MBS

MEMAAR BUILDING SYSTEMS

A Subsidiary of EII CAPITAL

COMPANY BROCHURE

Manufacturer Of Pre-Engineered
Steel Buildings & Sandwich Panels

Version 6.0224

MBS

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INTRODUCTION

Founded in 2002, Memaar Building Systems (MBS) is a wholly owned subsidiary of Ell CAPITAL (Emaar Industries & Investments (PVT) JSC), and is one of the largest manufacturers of Pre-Engineered Steel Buildings (PEB) and sandwich panels in the world.

MBS is specialized in the design, manufacture and supply of Pre- Engineered Steel Buildings (PEB), using internationally recognized engineering software and the most advanced production machineries in the PEB industry.

MBS has a monthly production capacity of 8,000MT of steel buildings and 150,000m2 of sandwich panels (consisting of PUR and PIR as core insulation) which allows the production facility to handle large fast track jobs in the shortest time period.

Since establishment, MBS has supplied more than 50,000 buildings to more than 100 countries worldwide.

Ell CAPITAL is dedicated to investing in sustainable companies and projects that are economically beneficial and commercially sound. With a focus on maximizing its subsidiaries long term value by exposing them to industry best practices, improving corporate governance, providing a solid capital base and ensuring a sustainable and flexible cash flow.

MBS has established professional sales teams to serve the United Arab Emirates, Gulf Cooperation Council, Middle East, Africa, Europe, Indo Pacific and Central Asia.

MBS has achieved the ISO 9001 Certification in Quality Management System, ISO 14001 in Environmental Management System and ISO 45001 in Occupational Health and Safety Management System. MBS products are also in compliance of EN1090 & EN14509, qualifying us to design, manufacture and supply Steel Buildings in compliance to the European Construction Product Regulation and affix the CE mark on MBS products.

MBS follows the latest American design codes and standards when designing its buildings and uses state of the art software and equipment to ensure accurate manufacture and rapid, problem free erection.

Each and every member of the MBS team is a professional dedicated to providing our customers with the best service. At MBS, we know and believe that our future depends on sustained customer satisfaction.

Our professional team spares no effort to provide the best service, at **MBS,** our commitment is to always provide:

1. The fastest response to a request for quotation
2. The most competitive prices
3. Proposal drawings to help visualize your building
4. Continuous engineering support for special needs
5. High quality materials and workmanship that will last and perform
6. Excellent after sales service to ensure quick and successful completion
7. On-site service anywhere in the world to support builders and construction companies

Sales and Customer Service

At MBS, our sales engineers handle each and every proposal for a building enquiry with the utmost attention, offering the best and most economical solution. All our proposals are submitted with a competitive price quotation and proposal drawings, to ensure sufficient information enabling the best possible solution.

A dedicated customer service team is in place to ensure seamless communication with the customer. This ensures that all of our customers, local and abroad, receive the best possible service.

Experts in Engineering

In our quest for engineering leadership in the metal building industry, we have equipped all our professional staff with state of the art computers and engineering software. We also have procedural safeguards in place to ensure that all engineering inputs and outputs, such as design calculations, shop details and bills of material are generated, checked, released and archived in digital format, ensuring that our customers' best interest is at heart.

THE MBS EDGE

Over the years, MBS has maintained its status as a leading manufacturer of Pre-Engineered Steel Buildings (PEB) and rigid foam injected sandwich panels (PUR and PIR) by nurturing a culture of continuous improvement. We at MBS continually strive to be at the forefront of industry best practices in an effort to better serve our customers.

Excellence in Coordination and Teamwork

From the moment of sale and until completion of the contract, the MBS technical order management support staff are available to attend to all your needs and to ensure detailed coordination in order to successfully erect all buildings according to the procedures and practices recommended by MBS.

On a daily basis, the Order Management department coordinates between sales, engineering, production and the customer. In addition, weekly coordination meetings are held, in which all department heads meet, to track the latest developments on each and every project.

Strength in Delivery

The MBS manufacturing facility is located in the Hamriyah Free Zone, making it ideal for deliveries in the UAE and anywhere in the world.

All materials loaded for delivery are part-marked and cross referenced for easy and accurate identification. Materials are loaded according to the site requirements as defined by the erection sequence. All materials are delivered on specially designed fork lift racks to facilitate the unloading of materials on site and to streamline the erection process from the start.

Efficiency in Production

At MBS, we have a fully equipped, state of the art production facility, operated by skilled and experienced personnel. The manufacturing process is streamlined to ensure that each and every building is complete and ready for on-time delivery.

Quality in Production

The MBS Quality Control team is trained and qualified in using the latest equipment and methods to ensure the consistent quality standards enforced by world renowned organizations, such as the American Welders Society (AWS), British Standards Institution (BSI) and the American Society for Testing and Materials (ASTM). Quality control at MBS starts with receiving raw material, where every batch of steel is tested for both physical as well as chemical properties, in order to always ensure consistent high quality. MBS also enforces quality control checks at every workstation in the production cycle, ensuring that only the highest quality products make it to the final stages of the production process.

Metal buildings date back to the late 18th century when the British constructed frames of mills and agricultural structures from metal in an effort to find strong, durable, fire-resistant and non-combustible construction material.

As the market started demanding customized buildings and what was once acceptable as prefabricated, now had to be pre-engineered in order to customize the structure to suit the customer's needs. PEB's are accurately engineered in a way that the structure as a whole works as a single unit. A pre-engineered steel building (PEB), is the most advanced metal building system available in the market.

Pre-Engineered Steel Buildings (PEB)

The main components of a PEB are built up at the plant according to the carefully engineered design according to the customer's needs. There are 3 main components:

Primary built up members

- Columns: vertical members from the ground up
- Rafters: horizontal members connecting the top of the columns

Secondary members:

- longitudinal members running along the length of the building, connecting to the main frame
- cold formed "Z" and "C" shaped purlins and girts

Sheeting:

- the outside covering of the building

MBS delivers uncompromising quality in the growing market demand for PEB's, which are widely used around the world. The advantages of pre-engineered buildings (PEB) include:

- One source for the total building solution
- Guaranteed 6 – 8 weeks production time
- Lower cost due to efficient design and lighter structure
- Higher quality achieved due to controlled production environment
- Longer clear span options (without interior columns)
- Low maintenance requirements
- Quick turnkey construction
- Effectively zero construction waste
- Highly energy efficient and recyclable

MBS produces a wide range of steel buildings, including:

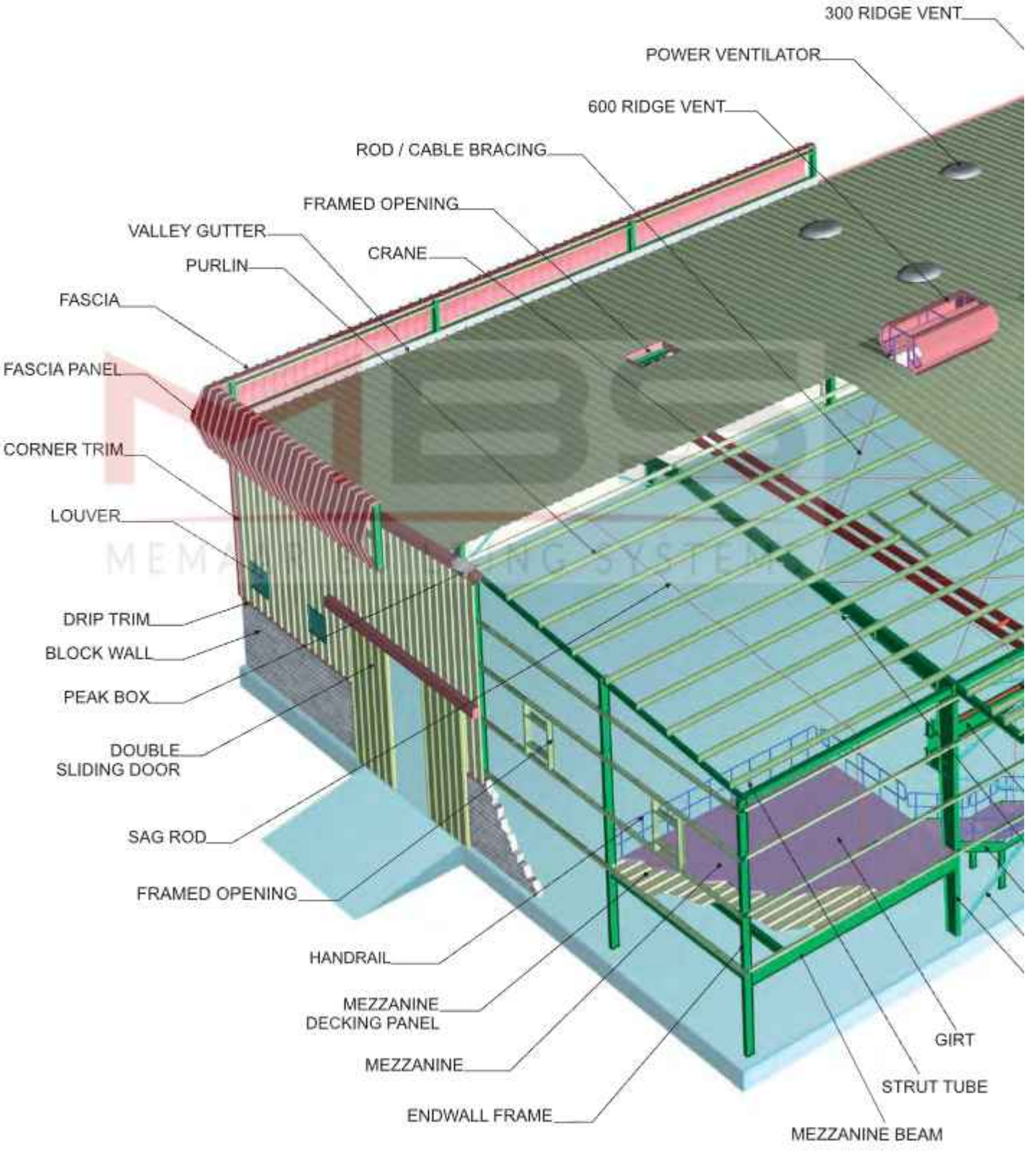
- Warehouses
- Showrooms
- Shopping centers
- Supermarkets
- Distribution centers
- Exhibition halls
- Factory buildings
- Aircraft hangars
- Cold storage
- Labor camps
- Parks and sports centers
- Office buildings
- Residential buildings
- Multi-story buildings

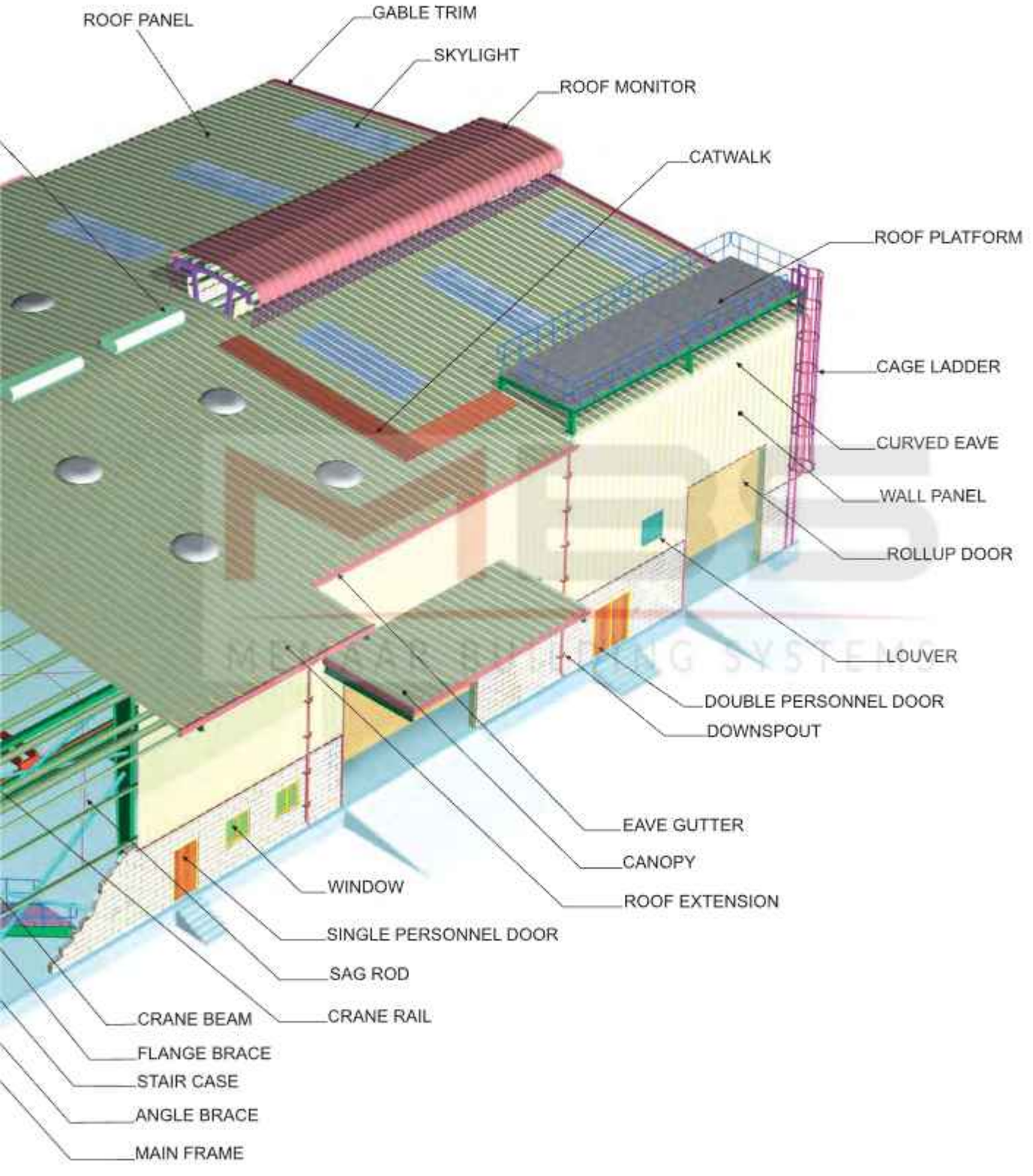
Other Steel Structures

The structural steel division at MBS has the capability and capacity to supply structural steel buildings for selected types of projects, including (but not limited to):

- Desalination plants
- Power plants
- Steel mills
- High rise buildings
- Bridge girders
- Office buildings
- Factory buildings
- Water towers
- Steel platforms

ILLUSTRATION OF MAJOR PEB ELEMENTS





The standard MBS pre-engineered steel building consists of columns, rafters, bracing, connection clips, roof purlins, and wall girts, roof and wall sheeting, anchor bolts, flashing, and trims. All MBS buildings are manufactured using materials that are new and free from defect, as assured by the Quality Control department.

The main building structure comprises of a single or multiple gable, interior rigid frames and either rigid or bearing frames at the end-walls.

Building length: the distance between the outside flanges of both end-wall girts. It is advisable to keep all bay lengths equal, however if this is not possible, then the interior bays can be equal and the end bays can be equal. Building length does not include the width of the end wall lean-to buildings or roof extensions.

Building width: the distance from the outside of the eave strut of one sidewall to the outside of the eave strut of the facing wall. As the optimum spacing for (roof) purlins is 1.5 meters, it is advisable to make the building width a multiple of 3 meters. 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 end wall) steel line of the main building to which the lean-to is attached.

End bay length: is the distance from the outside of the outer flange of the end wall girts to the center line of the first interior frame.

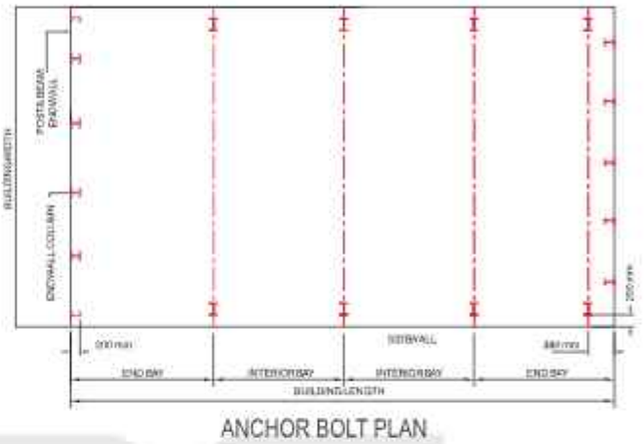
Interior bay length: measured as the distance between the center lines of two adjacent interior main frame columns, typically of the length 6 meters, 7.5 meters, up to 9 meters, longer lengths can also be designed.

Building eave height: is the distance from the finished floor level (FFL) to the top of the eave strut at the sidewall steel line (up to a height of 30 meters). In the case of columns that are recessed or elevated from the FFL, the eave height is the distance from the finished floor to the top of the eave strut.
Building clear height is the distance between the finished floor level (FFL) to the bottom of the end plate of the rafter at the knee.

Roof slope: the angle which the roof forms with respect to the horizontal, are typically 0.5 or 1.0 units of vertical rise to 10 units of horizontal run (other slopes are available upon request).

The side wall steel line: is the plane of the inside vertical surface of the sidewall sheeting. It is also the plane of the outside vertical surface of the eave strut.

The end wall steel line: is the plane of the inside vertical surface of the end wall sheeting. It is also the plane of the outside vertical surface of the outer flange of the end wall girt.



ANCHOR BOLT PLAN

Standard Structural Framing Systems

Clear Span (CS): buildings have a gable roof with vertical sidewalls and end walls. Interior bay frames are clear span rigid frames (without interior columns).

Multi Span (MS): buildings have a gable roof with vertical sidewalls and end walls. Interior bay frames are rigid frames normally with tapered exterior columns and rafters and constant depth interior columns. The designation MS-1 implies one interior column, MS-2 implies two interior columns, and so on.

Space Saver (SV): buildings have gable roof with vertical sidewalls and end walls. Interior bay frames are clear span rigid frames with constant depth columns and tapered rafters typically with horizontal bottom flanges.

Lean-To (LT): buildings consist of outer sidewall columns supporting simple span rafters attached to the sidewall columns or the end wall posts of the main building. Lean-to columns are normally of constant depth while lean-to rafters may be tapered or constant depth.

Multi Gable (MG): buildings have a roof with 2 or more gables, vertical sidewalls and vertical end walls. Interior bay frames are rigid frames typically with tapered exterior columns and rafters and constant depth interior columns.

CLEAR SPAN (CS)

MONO SLOPE

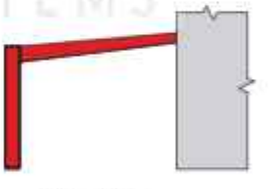
ROOF SYSTEM (RS)

MULTISPAN "1" (MS-1)
(1 Interior Column)

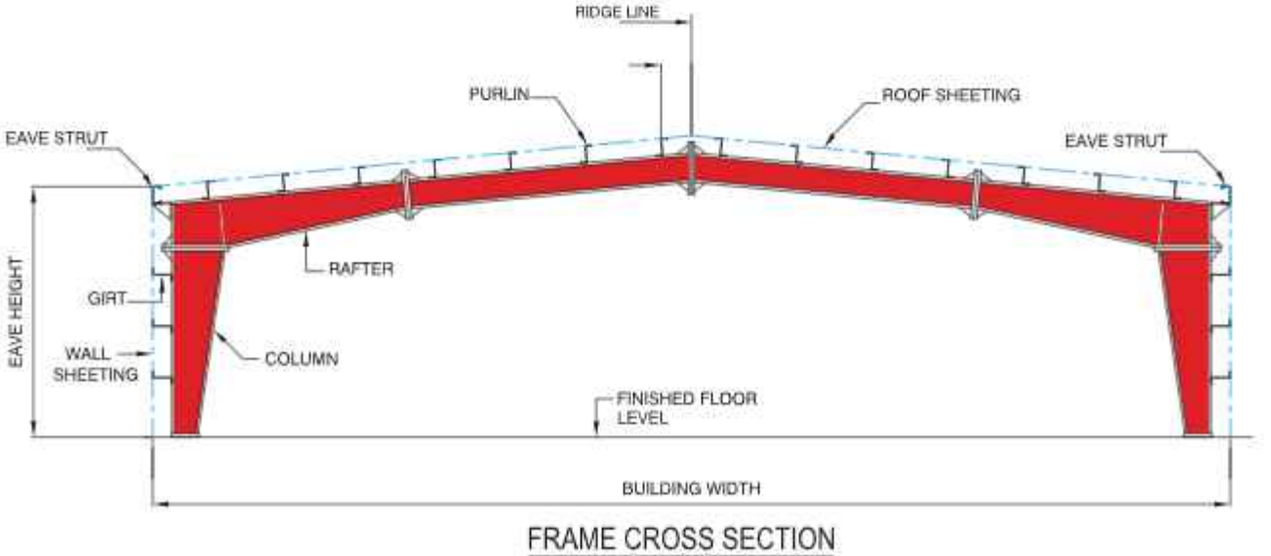
MULTISPAN "2" (MS-2)
(2 Interior Columns)

MULTISPAN "3" (MS-3)
(3 Interior Columns)

MULTIGABLE "1" (MG-1)
(1 Interior Column)



LEAN - TO (LT)



FRAME CROSS SECTION

Standard Framing Features

Rigid frames: are constructed from both tapered or constant depth columns and rafters. In Clear Span (CS) and Multi Span (MS) buildings, rigid frames are most commonly spaced from 6 meters to 10 meters apart (center line to center line). Outside flanges of CS and MS rigid frame columns are inset at 200mm from the sidewall steel line to allow for bypass girts. While outside flanges of the Space Saver (SV) rigid frame columns are placed flush with the sidewall steel line. The top flanges of all rigid frame rafters are positioned 200mm below the bottom of the roof sheeting.

End frames: are load bearing frames with end wall girts flush framed into the webs of the end wall posts, this is done so that the outer flanges of the girts are in the same vertical plane as the outer flanges of the posts. Optional rigid frames may be used at the building ends, with the center line of the end wall rigid frame placed at 380mm from the end wall steel line.

End wall posts: are typically spaced at 6 meters apart. Depending on the width of the building and end wall openings, other spacing may also be used. When the building width is not evenly divisible by 6 meters, the interior spacing of the end wall posts is set at 6 meters with 2 equal end spacing's either shorter than or longer than 6 meters.

Building Components

Columns and rafters of rigid frames are tapered built up "I" sections. While interior columns of multi span frames may be either built up "I" sections (typically of constant depth) or tubular sections.

All rigid frame connections are bolted with columns and rafters provided with welded endplates for the anchoring of foundations and for member to member attachment.

Pre-punched holes and angle clips are provided for attachment of purlins, girts, bracing and other components.

Bearing end frames may be constructed from cold formed channels, hot rolled sections or built up welded plate sections, depending on the engineered requirements.

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

Eave purlins: are pre-punched cold formed "C" and "Z" shaped sections, 200mm in depth with 60mm stiffened flanges. The eave purlin serves as a longitudinal structural bracing member in addition to acting as a transition point for wall and roof sheeting.

Panels (roof and wall): are roll formed for the maximum practical length (normally 9 meters) to minimize end laps in the field.

The standard roof and wall panel is the M45-250 profile. It is a roll formed panel with 5 high ribs and 4 minor ribs. The panel covers a width of 1 meter with a hem on the top lapping side to provide a straight edge at the side lap.

Roof panels have a minimum end lap of 150mm over purlins and are fully protected from siphon action by side lap and end lap mastic. Wall panels have the same side lapping as roof panels, with no side lap or end lap mastic required.

Profiled ridge panels are provided at the ridge of all buildings.

Eave gutters: are supplied in lengths of 4.3 meters and have a profiled cross section that is 170mm wide and 165mm high.

Downspouts for eave gutters: are supplied in lengths up to 6 meters and have a rectanguler cross section that is 100mm by 70mm.

Valley gutters: are supplied in lengths of 5.5 meters and are available in 2 standard types. Type 1 is 370mm wide and 190mm high. Type 2 is 400mm wide and 190mm high.

Downspouts for valley gutters: in multi gable (MG) buildings are PVC pipes, supplied in 3 diameters: 100mm, 150mm and 200mm (inside). PVC outlets connecting the valley gutter to the downspouts are also supplied.

Diagonal bracing: that provides longitudinal stability against wind, seismic or other forces is attached to the web of the rigid frame, near the outer flange of columns and rafters. The standard diagonal bracing is made of galvanized cable strand. Solid bars and hot rolled angles may be used as required by design.

Flange braces: in the form of angles are provided to stabilize the interior flange of rigid frame rafters and columns at certain purlin and girt locations.

Base angles: are a light gauge bent plate, provided in fully sheeted walls to attach the wall panel to the concrete slab.

Design Codes

MBS designs and manufactures in accordance with the codes and guidelines of the AISC, AISI, AWS and MBMA manual. For the specific edition of each institutes codes used for a specific MBS building, please refer to the section marked "Applicable Codes" in the MBS proposal offer.

Frame members (hot rolled or built up) are designed in accordance with the American Institute of Steel Construction (AISC): Steel Construction manual.

Cold formed members are designed in accordance with the American Iron and Steel Institute (AISI): Cold Formed Steel Design Manual.

All welding is done in accordance with the American Welding Society (AWS): Structural Welding Code for Steel. All MBS welders are qualified and certified for the type of welds performed.

Manufacturing dimensional tolerances are in accordance with the requirements of the Metal Building Manufacturers Association (MBMA) of the USA: Metal Building Systems Manual.

MBS also accommodates other codes when specified.

Loads

All MBS buildings are designed to withstand the dead load (DL) of the structure plus a specified live load (LL) and wind load (WL).

The standard design of an MBS building is based on a live load of 0.57 kN/m² and a wind speed of 130 km/hr. Higher live loads and wind speeds are used in the design, only when specified by a customer. For the exact live load and wind speed, according to which an MBS building is designed, please refer to the section marked "Building Description" in the MBS proposal offer.

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

Where a snow load is specified, the higher value of either the snow load (in lieu of the live load) or the live load is used for load combinations, to ensure the stability of the structure. Snow loads and live loads are not cumulative and therefore are not combined.

MBS load combinations used in the design of buildings are in accordance with the requirements of the "Metal Building Systems Manual" published by the MBMA.

3D Design

Projects are designed in 3D, which result in more accurate designs and reduced engineering errors, and are also a valuable tool with complex projects allowing the customer to easily visualize the complete building.

MATERIAL SPECIFICATIONS

Structural Members: Built up sections (primary members) are fabricated from hot rolled steel plates, conforming to ASTM A 572M Grade 345 or equivalent, with a minimum yield strength of 345 N/mm² (50ksi). Flanges are welded to the web by a continuous single side fillet weld, through an automatic submerged arc welding process. Primary members are factory painted with 50 microns (DFT) of red oxide primer as the MBS standard, also any other paint system or hot dip galvanizing system can be accommodated as per the customer's requirements.

Hot rolled sections are mill produced according to the following specifications:

- Tube: ASTM A 500 Grade B (Fy = 317 N/mm²)
- I-section: EN 10025 S355JR (Fy = 345 N/mm²)
- Channel: EN 10025 S355JR (Fy = 345 N/mm²)

Secondary members (purlins, girts, eave struts, base angles and gable angles): are cold formed from galvanized steel coils ranging in thickness from 1.5mm to 2.5mm for "Z" shapes, and in 1.5mm to 2.5mm for "C" shapes (lipped channels). The 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 340 N/mm². Base and gable angles are 50mm x 125mm x 1.5mm and supplied in lengths of 3 meters.

Cable bracing: comes in 12mm diameter strands in accordance with ASTM A 475 with a breaking load of 120kN.

Bracing rods: are solid plain round steel bars, conforming to ASTM A36 Grade or equivalent, with a minimum yield strength of 250 N/mm².

Sag rods: used to brace purlins and girts in bays longer than 8.5 meters or in buildings with slopes larger than 1.5 to 10, are 12mm or 16mm solid round steel bars conforming to ASTM A 36 or equivalent with a minimum yield strength of 250 N/mm².

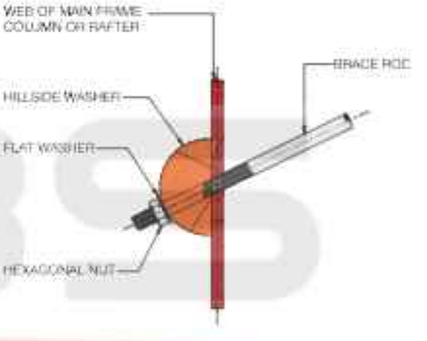
Flange braces: are used to stabilize the inner flanges of the main frame columns and rafters and are typically 40mm x 40mm x 4mm steel angles conforming to ASTM A 572M or equivalent, with a minimum yield strength of 345 N/mm² (50ksi).

TYPICAL RAFTER

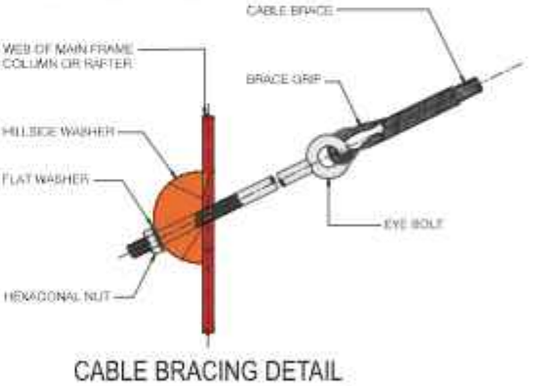
TYPICAL COLUMN

TYPICAL "Z" SECTION

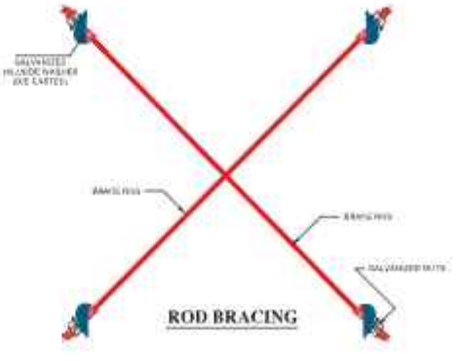
TYPICAL "C" SECTION



ROD BRACING DETAIL



CABLE BRACING DETAIL



ROD BRACING

Single Skin Panels (Sheeting)

Metal panels (for sheeting) are one of the most attractive features of a metal building system. The term panel refers to the metal sheets used for roof and wall, interior roof and wall liners, partition panels, fascia panels, and soffit panels. The single skin profiled sheet is ideal for agricultural, commercial and industrial buildings. These profiles are available with design flexibility to suit your design requirements and also can be used as wall and roof panels. The profiles are available in 2 different types M45-250 and M45-150, and are either steel or aluminum.

Steel panels: standard stocked steel panels conform to ASTM A792, Grade 340 Class 1. The protective steel coating shall be an aluminum zinc alloy comprised of 55% aluminum and 45% zinc, weighing 150 grams/m^2, applied on both sides.

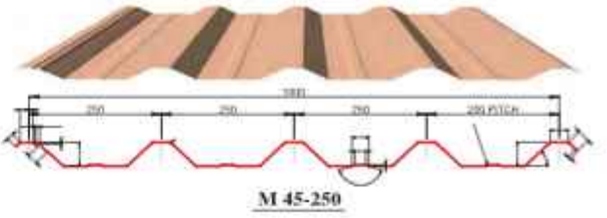
The aluminum zinc alloy coating offers roughly 4 times more corrosion resistance compared to the galvanized alternative. Pre-painted Aluzinc coated steel come with a 5 micron primer paint coat and a 20+ micron polyester paint coat applied at the mill on the exterior face; and a 5 – 7 micron polyurethane compatible epoxy primer in RAL 7035 (light gray) color on the interior face.

Aluminum panels: standard stocked aluminum panels are made from alloy AA3105, temper H46 for mill finish and for pre-painted panels. Pre-painted aluminum comes with a 5 micron primer paint and 18+ micron polyester paint applied at the mill on the exterior face. The polyester paint is made of a polymer that is equal or superior to silicon polyester. The interior face is coated with a 5 – 7 micron polyurethane compatible epoxy primer in an RAL 7035 (light gray) color.

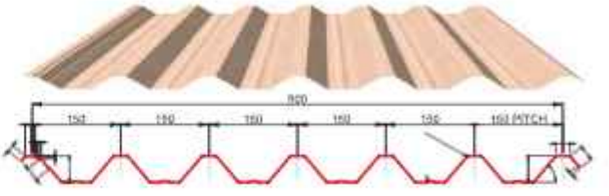
Standard roof panels are made from Aluzinc coated steel or mill finish aluminum. Pre-painted roof panels are optional. Roof panels are roll formed from either:

- 0.5mm thick cold rolled steel, coated with an aluminum and zinc alloy (Aluzinc). The material conforms to ASTM A 792M Grade 340 class 1, with zinc coating AZM150 or equivalent, with a minimum yield strength of 340 n/mm^2. The coating is achieved through a hot dip process in a solution containing 55% aluminum and 45% zinc alloy.

- 0.7mm thick cold rolled aluminum according to alloy AA3105 with temper H46 for mill finish and pre-painted. The yield strength is a minimum of 145 N/mm^2.



M 45-250



M 45-150

Standard wall panels and interior liner panels are made from either Aluzinc coated steel or aluminum, both of which are pre-painted at the mill.

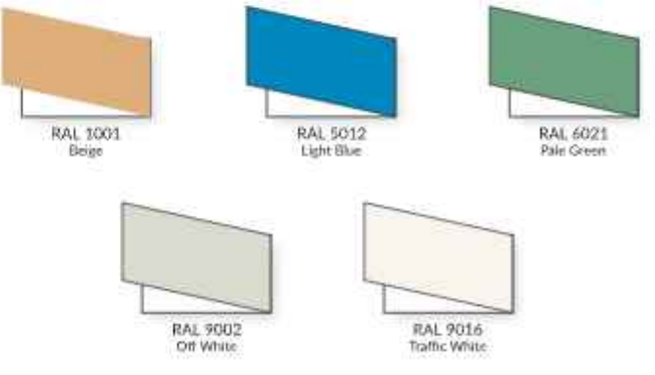
- Aluzinc coated steel, paint finish thickness is 25 microns of super polyester on the exterior face and 5 – 7 microns of epoxy primer on the interior face in RAL 7035 (light gray) color.

- Aluminum, paint finish is 23 microns +/- 5 microns of high performance polymer (equal to or superior to silicone polyester) on the exterior face, and 5 – 7 microns of epoxy primer on the interior face in RAL 7035 (light gray) color.

Standard colors for pre-painted panels, both Aluzinc coated steel and aluminum, include: RAL 9002 (off-white), RAL 1001 (Beige), RAL 5012 (light blue), RAL 6021 (pale green) and RAL 9016 (traffic white).

Roof and wall panels may be upgraded to a higher thickness and/or a higher exterior paint system, such as PVF2, this is subject to an extended delivery period.

Standard Colors:



MATERIAL SPECIFICATIONS

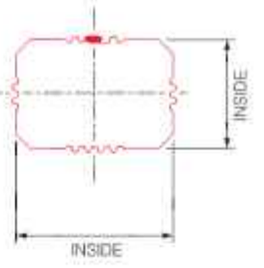
Trims and Gutters

Wall flashing: and trims (gable, corner, framed opening, accessories, etc.) are made from the same material (color and finish) as the wall panels.

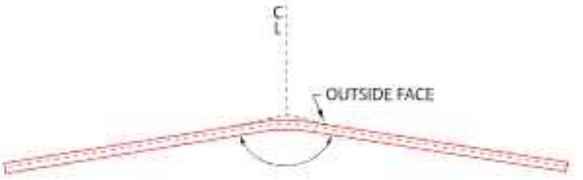
Roof flashing: and trims (parapet, flashing, transition trims, expansion joint trims, ridge caps, etc.) are made from the same material (color and finish) as the roof panels.

Eave gutters: and down spouts are made from the same material as wall panels.

Valley gutters: (used in parapet fascia and valley conditions) are made from a 1.0mm thick steel conforming to ASTM A1046M Grade 340, with metallic coating ZMM 120 designation (120 g/m^2), and with a minimum yield strength of 340 N/mm^2.



STD. DOWN SPOUT



RIDGE PANEL

STD. EAVE GUTTER | STD. VALLEY GUTTER | EAVE GUTTER

STD. OUTSIDE CORNER TRIM
AT INTERSECTION OF ENDWALL & SIDEWALL

STD. EAVE TRIM
AT SIDEWALL WITH EAVE GUTTER

STD. DRIP TRIM
FOR PARTIALLY OPEN WALLS

STD. EXPANSION JOINT TRIM

STD. HOOD TRIM
FOR SLIDING DOOR

STD. PANEL END CLOSURE TRIM
AT FRAMED OPENING

STD. GABLE TRIM
AT END WALL

STD. OUTSIDE CORNER TRIM
AT INTERSECTION OF ENDWALL & SIDEWALL

Bolts

High strength bolts: are hot dip galvanized and conform to ASTM A325M Type 1 or equivalent. These bolts are used to connect primary and secondary members.

Anchor bolts: are manufactured from rods conforming to ASTM F1554 Grade 36 or equivalent, with a minimum yield strength of 250 N/mm^2 and an ultimate tensile strength of 400 N/mm^2.

Fasteners

Roof and wall fasteners: (used to attach panels to purlins, girts, etc.) are self-drilling fasteners with a thread diameter of 5.5mm. The head is hexagonal (8mm), preassembled to a 19mm diameter washer that is bonded to a 3mm thick EPDM seal.

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

For Aluzinc coated steel panels, the fasteners are manufactured from high grade carbon steel with the surface protected by a zinc based coating of 8 microns.

For aluminum panels the fasteners head and stud are manufactured from stainless steel, whereas the drill bit is made of hardened carbon steel.

Pop rivets: are 4.0mm in diameter and made from Stainless Steel. They are used in gutter splicing, fixing trim to trim or trim to panel and fastening accessories to roof or wall panels.

Surface and Paint (Shop Primer): Primary members are sweep blasted, cleaned and painted with a red oxide alkyd primer, to a dry film thickness (DFT) of 50 microns. Shop primer is intended to provide temporary protection against weathering during transport and erection. It is not intended to provide permanent corrosion protection, especially in the case of exposed steel.

Secondary members are pre-galvanized.

Shot blasting to SA 2.5 and special paint systems can be provided upon request, as an upgrade option.

Miscellaneous Items

Skylights and wall lights: are made from 1.5mm thick translucent white, acrylic modified, ultra violet stabilized fiberglass. Translucent panels weigh 2.4 kg/m^2 and provide the same coverage as the panel width with a maximum length of 3.85 meters.

The profile of translucent panels match that of the adjoining roof and wall panels to ensure that weather resistant tightness is achieved through the same lapping technique used for the other panels. The translucent panels meet the light transmission value of 80%.

Foam closures: match the panel profile and made from expanded polyurethane or similar material.

Bead mastic: is a butyl rubber based sealant and supplied in rolls on silicon release paper.

Flow-able mastic (caulking sealant): is a neutral silicone 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.

Anchor Bolts

Bolts with Nuts & Washers

Roof Extensions: Sidewall roof extensions extend beyond the defined building width and are generally a continuation of the main building roof slope.

End wall roof extensions extend beyond the defined building length and are constructed by extending the end bay purlins and eave struts of the main building past the end wall rafter.

Standard widths for roof extensions range from 0.9 meters to 1.5 meters. Wider roof extensions are possible but may require heavier or additional framing.

Soffit panels for roof extensions are optional.

Main building gutters are normally relocated to the edge of the roof extensions and gutter drainage by downspout is located at the building sidewall.

Canopies: Sidewall canopies are cantilevered rafters attached to the sidewall columns at any point below the eave and support 200mm deep by-pass "Z" purlins supporting the canopy roof panels.

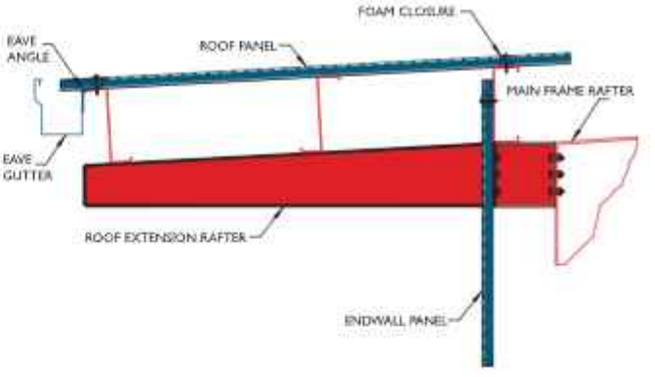
End wall canopies are cantilevered rafters attached to the end wall posts below the roof line and support 200mm deep by-pass "Z" purlins supporting the canopy roof panels.

Optional canopy soffits conceal only the canopy purlins, leaving the rafters exposed, unless otherwise specified.

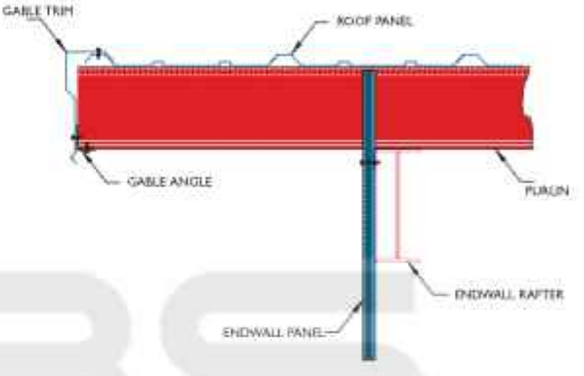
The roof panels of the canopies match the specifications of the main building roof panels, unless otherwise specified.

Typical canopy widths range from 1.5 meters to 3.0 meters. Wider canopies are possible but require heavier sidewall columns or end wall posts.

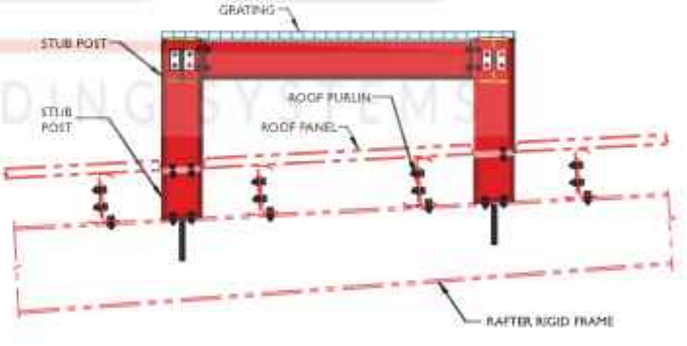
The length of a canopy is ideally a multiple of bay lengths of the sidewall or a multiple of column spacing of the end wall.



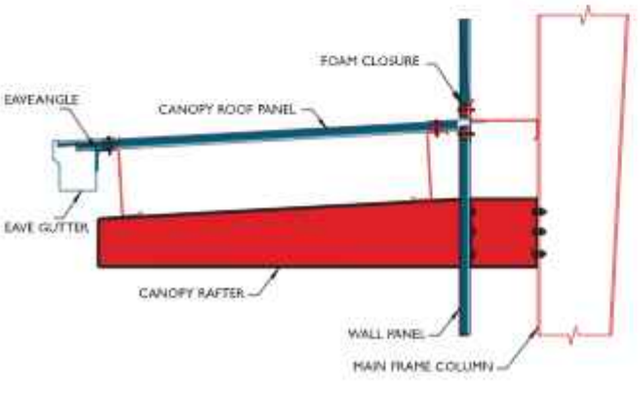
SIDEWALL ROOF EXTENSION



ENDWALL ROOF EXTENSION



ROOF PLATFORM



CANOPY

Fascia and Parapets: Vertical fascia consist of 200mm deep vertical posts, supported by brackets from sidewall columns or end wall posts. Cold formed 200mm deep "C" section, top and bottom girts are flush framed to the vertical fascia posts. An intermediate "C" girt positioned vertically is supplied to support a valley gutter, if required.

Standard vertical fascia protrude 600mm from the building sidewall or end wall steel lines. Protrusions exceeding 600mm are possible but may require heavier sidewall columns and/or end wall posts. The height of the fascia varies depending on actual requirements, with typical heights ranging from 1.0 meters to 1.6 meters.

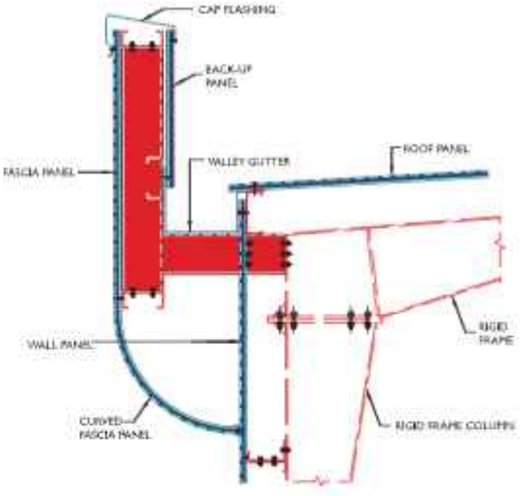
Fascia sheeting is designed to match the specifications of the sidewall panel, unless otherwise specified. Soffit panels and back up panels are provided only when specified.

Curve line fascia are of the same type of construction as vertical fascia, except they are sheeted with curved profiled panels and are available in 3 types:

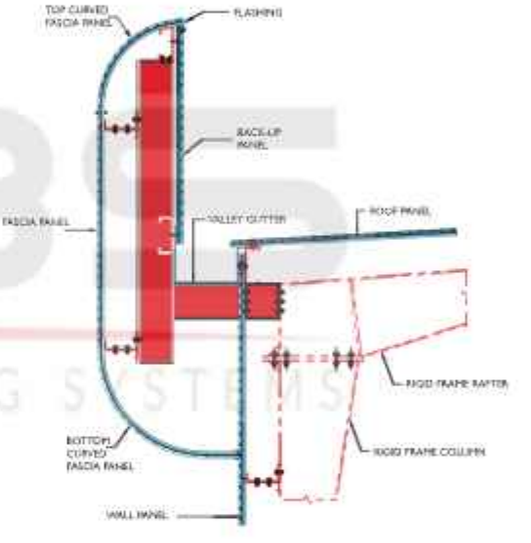
- Bottom curved fascia, with a curved panel only at the bottom of the fascia.
- Top and bottom curved fascia, with a curved panel at the top and bottom of the fascia.
- Center curved fascia, with a panel curved at mid height of the fascia

A parapet fascia is an extension of the sidewall and end wall above the roof line. The wall sheeting of the building will continue to the top of the parapet.

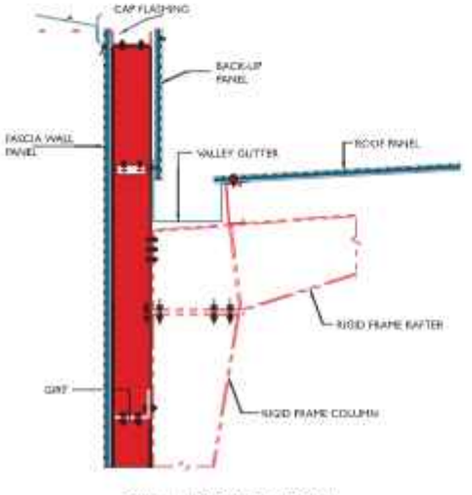
Standard eave gutters and downspouts are used in buildings with sidewall vertical fascia. Valley gutters are used in buildings with sidewall parapet fascia.



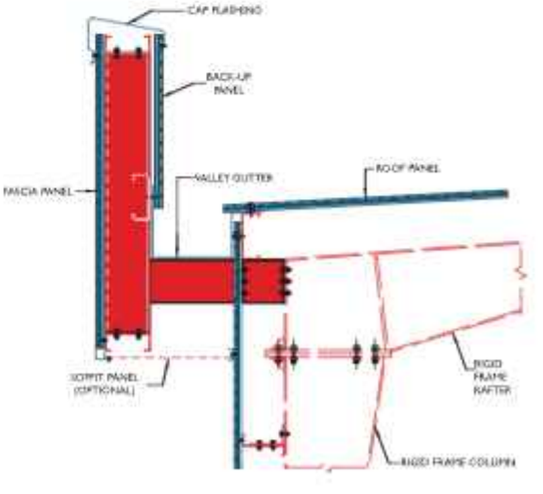
BOTTOM CURVED FASCIA



TOP & BOTTOM CURVED FASCIA



PARAPET FASCIA



VERTICAL FASCIA WITH BACKUP PANEL & VALLEY GUTTER

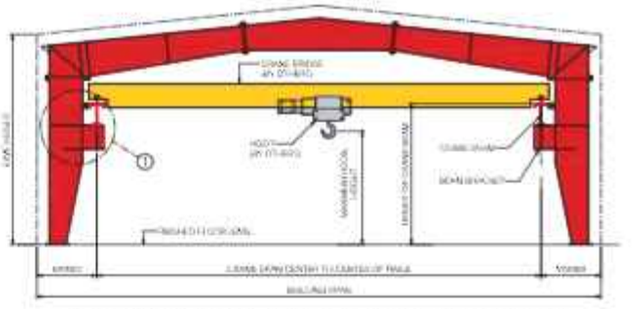
Crane System: Two out of every five metal building systems are constructed for manufacturing facilities where cranes are needed for material handling.

MBS buildings can be designed to support any required crane system. Overhead traveling cranes, up to 15 metric tons are supported on brackets, while higher capacities are typically supported by an independent support system.

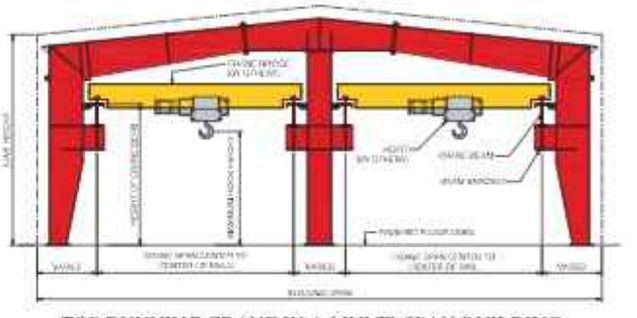
A building crane is a complex structural system which consists of the crane with the trolley and hoist, crane rails with their fastenings, crane runway beams, structural supports, stops and bumpers.

We require the customers complete crane system information in order to design and estimate buildings with cranes. The estimate for adding a crane system to a metal building consists of:

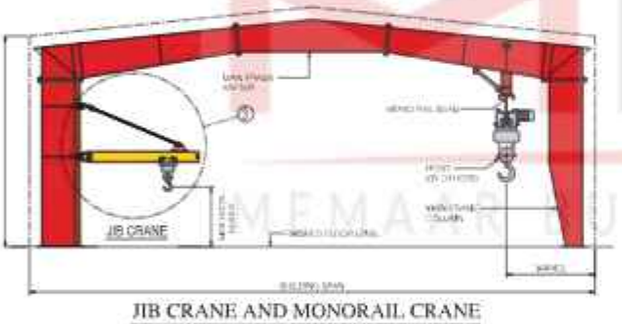
- Strengthening the buildings main frames to support the crane load
- Supplying the crane brackets and crane runway beams that support the crane system



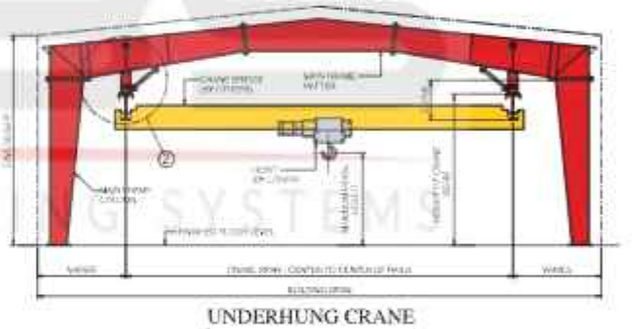
TOP RUNNING CRANE IN A CLEAR SPAN BUILDING



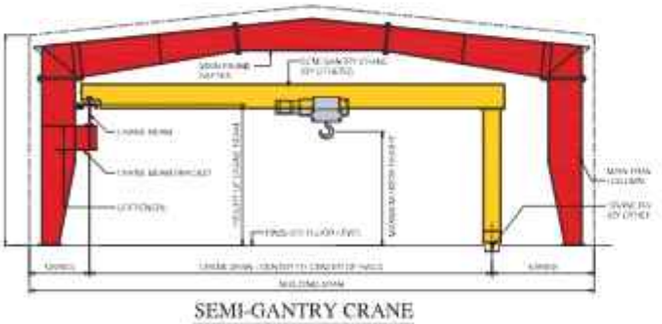
TOP RUNNING CRANE IN A MULTI-SPAN BUILDING



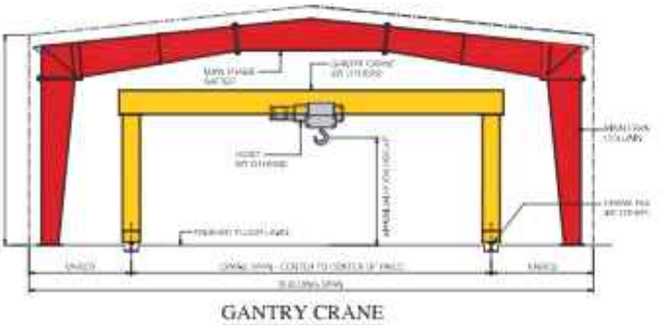
JIB CRANE AND MONORAIL CRANE



UNDERHUNG CRANE



SEMI-GANTRY CRANE



GANTRY CRANE

Mezzanine Systems: A mezzanine system normally includes mezzanine columns, beams, joists, and deck and trimmer angles. The mezzanine columns are normally placed along the frame line. They support the mezzanine beams, which in turn support the mezzanine joists. The mezzanine joists are normally placed parallel to the roof purlins. Joist spacing varies depending on the joist length and applied loads.

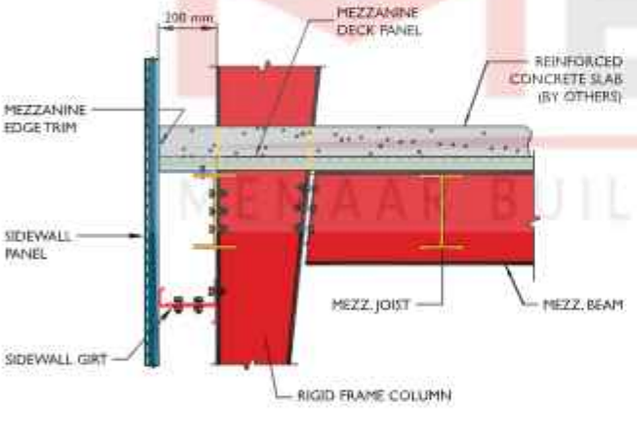
The mezzanine columns, beams and joists are designed to withstand the mezzanine live load, the weight of 100mm thick reinforced concrete slabs and the weight of the deck. Additional dead loads and collateral loads, if present, must be communicated to MBS in order to be considered in the mezzanine design.

The mezzanine deck is roll formed from 0.7mm thick, galvanized steel coil, conforming to ASTM A653M Grade 340 or equivalent, with zinc coating to Z180, with a minimum yield strength of 340 N/mm^2 (50ksi).

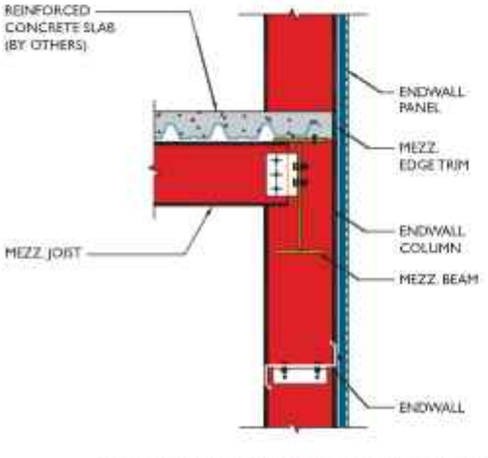
The concrete slab requires structural reinforcement to support its own weight, in addition to other dead loads, live loads and collateral loads. Please note that MBS does not provide slab designs.

Mezzanine deck fasteners are 5.5mm in diameter, self-drilling screws with a hexagonal head, but without a sealing washer.

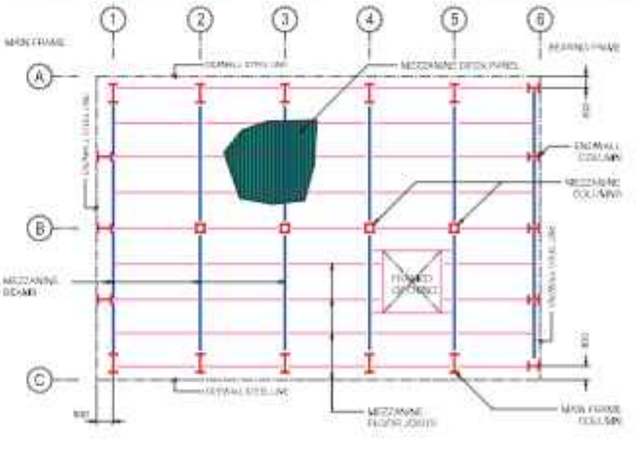
Staircase with handrails are offered as an option, in a knocked down condition, for field assembly. Staircases may be single or double flight and with or without an intermediate landing.



MEZZ. BEAM CONNECTION TO RIGID FRAME COLUMN



JOIST TO BEAM CONNECTION @ END WALL



MEZZANINE PLAN

SANDWICH PANELS

MBS offers insulated panels with an excellent slip joint connection for structural strength and weather tightness. The profiles shown below can be used as an inner skin for roof and wall panels and as partition panels.

The inner profiles are available in four different types:

- Micro ribbed
- Stripped
- Microwave
- Flat

Rigid polyurethane (PUR) and polyisocyanurate (PIR) foam, sandwiched by metal or flexible facings is increasingly successful in meeting the requirements of the construction industry, with an emphasis on cost effective building systems and conservation. Some popular applications include industrial and commercial buildings, as well as the food supply sector (cold storage, refrigerated transport, etc.).

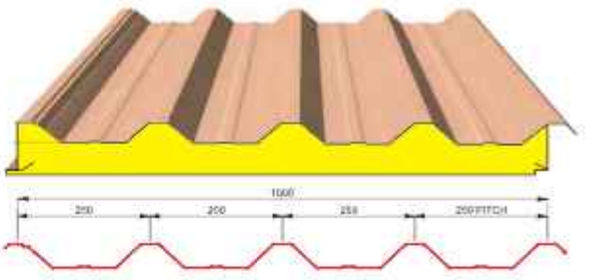
Rigid PUR insulation products are made by reacting a liquid polyol component with a liquid polymeric isocyanate component, methylene diphenyl di-isocyanate (MDI), in the presence of a blowing agent and other additives, the result is a highly efficient insulation product.

While rigid PIR is produced using an excess of the MDI component, in the presence of an appropriate catalyst the excess MDI reacts with itself to form isocyanurate, resulting in greater heat stability. PIR insulation products have increased fire performance and reduced combustibility and a higher working temperature limit compared to PUR. When incorporated into building products, PIR panels meet some of the most demanding fire performance requirements.

Sandwich panels offer a wide range of desirable properties, which can be seen from the increasing demand of this unparalleled construction product. Some of these properties include:

- Thermal insulation
- Impact resistance and stability
- Fire retardant
- Light weight and space saving
- Low maintenance and long life
- Fast delivery (due to automated manufacturing)
- Long length and wide spans (rapid and simple erection)
- Environmentally friendly (CFC and HCFC free)

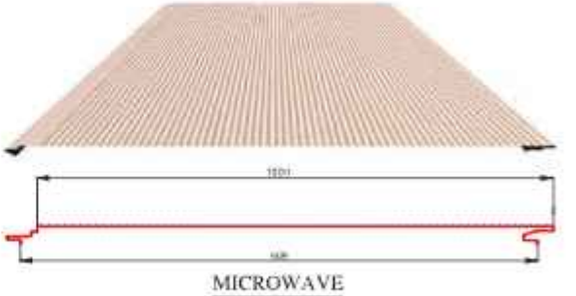
MBS produces sandwich panels in 6 thicknesses 35 mm, 50 mm, 75 mm, 100 mm, 125 mm and 150 mm. while the top and bottom profiles can be manufactured from variable selections such as the M45-250, M45-150, Microwave, Micro Ribbed, Stripped and Flat.



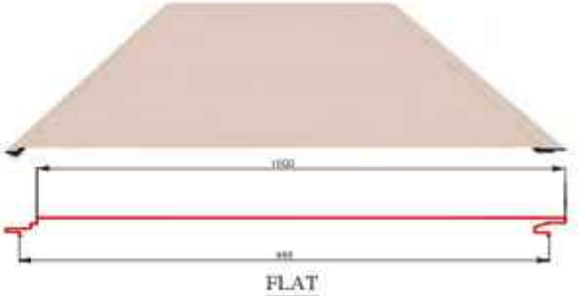
Sandwich Panels Cross Section
Available Thickness 35mm, 50mm, 75mm, 100mm 125mm & 150mm

MICRO RIBBED

STRIPPED



MICROWAVE



FLAT

Material Options for Single Skin Panels and Sandwich Panels

Options for Exterior Skin

Profile	Covering width (mm)	Standard Stock Material and Colors					
Roof Panels		**AluZinc Coated Steel and Aluminium**					
M 45-250	1000	Mill Finish	RAL 1001 (Beige)	RAL 5012 (Light Blue)	RAL 6021 (Pale Green)	RAL 9002 (Off White)	RAL 9016 (Traffic White)
M 45-150	900						
Wall Panels							
M 45-250	1000						
M 45-150	900						
Micro Ribbed	1000						
Stripped	1000						
Microwave	1000						
Flat	1000						

Options for Interior Skin

Profile	Covering width (mm)	Standard Stock Material and Colors		
Roof an Wall Panels		**AluZinc Coated Steel**	**Aluminum**	**GI**
Flat	1000	RAL 9002 (Off White)		Galvanized
Stripped		**Available in Stock for Flat Interior Skins**		
Microwave		Aluminum Foil	100 g/m²	Metallic
Micro Ribbed				

*Non-standard material can be supplied on request.

Sandwich Panel Thermal Properties (PIR and PUR)

Table of Thermal properties derived, in accordance with BS EN 12939

Panel Profile	Sandwich Panel Nominal Thickness (mm)	Thermal Conductivity K-Value (W/m.K)	Thermal Resistance R-Value (m^2 °K/W)	Thermal Transmission U-Value (W/m^2 °K)
45-250	35	0.0210	2.362	0.423
45-250	50	0.0210	3.076	0.325
45-250	75	0.0210	4.267	0.234
45-250	100	0.0210	5.457	0.183
45-250	125	0.0210	6.648	0.150
45-250	150	0.0210	7.838	0.128
45-150	35	0.0210	2.543	0.393
45-150	50	0.0210	3.257	0.307
45-150	75	0.0210	4.448	0.225
45-150	100	0.0210	5.638	0.177
45-150	125	0.0210	6.829	0.146
45-150	150	0.0210	8.019	0.125
Flat	50	0.0210	2.381	0.420
Flat	75	0.0210	3.571	0.280
Flat	100	0.0210	4.762	0.210

SANDWICH PANELS

Certificates and Approvals: MBS sandwich panels comply with the Ecosafe E (PUR) and Ecosafe E Plus (PIR) rules for certification of factory made rigid polyurethane foam as well as polyisocyanurate foam. Also, in accordance with UKAS accreditation to ISO 17065 Certification, MBS is certified for "Ecosafe E Plus Polyisocyanurate (PIR) Sandwich Panel" by Thomas Bell-Wright and complies with Product Certification Scheme SD03 Exterior Wall Assemblies, Cladding, Curtain Walls, Building Materials, Products and Assemblies.

All requirements set up by the Dubai Central Laboratory (DCL) and Dubai Municipality (DM), for heat transmission (U-value) for roof and wall panels, the compressive strength and the reaction to fire are met by MBS. This gives our customers the assurance of a high quality product, labeled with the DCL conformity mark.

MBS PIR panels with Aluzinc facings comply to ASTM E84 or UL 723 Class A category, with flame spread index of 5–10 and smoke developed index of 115–185.

Testing and Quality Control: To ensure the maintenance of proper standards in manufactured sandwich panels and to steadily improve systems and processes to secure panels are designed and produced to meet customer and authority requirements, a quality control and in-process inspection plan are implemented at MBS. Key factors in the production are monitored and controlled against internationally recognized tolerances, and counter measures for any detected non-conformance is swiftly identified and standardized.

MBS has its own onsite testing laboratory, which is equipped with instruments such as the heat flow meter, ignitability test Apparatus (Single Flame Source Test) and compression strength tester, that allow for the inspection of all required properties in accordance with BS EN 13165 and DCL's specific regulations.

Insulation: Fiberglass blanket composed of stable and uniformly textured inorganic glass fiber bonded together by a non-water soluble and fire retardant thermosetting resin.

The standard insulation thickness is 50mm, higher thicknesses (75mm and 100mm) are available upon request.

The standard insulation facing is either Foil Reinforced Kraft (FRK) or White Metalized Scrim Kraft (WMSK).

The insulation is supplied in rolls where the insulation width is 1.0 meter for WMSK facing, and 1.1 meters for FRK facing. Both types of facings extend 50mm on each side of the insulation.

The standard nominal density of the insulation is 12 kg/m^3. Higher densities (16 kg/m^3 and 24 kg/m^3) are available upon request.

Heavy Duty Personnel Doors: Personnel doors are flush finished and 49mm thick. Single leaf doors are 915mm wide x 2135mm high. Double leaf doors are 1830mm wide x 2135mm high.

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

Steel door panels are 1.2mm thick hot dip galvanized cold rolled steel, thoroughly cleaned and painted with RAL 7035 (light gray) color finish to ensure adequate corrosion protection.

Doors are factory prepared for a cylindrical lockset.

Door frames are 1.5mm thick hot dip galvanized or equivalent, thoroughly cleaned and painted with RAL 7035 (light gray) color finish coat.

Door frames are delivered knocked down, mitered 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 3 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.

Steel Sliding Doors: The frames of horizontal steel sliding doors are manufactured from 2mm thick cold formed channels and girts, and are delivered knocked down for field assembly. All clips, fasteners and other items necessary for assembly are provided.

The exterior face of the door leaf is sheeted with profiled panels that match the profile and material of the wall panel.

Door leaves are suspended from an exterior mounted trolley rail, attached to a structural header beam. The door hood trim, to conceal and protect the header and rail, is supplied in the same material as the wall panel.

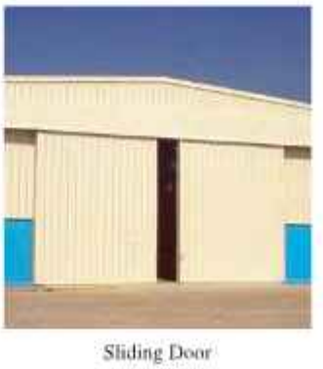
Doors are bottom guided by a specially designed steel rail track.

Sliding doors may also be provided with flush hinged pilot doors. A pilot door is a personnel door located within a leaf or the sliding door.

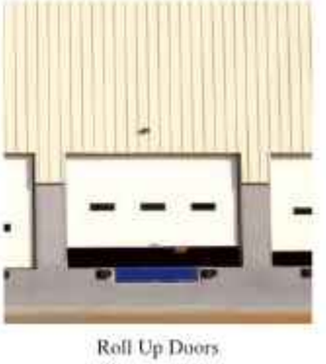
Steel Sliding Doors (Single / Double)	
Width (mm)	Height (mm)
3000	3000
4000	4000
5000	5000
6000	6000

Personnel Door

Double Personnel Door



Sliding Door



Roll Up Doors

BUILDING ACCESSORIES

Adjustable Steel Louvers: Adjustable steel louvers are 0.9 meter wide x 1 meter high. They are supplied complete with a galvanized steel mesh, blades, and framing. Made from 0.5mm pre-painted Aluzinc coated steel sheet and are only available in off white color.

Gravity Ventilators: Gravity ridge ventilators are 3 meters long, with a throat opening of 600mm and without a damper. They are installed as either individual units or as continuous (ex: joined) units. The outer skin of the ventilators is made from the same material as the profiled roof panels. The ventilators are supplied complete with bird screens. Ventilators are shipped knocked down and ready to be assembled on site before installation.

Fiber Glass Roof Curbs: Roof curbs are used mostly to support power ventilators. They are made from fiberglass reinforced polyester, 3mm thick and coated with a weathering surface on the exterior face.

The roof curbs base is the same profile as the roof panel for easy and water tight installation. The roof curb package includes the fasteners and sealant required to install the curbs on the roof.

Steel Rollup Doors: A roll up door curtain is cold formed from hot dip galvanized steel and painted with a polyester paint in off white color. The bottom rail of the door curtain is an extended aluminum angle guide.

The door drum, supporting the door curtain, houses safety springs, end shafts, collars and bearings.

Doors are supplied complete with guides, axle, curtain, manual chain and a reduction gear operating system.

Electrically operated doors are available as an option, upon request.

Steel Rollup Doors Standard Sizes	
Width (mm)	Height (mm)
3000	3000
4000	4000
5000	5000
6000	6000

Windows: Window frames are made of anodized or powder coated aluminum extrusions and are the horizontal, half slide type, 1 meter high and 1 meter wide, specifically designed for installation in profiled exterior wall panels. Windows are factory glazed with 6mm thick clear glass and are equipped with latches and removable insect screen.

Windows

Adjustable Louvers

Double sided Tape & Patching Tape

Sundry Items

Hillside Washers

Fasteners

Other Building Accessories: Fixed louvers, roof curbs, translucent panels, ridge ventilators, power ventilators, insulation, suspended ceilings, roof extension, canopies, fascia, partitions, cranes and roof monitors.

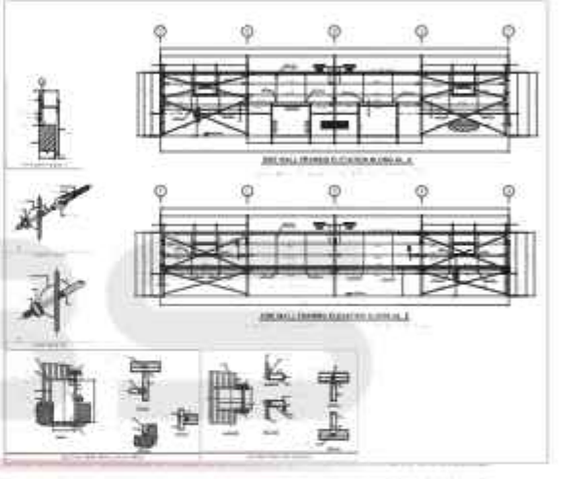
SUBMITTALS

Approval Drawings: Approval drawings are submitted upon request. If approval drawings are requested, fabrication will not start until one set of the approval drawings is signed by the buyer or their representative as "Approved As Is" or "Approved As Noted" and returned to MBS.

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, foundation work, etc. MBS is not responsible for any consequences arising from the premature use of information provided in drawings that are not issued for construction.

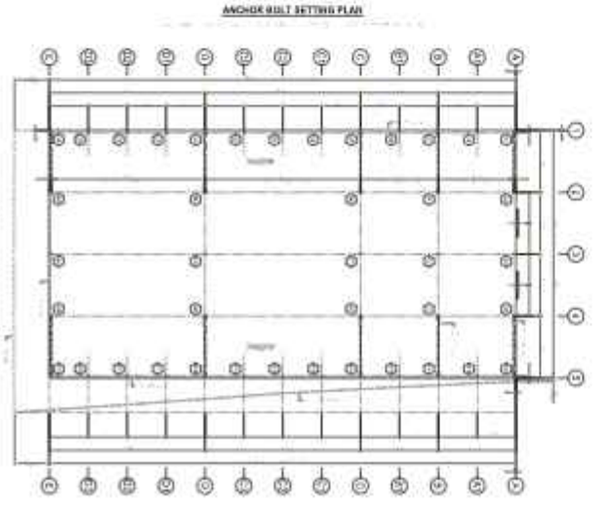
Erection Drawings: Erection drawings "Issued for Construction" are provided for the assembly of the buildings and consist of an anchor bolt setting plan, a frame cross section, a roof framing plan, wall framing details, and roof and wall sheeting details. Part marks for all Bill of Material (BOM) components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

The bolts schedule is for identifying the required bolt diameter and length for specific connections and is shown on the erection drawings.



Design Calculations: Structural design calculations may be provided upon request.

Anchor Bolt Plan for Construction: Foundations, tie beams and concrete floor slabs should be designed by a licensed engineer. MBS does not provide this service. The design of the concrete substructure should be based on the MBS supplied column reactions as noted on the MBS "Issued for Construction" anchor bolt setting plans. Anchor bolts must be set in strict accordance with MBS's Anchor Bolt Setting Plan. MBS is not responsible for incorrectly set anchor bolts.



PROJECTS

MBS has extended its service to over 50,000 buildings worldwide, with exceptional growth in several regions, such as the Gulf Cooperation Council, Middle East, Africa, Europe, Asia, and Indo Pacific. A testimony to this is the global extension of sales presence in these regions. MBS also works with a network of highly professional and dependable agents, distributors, builders and contractors to ensure the successful completion of all projects.

Warehouse
Afghanistan

Offices and Water Bottling Facility
Algeria

Warehouse
Angola

Brewery
Armenia

Auxiliary Shed
Azerbaijan

Car Showroom
Bahrain

Pharmaceutical Laboratory and Offices
Bangladesh

Warehouse
Benin

Safe Manufacturing Facility
Bulgaria

Factory
Congo

Offices
Gabon

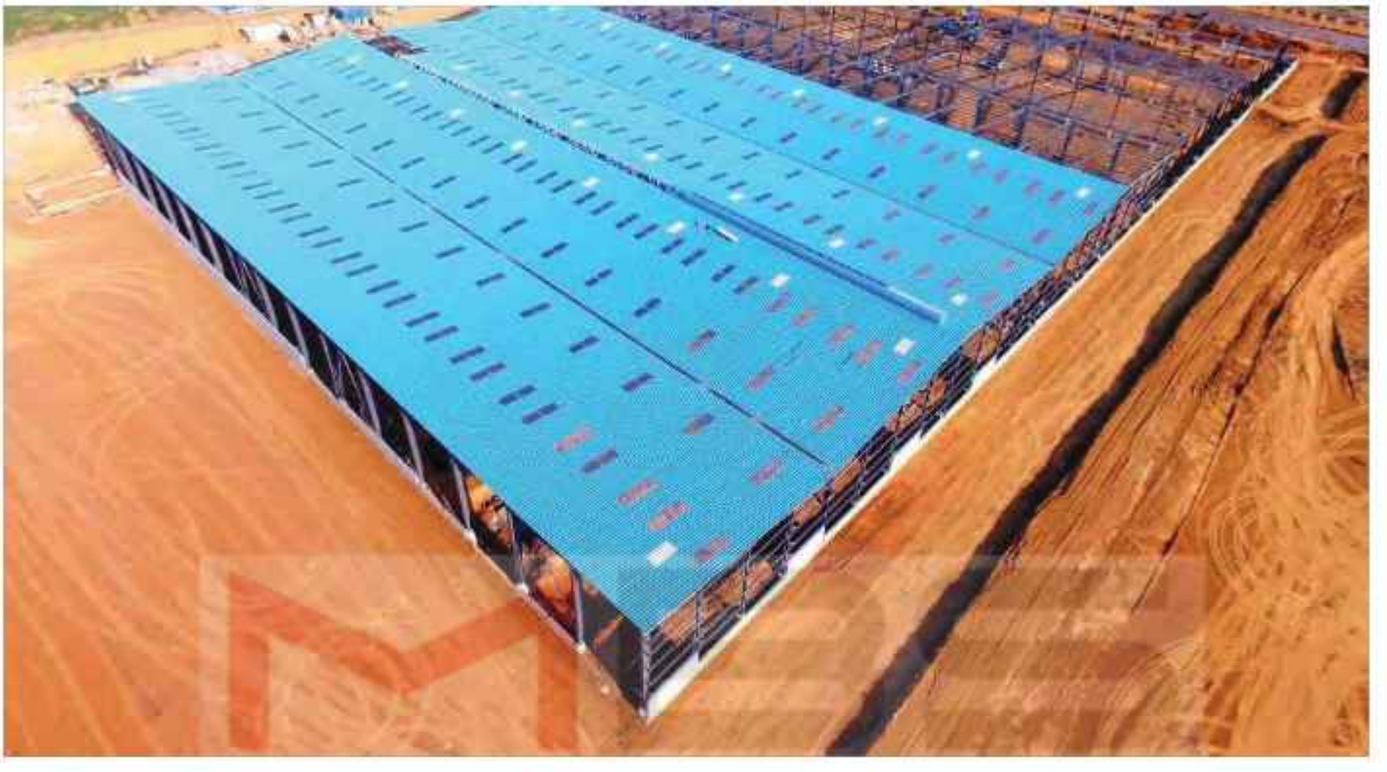
Clay Factory
Georgia

Cashew Nut Processing Plant
Ghana

Retail Mall
India

Juice Processing and Bottling Facility

Ivory Coast



Warehouse Complex

Kazakhstan

Grain Store
Mauritania

Mill
Mauritania

Distribution Center and Warehouse

Mauritius

Port Warehouse

Mozambique

Warehouse
Mozambique

Pre-Cast Panel Factory
Myanmar

Port Side Urea Production Complex

Nigeria

Engineering Workshop

Oman

Industrial Complex
Pakistan

Warehouse, Offices and Distrubution Center
Russia

Manufacturing Facility

Rwanda

Car Showroom

Saudi Arabia

Warehouse and Office Building
Senegal

Office, Showroom and Warehouse
Seychelles

Multistory Building
Somalia

Factory
South Africa

Office Complex
Sri Lanka

Oil Refinery Process Structure
Sudan

Multistory Residential Building

Tanzania

Cow Farm

Turkmenistan

Car Showroom
United Arab Emirates

Logistics and Distribution Center
United Arab Emirates

SSP and CP Tower
United Arab Emirates

Retail Center
United Arab Emirates

Maize Mill and Distribution Center
Uganda

Warehouse
Ukraine

Copper Tube Factory
Uzbekistan

Service Center
Zambia

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