Mabani Steel LLC produces high quality, Pre-Engineered Metal Buildings. For your new building to yield optimum integrity and durability, proper assembly & Erection is required. This Erection Guide provides general assembly instructions.

The Mabani Steel LLC Erection Guide is intended to be an aid to your Pre-Engineered Erection Drawings, which dictate specific building parts and construction details. Mabani Steel LLC assumes that only an experienced, knowledgeable erector with trained crews and proper equipment will perform the assembly & erection.

The methods & procedures suggested by this Erection Guide are fundamental in nature and present good, safe erection practices. They can, and should, be modified when necessary to adapt to special conditions or circumstances. Before beginning, familiarize with the building details and sequence of erection. Some buildings need complex sequence of erection; those must be processed & assessed by specialist before execution.

All anchor bolts in the concrete pedestals must be casted in compliance with the Mabani Steel LLC’s Anchor bolt Setting Plan Drawing marked “Issued for Construction”. This must be done by the assigned civil work contractor and should be checked by Mabani steel LLC’s Erection specialist prior to move in or start of erection. The responsibility and accuracy of placement of all anchor bolts rests to the Customer and his assigned civil contractor.

- Prior to starting the erection, all the anchor bolts cast must be thoroughly double checked for the following such as: location, dimensions, orientation, projection/level, center to center distance and the squareness of the structure.
- Check again all anchor bolts threads must be free from any concrete or rusting.
- Ensure all anchor bolts levelling nuts were fixed according to the required level and projection.
- Any discrepancies found must be reported immediately and require action must be taken by the assigned civil contractor to immediately rectify.
INITIAL REQUIREMENTS PRIOR TO START ERECTION ACTIVITY

Prior to commencement of the steel erection, Mabani will visit / check the actual condition, readiness of the site and double check the following listed below:

- The 5 meter wide clear, levelled/compacted and unobstructed passage area around the building is required to facilitate access of our erection equipment and for the installation of scaffolding.
- Backfilled and compacted ground area inside the building is required to facilitate the access in manoeuvring of the equipment during the erection.
- Access ramp is also required to facilitate movement in and out of the equipment in the building.
- The site area should be checked for overhead electrical lines and should be free from any other overhead utilities.
- Prior to moving in and starting the erection, handing over from the civil contractor must be received / secured that full area is ready move in and erection. If the concrete floor will be completed prior to start erection it will be advantage.

NOTE: Mabani will not be liable for any damage to concrete slab.

REQUIRED BASIC ERECTION EQUIPMENT & TOOLS

UNLOADING EQUIPMENT: Fork Lift, Tele Handler or Mobile Crane

LIFTING EQUIPMENT: Mobile Crane, Tower Crane

ACCESS EQUIPMENT: Man Lift, Scissor Lift, and Mobile Crane/Tele Handler with Man Basket

POWER TOOLS: Screw Gun, Drilling Machine, Nibbler, Reciprocating Cutter etc.
SAFE UNLOADING & EFFECTIVE STORING PROCEDURE

INCLINED STORAGE TO ALLOW WATER RUN OFF

REFER PART MARK DRAWING TO SEGREGATE THE MATERIALS NEAR RESPECTIVE GRIDS

SEGREGATION, PREPARATION & ASSEMBLING

[ Refer part mark drawing to segregate the materials near respective grids ]

SLOPE FOR DRAINAGE

WOODEN SPACERS

STORAGE AND PROTECTION FOR PANEL SHEETING

STORAGE AND PROTECTION FOR STEEL MEMBERS

NOTE: SANDWICH PANEL STACKING MAXIMUM OF 2 BUNDLES ONLY

S/P SHEETING

5.1 | ITEM
---|---
1 | MAIN FRAME MEMBERS
2 | ENDWALL COLUMN
3 | ENDWALL RAFTERS
4 | SECONDARY MEMBERS BUNDLE (LOVE STRUTS, GRITS, PURLINS ETC.)
5 | PANEL BUNDLE
6 | FASTNERS AND LOOSE CLIPS

WOODEN SPACERS

1.5 M MAXIMUM SPACING
BASIC ERECTION EXECUTION SEQUENCE

Each of our buildings are customer specific, different in specifications; shape, size and weight etc, hence erection sequence for each buildings differ. Here we have illustrated erection sequence for a simple box building with clear span up to 30 M & height within 10 M. For different building systems the fundament erection procedure is followed with detailed sequencing system referring to particular building size & weight.

GROUND RULE: Erection always starts on a braced bay.

[ Lift the column with sufficient guy wire rope ]

[ Tightened the nut over supplied washer after plumbing the column ]

[ Position the column on levelling nut ]

[ Tie all the temporary bracings before releasing the crane load ]

[ Similarly erect other columns ]

ERECTION MARKS:

When steel members have critical orientation requirements and where it is possible to fit those members incorrectly an erection mark can be found on the member, this erection mark is a small round plate welded but indicated in the erection drawings by this symbol.

Erection mark

Beams with erection marks should be erected with the welded plate at the marked end.
[Install the side wall girts]

[Repeat the steps on opposite side wall]
[Assemble the rafters, don’t forget to install the flange braces & tighten the splice joints]

[Position & rig the rafter assemblies]

[Lift & erect the rafter assembly, ensure to tie enough guy wire ropes & tag lines]
[ Similarly lift & erect the other rafter assembly of the 1st braced bay ]

[ Fill the purlins in between ]

NOTE: FLANGE BRACES TO BE FIX AFTER INSTALLING PURLINS BAY BY BAY
[ Install all the roof & wall bracings and align the bay ]

GROUND RULE: Proceed to next bay only after aligning the 1st Braced bay

[ Similarly erect the other frames on grids ]

[ Details of installing hill side washer for cable bracings or rod bracings ]

NOTE: TEMPORARY CABLE SHOULD NOT BE REMOVED ON BOTH ENDWALLS UNTIL ROOF SHEETING WORKS COMPLETED.
NOTE: PROJECTION OF HILLSIDE WASHER SHOULD COME ON THE SMALL ANGLE SIDE

[ Details of installing hill side washer for cable bracings or rod bracings ]

[ Details of installing portal bracing ]

[ Details showing purlin overlap, flange brace & lapping bolts ]

[ Details of installing angle bracings ]

[ Details of installing strut purlin with stabilizers ]
BOLT TIGHTENING & INSPECTION PROCEDURE

TIGHTENING:

- Ensure all connection bolts have been installed as per issued for construction drawings; verify the sized mentioned in the erection drawings.

- All the bolts should be brought to Snug tight position before tensioning. (Position the bolts to snug tight by manual operation using an ordinary spud wrench. A full effort of an erector using an ordinary spud wrench would bring the bolt to a snug tight position. No wrench extension or long wrenches should be used to bring the bolt to a snug tight position in order to avoid tensioning. A 300 mm long spud wrench is normally used)

- Once the snug tight position is achieved, the outer face of the nut shall be match-marked with the help of a permanent marker pen.

- After marking further tightening / tensioning shall be proceed until the desire nut rotation meets requirement shown in Table 8.2 (Tightening shall be carried out Manually by extending the spud wrench length or increasing the number of erectors to two; electric impact wrench can also be used, but ensure to avoid over tensioning)

INSPECTION:

- Inspection of bolts shall be visual check of match marks before and after bolt tightening. The bolted connection shall be accepted when match marks have reached the required rotation as stated in table 8.2

- The QC Inspector shall keep records of inspection of connections, 10% of bolts shall be inspected at random connections, out of which 90% must pass for successful inspection.

Table 8.2. Nut Rotation from Snug-Tight Condition for Turn-of-Nut Pretensioning

<table>
<thead>
<tr>
<th>Bolt Length c</th>
<th>Disposition of Outer Face Bolted Parts</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Both faces normal to bolt axis</td>
</tr>
<tr>
<td>Not more than 4dₐ</td>
<td>1/3 turn</td>
</tr>
<tr>
<td>More than 4dₐ, but not more than 8dₐ</td>
<td>1/2 turn</td>
</tr>
<tr>
<td>More than 8dₐ, but not more than 12dₐ</td>
<td>2/3 turn</td>
</tr>
</tbody>
</table>

- Nut rotation is relative to bolt regardless of the element (nut or bolt) being turned. For required nut rotations of 1/2 turn and less, the tolerance is plus or minus 30 degrees, for required nut rotations of 2/3 turn and more, the tolerance is plus or minus 45 degrees.

- Applicable only to joints in which all material within the grip is steel.

- When the bolt length exceeds 12 dₐ, the required nut rotation shall be determined by actual testing in a suitable tension calibrator that simulates the conditions of solidly fitting steel.

- Beveled washer not used.
UNDER COLUMN GROUTING DETAILS

The purpose of providing a grout pocket above finish floor is to allow for the correction of uneven pedestal heights.

Mabani Steel LLC details almost all buildings allowing for a 50mm grout under the column base plates measured upwards from finished floor level. It is important to understand that provision must be made for this grout at the time of setting anchor bolts by ensuring that the projection of the anchor bolts is as per the latest “Issued For Construction” anchor bolts drawings. Failure to do this will affect building eave height, interior vertical clearances, sidewall and end wall door framed openings and may limit the erector’s ability to level the building correctly.

The Civil Contractor is responsible for providing and setting the non-shrink grout immediately after the erector has declared that the erection of the PEBSS of a building or area of a building (in the case of large footprint buildings) is complete.

The Civil Contractor should ensure that the grout is in full bearing against the underside of the column base plate and no air pockets remain around the anchor bolts. In buildings with mezzanines it is extremely important that the grout is set prior to casting of the mezzanine slab. Failure to set the grout in a timely manner i.e. before the mezzanine slab is cast or before the use of overhead cranes (if present) may result in deformation to the base plates and columns, necessitating expensive rework or replacement.

TOUCH UP PAINT

Touch up paint during & after erection is always a part of erection method statement. As scratched developed during erection / mechanical damages must be addressed immediately by proper surface preparation & application of proper coating to avoid corrosion.

GROUND RULE: it’s wiser to address the touch up paint at ground than at height.

CORRECT & INCORRECT WAYS

[ Correct & Incorrect installing desk panels ]
**Correct & Incorrect way of panel lapping**

**Correct way of lifting single skin & sandwich panels**

- **Correct Way**
  - Crane Hook
  - Spreader Bar
  - Wood Pallet Support
  - Temporary Packing

- **Incorrect Way**

**Note:** Bead Mastic @ Side Lap Normally Not Required When a Syphon Break is Present in the Panel

[ Correct way of lifting single skin & sandwich panels ]
DO NOT HANG COLLATERAL LOADS FROM BOTTOM FLANGE OF PURLINS. ATTACH COLLATERAL LOADS TO THE WEB OF PURLIN. ALTERNATIVELY, COLLATERAL LOADS CAN BE HUNG BY A BRIDGING ANGLE (BY OTHERS) ATTACHED TO THE BOTTOM FLANGE OF TWO ADJACENT PURLINS.

[ Collateral hangings loads from purlins, correct method ]

DO NOT HANG COLLATERAL LOADS FROM ONE SIDE OF BEAM FLANGE. ATTACH COLLATERAL LOADS TO THE BOTH SIDES OF BEAM BOTTOM FLANGE

[ Collateral hangings loads from rafters, correct method ]

[ Correct & Incorrect way for the erection: beams, rafters & columns ]
PPA / SHEETING WORK PROCEDURE

GROUND RULE: Sealant is must to avoid any water leakages in future.

[ Single skin panels laying, sealant & lapping details ]

NOTE: TEMPORARY CABLE SHOULD NOT BE REMOVED ON BOTH ENDWALLS UNTIL ROOF SHEETING WORKS COMPLETED.

[ Single skin panel lapping, sealant & fastening details ]

NOTE: REFER THE ERECTION DRAWINGS FOR THE DIMENSIONS ‘A’ & ‘B’
INSULATION

- Sandwich panels lapping, sealant & fastening details
- Correct screw tightening
- Sheet angle is required to be installed before laying the sandwich panel and to fix with double line screw as shown section 'A'
- Refer the erection drawings for the dimensions 'B' & 'C'

[ Laying Insulations on roof ]
**STEP 1:** Pull tabs together & staple full length as shown in figure.

**STEP 2:** Fold tabs over & staple staples as shown in figure.

**Insulation Side Lap**

[Laying ridge cap panel on roof]

[Laying Insulations on wall & Lapping details]
GUTTER & DOWN SPOUT PIPES

1. SLIT AT FOUR CORNERS OF THE DOWNSPOUT UP TO 30mm AS SHOWN ABOVE.

2. SLIGHTLY BEND INWARD ALL FOUR SIDES OF THE SLITTED END AT AN APPROPRIATE ANGLE JUST ENOUGH FOR THE DOWNSPOUT TO SLIDE INTO ANOTHER DOWNSPOUT OR DOWNSPOUT SHOE AS SHOWN IN FIGURE 3.

3. INSERT THE DOWNSPOUT INTO THE DOWNSPOUT AND/OR DOWNSPOUT SHOE.

NOTE: DOWNSPOUT STRAP IS FOLDED AT SITE TO THE REQUIRED SHAPE.
WATER LEAK TEST METHOD STATEMENT

WATER LEAK TEST PROCEDURES:

Site Requirements for “water leak test”:

- Manpower to conduct the leak test on site – 2 Erectors on roof to apply and 2 ground crew to check / observe underneath.
- Water tank with the hose pipe (1 ½ “inch diameter) ready with enough length.
- Key plan of the building, where the water leak test will be carried out.

Site preparation prior to conduct water leak test:

Prepare the roof area of the building for leak test. Double check all the possible roof penetration must be fully sealed off properly.

Mobilize the manpower and the water tank, ensure above requirements fully complied and checked prior to any water test.

Water Leak Test Application:

Safely access the 2 Erectors at the top of roof, who will conduct the application of water test. Water pressure must be normal and run through the lower rib of the roof panels.

Start the leak test on the first bay at roof ridge (ridge panel) and let the water free flow through the roof panel, skylights, roof penetration, curved panel or to the gutter.

The ground crew will check underneath the roof, any water coming it will be marked on the ground floor. The applications will do until last bay of the building.

Any leaks must be repaired immediately and make the re-test until all marked points is cleared. Upon completion, the KEY PLAN will be marked / signed by all parties.
CONTAINER UNLOADING PROCEDURE

1. The container must be discharged on flat ground. Do not attempt to unload the contents while the container is on the bed of the truck. Do not tilt or drag the container.

2. Make sure that the container lies on suitable level ground before opening. A minimum of 12 meters must be unobstructed in front of the container doors.

3. Provide 2 or 3 mm thick metal strips to form "discharge track" of the "track" inside the container as shown in the inset drawing. Make sure that the level of the discharge track is the same level as that of the inside track. Once the level of inside and discharge track is aligned, fix the discharge track to the wooden ties using nails.
For outside UAE and other GCC countries the procedures shown are only a guide for unloading the contents from the skid-packed "DRY" containers.

Safety should be observed at all times. MABANI STEEL is not responsible for any accident or damage resulting from carelessness on the part of the Contractor/Sub-Contractor or Customer.

Under no circumstances should attempts be made either:
- To Unload the container components while the container is on a truck. OR
- To Unload the cargo Piece-By-Piece.

Careful consideration of these guidelines and proper planning at the unloading point will result in a safe & damage-free unloading of the cargo.

The unloading vehicle must be capable of pulling 20 Tons weight on the Greased Track.

The materials required to unload the container according to this procedure, which are not included in the scope of MABANI STEEL: Nails, Wooden Ties, Cables/Chains & Grease.

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IMPORTANT NOTES

If Mabani Steel LLC is not being used to erect the buildings, Mabani Steel LLC accepts no responsibility for erection quality, defects or collapse due to negligence or improper erection procedure.

Mabani Steel LLC’s policy of continuous product improvement may necessitate change in materials, design specifications and procedures without notice.

FIRST AND FOREMOST! Rent a Forklift / Tele Handler / Mobile Crane, etc. or make necessary arrangements in advance to have your supplied building unloaded upon arrival!

Buyer/End User Responsibilities

- It is the responsibility of the BUYER/END USER to obtain appropriate approvals and secure necessary permits from City, County, State, or Authorities as required, and to advise/release Mabani Steel LLC upon receiving such.

- The BUYER/END USER is responsible for setting of anchor bolts in accordance with Mabani Steel LLC “Issued For Construction” drawings only. Use only final “Issued For Construction” drawings. (Section 7 AISC Code of Standard Practice, 9th Edition).

- A Mabani Steel LLC - Erection Specialist may be available to check the correct setting of anchor bolts.

- Normal erection operations include the corrections of minor misfits by moderate amounts of reaming, chipping, welding or cutting, and the drawing of elements into line through the use of drift pins. Errors which cannot be corrected by the foregoing means or which require major changes in member configuration are to be reported immediately to Mabani Steel LLC by the BUYER/END USE CUSTOMER, to enable whoever is responsible either to correct the error or the approve the most efficient and economic method of correction to be used by others. (Section 7 AISC Code of Standard Practice, 9th Edition).

- All bracing shown and provided by Mabani Steel LLC for the building is required and shall be installed by the erector as a permanent part of the structure.

- Any claims or shortages by buyer must be made to Mabani Steel LLC within seven (7) working days after delivery, or such claims shall be considered waived by the customer and disallowed.

Mabani Steel LLC has a commitment to manufacture quality buildings that can be safely erected. However, the safety commitment and job site practices of the erector are beyond the control of Mabani Steel LLC. It is strongly recommended that safe working conditions and accident prevention practices be the top priority of any job site. Local, State, and Federal safety and health standards should always be followed to help ensure workers safety. Make certain all employees know the safest and most productive way of erecting a building. All employees should know emergency procedures. Daily meetings highlighting safety procedures are also recommended. The use of hard hats, rubber sole shoes for roof work, proper equipment for handling material, and safety nets where applicable, are recommended.