of H46 for polyester painted. The yield strength is a minimum of 14.5 kN/cm².

Standard roof panels are made from bare (unpainted) Aluzinc coated steel or mill finish aluminum. Polyester painted roof panels are optional but must be specified at time of quotation.

Standard wall panels and interior liner panels are made from polyester painted Aluzinc Coated Steel or polyester painted Aluminum.

Panel paint film thickness is 25 microns (5 microns primer + 20 microns of Polyester paint) on the exterior weather face and 7 microns of PU compatible epoxy primer on the interior face.

Standard colors of polyester painted wall panels for both Aluzinc Coated Steel and Aluminum are Frost White (FW), Cactus Green (CG), Shasta Blue (SS), and Arabian Beige (AB). The interior surface of painted panels shall typically be RAL 7035 (light gray) color.

Panel attributes (profile, thickness, metal coating type, paint type, paint thickness and paint color) may be upgraded subject to extended delivery.

Wall flashings and trims (gable trims, corner trims, framed opening trims, eave gutters and downspouts) are normally produced from the same material as the wall panels.

Roof flashings and trims (transition trims, expansion joint trims and ridge caps) are made from the same material as the roof panels.

Valley gutters (used in parapet facias and valley conditions) are made from a 0.9 mm thick ASTM A 653 Grade A steel to Z-275 zinc coating designation. (275/gm^2) having minimum yield strength of 24.5 kN/cm^2. The inside water surfaces are factory epoxy painted.

Roof and wall fasteners (primarily used to attach panels to purlins and girts) are self drilling type with thread diameter of 5.5 mm. The 5 mm hexagonal head is pre-assembled with a 19 mm diameter washer bonded to a 3 mm thick EPDM seal.

Stitch fasteners (used at panel side laps and to attach flashings to panels) are self drilling type with a thread diameter of 4.8 mm. The hexagonal head is pre-assembled to a 16 mm diameter washer bonded to a 3 mm thick EPDM seal.

For Aluzinc Coated Steel panels, the fasteners are manufactured from high grade carbon steel with a 10 microns thick zinc based coating.

For Aluminum panels, the fastener heads and studs (surfaces in contact with the aluminum panel) are manufactured from stainless steel. The self drilling drill bit portion is made of hardened carbon steel.

Pop rivets are made of Aluminum with a 3.2 mm diameter. They are used in eave gutter splicing, trim-to-trim and trim-to-panel fixing, and for fastening of accessories to roof or wall panels.

Grommet fasteners, used to fasten skylights to roof purlins in order to ensure a water tight condition, are made of aluminum and are 4.8 mm in diameter. They are pre-assembled with EPDM washers to provide a water tight compression connection. Grommets are used to fasten the side laps of skylights/wall lights to adjoining roof/wall panels and to fix the skylight at intermediate purlins.

Skylights and wall lights are made of 1.5 mm thick translucent white acrylic modified ultra violet stabilized fiberglass with a tensile strength of 7.2 kN/cm^2 and a flexural strength of 14.0kN/cm^2. Translucent panels weigh 2.4 kg/m2 (nominal) and provide the same coverage as the panel width. The standard lengths are 3250 mm and 3900 mm.

The cross-section profile of the translucent panel matches the adjoining roof or wall panels so that weather tightness is achieved through the same lapping technique used for panel installation. They have a light transmission value of 80%.

Foam closures match the panel profile and are provided to achieve weather tightness at panel end conditions such as at eaves or framed openings. They are made of expanded polyurethane or similar material.

Bead mastic is an extruded elastomeric butyl rubber based sealant supplied in rolls. It is used to weatherseal panels at roof end laps.

Flowable mastic (caulking sealant) is a neutral cure sealant that is chemically inert and non-corrosive. It is UV resistant and suitable for exterior applications against weathering and rainwater. When cured it is non-toxic and will accommodate high thermal and shrinkage changes in structural movement joints.

4. Structural Surface Preparation & Paint

Primary members are blasted to Swedish Standard Sa 2 and shop painted with an epoxy primer to a dry film thickness of 50 microns. Shop primer is intended to provide protection against weathering during transport and erection. It is not intended to provide permanent corrosion protection especially in the case of exposed steel. Optional Sa 2.5 shot blasting and special paint systems can be provided upon request.

Secondary members are pre-galvanized.

5. Structural Additions

5.1 Roof Extensions

Sidewall roof extensions extend beyond the building width at sidewall eaves and are generally a simple continuation of the main building roof slope.

Endwall roof extensions extend beyond the building length at endwall gables, These are developed by simply extending the end bay purlins and eave struts of the main building beyond the endwall steel line.

Standard lengths for roof extensions range from 900 mm to 1500 mm. Longer roof extensions are possible but may require heavier framing or additional structural members.

Standard roof extensions at both sidewalls and endwalls are provided with roof panels only; soffit panels for roof extensions are optional.

Eave gutters are typically relocated from the main building eave to the edge of the roof extensions. Gutter drainage is provided by downspouts located at the building sidewall and connected to the roof extension eave gutter with return downspouts.

5.2 Canopies

Sidewall canopies are cantilevered rafters attached to sidewall columns at any point below the eave. Endwall canopies are cantilevered rafters attached to the endwall wind columns below the gable.

Standard canopy depths range from 1500 mm to 3000 mm. Deeper canopies are possible but may require reinforcement of sidewall or endwall columns.

Canopy depths that are 1500 mm are constructed using 200 mm deep hot rolled / built-up I-sections supporting 200 mm deep flush Z-purlins to support the canopy roof panels. Optional canopy soffit panels conceal both purlins and rafters. Canopy depths that are greater than 1500 mm are typically constructed using tapered rafters supporting 200 mm deep by-pass Z-purlins to support the canopy roof panels. Optional canopy soffit panels conceal the canopy purlins only, leaving the rafters exposed.

Canopy lengths are ideally a multiple of sidewall bay lengths or a multiple of endwall column spacings. This optimizes the economy of attaching the canopy rafter to existing columns.

Unless otherwise specified, the roof panels of the canopies will conform to the specification and color of the main building roof panels.

5.3 Fascias and Parapets

Vertical fascias consist of 200 mm deep hot rolled or built-up I-section vertical posts supported by brackets attached to sidewall or endwall columns. Cold-formed 200 mm deep "C" section top and bottom channel girts are flush-framed to the vertical fascia posts. An intermediate "Z" girt is supplied to support a modified valley gutter, when required.

Standard vertical fascias project 600 mm from the building sidewall or endwall steel lines. Projections exceeding 600 mm are possible but may require heavier sidewall columns and/or endwall wind columns. Fascias are often used to conceal the roof slope along the sidewall eave and/or the gables at the endwall. The height of the fascia varies depending on roof slope, building width, or aesthetic considerations.

Unless otherwise specified, fascia sheeting shall match the specifications and color of the wall panels. Soffit panels and interior back-up panels are optional and provided only when specified at time of quotation.

Curveline fascias are of the same type of construction as vertical fascias but are sheeted with curved profiled panels. Curved fascias are available in three types:

- Bottom curved fascia having the curved panel only at the bottom of the fascia.
- Top and bottom curved fascia having curved panels at both the top and bottom of the fascia.
- Center curved fascia having a single curved panel at the mid height of the fascia.

A parapet fascia is an extension of the existing sidewall or endwall planes above the roof line. The wall sheeting of the building is extended to the top of the parapet.

Standard eave gutters and downspouts are normally used with sidewall vertical fascias. Valley gutters recessed at the eave are used with sidewall parapet fascias.

5.4 Mezzanine Systems

Mezzanines typically require mezzanine support columns, beams, joists, deck, and edge angles. Mezzanine columns are usually placed along the existing main building frame lines. They support the mezzanine beams which in turn support the mezzanine joists. Mezzanine joists are normally oriented parallel to the sidewall. Joist spacing varies from 1000 mm to 3000 mm depending on the mezzanine dimensions; deck profile and applied loads.

The mezzanine columns, beams, and joists are designed to withstand the mezzanine live load, the weight of a 100 mm thick reinforced concrete slab, and the weight of the deck. Additional dead loads, collateral loads and floor finish loads, if present, must be advised to Mabani Steel by the client to be considered in the mezzanine design.

Mezzanine deck is roll formed from 0.7 mm thick galvanized steel coil conforming to ASTM A653M, grade 55360 with minimum yield strength of 34.5 kN/cm^2 (50 ksi) or equivalent, zinc coated to Z180.

The deck is intended to be used as shuttering during construction. It is designed to support the weight of the concrete slab only.

The mezzanine concrete slab requires structural reinforcement to support its own weight plus other dead loads, live loads, collateral loads and floor finish loads. Slab design is not provided by Mabani Steel.

Mezzanine deck fasteners are 5.5 mm diameter hexagonal head self drilling screws without a sealing washer.

Staircases with handrails are offered as an option. They are shipped in a knocked-down condition for field assembly. Staircases may be single or double flight and with-or-without intermediate landings.

6. Building Accessories

6.1 Insulation

Insulation is typically fiberglass blanket of stable and uniformly textured inorganic glass fiber bonded together by a non-water soluble and fire retardant thermosetting resin.

Standard insulation thickness is 50 mm; higher thicknesses (75 mm and 100 mm) are available upon request.

Standard insulation facing is White Metalized Scrim Kraft (WMSK).

Insulation is supplied in rolls with an insulation blanket width of 1000 mm for WMSK facing. The facings shall have additional "tab" material extending 50 mm on each side of the insulation to allow for neat, sealed installation.

The standard nominal insulation density shall be 12 kg/m^3 with a thermal conductivity of 0.041 w/mk at mean temperature of 25°C. Higher densities (16 kg/m^3 and 24 kg/m43) are available upon request.

6.2 Personnel Doors

Door leaves are 44mm thick flush-finished. Single leaf doors are 915 mm wide x 2135 mm high. Double leaf doors are 1830 mm wide x 2135 mm high.

Door leaves are reinforced, stiffened, and sound deadened with an expanded polystyrene core laminated to the inside faces of door panels, completely filling the cavity of the door leaf.

Steel door panels are made from 0.9 mm thick hot-dip galvanized sheet as per ASTM A 653M (Z-180) cold-rolled steel, thoroughly cleaned, phosphatized and painted with a universal epoxy primer to assure superior corrosion protection. They may be field painted with an epoxy primer compatible overcoat.

For all double doors a "Z" shaped astragal is field attached to the inactive leaf.

Doors are factory prepared for a cylindrical lockset and 3 hinges.

Door frames are 1.5 mm (nominal) thick hot-dip galvanized steel to ASTM A653 (Z-180) classification (or equivalent) thoroughly cleaned, phosphatized and painted with a gray universal epoxy primer.

Door frames are delivered knocked-down. Corners have brackets with pre-drilled holes for field assembly and are supplied with all fasteners necessary for assembly.

The lockset is a keyed cylindrical type with satin chrome finish. Optional panic devices and auto closers are available.

Each door leaf has three mortise 115 mm x 115 mm ball bearing hinges with a security set screw in the barrel to prevent removal of the hinge pin with the door in a closed position.

6.3 Steel Sliding Doors

The frames of horizontal steel sliding doors are manufactured from 1.5 or 2.0 mm (nominal) thick x 200 mm deep cold formed channels and are delivered as knocked-down packages for field assembly. All clips, fasteners, etc. necessary for assembly are provided.

The exterior face of the door leaf is sheeted with profiled panels matching the profile, material specifications, and color of the wall panels

Standard Double Sliding Door Sizes are 3000 x 3000, 4000 x 4000, 5000 x 5000 and 6000 x 6000. Other sizes can usually be accommodated.

Door leaves are suspended by hangers mounted on a track (rail) attached to a structural header. Door hood trim, to conceal and protect the header and rail, is supplied in the same material and color as the wall panels.

Doors leaves are bottom guided by a specially designed segmented steel rail which is to be embedded in the concrete /ramp.

As an option, sliding doors may also be provided with flush hinged pilot doors. A pilot door is a single leaf personnel door located within a leaf of the sliding door.

6.4 Steel Roll-up Doors

The roll-up door curtain is cold formed from variable thickness white polyester painted galvanized steel. The bottom rail of the door curtain is an extruded aluminum angle guide.

The door drum (supporting the door curtain) is of a variable diameter and thickness pipe. The drum houses safety springs, end shafts, collars, and bearing.

Doors are supplied complete with guides, axles, curtain, an electrically operated mechanism and a manual chain to operate the door in the event of power failure.

Standard Roll-up Door Sizes are 3000 x 3000, 4000 x 4000, 5000 x 5000 and 6000 x 6000. Other sizes can be accommodated.

6.5 Windows

Window frames are made of powder coated aluminum extrusions in Frost White color only. They are horizontal half slide type (fixed type is optional), 1000 mm high and 1000mm wide (other sizes are optional). Windows are factory glazed with 6 mm thick clear glass and are equipped with latches and removable insect screens.

6.6 Sand Trap Louvers

Standard sand trap louvers are 1000 mm wide x 1000 mm high (other sizes are optional). They are supplied with vanes and framing. They are made from 0.7 mm (nominal) polyester painted Aluzinc Coated Steel sheet in any Mabani Steel Standard Colors.

6.7 Gravity Ventilators

Gravity ridge ventilators are 3000 mm long with a throat opening of 300 mm or 600 mm. **300 mm (throat opening) ventilators** are equipped with dampers and are available in Frost White Color only. **600 mm (throat opening) ventilators** are supplied without dampers and are available in any standard Mabani Steel Color. Ventilators are installed as either individual units or as continuous (joined) units. The outer skin of both types of ventilators is made from 0.7 mm thick polyester painted Aluzinc Coated Steel. Both sizes are supplied with bird screens and shipped knocked down.

6.8 Fiber Glass Roof Curbs

Roof curbs are made of 3 mm thick fiberglass reinforced polyester and coated with a weathering surface on the outside face.

The roof curb's base cross section matches the Mabani Steel roof panel for water tight installation within the raised portion of the roof curbs of 1150 mm x 1150 mm in which to field cut openings for the roof mounted accessory. The roof curb package includes the fasteners and sealants required to install the curbs on the roof.

7. Foundations and Anchorage

Foundations, tie beams, and concrete floor slabs are to be designed by a licensed engineer engaged directly by the client. Mabani Steel does not provide this service.

The design of the concrete substructure should consider Mabani Steel's column reactions as noted on Mabani Steel's "Issued for Construction" anchor bolt setting plans.

Anchor bolts must be set in strict accordance with Mabani Steel's anchor bolt setting plans. Mabani Steel shall not be responsible for consequences, delay, and problems due to incorrectly set anchor bolts.

8. Submittals

8.1 Approval Drawings

Approval drawings are prepared and submitted upon request. If approval drawings are requested, preparation of shop drawings for fabrication will not begin until one set of the approval drawings has been signed by the buyer or his representative as "Approved As Is" or "Approved As Noted" and returned to Mabani Steel.

Approval drawings are issued as "Not for Construction" drawings. The contractor is specifically instructed not to use dimensions shown on approval drawings for civil work, foundations work, etc. Mabani Steel is not responsible for any consequences arising from the premature use of information provided in drawings that are not "Issued-for-Construction."

8.2 Erection Drawings

Erection drawings "Issued for Construction" are provided for the assembly of the buildings. They consist of an anchor bolt setting plan, a frame cross section, a roof framing plan, wall framing details and roof and wall sheeting details. Part marks for all Bill of Material (BOM) components are shown on erection drawings.

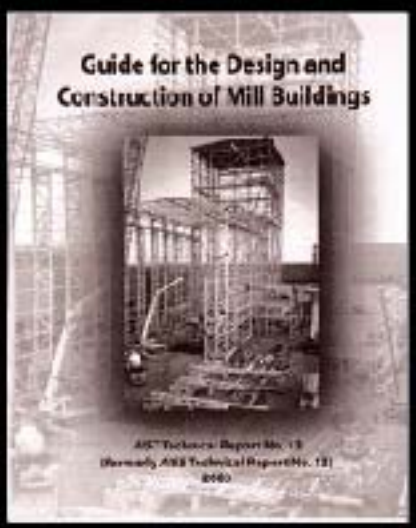
Bolts Schedules identifying the required bolt diameter and length for specific connecting are shown on erection drawings.

8.3 Bill of materials (BOM's) and Shipping Lists

A Bill of Materials listing all components supplied for a building is sent with the erection drawings of the building. A Shipping (packing) List recording all materials on a specific trailer is released to the trailer driver and faxed or emailed with the shipment advice (that is intimated to the customer prior to the dispatch of a trailer).

Mabani

STEEL



MABANI STEEL LLC.
Head Office & Factory
P.O. Box 31508
Ras Al Khaimah - U.A.E.
Tel : + (971-7) 244-7464
Fax : + (971-7) 244-7277
E-mail: sales@mabanisteel.com