

Section 9

Fox 1440 ICF

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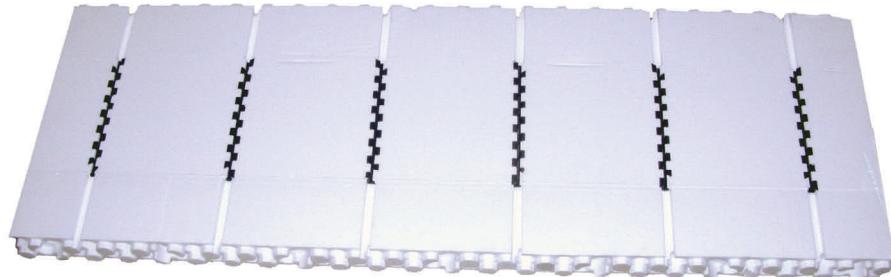


Section 9 - Fox 1440 ICF

9.1 Fox 1440 Product overview

The Fox 1440 ICF Wall System is a knock-down insulated concrete form (ICF) wall system. It is an ICF system which forms flat concrete walls with uniform thickness. These walls are of pre-determined thicknesses of 4, 6, 8, 10 and 12 inches. Concrete walls with thicknesses greater than 12 inches can be easily build with Fox 1440 in thicknesses of 2" increments as is explained in Section 9.2.

The Fox 1440 ICF system has expanded polystyrene (EPS) panels with embedded polypropylene components known as grippers, spaced 8" on center along the panels.



9_1A Panel

The grippers serve to receive the ends of "ties" which are known as webs, as these webs pass through the concrete cavity. The webs slide into the grippers in the panels to assemble the Fox 1440 form.



9_1B 4" web



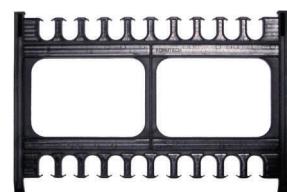
9_1C 6" web



9_1D 8" web



9_1E 10" web



9_1F 12" web

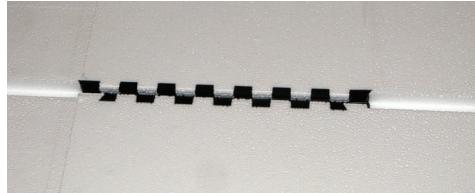
The Fox 1440 form assembly takes place at the jobsite.



9_1G Wall being assembled

The Fox 1440 ICF is a stay-in-place forming system. After the concrete has been placed into the wall forms, the forms remain in place and the EPS panels provide the insulation in the wall assembly.

The grippers also serve to provide attachment locations to the wall, as would a stud in wood frame or steel frame construction.



9_1H Gripper

In summary the Fox 1440 ICF is a knock-down insulated concrete form system, assembled at the jobsite, which forms flat concrete walls. The expanded polystyrene serves as wall insulation once the building is occupied and the grippers serve as attachment locations for exterior and interior finishes.

9.2 Description of Fox 1440 ICF components

The Fox 1440 ICF Wall System was designed as a knock-down system to be assembled on site.

The system is primarily made up of flat panels 16" by 48" by 2.5" each having 6 grippers embedded in the EPS and webs which bridge through the concrete cavity.

The flat panels are available in 3 configurations:

- Flat 2.5" thick panels



9_2A 2.5' thick panels

- Taper Top panels which have reduced thickness of EPS at the top enabling the concrete wall to become thicker at the top of the wall. These are used in situations where a designer needs to increase the surface bearing area of the wall to support such construction as a floor system or roof:



9_2B Taper Panel

- Corbel panels. This panel will form the concrete with a corbel or ledge which typically is used to support brick veneer exterior finishes.



9_2C Corbel Panel

All three of these panels have grippers oriented vertically and spaced 8" on center along the length of the panels.

Webs:

The webs (aka cavity webs) slide into the grippers to space two panels a fixed distance apart. The thickness of the formed wall is determined by the width of the webs used. Webs are available in lengths to create Fox 1440 ICF walls with concrete thicknesses of 4", 6", 8", 10" and 12".



9_2D 4" web



9_2E 6" web



9_2F 8" web

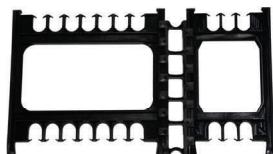


9_2G 10" web



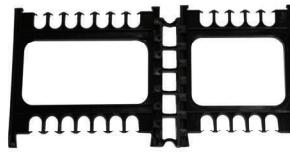
9_2H 12" web

Wall thicknesses greater than 12" can be readily constructed using the Webex, which is a part that connects 2 webs. Webxes can be used to join webs of any length.



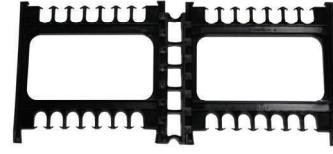
Using 8" + Webex + 4"

9_2I 14" web



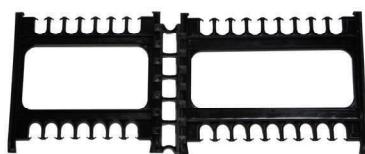
Using 8" + Webex + 6"

9_2J 16" web



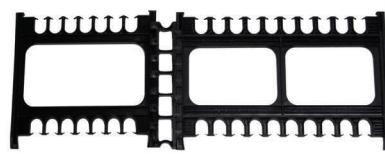
Using 8" + Webex + 8"

9_2K 18" web



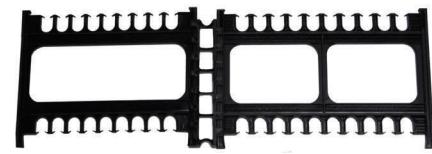
Using 8" + Webex + 10"

9_2L 20" web



Using 8" + Webex + 12"

9_2M 22" web



Using 10" + Webex + 12"

9_2N 24" web

90 Degree Corner forms:

Fox 1440 has formed 90 Degree Corner panels for 4", 6" and 8" walls. These "L" shaped panels are shipped in bundles and are easily assembled with webs on-site to create Fox 1440 corner forms.

Each pair (one outside panel and one inside panel) is designed to receive 4 webs of the intended cavity size 4", 6", or 8". Plus, they are designed to receive one web of the next

size larger to be placed in the corner diagonally. For example, if you are assembling a 6" corner, it needs four 6" webs and one 8" web. This additional web in the corner provides additional support and makes for a stronger corner form.



9_2O 90° Corner Panel

45 Degree Corner forms:

Fox 1440 has 45 Degree Corner panels in the 6" and 8" thicknesses. These are assembled on-site with 4 appropriate sized webs to create 45 Degree Corner forms.



9_2P 45° Corner Panel

Fox 1440 PCV Corner Guides:

Fox 1440 also has a system of PVCLs and PVCTs, which can be used with straight panels to build 90 degree corners. These are used when constructing walls which are 10" and 12" thick. This system can also be used for the 4", 6" and 8" systems which can provide advantages in some cases such as constructing a wall with significant amounts of rebar in the corners, or in remote locations where transportation efficiency is paramount.



9_2Q PVC Corner



9_2R PVC Corner 2



9_2S PVC Bundle

Fox 1440 has PVC 45 degree corner guides, similar to the PVCLs and PVCTs, to enable the easy construction of 45 degree corners with straight panels. This system is used for constructing 45 degree corners with wall thicknesses of 4", 10" and 12".



9_2T PVC 45° Corner



9_2U PVC 45° Corner 2

9.3 Information needed when ordering Fox 1440.

There are three steps needed to make a Fox 1440 order and they are:

- i) Conduct a material estimate of the wall height and length and determine the number of each type of form needed,
- ii) Determine the number of components in each form,
- iii) Determine the quantity of each component needed considering the minimum order size for each component.

For the material estimate, please see Section 4.1 as the method to determine the number and type of forms needed is the same for Fox 1440 as it is for Fox Block.

Calculation of number of panels required:

To calculate the number of straight panels needed take the number of standard forms needed and multiply by 2 to get the total number of panels needed.

When ordering Taper-Top panels, assuming the form is to have a Taper-Top panel on one side and straight panel on the other, determine the number of Taper-Top forms needed. The number of taper-top panels needed is the same number as the number of forms. Plus the same number of straight panels will be required.

Similarly for corbel panels, assuming the form is to have a corbel panel on one side and a straight panel on the other, determine the number of corbel forms needed. The number of corbel panels needed is the same as the number of forms. Plus the same number of straight panels will be required.

For 90 Degree Corners each corner has two "L" shaped panels, the longer being the outside panel and the shorter being the inside panel. These panels are connected with 4 webs of the same length as used in the wall, and one placed diagonally in the corner that is the next size longer. Therefore, each 90 Degree Corner has 2 EPS panels, 4 webs the same length as are used in the wall and one web which is 2 inches longer.

The 45 Degree Corners have two EPS panels, the longer being the outside panel and the shorter being the inside panel, and 4 webs of the length used in the wall.

PVC corner parts:

PVCL, PVCT are 48" in length and are ordered by the piece. However they are used to construct corners in pairs consisting on one PVCL and one PVCT.

The PVC45 are 48" in length and are used in pairs consisting of two PVC45s. Each pair requires 3 webs of the length used in the wall.

Calculation of the number of webs required:

- i) For the straight forms determine the number of forms required for each wall thickness and multiply by 6 to determine the number of webs required in each size,
- ii) For each 90 Degree Corner form multiply the number of forms by 4 to determine the number of webs of the given thickness of the wall, PLUS add one web for each 90 Degree Corner form of the next size larger web,
- iii) For each 45 Degree Corner form multiply the number of corner forms by 4 to determine the number of webs of the given thickness of the wall,
- iv) For each PVC45 ordered multiply by 3 to determine the number of webs needed of the given thickness of the wall,
- v) Total items i), ii), iii) and iv) for each web size. These totals are the number of each size of web needed for the project.

The final calculation needed is to take the total number of each component, divide it by the quantity in each package as given below, which is the minimum quantity shipped for each component. You must round up to the next even number of packages of the components as Airlite Plastics Co. does not ship quantities less than as packaged.

Minimum packaged quantities of Fox 1440 components:

The straight panels are shipped in bags, 10 panels in each bag,

The taper-top panels are shipped in plastics bags, 10 panels in each bag,

The corbel panels are shipped in corrugated trays with 8 panels in each tray,

The 4 inch 90 degree corners are shipped in bundles of 6 corners (12 pieces of EPS),

The 6 inch 90 degree corners are shipped in bundles of 6 corners (12 pieces of EPS),

The 8 inch 90 degree corners are shipped in bundles of 6 corners (12 pieces of EPS),

The 6 inch 45 degree corners are shipped in bundles of 10 corners (20 EPS pieces),

The 4 inch webs are shipped in boxes with 300 parts in the box,

The 6 inch webs are shipped in boxes with 210 parts in the box,

The 8 inch webs are shipped in boxes with 150 parts in the box,

The 10 inch webs are shipped in boxes with 130 parts in the box,



The 12 inch webs are shipped in boxes with 90 parts in the box,
The webex parts are shipped in boxes with 430 parts in the box,

The PVC corner parts, PVCLs, PVCTs and PVC45s are shipped by the piece.

Remember the Fox 1440 system requires the contractor to determine the number of components needed and round up to the minimum quantities shipped for each component.

9.4 Fox 1440 ICF assembly

Assembling straight forms.

Step 1: Take 2 panels and space them apart approximately the distance of the form size you are planning to make. Make sure that the web-slots in the grippers molded into the EPS panels which receive the webs, are facing each other.

Step 2: Take 2 webs of the same width and the correct width to make the intended form size, and slide one into grippers through the web-slot on the inside of the panel first at one end of the panels and then at the other end. This sets up and supports the panels.

Step 3: Take 4 more webs of the correct width and slide them into the web-slots so that there are a total of 6 webs connecting the two panels.

Step 4: When pushing a web down through the web-slot use a push with an even force. As the web is forced through the gripper a clicking or ratchet sound will occur. The web is in position when further pressure cannot move it further. Do not attempt to push the web further with excessive force, as this may cause the web to break.

Please note that webs in place in a form can be removed by pulling up on the webs, but care must be taken to not damage the webs. Undamaged webs and panels can be used after the webs have been removed.

In a similar manner Fox 1440 forms can be made with Taper-Top panels or Corbel panels.

The Fox 1440 system provides increased flexibility when compared with factory assembled ICFs as the contractor can assemble the form with Taper-Top panels on one or both sides as required by the job. Likewise, with the Corbel panel it can be assembled on one or both sides to meet the requirements of the project.

Assembling the 90 Degree Corner forms:

To assemble the 90 degree corners take a pair of EPS panels, the longer one is the outside panel and the shorter one is the inside panel and place them side by side with the web-slots of the grippers facing each other. With the distance between the panels equal to the size of the concrete cavity, slide the 4 webs into place. Then slide the fifth longer web into the diagonal position in the corner.



Assembling the 45 degree corners:

To assemble the 45 degree corners take a pair of EPS panels, the longer one is the outside panel and the shorter one is the inside panel and place them side by side with the slots for the gripper facing each other. With the distance between the panels equal to the size of the concrete cavity, slide the 4 webs into place.

Constructing corners with PVCLs, PVCTs and PVC45s:

Constructing corners with PVCLs, PVCTs and PVC45s is done while the walls are being stacked up. The instructions to build corners with PVCLs, PVCTs and PVC45s are covered in the next section, Section 9.5 Construction Fox 1440 walls.

9.5 Constructing Fox 1440 walls

Once the Fox 1440 forms have been assembled the construction of the Fox 1440 wall is the same as with Fox Blocks with a few exceptions.

Therefore please refer to Chapter 4 for installation instructions.

The exceptions that differ with Fox 1440 occur when formed corners are not used. In those cases the PVCLs, PVCTs and PVC45s will be used to construct the corners.

First and subsequent odd numbered courses:

Step 1: Take two panels, "A" and "B" and butt them together at a 90 degree angle and insert the corner PVCL, sliding it into the appropriate web-slots, as shown in the diagram. Then guide the out-side PVCT into the slot in the PVCL and around the end of panel "A". This completes the outside panels of the corner.

Step 2: It is recommended that the PVCL is cut into a 2 foot length so the break between PVCLs going up the wall occurs in the mid height of the panels rather than at the elevation of the joints between the panels. This provides extra support through the corner and reduces the risk of the panels lifting.

Step 3: To build the inside of the corner, cut 8 ½ " from the right end of panel "C" (the panel facing "A"). Put the remaining panel, which now has a length of 39 ½ " in place and insert the webs as usual.

Step 4: Cut ½ " off the left end of panel "D" (the panel facing "B"). Position this panel, which has a length of 47 ½ " and insert the webs. This panel will be offset and 8" longer than panel "B".

Step 5: Trim ½ " from the remnant cut from panel "C" and use it as an extension on panel "B" to attain the same length as panel "D". Insert the last web and also provide additional strapping to support this short piece of panel in place.

Step 6: Additional strapping or taping with fiber-tape will be required to support the corners. This strapping and/or taping should extend back at least 20 inches from the corner. When using fiber-tape a minimum of 2 strips per course is recommended.



Building the second course, and subsequent even number courses:

Step 1: Cut one panel into 2 24" lengths. This creates panels "A" and "B". Place the left half, panel "A" in position by sliding it down the guide of the PVCT from the first course. The factory moulded end should be in the corner PVCT.

Step 2: Cut $\frac{1}{2}$ " off the left side of the remaining half, panel "B", and insert it into position.

Step 3: Take a new panel and cut 32" off the left side to create panel "C". Place panel "C" in position across from panel "B".

Step 4: Trim $\frac{1}{2}$ " off the right side of the remaining piece to create panel "D".

Step 5: When all four panels are in position, insert the webs as normal. The corner bracing provided by the PVCT and PVCL will hold all the pieces in position. Additional strapping and/or taping with fiber-tape is required to hold the panels in place and provide adequate form strength during concrete placement.

Constructing Subsequent Courses: For subsequent courses alternate the pattern created in the first two courses. As you build the subsequent courses it is recommended where possible to maintain the running bond pattern of panel placement near the corners and only have the vertical stacked joints in the middle of the walls midway from the corners.

Steps to build 45 degree corner with PVC45s

Step 1: Place 2 full length panels into a PCV45, one each side. This will creates the outside of the corner.

Step 2: To position the inside of the corner place a PCV45 in position and insert a web of the length used for the wall thickness in the PVC45s. A second web may to slide into place to assist in temporarily stabilizing the corner.

Step 3: Take 2 additional panels and trim back the end to be inserted into the PCV45 creating the inside of the corner. The amount to be removed is determined by the amount required so that the web-slots align opposite the web-slots on the outside panels. Do this for the panels on both sides of the PCV45 creating the inside corner.

Step 4: Insert the webs between the panels to complete the corner.

Remember that to achieve a running bond between courses, the panels used on the second and every other alternate course must have 16" removed before being used to construct the corner.



9.6 Integrating with Fox Block walls where required

On some projects both Fox 1440 ICF and Fox Block ICF may be used. This section identifies the differences between the two systems and suggests methods to overcome these challenges. There are many reasons why both systems may be used on the same project such as:

- Use Fox Block to capture advantages of less labor to install,
- Use Fox Block to gain access to speciality forms only available in Fox Blocks, and
- Use Fox 1440 to build wall thicknesses not available in Fox Block ICF,
- Use Fox 1440 to capture lower freight cost,
- Use Foxx 1440 to achieve construction flexibility in walls with congested rebar.

Whatever the reason, what designers and contractors need to know is:

- i) The interlocks are not the same,
- ii) While both forms cast concrete walls with the same thickness of concrete the panels have different thicknesses and there will be a small 1/8" step on both sides of the wall outside of the forms at the transition,
- iii) The horizontal rebar is not in the same position in the form, this means that the rebar cannot run continuously from a Fox Blocks form to a Fox 1440 form,
- iv) The space for the vertical steel between the horizontal steel rebar is in a different position so vertical rebar may not be placed continuously through the different form systems.

Ways to mitigate these items are:

For item 1, when placing one system on top of the other, cut the interlock off the one on the bottom and when placing the next course use adhesive foam, zip webs and/or wire to secure it in place.

For item 2, it is important to plan when such a transition is to take place so that it can take place at a floor transition or at a jog in the wall or some other architectural feature to accommodate this small change of wall thickness.

For items 3 and 4, while the rebar cannot be run continuously through the transition, lap splices and in particular non contact lab splices can be used to bridge these transitions, as the rebar will be close enough to meet the non contact lap splicing requirements. Please note there are minimum lap length requirements and these are specified in the applicable code or concrete design manual.

In summary, while transitioning from Fox Block to Fox 1440, or Fox 1440 to Fox Block may present certain inconveniences they can readily be overcome by an experienced crew.



9.7 Fox 1440 Product Approvals and Product Testing

Fox 1440 ICF has the following code approvals:

- US National approval: ESR 1521
- Canada National approval: CCMC 13367R
- State of Florida: FL11311

The following product testing has been conducted:

- Fire Resistance Rating ASTM E119 up to 2 hours
- Sound Transmission Class (STC) ASTM E90 up to 52
- Testing confirming Fox 1440 in a wall assembly with Hardiplank exterior cladding complies with NBC Canada Sentence 3.2.3.7.
- Fastener withdrawal performance tested in accordance with a modified ASTM D 1929.
- Calculations determining R-value in accordance with ASHREA 90.1

