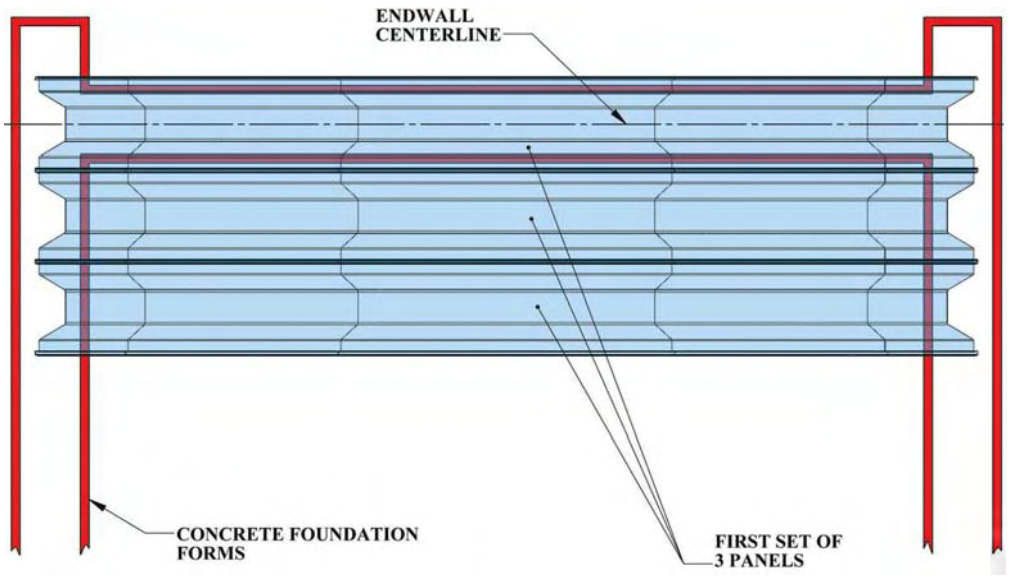

FIRST PICK PLACEMENT

Once the PICK is in position on the angle iron, the crew will secure both sides to the angle iron with R-9 clamps or blocks of wood wedged between the panels and the MIC-Forms. These are temporary braces until the PICKS are welded.

CAUTION: Workers on top of the building will be using a Fall Restraint System; however, on the FIRST PICK there is no good place to secure a worker to. You do not want to lock a worker onto the FIRST PICK in the event the PICK should become unstable and fall. It is recommended that a man-lift be used to perform overhead operations, such as lifting bar disconnection. If the worker needs to move outside the lift for any reason, they should connect a safety line to the man-lift. If no man-lift is available, extension ladders should be used to reach to lifting brackets. This operation will be performed on each side with one worker on the structure at a time. The Fall Restraint System is connected to the second PICK and used throughout the rest of the construction process.

For the first PICK, guy ropes are attached to anchor points and the first panel is welded to the angle iron (Section 7.4.6.).

For all additional PICKS, workers on top will ensure PICKS are clamped (Section 7.4.3) together properly PRIOR to unhooking the lifting brackets. Once the lifting brackets are disconnected, the crane will back into position for the next PICK. The PICKS will then be seamed together (Section 7.4.3.) and welded (Section 7.4.6.).

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7.4.2. Plumbing PICKS

Plumbing the PICKS is a vital process to ensure the building remains vertically straight and square. If a PICK is out of plumb, additional PICKS may not set properly on the angle iron and the end walls will not be straight. The reference points you want to use to check a PICK for plumb are the top center and the bottom sides of the building, utilizing a plumb bob and/or a 5-point laser level.

Workers on top of the building will get a measurement at the building center point and relay it down to the workers on the ground. The workers on the ground will get a measurement on each side of the building to determine side wall adjustment requirements and monitor overall length. Each PICK must be checked for measurement and plumb; then adjusted prior to welding.

On the first PICK, you will use the guy ropes to accomplish any plumbing movement that is needed. Un-used coils of steel make good temporary anchor points. Guy ropes should be tied off in a crisscross pattern to allow side to side adjustments and parallel to adjust front to rear adjustment. Guy ropes need to be left in place until the building is as long as it is wide.

CAUTION: Do not tie the guy ropes to any sharp or movable objects, such as rough cut TAB holes or vehicles. Sharp edges can fray or cut the guy ropes or someone could unintentionally move the vehicle causing the building to collapse.

On additional PICKS, the top is the governing factor for adjusting plumb. All adjustments will need to be made by moving the sides to align with the top. You must push or pull them to the same measurement as the top of the PICK to ensure the PICK is setting square and plumb.

GUY ROPES

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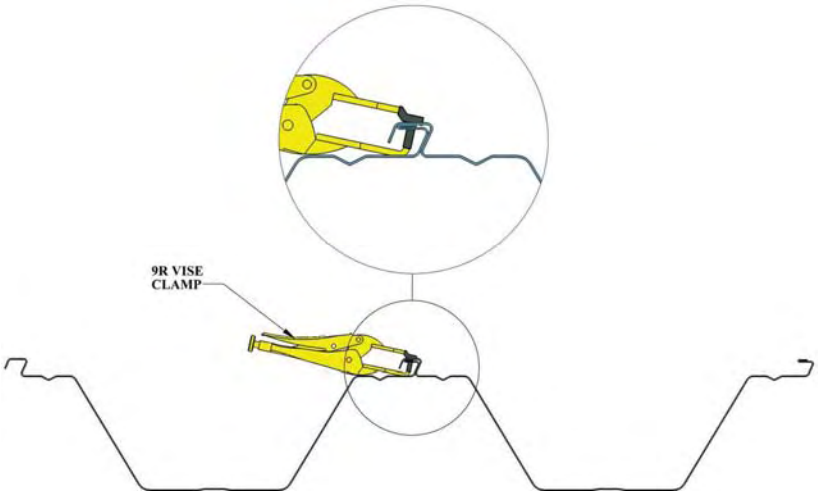
7.4.3. Clamping and Seaming

As a new PICK is lowered into position to be connected to the previous PICK, the erection crew must ensure the HOOK comes down over the HEM along the entire edge of the panel. The PICKS are then clamped together using R-9 clamps. These clamps are used to secure the PICKS temporarily until they can be seamed together. The R-9 clamps are spaced as needed to ensure the seam is very tight. The intervals shall vary between 2-4 ft (.6-1.2m) depending on the steel thickness, shape of building and size of radius. It is better to use too many clamps and space them closer together than not enough.



CLAMPING PROCEDURE

When clamping the two PICKS together you must start clamping on the side that rests better on the angle iron. This way any void in the seam is gradually closed and pushed in the direction that is raised off the angle iron on the opposite side. This should push the raised side down onto the angle iron. DO NOT clamp from both ends, this will create uneven gaps in the seam and may damage the HEM and HOOK during the seaming process.

A method to assist in closing large gaps in a seam is to use two the R-9 clamps. Use one clamp to close the seam a little and another clamp next to it to close it a little more. Remove the first clamp, and use it to tighten the seam again. Repeat this process until the seam is closed and the clamp is tight. Move up the seam a short distance and repeat the process until the entire seam is closed and tight.

If every thing is done correctly up to this point, you can seam from either side of the building and alternate back and forth, alleviating the need to carry the seamer from one side to the other. Only the hand-crimper would need to be carried back and forth.

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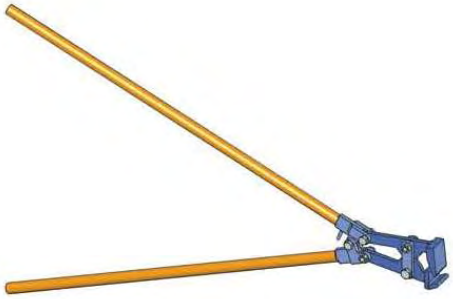
However, if the PICK does not settle evenly on the angle iron on both sides, you must start from the side that you started clamping from.

Hand crimp the first 12 in. (30.5cm) of seam to allow the seamer to be installed correctly. Attach the seamer to the seam, ensuring the direction switch is in the proper position. As you run the seamer over the building, remove the clamps as the seamer approaches them. Re-attach the clamps on the adjacent seam toward the HEM so it is readily available for use when clamping the next PICK. The crew on the ground operates the seamer until it is received by the crew member at the top of the extension ladder. That crew member operates it until it is received by the worker on top of the building. The seamer is then handed off the other worker on top and the process continues down the opposite side of the building. Once the process is complete, the seamer is removed, the direction switch is moved in the opposite direction, and rollers are switched and placed on a pallet or other clean surface. Keep the seamer out of the dirt or sand to prevent damage.

CAUTION: DO NOT ride the seamer! This could lead to seamer malfunction, premature wear, and possible personnel injury.



HAND CRIMPER

7.4.4. Controlling Growth (Measurement)

Building growth is inherent with our system. It is unavoidable and has to be monitored and calculated during the building process. The last end wall placement will be determined by these calculations.

Although the UBM produces a panel with the specification of 24 in (60.96cm) wide, once it has been curved, erected, and comes to its natural resting position, its measurement ends up being 25 in. (63.5cm). As specified, the PICK would be 72 in wide, but adding 1 inch per panel and ½ inch for the combined seams, the total PICK width will be approximately 75 ½" (1.918m) from the outside edge of the HEM to the inside edge of the HOOK..

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Length measurements along the top center of the building and the bottom sides will be taken after every PICK is placed. Adjustments will be made to match the side walls with the top. It is impossible to make any adjustments to the top of the building, so all adjustments will be made by moving the bottom of the panels forward or backward on the angle iron until each side matches the measurement of the top.

Do not make large adjustments on one panel of a PICK, this will cause panel distortion. Small adjustments should be made to each panel to spread the movement along the entire PICK. If necessary, the un-welded panels from the previous PICK can be adjusted to assist in aligning the sides to the top.

Adjustments can be made using a tanker bar by tapping the base of the panel in the desired direction. Larger adjustments can be made using a come-along or ratchet straps. Hook these items to a seam with an R-9 clamp and then put some tension on the PICK in the direction you need to move. Clamps and wood bracing will hold the panel securely to the angle iron until the PICK can be welded.

Every three PICKS should be checked for plumb using a 5-point laser level or plumb bob.

7.4.5. Bracing / Supporting

During the construction phase, the ends of the panels are welded into place and the building is considered to be in a hinged condition. Depending on environmental factors and size of the building, additional bracing or support may be needed until concrete is poured. Once concrete is poured, the building is in a fixed condition and at its most stable state.

Under these conditions, the building must be secured and held plumb until the concrete cap is cured. There are many methods to brace or support the building.

The recommended method is to use turnbuckles or come-along to pull the building plumb and hold it in place. Tabs can be seamed in during assembly at the top of the wall section to provide a pull point. Another method would be to use wood or metal bracing on the outside of the building to properly support it.

In both methods, the supports will be used as needed. We have provided you illustrations of two methods.

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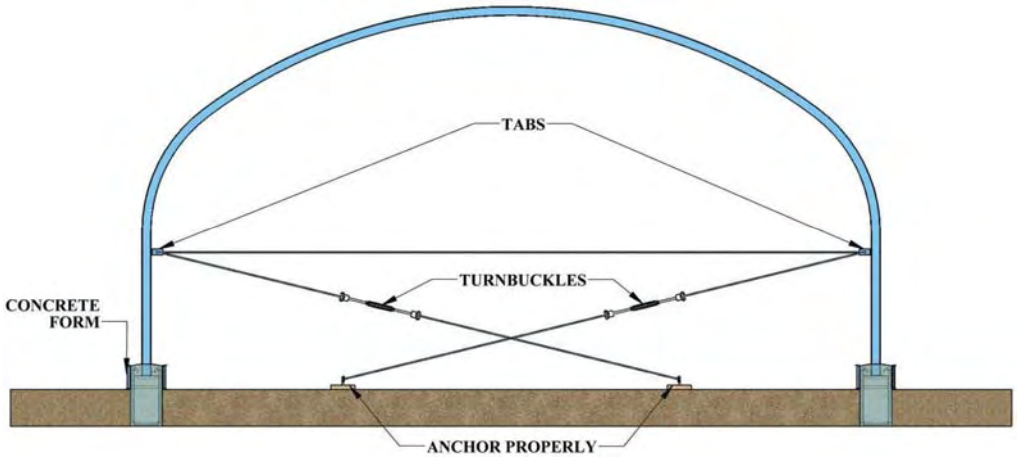
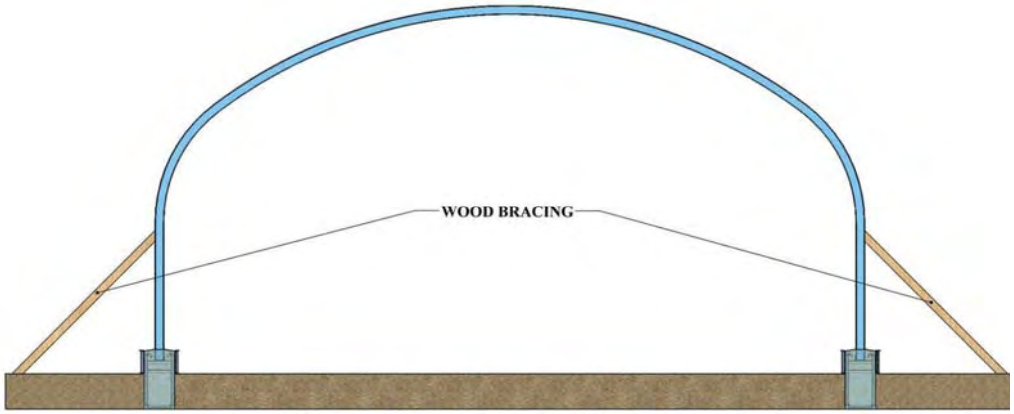


BRACING OPTION A



BRACING OPTION B

7.4.6. Welding

The welder is responsible for securing the PICKS to the angle iron. The welder will place welds, approximately 1 in. (2.54cm) long, at both corners on the belly of each panel where it comes into contact with the angle iron. These welds need to be good solid welds. Leave a PICK un-welded until the next PICK is placed and adjusted.

NOTE: UNTIL THE PANELS ARE WELDED, THEY MUST BE CLAMPED OR BLOCKED SECURELY TO THE ANGLE IRON.

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RECOMMENDED WELDING SEQUENCE IS AS FOLLOWS:

Weld 1st panel of first PICK to hold it at the location you desire to start erection from.
Adjust 1st PICK for plumb utilizing guy ropes.
Weld the remainder of the 1st PICK after the 2nd PICK is placed and adjusted for plumb
Weld 2nd PICK after 3rd PICK is placed and adjusted for plumb.
Weld 3rd PICK after 4th PICK is placed and adjusted for plumb.
Continue this sequence up to the last three PICKS. Leave the last three or four PICKS free until the last PICK is adjusted. After the last PICK has been adjusted, weld all remaining PICKS.

Down Time Considerations!
If you have to leave the site during erection for any duration and inclement weather is a concern you may want to take additional temporary steps to ensure your structure is stable through the inclement forecasted weather. You may temporarily weld additional panels of erected PICKS through the time you will be away from the site. Plumb the PICKS you will be adding the additional welds to. These welds will be cut free prior to erection resuming. Also prior to resuming the erection process check and ensure the erected PICKS are plumb.

7.5. End-walls

MIC buildings are structurally sound without end-walls; however, they can provide additional shelter and security. On buildings built with the UBM-240, you can create end-walls with a variety of MIC equipment including the UBM-240, UBM-120, MIC-163, ABM-240, and ABM-120.

The walls consist of straight panels made from the Panel Machine. The panels are measured, cut, and set into place individually. The bottoms of the panels attach to angle iron the same as the curved panels, but the tops require a pre-fabricated channel to hold and secure them into place. Once the bottoms have been welded and the tops screwed or riveted into place, all the panels are seamed together.

An end-wall Cut List should be developed and provided to the Production Crew as soon as possible for steel coil management. The last portion of each steel coil that is not sufficient to produce a complete roof panel will be cut into sections for use as end-wall panels. Additional end-wall panels may need to be produced after the roof panels have been completed. The panels will need to be approximately 6" (15.24 cm) longer than the height of the building where the panel will be attached.

There are various methods of creating an end-wall Cut List:
PROSOFT AX will automatically create a graphic Cut List based off the building specifications. This method will be the most efficient for time, steel management, and waste control.

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An engineer or AUTOCAD user can produce a Cut List based off the building and panel dimensions. This method will also be efficient in management and waste control.

A cut-list can be developed manually using jigs, taking various measurements between the belly of the roof panel and the angle iron along the radius of the building. Start from the center line of the building and work out to one side. The number of panels needed at each length will be multiplied by four to cover the opposite side and the second end-wall.
Depending on how meticulous the crew is in obtaining these measurements, this can be an efficient method to manage steel and control waste, but will increase the amount of labor and time required to prepare the list.

NOTE: TO OBTAIN THE MEASUREMENTS AT THE BELLY OF THE ROOF PANEL, IT IS RECOMMENDED TO USE A MAN-LIFT OR OTHER LIFTING DEVICE. IF NONE IS AVAILABLE, TAKE MEASUREMENTS FROM THE TOP EDGE OF THE ROOF PANEL.

The first step in constructing the end-wall is to determine the optimum placement of the first panel; On-Center or Off-Center. You want the last panels on each side to be large enough to work with and be equal size for a quality appearance. Below are a couple of methods to determine the best position:
For end-walls without a roll-up door:

Divide the width of the building by the panel width (25 in). This will also give a rough estimate for the total number of straight panels needed to construct one end-wall.
If this value is an even number, the center of the first panel will align with the center line of the building. If the value is an odd number, the outside edge of the panel will align on the center line of the building.

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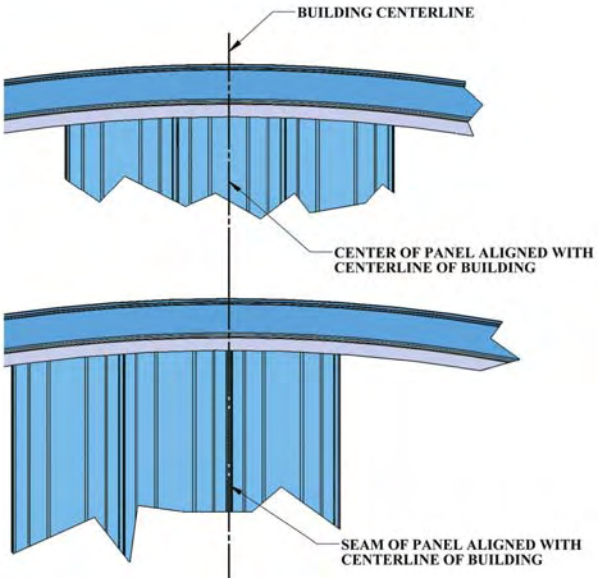

ON-CENTER / OFF-CENTER ALIGNMENT

For end-walls with a roll-up door:

Divide the width of the door opening by the panel width 25 in. (.63 m).

If this value is an even number, the center of the panel will align with the center line of the building. If this value is an odd number, the outside edge of the panel will align with the center line of the building.

It is preferable to lay out the end-wall such that the vertical jams are located on the flat belly portion of the end-wall panels on either side of the framed opening.

ENDWALL WITH ROLL-UP DOOR INSTALLED

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Most other doors, windows, vents, etc. can be installed after the end-wall is finished.

If you have a large crew and can perform end-wall installation and roof erection simultaneously, the guy ropes can be removed and the first end-wall started once the building is as long as it is wide.

NOTE: IF A LARGE EQUIPMENT DOOR IS TO BE INSTALLED, A STRUCTURAL SUPPORT DOOR FRAME SHOULD BE MANUFACTURED AND INSTALLED PRIOR TO ANY ENDWALL PANELS BEING INSTALLED.

7.5.1. End wall Channel Production and Installation

In order to connect an end-wall panel to a UBM-240 arched panel, a "C" shaped channel needs to be attached to the belly of the arched roof panel. This channel provides a uniform surface to seat and seal the tops of the end-wall panels. The channel is produced from the same roll coil stock used on the UBM-240 machine for arched panels. There are two options for fabrication of channel; off-site by a local fabricator or on-site by the construction crew. After the channel has been produced, it will be curved to match the radius of the building using the Channel Curver.

For off-site fabrication, the vendor will need a roll coil of steel used by the UBM. The following tools will be needed to curve the channel once it is delivered to the job site:

Channel Curver

Power Source with Extension Cord

For on-site fabrication and curving, the following materials and tools are required:

- Roll Coil of Steel
- Straight Edge for Marking
- Electrical Source
- Extension Cord
- R-9 Clamps
- Tape Measure
- Kett Shear
- Metal Break
- Channel Curver

7.5.2. Channel Production

It is recommended that the coil stock be cut and bent as follows:

(1) Roll coil stock out and cut 6' to 8' (1.8 to 2.4 m) lengths.

(2) Split these lengths into widths of 12-1/4" to 14-1/4" (31.1 to 36.2 cm).

(3) Bend these pieces to form a "C" channel with an outside width of 8-1/8" (20.6 cm) and two 90 degree vertical legs of equal length. The channel will need to meet the above specifications in order to feed through the Channel Curver.

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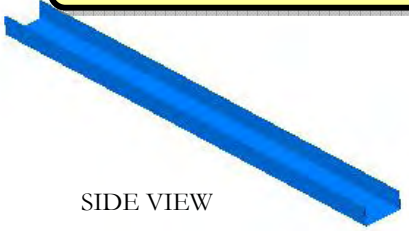
FABRICATED "C" CHANNEL

C-Channel Measurements
3" (od) X 8" (id) X 3" (od)
7.62 cm (od) X 20.32 cm (id) X 7.62 cm (od)



SIDE VIEW

NOTE: ADDITIONAL CHANNEL SECTIONS SHOULD BE PRODUCED FOR USE DURING CHANNEL CURVER CALIBRATION.

If a hand brake is not available, an offsite fabricator can perform this operation. Another option is to modify straight panels from a UBM/ABM-120 or MIC 163, if available.

The steps to modify a UBM/ABM-120 or MIC-163 straight panel are as follows:
(1) Produce a 6' to 8' section of straight panel.
(2) Cut off the HOOK and HEM.
(3) Cut the panel along the belly approximately 4" from each 90 degree bend.
(4) The cut edges of the belly can be mated flush to each other to form a 2-piece "C" channel. Each half of the channel will need to be fed through the Channel Curver separately.

7.5.3. Channel Curver Operation

The Channel Curver will be used to bend or curve the "C" channel to match the radius of the roof. You may only run the "C" channel through the Channel Curver once. The extra "C" channel produced will be used to test and calibrate the Channel Curver to produce the radius needed. After you run the channel through the Curver, you can check the radius with the radius gauge or by placing it against the under-belly of a roof panel. Adjust as necessary to match the appropriate radius. The curved channel must not have any twists in it and both sides must be the same radius to match the curvature of the arched panels. The channel has to MATCH the radius of the roof panels.

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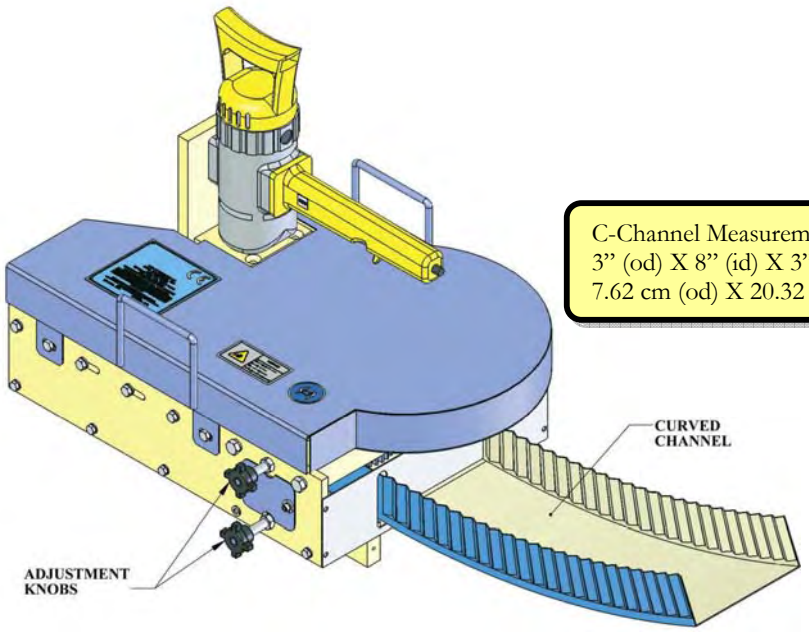

C-Channel Measurements
3" (od) X 8" (id) X 3" (od)
7.62 cm (od) X 20.32 cm (id) X 7.62 cm (od)

CHANNEL CURVER

The Channel Curver has 4 adjustment knobs, two knobs on each side. The bottom knobs are used to adjust for different steel thicknesses and the upper knobs adjust the internal crimpers that produce the radius.

Bottom Knob Adjustment:

Channel material of .050 to .060 (1.27 mm to 1.52 mm), loosen both knobs completely.

Channel material of .049 or less (1.20 mm), tighten both knobs firmly.

Upper Knob Adjustment:

For a tighter crimp or radius, tighten both knobs in small increments then run a section of C-Channel through the Channel Curver. Place curved channel against the belly of a curved roof panel or use a radius gauge to determine if it matches the roof radius. Continue making small adjustments to the knobs and curving sections of channel until desired radius is achieved. To loosen the crimp or open the radius, loosen the knobs in small increments.

NOTE: ONLY SMALL ADJUSTMENTS SHOULD BE MADE TO THE UPPER KNOBS BETWEEN CURVING SECTIONS OF CHANNEL DURING CALIBRATION. THE TOTAL RADIUS ADJUSTMENT RANGE FOR ANY RADIUS WILL BE WITHIN ONE FULL TURN OF THE KNOBS.

The recommended material to be used for C-Channel production is .050 to .060 (1.2mm to 1.52mm) to reduce any waviness the vertical legs may have after it is curved by the channel curver.

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7.5.4. Channel Installation (On-Ground / In-Air)

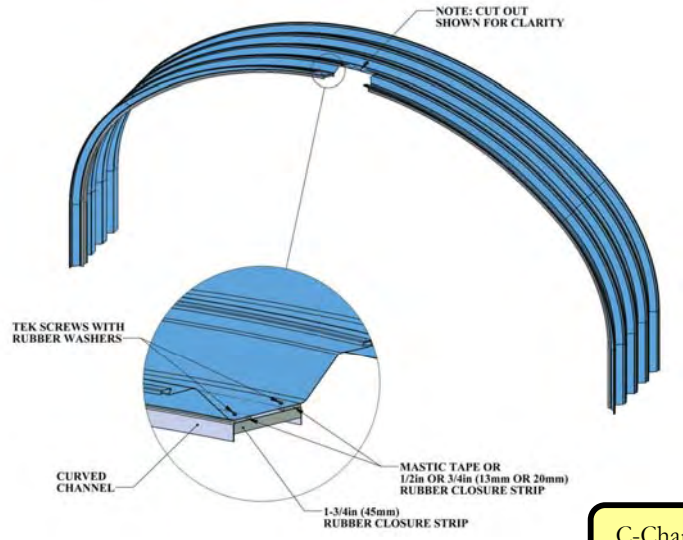
The C-Channel is attached to the first and last arched panel of the building. There are two methods to install the channel; On-Ground and In-Air. The On-Ground method is the easiest method, but requires all the materials to be ready for installation prior to the Erection Process. The In-Air method is performed after the PICK has been lifted and placed on the building foundation. This method is more difficult and time consuming. Both methods require the following for installation:

- Power Source
- Extension Cord
- Screw Gun and Nut Driver (or Drill)
- R-9 clamps
- Rubber strips
- Manufactured C-Channel
- TEK screws
- Block of Wood for Bracing (2x4)

For the In-Air method the following additional equipment will be needed:

- Man-Lift or Scaffolding
- Fall Arrest System
- Extension Ladder

NOTE: DELIVERY OR PRODUCTION OF C-CHANNEL WILL DICTATE WHICH METHOD IS USED TO ATTACH THE CHANNEL. IF THE CHANNEL IS FABRICATED AND CURVED PRIOR TO THE ERECTION PROCESS, THE CHANNEL CAN BE ATTACHED ON THE GROUND. IF NOT, THE CHANNEL WILL HAVE TO BE ATTACHED IN THE AIR. IF THE CHANNEL IS AVAILABLE PRIOR TO COMPLETION OF THE ROOF, THE SECOND END-WALL CHANNEL CAN BE ATTACHED ON THE GROUND.



C-Channel Measurements
3" (od) X 8" (id) X 3" (od)
7.62 cm (od) X 20.32 cm (id) X 7.62 cm (od)

END-WALL CURVED CHANNEL

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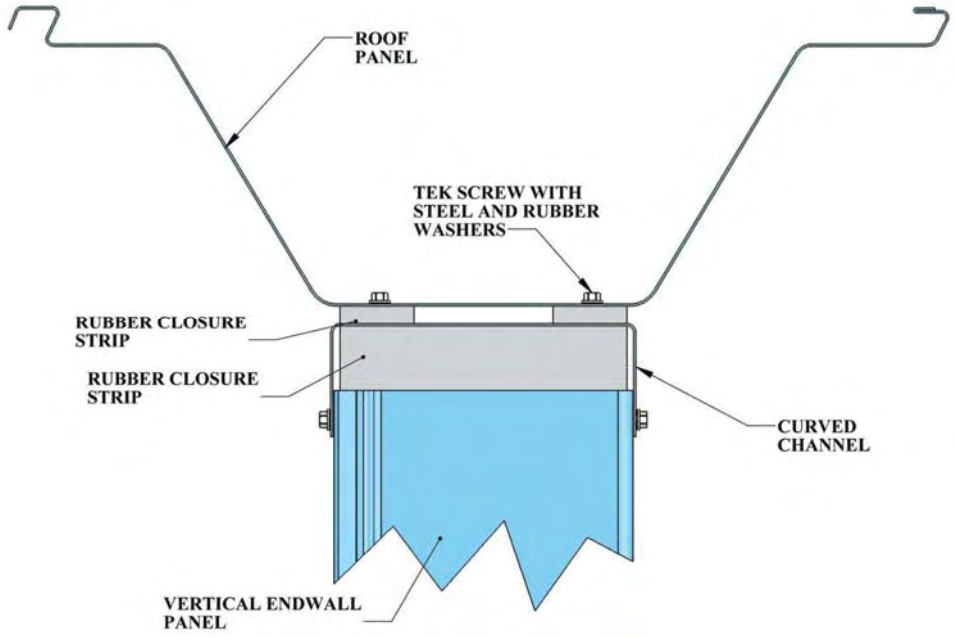
The channel is installed using TEK self tapping screws with foam seal strips attached between the channel and the roof panel. The screws will be drilled from the outside of the roof panel through the foam seal into the channel. They will be spaced approximately 1" from the edge on each side of the belly and 12 in. (30cm) apart. Start the installation approximately 3 to 4 in. (7.62 to 10.16cm) from the ends of the arched panel to allow the ends to sit properly on the angle iron. The sections of C-Channel can be interlocked or butted end-to-end as necessary.

7.5.5. Foam Seal Installation

There are two types of foam weather stripping used when installing C-Channel to an arched panel. One is ½" x 2" (1.27cm x 5cm) with a pressure sensitive adhesive (PSA) on the back. This is used between the C-Channel and the belly of the arched panel, and functions as a weather seal between the two sections. The other foam weather stripping is 1 ½" to 1 ¾" (3.8cm to 4.4cm) x 8" (20cm) wide with pressure sensitive adhesive on the back. This is placed inside the channel between the top of the end-wall panels and the channel. The end-wall panels are pushed up into the foam creating a weather tight seal and to conceal the cut edges of the panels.

If the 2" foam is not available, double strips of Mastic can be used between the channel and the arched panel.



END-WAL FOAM SEALING DETAIL

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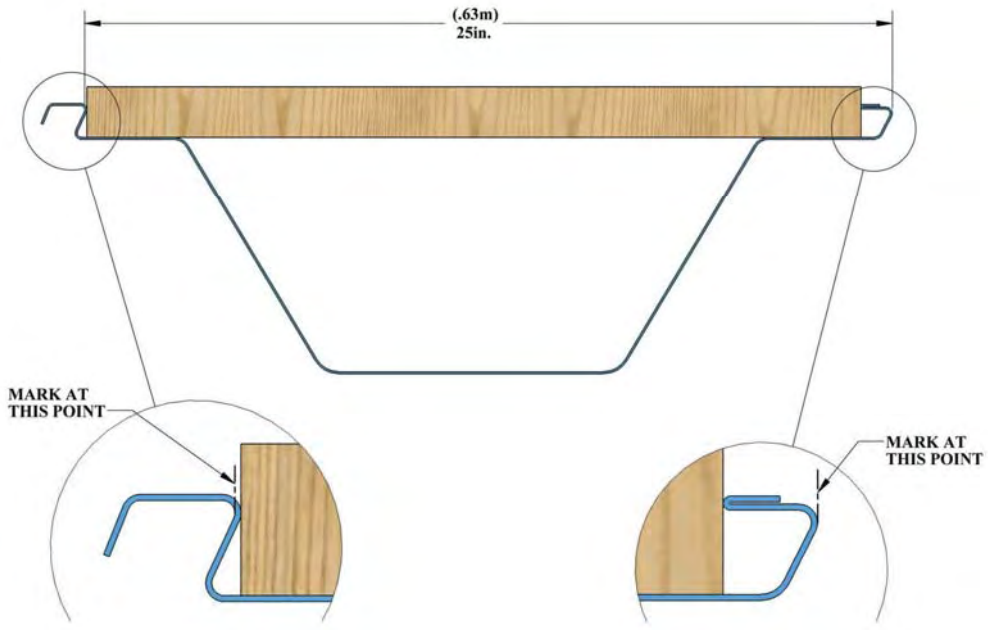
7.5.6. 7.5.2. Measuring Panels

Based on the Cut List provided to the UBM Machine Operators, panels should have been produced and ready for end-wall construction. These panels will need to be measured individually and cut to the proper size and shape to fit into the end-wall channel and sit securely on the angle iron.

After you have determined the starting location of your first panel, On-Center or Off-Center, the panel length requirement must be determined. The easiest way the determine panel length requirement is to create 2 measurement jigs. One jig will be used on the top on the building along the radius and the other at the bottom along the angle iron. The jigs will be constructed out of 4" (10.16 cm) sections of straight panel with either wood or sheet metal braces attached between the hook and hem with TEK screws.



END-WALL MEASUREMENT JIG

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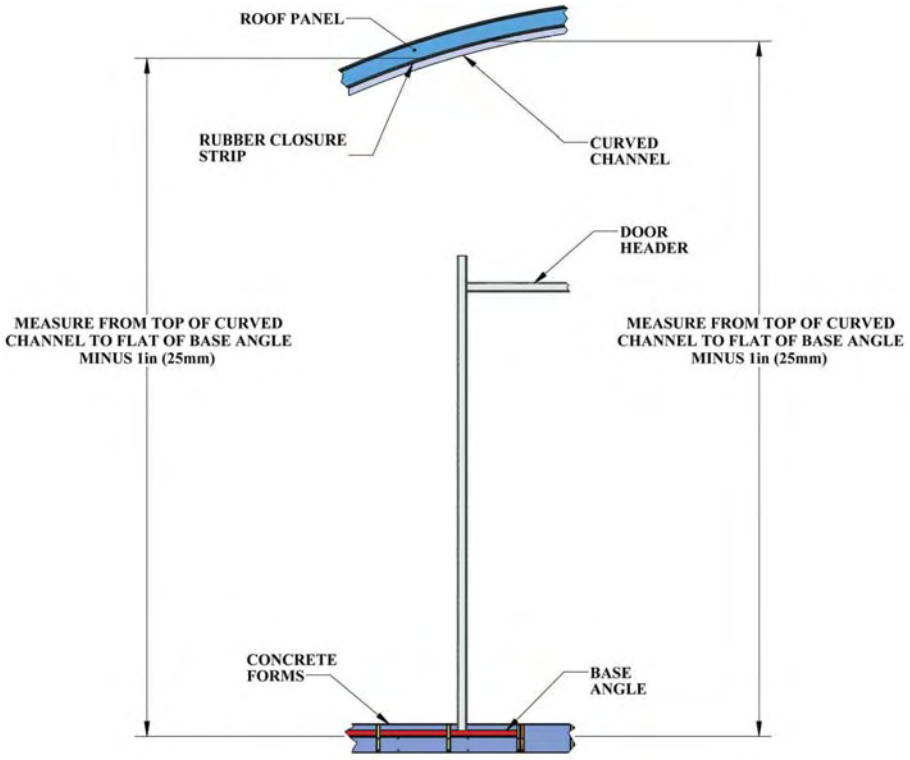
(1) Using a Plumb Bob or Laser Level to determine the center line from the top of the building to the angle iron, mark the center line on the angle iron. The centerline on the angle iron can also be determined by measuring the width of the building and marking the angle iron at the center point.

(2) Place belly of one jig on the angle iron at the desired position on the mark, either On-Center or Off-Center.

(3) Again, using a Plumb Bob or Laser Level, align the jig on top of the building along the C-Channel with the jig on the angle iron. Using the jigs for reference, place marks on the channel and the angle iron along the outside of the HEM and inside of the HOOK .

(4) Measure directly between the mark on the angle iron and the top of the C-Channel for each side and subtract 1" (2.5 cm) from those measurements. These measurements will be the length of the End-Wall Panel at the HEM and the HOOK. Subtracting the 1" (2.5 cm) from each side will allow the panel to press firmly into the foam weather stripping inside the C-Channel.



END-WALL PANEL MEASUREMENTS

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(5) Transfer the HEM side and HOOK side measurements onto a section of straight panel with a marking device.

(6) Draw a line between along the belly of the panel between the HEM and HOOK marks matching the radius or straight section of the roof. There are various methods for transferring the radius of the roof to the panel for cutting:

1. Use a piece of C-Channel that is curved to the same radius as the roof as a guide. Align the edge of the C-Channel with the marks on the HEM and HOOK. Draw a line on the belly of the panel by tracing along the C-Channel guide. For the areas not in contact with the guide, estimate visually by looking straight down from the guide to areas not in contact and draw lines to the edges of the panel to the HEM and HOOK marks. A laser pointer works very well to allow you to follow the guide and place marks on the illuminated dots along the panel. Draw a line connecting the dots. A Combination square can also be used to align the marking device with the guide while marking the panels.

2. Use a flexible piece of material cut to match the radius as a guide. This type of guide can be bent along the contour of the panel and traced. However, caution should be practiced using this method, the material should be sturdy enough not to deform and change the radius. The intent is to bend enough to allow a marking device to trace along the edge and make contact with the panel.

3. For straight sections, any straight edge will work using the above marking procedures.

4. For combinations of both straight and curved sections or areas where two radii's meet, you must calculate the location on the panel where the two angles meet and mark accordingly. It may take a few experiments to get this measured out correctly.

Any method is acceptable to transfer the radius or shape to the panel for cutting.

The process will be repeated for each additional panel; however, after the first panel has been erected, all additional panels will only require measurements on one side. The follow on panels will have one side matching the last panel erected. Place the jigs on the HEM or HOOK of last panel at the top and bottom of the building and transfer marks onto the angle iron and C-Channel. Measure from those marks for the unknown length.

Another method of measuring the panel length's is to place marks on the angle iron along the entire width of the end-wall. After the first panel location has been determined and marked on the angle iron, move the jig left of right as necessary to mark the location of adjacent panels. Take a Laser Level

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and project each location to the roof and mark the C-Channel at those points. All measurements can be made using those marks.

7.5.7. Cutting the Panels

There are two recommended methods to cut the end-wall panels to match the appropriate length and radius of the building.

1. PLASMA Cutter: The quickest and easiest method which is supplied in the MIC-75, if available.

2. Bolt Cutter and KETT Shear: Cut the HEM with a bolt cutter, and use the KETT Shear to cut the panel along the lines drawn on the panel. Both of these tools are supplied with the UBM-240.

HEM PORTION OF PANEL

The cuts must match the radius as close as possible to ensure the tops of the panels make a good seal in the weather strip foam inside the C-Channel. If the panel does not fit properly, make a new one and re-cut that one for one of the shorter panels if possible.

DO NOT USE A TORCH to cut the end wall panels. It will leave a wide burn mark on the panel and will detract from the overall appearance of the finished project.

7.5.8. Panel Lifting and Placement

Once the panel has been marked and cut it can now be lifted into position. The crew on the roof will pull the panel up using a tow rope while the crew on the ground will assist in lifting and controlling the panel as it is raised.

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1. Attach the looped end of the toe rope to the panel using two R-9 Clamps. It is recommended to position the handles facing the opposite direction of each other. If one of the clamps catches on something during the lifting process and opens, there is still another clamp securing it. Being attached in the opposite direction, should avoid catching on the same obstruction and opening.

2. Once the panel is erected into a full vertical position, the crew on top of the building will secure it by hand and remove the rope and clamps. The ground crew will maintain control of the panel at the bottom.

3. After the clamps are removed, the panel will be lowered enough to clear the bottom of the C-Channel. As the panel is being lifted, the crew on top of the roof will guide it into the C-Channel at the designated marks. The ground crew will ensure it is aligned with the appropriate location marks on the angle iron. The ground crew must push the panel up and into the foam seal inside the channel. This may require using a leverage device, such as a tanker bar or pry bar, to push the panel up high enough to set the base of the panel onto the angle iron.

4. Once the panel is in the desired location, attach two R-9 clamps to the angle iron. Place one clamp on each side of the belly side walls. Wood braces can be wedged between the concrete form and the belly of the panel. This will temporarily hold it in place until it can be welded.

7.5.9. Plumbing Panels

It is imperative that the ground crew ensures that the end-wall panels are plumb. They can perform this task using a 4ft (1.21m) level. Each end wall panel will be checked for plumb and adjusted as needed prior to it being secured.

7.5.10. Securing Panels

The bottom of the end wall panels will be secured to the angle iron temporarily with R-9 clamps or wood braces until the entire end wall has been installed. Once completed, the panels can be welded into place.

Each panel will be secured together along the seams with three R-9 clamps, one at the top, middle, and bottom of each seam until the end-wall installation is complete.

The preferred method of securing the tops of the panels is to insert two TEK screws or rivets from the inside of the C-Channel flange through the belly of each panel after it is set, clamped, and checked for plumb. This requires a man-lift or lifting device on the inside of the building. TEK screws or

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rivets will also be inserted through the outside of the C-Channel flange into the HEM and HOOK, however, leave the open side unsecured until the next panel is in place. This will allow the next panel to slide into the channel unobstructed.

Other methods to secure the tops of the panels are as follows:
(1) Insert two TEK screws or rivets on the outside of the building through the belly of the panel into to the interior C-Channel flange, just below the foam seal. Secure the HEM and HOOK same as above.
(2) Secure the HEM and HOOK same as above during the project and insert the TEK screws or rivets through the inside of the flange through the belly after the end-wall installation is completed.

NOTE: THE HEM AND HOOK TEK SCREWS CAN NOT BE INSTALLED UNTIL THE NEXT PANEL IS INSTALLED SO THE SCREW DOES NOT IMPEDE THE INSTALLATION OF THE ADJACENT PANEL DURING INSTALLATION.

NOTE: RIVETS CAN BE USED INSTEAD OF TEK SCREWS. AT TIMES THEY WILL PROVIDE A BETTER FINISHED APPEARANCE AND PROVIDE THE SAME SECURING STRENGTH.

7.5.11. Hand Crimping and Seaming

Once all the end-wall panels are installed, clamped, and secured, seaming operations can begin.

The first step will be to manually crimp the HOOK over the HEM in areas where the Seamer will not be able to completely reach and to prepare the seam for proper Seamer attachment. A Hand Crimper is supplied with the UBM-240.

Prior to attaching the Seamer to the panels, each panel must be hand crimped at the base near the angle iron approximately 12 in. (30.5 cm) up. After the panels have been seamed, the top of each panel will need to be hand crimped near the C-Channel. The Seamer will come in contact with the channel prior to completing the seam. Areas above doors, windows, and vents will also be hand crimped.

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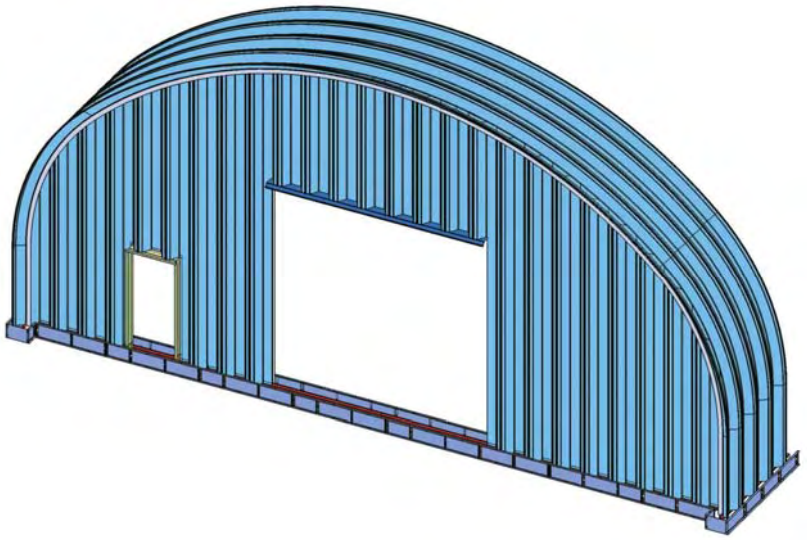

COMPLETED END-WALL

The Seamer will be run to the top of the end wall panel, then reversed and run back to the bottom so it can be removed and placed on the next seam. The crew working in the air will be in control of the Seamer once it is above the reach of the ground crew personnel. The R-9 clamps will be removed just prior to the Seamer coming into contact to the clamps.

7.6. Openings

Various types of openings can be installed on MIC Buildings. These include windows, personnel doors, large equipment doors, vents, louvers, skylights, etc.

Personnel doors and windows of all makes and styles can be installed in our buildings. MIC offers pre-fabricated doors and windows with inserts which install easily and give the finished building a clean, quality look.

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7.6.1. Doors

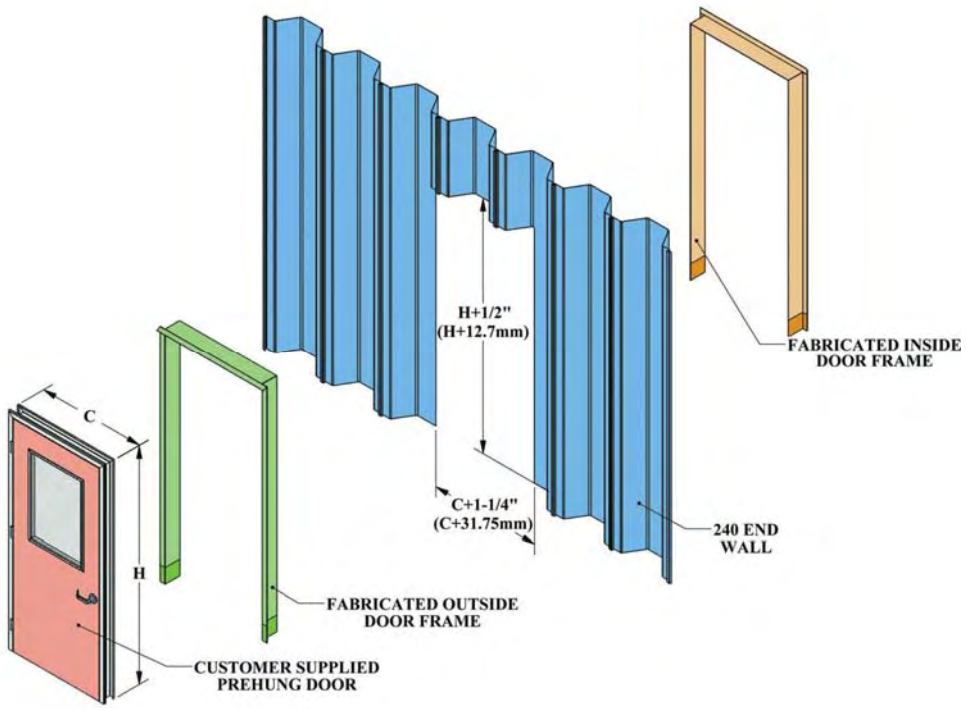
7.6.2. Personnel Doors

The procedure in this section is for door installation in the end-wall of the building. Below is an example of a personnel door designed by M.I.C. that allows for quick fabrication and simple installation. Consult with a local structural engineer for alternate designs.

Door installation in a UBM-240 building is a simple task. For placement, the easiest method is to have the sides of the door frame attach to the flat, belly portion of the end wall panels.

The metal frame described in the illustrations is a sample frame, designed by M.I.C. that allows for quick fabrication and is simple to install. Consult with a local structural engineer for alternate designs.

The frame is fabricated from 12 GA (2.5 mm) steel, consisting of a two piece insert. The first piece slides into the pre-cut hole in the end wall from the inside of the building. The second piece then slides into the first piece from the outside of the building. The door with accompanying frame will slide into insert. Be sure to add sufficient length to each side of the insert in order to attach it to the angle iron and or embed in the concrete. The length should be determined by a local structural engineer. The dimensions of the frame are dictated by the door size itself. See the following diagrams for detailed construction information.



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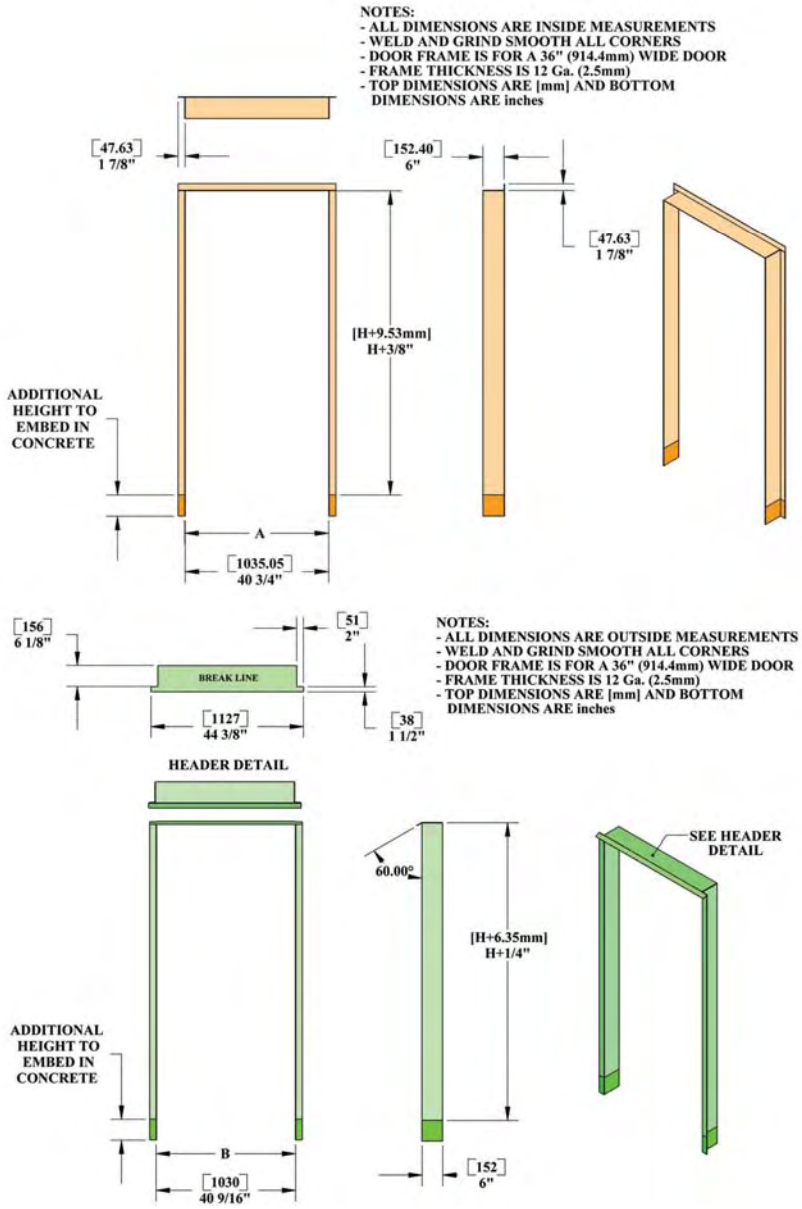
DOOR INSTALLATION



DOOR CONSTRUCTION DETAILS

The height of the door is at the discretion of the user. Dimension "H" in the above illustration does not include the provision for embedding the legs of the two piece shell into the concrete. Use "H" as the base dimension and add the additional value as depicted in the illustration to allow proper installation clearance.

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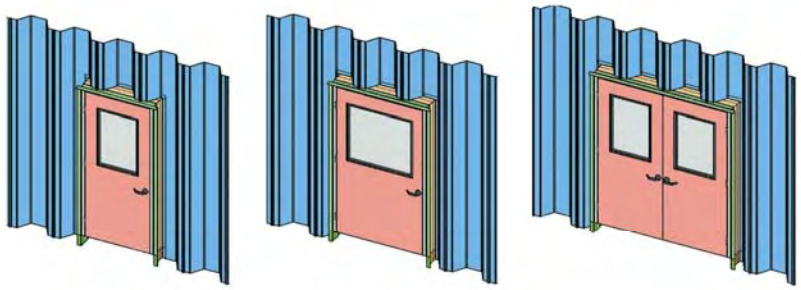


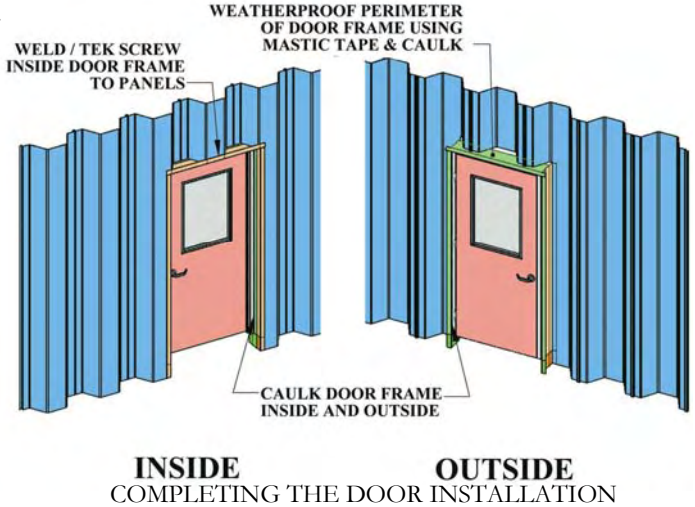
36 in (.9 m) Wide Door | 48 in (1.2 m) Wide Door | 72 in (1.8 m) Wide Door

Door Width	Dimension A (Inside Dimension)	Dimension B (Outside Dimension)	Door Size C (Outside Of Jambs)	Cutout Width
36 in (914 mm)	40.63 in (1016 mm)	40.62 in (1032 mm)	40 .3 in (1024 mm)	41 in (1041 mm)
48 in (1219 mm)	52.81 in (1321 mm)	52.63 in (1.34 mm)	52 in (1328 mm)	53 in (1346 mm)
72 in (1829 mm)	76.81 in (1930 mm)	76.63 in (1946 mm)	76 in (1938 mm)	77 in (1956 mm)
Other Widths (W)	W + 4 in (W +102 mm)	W + 4.6 in (W + 117 mm)	W + 4.3 in (W + 109 mm)	W + 5 in (W + 127 mm)

VARIUOS DOOR CONFIGURATIONS

To attach the two piece shell to the end wall panel, use structural rivets or sheet metal screws. Once installed, weatherproof it using mastic tape and a silicon sealant.

Once the frame is installed, the door, with its frame will be installed. This is done utilizing either rivets, sheet metal screws, or by welding. The spaces between the door frame and the shell should also be weatherproofed.



COMPLETING THE DOOR INSTALLATION

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There will be times when the door widths do not match the widths of the end-wall panels. Special modifications need to be done. Consult a structural engineer for a frame design that will withstand the wind loads for your area.

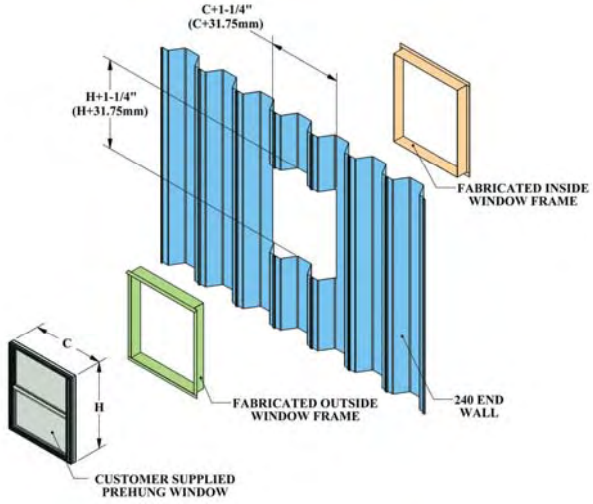
7.6.3. Equipment Doors

For large equipment doors, it is recommended to use a roll-up type door. These doors work best with our structures; however, other types of doors can be used. Other types of large doors can be swinging, sliding, rolling, or garage style panels. For large doors, it is recommended to install a frame support prior to installing the end-wall. All other openings can be installed during the end-wall construction process or after the walls are complete.

7.6.4. Windows

The procedure in this section is for window installation in the end-wall of the building. Below is an example of a window designed by M.I.C. that allows for quick fabrication and simple installation. Consult with a local structural engineer for alternate designs.

The frame is fabricated from 12 GA (2.5 mm) steel, consisting of a two piece insert. The first piece slides into the pre-cut hole in the end wall from the inside of the building. The second piece then slides into the first piece from the outside of the building. The window will slide into the two inserts. The dimensions of the frame are dictated by the window size itself. See the following diagrams for detailed construction information.



WINDOW CUTOUT AND INSTALLATION

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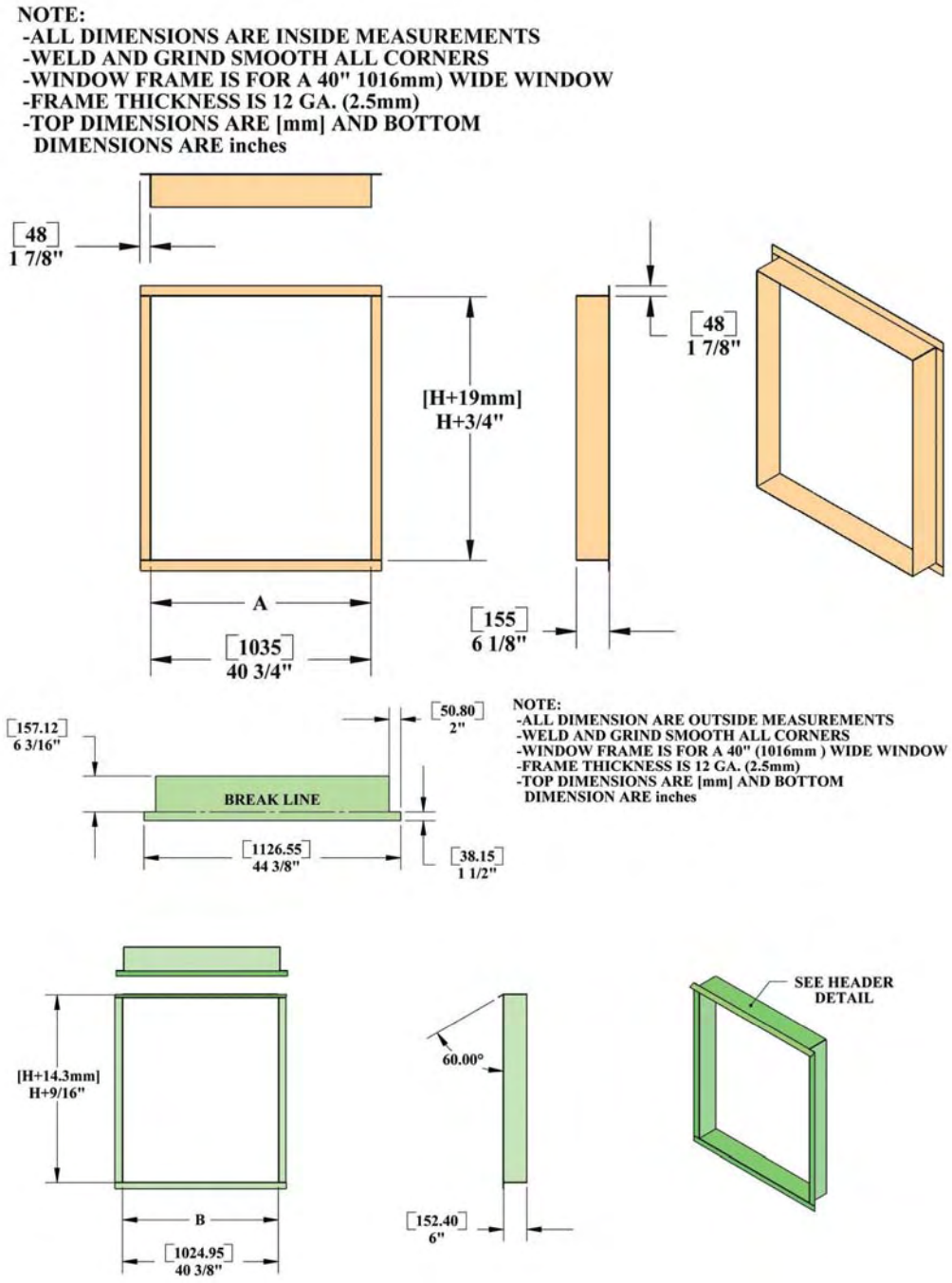

WINDOW CONSTRUCTION DETAILS

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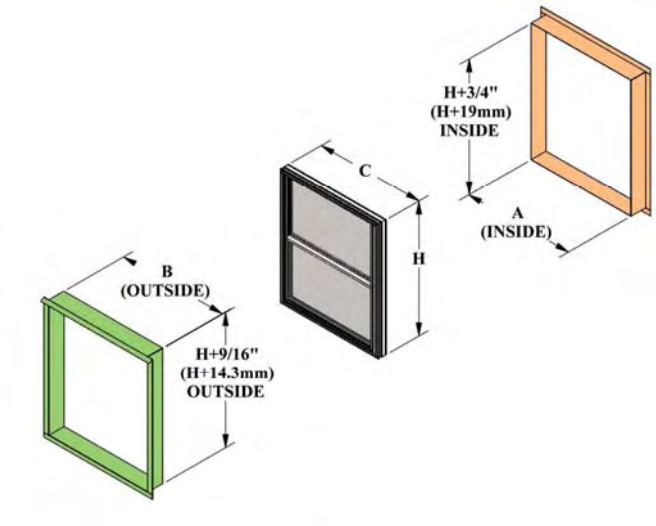
The height of the window is at the discretion of the user. Dimension "H" is shown as the base dimension of the height of the window frames top extrusion to the bottom of the lower corner. Use the "H" as the base dimension and add the additional value as depicted in the above illustration for proper installation clearance.



Cutout Width	Dimension A (Inside Dimension)	Dimension B (Outside Dimension)	Window Size C (Outside Of Jambs)
41 in (1041 mm)	40.6 in (1031 mm)	40.3 in (1024 mm)	40 in (1016 mm)
49 in (1245 mm)	48.6 in (1234 mm)	48.3 in (1227 mm)	48 in (1219 mm)
C + 1 in (C + 25 mm)	C + .6 in (C + 15 mm)	C + .3in (C + 8 mm)	Other Sizes

FRAMING THE WINDOW

Attach the inside frame first using TEK screws or rivets. A strip of neoprene rubber or mastic tape should be used around the perimeter before fastening into place. Install neoprene rubber or mastic tape to the outside frame and insert it into the first portion, use TEK screws to secure it into place. Install the window using TEK screws to secure the window frame to the metal frame. Apply silicon caulking around the perimeter inside and out.

When the windows are required in the main building side-walls, consult a structural engineer for guidance.

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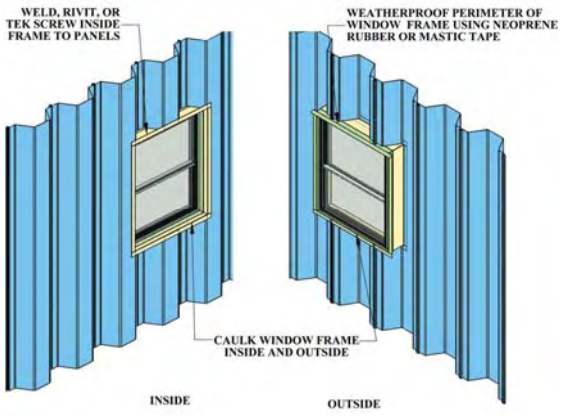

TYPICAL WINDOW VIEWS

7.6.5. Vents

Turbine style ventilation can be installed easily in the UBM buildings. Normally they are installed on the very top of the building. We recommend an installation which allows for the least cutting of the panels.

Determine the location of the ventilation and how many panels that will be affected. The ideal method is to use a two panel installation. Cut a series of holes to coincide with the ventilation requirements. Check with the manufacturer to determine the amount of air flow needed for proper operation. If this information is not available, match the square area of the throat of the ventilator with the cutout in the panels.

Fabricate side and top covers to match the building panels. Use mastic tape or other sealants to complete the installation.

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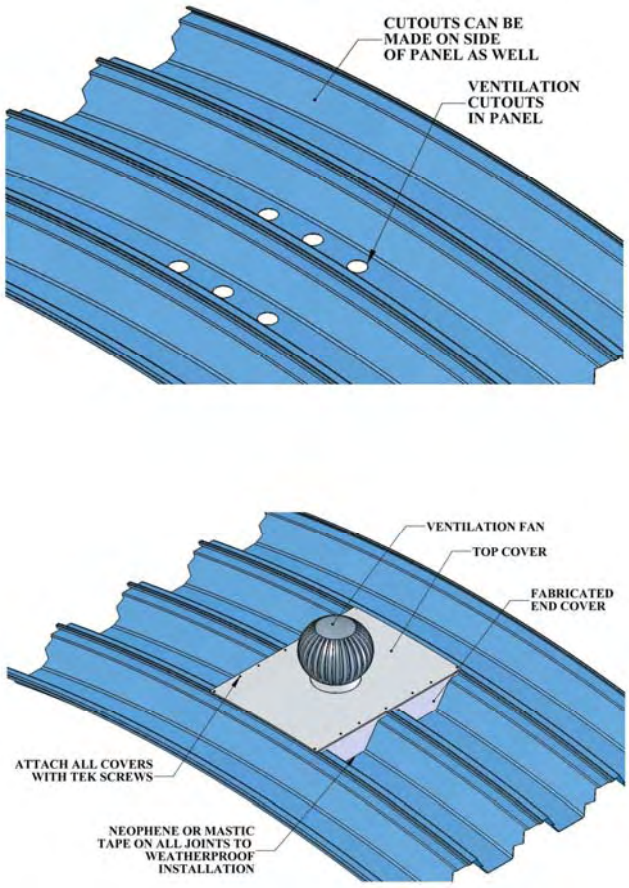

PROPERLY INSTALLED EXHAUST FAN

If powered ventilation is required they are usually installed in the end walls of the building. Follow the window installation procedures for creating a sample frame that will work well with powered ventilators.

7.6.6. Sky Lights

We recommend keeping the number of skylights to a minimum since they required continuous maintenance. Consult with a structural engineer to determine how many skylights can be installed safely in your building.

Fabricate a skylight using polycarbonate glass and an aluminum frame. Many window and door manufacturers can fabricate assemblies easily. They are also available at M.I.C. Industries.
Measure the skylights height and width to determine the opening needed to install the skylight. Subtract 1 5/8" (4.13 cm) from the total width and height to determine the size of the cutout needed. Use a plasma cutter or other suitable cutting device to cut the hole in the building panel.

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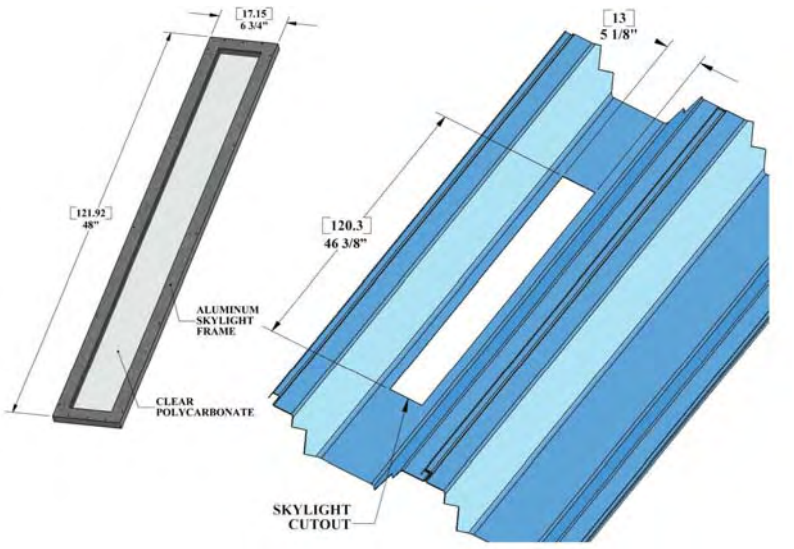
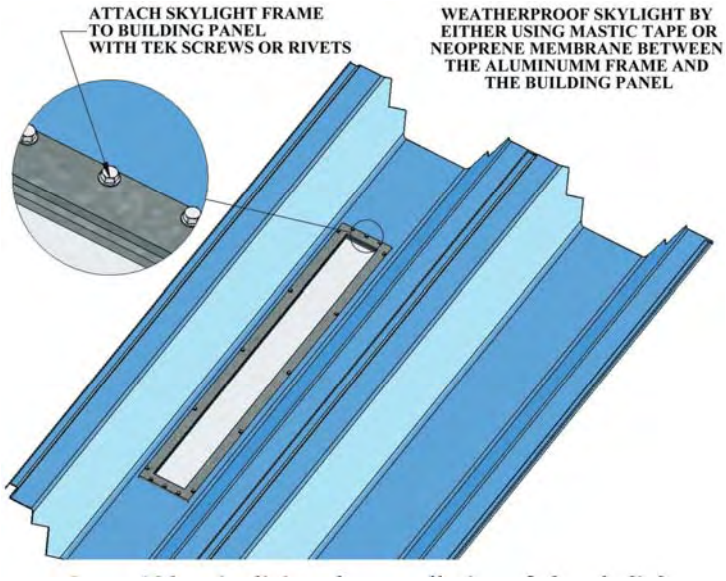


PREPARING FOR SKYLIGHT INSTALLATION

To weatherproof the skylight, apply mastic tape, or other sealant, to the perimeter of the hole and firmly place the skylight into position. Use self drilling TEK screws or rivets to fasten the skylight to the panels.



FINALIZING THE SKYLIGHT INSTALLATION

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7.7. Finishing

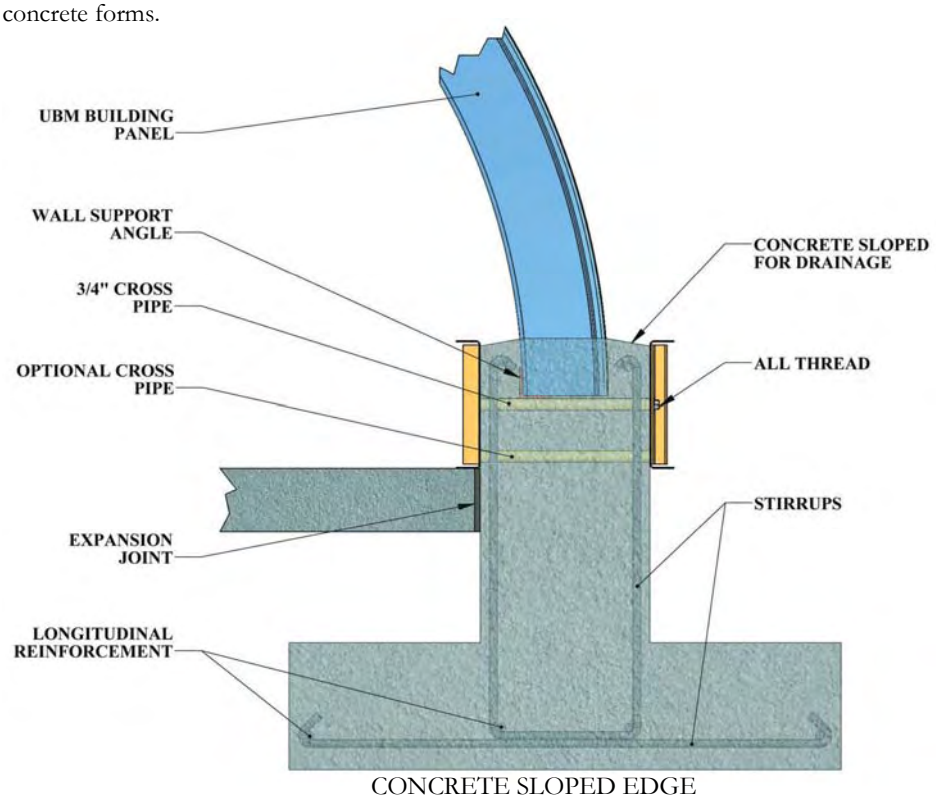
Once the building has been erected and the end walls with desired openings are complete, the final step will be placing the concrete with appropriate curb, weatherproofing, and adding utilities if desired. Once the concrete has been placed, the building will be at its most stable state.

NOTE: NO MATTER HOW GOOD THE PROJECT LOOKS UP TO THIS POINT, A POOR JOB FINISHING THE IT MAY RESULT IN AN UNSIGHTLY COMPLETED BUILDING.

7.7.1. Curb Placement

When placing concrete, use a concrete vibrator to avoid "honey combing" or air pockets in the pour. The objective is to obtain a good bond around the angle iron, rebar, and the ends of the panels.

On the inside of the building the concrete will be screed and finished to the top edge of the forms. A broom can be used at this time to give a textured finish, if desired. On the outside of the building the concrete is trowled at an angle away from the building to ensure water runs off and away from the structure. The recommended slope is 2" (5.08 cm) from the building panels down to the top of the concrete forms.



CONCRETE SLOPED EDGE

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While placing the concrete, care should be taken to avoid excess splatter onto the panels, however some will be unavoidable. To wipe off the building it is best to use DRY rags and as the concrete starts to cure it will turn to a grayish color. It is then that it is easily wiped or rubbed off of the metal building panels. As it is wiped off it will turn to a dusty powder and fall off the panels. Wipe off the splatter as soon as possible to obtain a clean, quality appearance. If it is allowed to fully cure, it will be extremely difficult to remove. The extra time and effort will be well forth it in the appearance of the final product

NOTE: ATTEMPTING TO REMOVE THE SPLATTER BY POWER WASHING THE PANELS AFTER THE CONCRETE HAS FULLY CURED DOES NOT WORK.

7.7.2. Weatherproofing

An additional weather proofing option and highly recommended, is to paint the base of the panels that will be embedded in the concrete with a rubberized paint. Pool paint is a good example of paint to use. This will protect the steel panels from the caustic reactions of the concrete while curing.

NOTE: IN THE TECHNICAL MANUALS YOU CAN FIND A SPECIFICATION SHEET ON ANOTHER RECOMMENDED RUBBERIZED PAINT.

Apply MASTIC around any cut and exposed edges to prevent rust. For areas that were scratched during construction, touch up these areas with a color matched spray paint to prevent rust.

7.7.3. Utilities and Interior Finish Work

There are many ways to install utilities in our building, below are a few examples. The use of the structure will determine which method you use.

The TROFF method has been used by many UBM users. The TROFF is a straight panel from the UBM-120/240, ABM-120/240, or the MIC-163. Take the straight panels and install them by hanging them from the tabs in a straight line. To install the TROFFS you can use TEK screws through the straight panels into the TABS. The best way of installing the TROFFS is in 20 to 25 ft. sections (6.09m to 7.62m) and interlocking the ends. Installing TROFFS will require a lifting device to allow you to get up into the roof area. A scissor lift works best for this, but man lifts, and scaffolding have been used to accomplish this task. The TROFFS will allow you to suspend any style of light fixture from the bottom of the TROFF. It also allows you to run all conduit and electrical wires inside the panel. The TROFF provides a nice clean look in the ceiling and is color matched to the inside of the roof panels. The TROFF can also be used to suspend a fire suppression system in the same manner. It would also give a nice clean look with only the sprinkler system heads protruding through the TROFF panels.

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Another method of installing utilities is by using unistrut material. This method gives you more options on where you can suspend your utilities since you do not have to rely on a Tab being in every location. With unistrut material you are able to create a grid for the suspension of your utilities. This method is easier to install but may not provide the appearance desired..

There are various methods to apply insulation in M.I.C. buildings. We highly recommend using our MIC-500 and MIC-550 system or our MIC-660 and MIC-800 system. They are both spray on insulation systems.

The MIC-500 machine sprays a Cellulose material which provides a good insulation value and is a fire proof material and has an additive in the material to combat against insects burrowing into the cellulose material. Cellulose material is also an excellent sound proofing material. The MIC-550 machine applies an exterior protective cover or shell for the cellulose material.

The MIC-660 machine applies a spray on polyurethane material that provides a great insulation value to the building. The MIC-800 machine applies a fire proof coating material that is sprayed over the polyurethane material.

Other materials have been used in our buildings but none are installed as easily. If you choose to utilize another type of material the Technical Support Specialist can offer you some recommendations on how to proceed.

If you are planning on installing interior walls and partitions or possibly a second floor the Technical Support Specialist can proved some valuable information and recommend some methods in accomplishing these tasks.

One method of securing interior walls to the inside of our building which we highly recommend is utilizing TABS to anchor the interior walls and partitions. C-Channel can even be attached to TABS and will provide a good expansion joint for the interior walls and partitions. The C-Channel will also work well if you are using CMU Blocks for your interior walls and partitions.

Other interior possibilities would be using our straight panels for drop ceilings. We have had some very good results with customers utilizing this type of design. Also, Cellulose material is great for sound proofing and as insulation above the drop ceilings. You can spray the cellulose material into the ceiling cavities in a dry state which will meet all of your additional sound proofing or insulation requirements

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If you are using metal or wood material for studding out interior walls or partitions again the Cellulose material will work well being applied in between the studs prior to the wall covering being installed. You can spray the cellulose material into the stud cavities with just water to apply enough adhesion to allow you to install the wall coverings, but we recommend a glue mixture (5 to 1 or 6 to 1) while performing this method.

Any item or material that will be connected to the interior of our building we HIGHLY recommend that the items be attached at the interior seams by using TEK screws. The TEK screws will not put a hole in the arched panel but will wedge itself in between the seams of the HEM and the HOOK. This connection is very secure and holds very well.

If for any reason a hole has to be made through the panel while performing any interior work, we recommend using a rubber grommet screw or bolt and if it is possible take added precautions by caulking around the interior of the opening. We recommend using a silicone (paintable) caulk or match the caulk to the color of the steel being used for the project. NEVER USE CLEAR caulk, even though the opening may be sealed properly, light will show through the clear caulk.

For questions or technical assistance, contact the Technical Support Department at trainers@micindustries.com or you can always call or email one of the Technical Support Specialists directly using the contact information provided during this training session.

7.8. Safety

In the work place and on the job Safety is an ongoing effort of providing and environment that is free from conditions which will cause injury through education, identification, and counter measures. Safety demands supervisors are diligent in identifying hazards, educating workers about the hazards and providing protections from the hazards for all workers.

Any endeavor undertaken in life has potential risk and hazards. The operation of the UBM-240 and construction of buildings also have potential risk and hazards. This section will help identify the hazard and provide safety guidelines on actions to take, equipment to use, and protective measures to take to minimize the risk and hazards.

7.8.1. Fall Restraint System

The construction of a UBM building requires personnel to work off the ground at various points in the process. OSHA (the U.S. Department of Labor OCCUPATIONAL SAFTEY & HEALTH ADMINISTRATION) provides that protection must be provided for workers who work on platforms that are 6 feet (1.8m) above the next lower level. They advise that the use of a guardrail

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system, safety net systems or a personal fall arrest systems can be used to provide this safety from falling. M.I.C. Industries provides a personal fall arrest system for this purpose, and believes this to provide the best protection during construction.

Earlier in this chapter you learned that personnel have to work on top of the building. The size of the building will determine how many personnel need to be on the building and the fall arrest must be provided for each person on the building.

The system has the following components.

1. Roof Clamp
2. 50 ft. Life Line
3. Safety Harness

7.8.2. Personal Protective Equipment

Ensure that all personnel are wearing the appropriate Personal Protective Equipment.

Hard Hats are to be worn at all times, especially when overhead work is performed or additional overhead risk exists.

Wear gloves when working with steel panels or steel coil stock.

Wear safety glasses. During operations in dusty areas, use of face or dust mask should be worn.

All personnel working on top of the building or on lifting devices will use a Fall Restraint System.

7.8.3. Tool Utilization

Read Safety instructions for all tools.

Keep work area clean and free of clutter.

Don't expose power tools to rain. Don't use power tools in damp or wet locations.

Don't use power tools in the presence of flammable liquids or gases.

Electric tools should be properly grounded while in use. Prevent body contact with grounded surfaces.

Extension cords. Use only 3-wire extension cords that have 3-prong grounding-type plugs and 3-hole receptacles that accept the tool's plug or 2-hole extension cord and adapter for tools that use 2-prong. Make sure the extension cords are in good condition. When tools are used outdoors, use only cords intended for outdoor use. Ensure cords are heavy enough to carry the current the tool will draw. The following chart shows the correct size to use depending on the cord length and nameplate ampere rating. If in doubt, use the next heavier gauge. The smaller the gauge number, the heavier the cord.

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MINIMUM GAUGE FOR CORDS SET

VOLTS	TOTAL LENGTH OF CORD IN FEET					
240 Volts	0-25	26-50	51-100	101-150		
240 Volts	0-50	51-100	101-200		201-300	
Ampere Rating						
More than	Not more than	AWG				
0	-	6	18	16	16	14
6	-	10	18	16	14	12
10	-	12	16	16	14	12
12	-	16	14	12	Not recommended	

When not in use, tools should be stored in a dry, locked placed.

Keep tools sharp and clean. Follow instructions for lubricating and changing accessories. Inspect tool cords periodically and if damaged, have repaired by authorized service facilities.

Keep handles dry, clean, and free from oil and grease.

Do not force tools during operation. If additional force is required, inspect the tool for adjustment or maintenance.

If tools are damaged they should be repaired by an authorized service center. Do not use tool if the switch does not turn it on or off.

Use tools for their intended uses.

Do not operate tools when you are tired.

Disconnect tools when not in use, before servicing, and when changing accessories.

Do not wear loose clothing when operating tools.

Remove adjustment keys and wrenches from tools before turning them on.

Avoid unintentional starting of tools. Keep finger off the switch when while carrying it, and ensure the switch is off before plugging it in.

7.8.4. Guy Ropes and Tag Lines

While moving the PICK from the Assembly Area tag lines may be necessary to prevent the sides from swinging, if the assembly is being raised above the erection crew's head. Ground crews should never place themselves beneath any elevated structures. In order to properly secure the first PICK and plumb the building, guy ropes will be used. The guy ropes should not be removed until the building is at least as long as it is wide.

Do not tie the guy ropes to any sharp objects such as tab hangers that have been torched to create a hole for attachment. These sharp edges can fray or cut the ropes and allow the structure to be unsecured. The use of shackles is recommended when attaching to the tabs.

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Additional ropes can be installed for safety.

Ensure the anchoring points are heavy and secure enough to hold the panels in place. Unused steel coils can be used as temporary anchors.

7.8.5. Working Aloft

At any time when workers are working aloft, a fall restraint device should be used. This includes elevated positions such as on top of the building, on man-lifts, on scaffolding, or any area over 6 ft (1.8 m) above the next lower level. No more than minimum number of workers needed should be working aloft. This number will be determined on a case by case basis in order to safely complete the intended operation.

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