Joints / Seams

As an installer you have 2 options when the blocks from either corner meet each other.Because of our 1” cutline the most common option is typically the overlapping joint. 1” cutlines separate SuperForm from alot of other Insulated Concrete Forms.

Overlapping Joints

SuperForm has a 1” cut line so often installers are using an overlapping seam. *When the block is cut on the line and overlapped if the joints are less than 8” from each other they will need additional form support. 8” is ok. 7” is not. Superform has great strength to resist concrete pressure perpendicular to the wall with 6” tie spacing and a corner tie. But the 12” overlap is what gives it strength to resist parallel concrete pressure and if this is missing it needs to be additionally supported. Blocks will stack over the joint like the picture to the right.

Pros

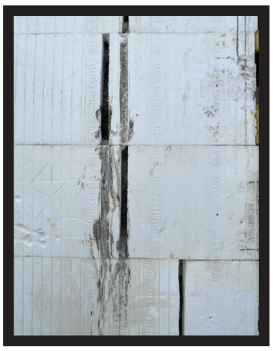
- Less cutting-less waste
- Less additional form support

Cons

- Foundation may need to be fudged ½ inch. ¼ inch if centered.
- Ties won’t typically line up at the joint for about 1 foot.

Any overlap less then 8” needs additional form support with wood to resist concrete pressure.

To the right we have an example of what happens when an overlapping seam is not supported properly. There needs to be 8” of overlap to resist the concrete pressure.



Red lines indicate the need for additional form support so it’s not missed as the block is stacked.

Stacked Joints

Creating a stacked seam means that the interlock is eliminated and the block will not overlapp over the seam all the way from footing to top of wall. When cutting blocks save any pieces that are bigger than 6” for use anywhere else in the wall. All stacked seams will need to be supported with wood on every row of ICF on both sides of the wall.

Pros

- All ties always line up
- No confusion of over lap and if it needs additional form support because the blocks will not be over lapping you can cut anywhere in the block and make a perfect length wall. (because it's not overlapping it can be cut in between cut lines etc.)

Cons

- More cutting
- More waste
- Typically more additional support making it more labour intensive.

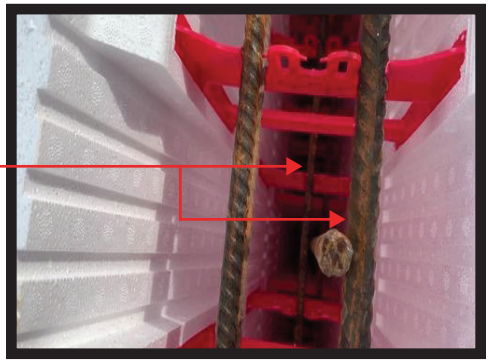
Reinforcing Steel / Bar

Rebar (short for reinforcing bar), known when massed as reinforcing steel or reinforcement steel, is a steel bar or mesh of steel wires used as a tension device in reinforced concrete and reinforced masonry structures to strengthen and aid the concrete under tension. Concrete is strong under compression, but has weak tensile strength. Rebar significantly increases the tensile strength of the structure. Rebar's surface is often "deformed" with ribs, lugs or indentations to promote a better bond with the concrete and reduce the risk of slippage.

Major building codes around North America (NBCC, IBC and IRC) recognise Insulated concrete forms as a method of concrete wall construction. ICF is simply a concrete wall encased in EPS foam with embedded plastic attachment points. The engineering design and structure are all reinforced concrete walls.

Always follow the engineering spec for rebar size and placement as per specifications and/or local building code. Typical rebar sizes are 10m (½") 15m (⅝") or #4 and #5.

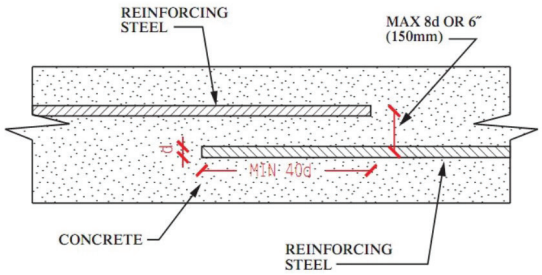
- Rebar snaps nicely into the rebar chairs. These chairs are placed to allow proper coverage between the rebar and the EPS foam.
- Offset your horizontal rebar by staggering every row of bar will hold the vertical bars in place. Because of this vertical bars do not need to be tied at the bottom.
- Vertical bars are always installed after all ICF and horizontal rebar is installed.



In applications where it is necessary to have 2 rows of reinforcing bar per course of SuperForm, the 2 slots used would always have 1 or 2 empty slots between them typically. This will ensure that enough space is allowed around each bar for the unobstructed flow of concrete with aggregates up to 3/4" in width. The rebar slots will accept up to 5/8" bar, and ¾" in the 8" forms. Care should be taken to ensure that the reinforcing bars are reasonably straight. Bars that are bent or deformed can prove to be troublesome in that they cause the wall to assume irregularity. Also, when bending rebar for corners or other angles, a rebar bender/shear is preferred. This tool will help in maintaining true, square corners and angles.

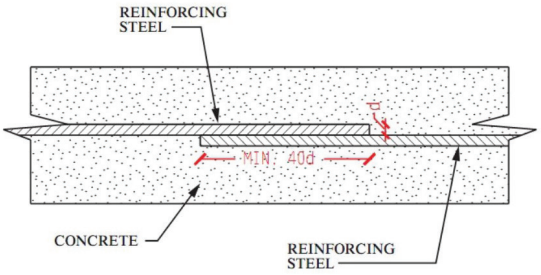
Non-contact Lap Splice

The reinforcing bars are allowed to be spaced at a distance of one fifth (1/5) of the lapped length to a maximum of 150 mm or 6 inches.



Contact Lap Splice

The lapped reinforcing bars MUST be in contact with each other and secured together.

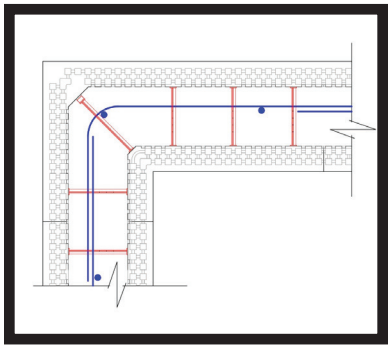


Reinforcing Steel / Bar

Efficiency Tip

After the first row of ICF has been stacked your horizontal measurement can be written on the wall. All rebar for all necessary rows can be cut ahead of time for efficiency. Be sure to account for any window or doors in the wall.

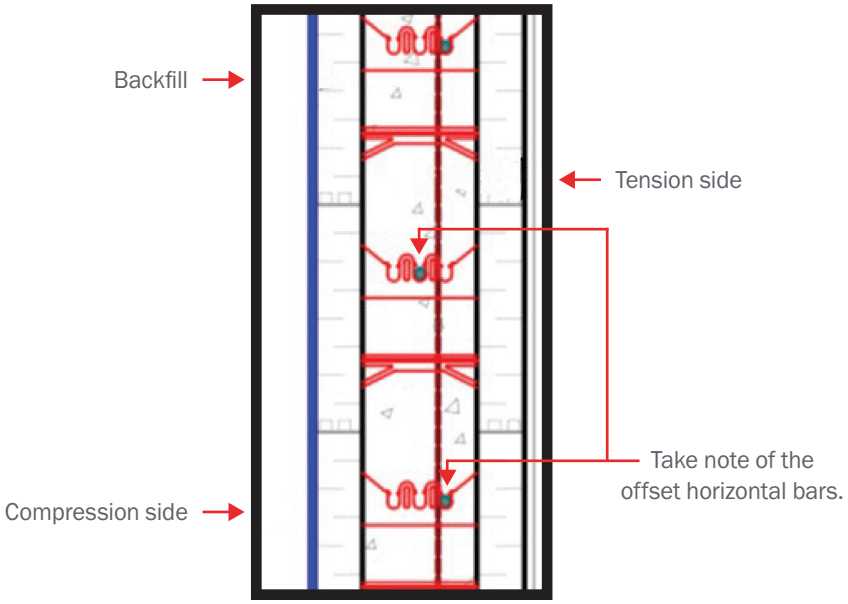
Lap length of the rebar is typically 40 times bar diameter in Canada. 10m or number 4 bar = 20 inch lap length. And 60 times the bar diameter in the USA. Number 4 bar= 30" overlapp. The bars do not need to be tied together because the rebar saddles hold them securely in place. Corner bars can be pre bent for efficiency.



Below Grade Rebar

Below grade rebar will go to the tension side of the wall. This is important!

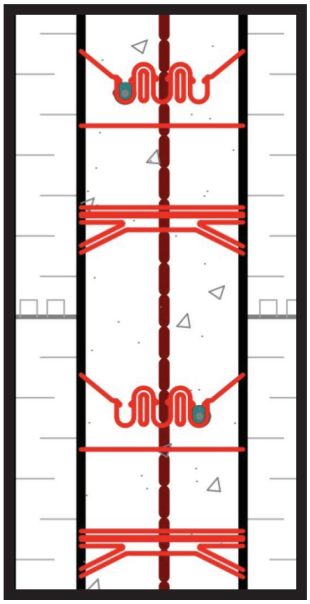
Horizontal bar-Inside / middle always offset the horizontal rebar to hold the vertical bars in place.



Above Grade Rebar

Above grade rebar in the center of the wall as there is no tension side.

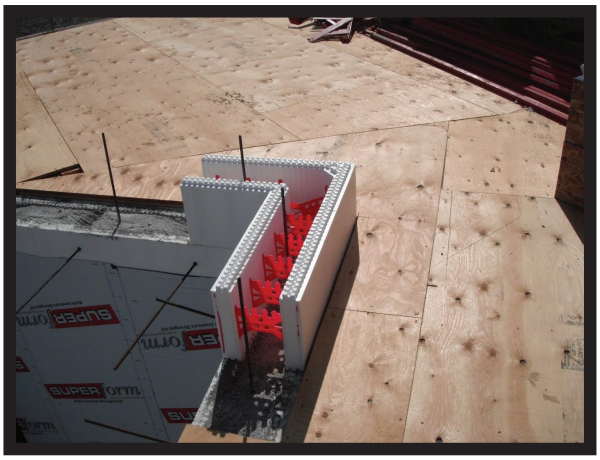
Horizontal bar-inside/outside



Reinforcing Steel / Bar

Vertical rebar is always dropped in after all the block is stacked. This makes it a lot easier to stack the block. Vertical bar is typically placed beside a tie to hold it in place(pour concrete so the flow pushes the concrete against the web) however if needed it can be tied to the top horizontal bar. Care should be taken to make sure vertical rebar has enough concrete coverage at the top of the wall. 2" coverage is sufficient.

Rebar dowels continue up from the basement pour to continue on with main floor walls if ICF continues. Typically these are wetset in after the pour so they are not in the way for the concrete pour.

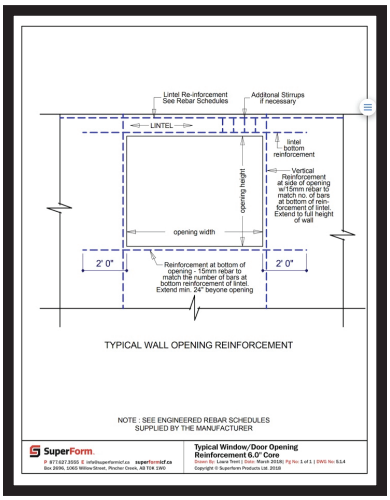


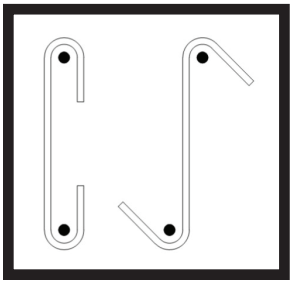
Typical Window/Door Reinforcing

Lintels: A lintel is a beam placed across openings like doors, windows, etc. in buildings to support the load from the structure above.

All lintel horizontal bars should extend 2' past openings. For sure 1 bar of steel should be placed within a few inches of the opening. Make sure it doesn't get pushed against the buck opening during concrete pour. Take note rebar stirrups may be required. Follow engineering, building codes and our lintel tables.

Refer to drawing 5.1.4 in technical drawings



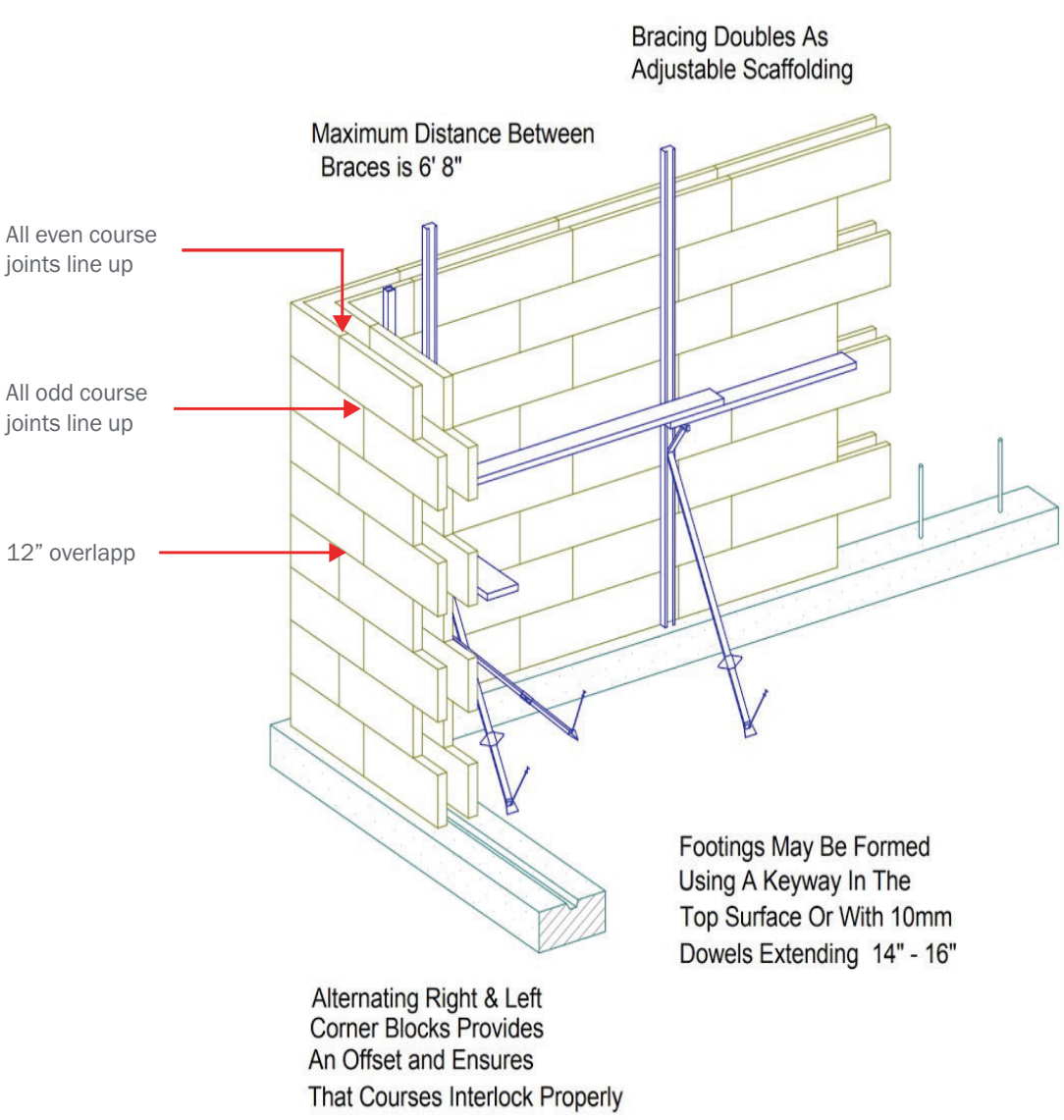


Typical stirrups used in ICF construction for lintels when necessary. These can be bent with a rebar bender or ordered.

Continuing Courses

The first 2 courses determine the layout for the remainder of the wall.

Remember to install horizontal rebar as required as the courses go up.
Layout the location of the bracing system on the wall.
By the fifth row the ICF bracing will need to be installed. We will cover this more on the next page.



ICF Bracing / Scaffolding

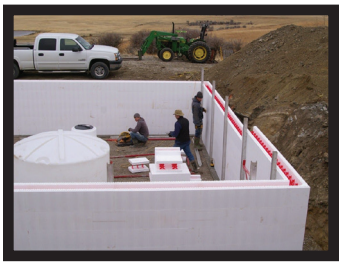
ICF bracing should start being erected by the 5th row. Follow bracing manufacturer safety standards. A bracing set will include a vertical channel, a diagonal turnbuckle, scaffold plank support and handrail attachment if necessary. Follow local safety protocol.

The bracing does 3 things

1. It braces the wall from blowing over.
2. It acts as a scaffold system to complete the ICF rows that can no longer be reached and to pour concrete (scaffold bracket).
3. It straightens and levels the walls and keeps it aligned with its adjustable turn buckle

Step 1

Layout the location of the aluminum channels starting from the a corner. Measure 3 webs one direction and 4 webs the other direction so the diagonal braces at the corner will not interfere with each other. Then layout the rest of the braces down the wall ideally every 6'.



Step 2

Screw the aluminum channel to the wall through the tie. Screws should be installed in the top of the slot and left slightly loose for some settling during concrete pour and for straightening the wall.

Step 3

Attach the diagonal to the aluminum channel using manufacturer approved connection

Step 4

A steel stake/bent rebar or a couple screws can be put through the foot of the brace to secure it.

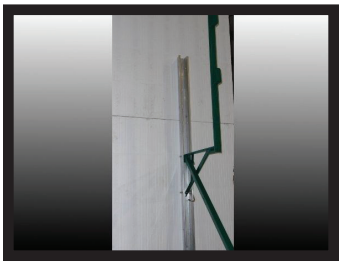
VERY IMPORTANT - make sure the turn buckle threads are halfway before securing the foot so you can easily push it out or pull it in without running out of thread.

ICF Bracing / Scaffolding

Step 5
Install the scaffold bracket. It typically drops in over the Diagonal.

Step 6
Install scaffold planks.

Step 7
Install handrails if required.



*Some systems may come as an all in one system but all ICF scaffold systems work in somewhat the same fashion.

Your ready to go to work on the scaffold! Typically one man on the ground will be handing one man on the scaffolding blocks and materials for sake of efficiency and safety.

Tall wall examples:
Here are a couple pictures of tall wall scaffolding. In the left hand picture a heavy duty scaffold system with guard rail was used. In the right hand picture blocks were stacked and concrete pour was completed on scissor lifts on the outside of the wall with bracing on the inside.

Window and Door Bucks

Window and door bucks provide a means in which to create an opening where a door or window may be installed. Window bucks can be built with numerous different materials however one of the most common methods is still wood.

- Door bucks should be laid out by the time you start the first row typically.
- Ensure you have the correct RO's from the manufacturer.
- Every opening requires additional rebar on the sides. (see rebar page 23)
- Make sure your door bucks account for the floor thickness!

When building wood bucks run 2x4s for the sill at the bottom for room to fill with concrete and vibrate confirming sufficient consolidation. Have some 16" plywood ready to attach to sill to prevent concrete from continuously bubbling up.

- Nails or screws should be put through the wood buck into the concrete void before the pour to hold the buck securely in place afterwards.

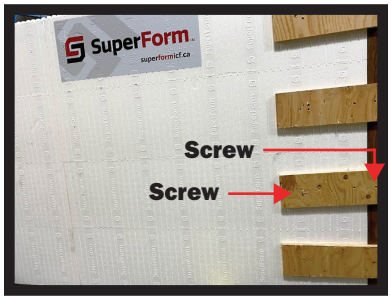
Efficiency Tip - Bucks can be prebuilt by a crew in the shop or onsite with internal bracing so they are ready to go when needed.

Openings need to be braced internally approximately every 2-2.5' to keep bucks straight because of the weight and pressure of concrete. These can be removed after the concrete has sufficiently cured.

Run a long 2x6 or 2x along the top of the opening if possible.

Window bucks are held in place with additional support/cleats both inside and outside.

Wood bucks should be PWF or wrapped with poly if they are in contact with concrete. They should be attached to the Superform using cleats (additional support). 1 screw in the cleat and 1 in the buck. If this is not done the pressure from the concrete will separate the ICF and buck. By putting 1 screw into the ICF tie and 1 screw into the buck it allows for any settling of the ICF while the door buck doesn't settle. Be aware of some block settling that may occur especially in our 6.5" block series. Leave a gap between the window, buck and the block on top of the opening to accommodate this.



Window and Door Bucks

If an opening is under 4’ from a corner the buck should be tied back with strapping to the corner to keep it straight due to the concrete pressure.

Blocks may need to be cut horizontally above or below openings. Using a skill saw works good for this.

For sake of efficiency always try to only cut blocks either on the top or bottom of your opening. If you cut the bottom row of ICF the top row should run over the window buck. If you cut the block above the window buck the buck should sit on the 4th/5th row etc.

In the example below to the right windows were ordered and bucks were built so no block was needed to be cut horizontally. If this is an option it optimizes efficiency!

TIP!
In between windows is a great place to use cutoff pieces. Any cut off block 6" long can easily be used in the wall. Right below the top course is another great option as the pressure is the least at the top of the wall. A 6” overlap to get rid of waste is acceptable especially close to the top of the wall. A good installer will leave a jobsite with only a garbage bag full of waste!!

Window and Door Bucks

Here is a few options to prevent thermal bridging through the buck if that is a concern.

Both options are easier to apply exterior stucco.

Option 1

Wood interior fastening surface for trim etc. In this practise the inside EPS panel is cut 1.5” bigger all the way around the opening and butted into the exterior foam panel. Cut 2.5” off of the buck from the overall block thickness and use devil washers and 4” screws to attach it through exterior foam.

Pictures from the outside

Pictures from the inside

Option 2

In this example EPS on the inside and outside is the actual RO and the wood buck is inset in between the EPS panels making the buck flush with the foam. Attach 2x4s blocks to the sill the to hold the window buck in place. Devil washers with 4” screws are used to secure the buck to the foam. Internal brace as normal.

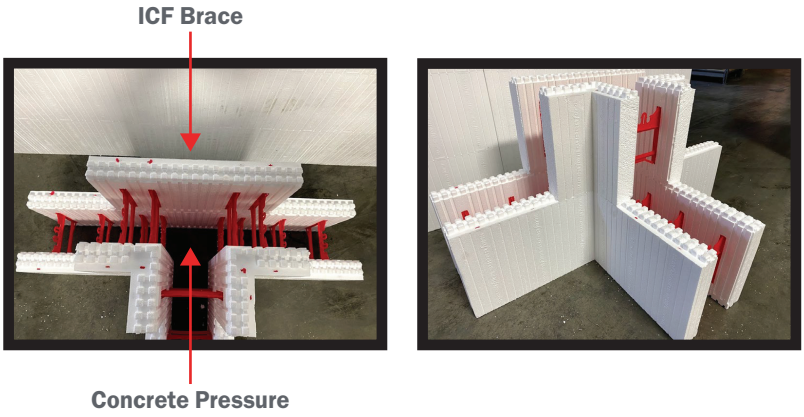
T Walls

T walls are quite common in foundations especially going from the basement into the garage etc. SuperForm T blocks make this very easy to accomplish.

Cut every other T- block 12” off to maintain 12” overlap.
The 12” pieces can be used as filler pieces by windows etc.

T-walls can also be created using straight blocks. See drawing 5.4.5 Additional strapping will be needed if you go this route.

Brace T walls to maintain straight walls during pour. A Lot of concrete pressure is pushing on this T causing it to bow out. A Icf brace works well to hold this in place with a few extra braces on the aluminum channel.

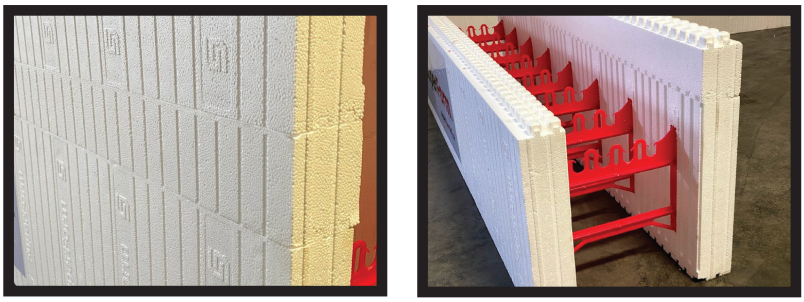


3” Height Adjuster

3” height adjusters work good if you need to get an extra 3” of height on your wall. Or they may work well to put above or below a window instead of cutting blocks. Make sure they are supported properly.

Foam the 3 inch height adjuster in both at the bottom as you put them down and then on top as they set the final row of ICF down. Always place them as high in the wall as possible, Keeping them just below the top row.

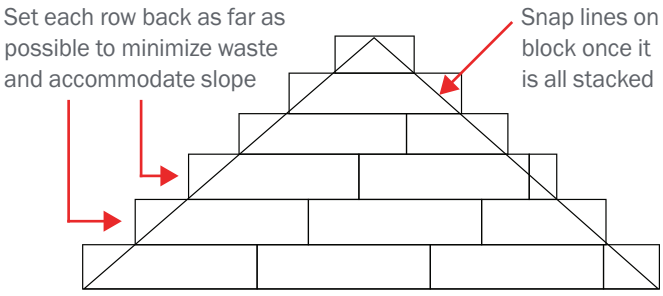
Refer to drawing 7.1.1



Gable Walls

The construction of gable walls can be efficiently accomplished on slopes up to 12/12. Most gable walls are assembled and poured on top of previously poured walls of normal height. The rigidity of the solid wall below provides excellent alignment for the peaked wall above.

Start stacking blocks and have a general idea of the slope of your gable wall. Every row can be set back as far as possible to limit the amount of waste.



Use vertical bracing as normal. Once you have reached the peak of your gable you can snap lines on either side of the wall and both sides of the slope.

Use a skill saw to cut as far as you can and then use a reciprocating saw with an 8” blade to continue through. Do this on both sides of the wall.

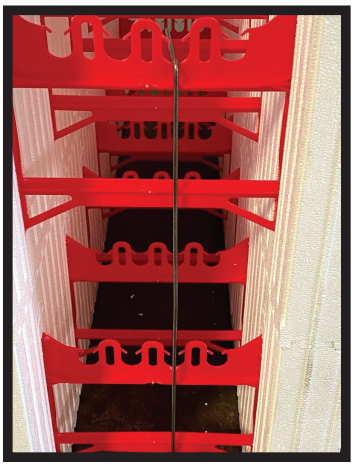
Typically a wood cap will have to be set on the slope to prevent concrete from slumping out. Make sure it is attached to the ICF with additional support. Holes can be cut into it every 48” or so to drop the pump hose into the wall. This wood cap can also have anchor bolts set into it and left on to use as a sill plate. Make sure you have done your gable calculations for height and slope correctly and this will be a sturdy gable wall to start bracing your roof system from.

Top Row ICF

The top row has a tendency to lift during the concrete pour. There are a couple options to prevent this. The crew below installed a 2x6 to the top row, this will help prevent lifting and also help keep the wall dimensions perfect and the wall straighter. The top row can be foamed, wire clipped, or taped down as an alternative as well.

If wire clipped, clip the last tie on every block at the joint, if taped down tape every vertical joint.

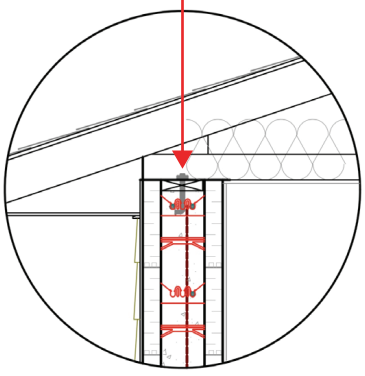
If this is the last course check all walls for level.

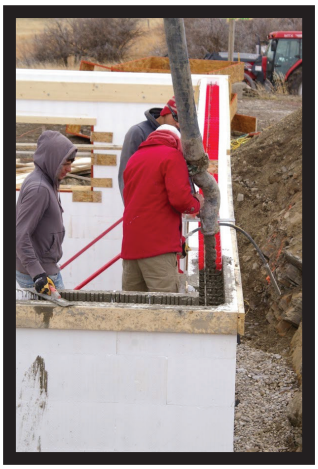


Run string lines to make sure your wall is straight. The string line is typically run on the opposite side of bracing. Use the stringline to adjust walls before and after pour. **Before placing concrete ensure the walls are slightly tilted in. It's a lot easier to push the wall out then pull it in with the weight of the concrete in it.**

The top plate can be sunk in to prevent thermal bridging.

- Put a 2x6 on a piece of plywood to create a trowel that drops the level of the concrete at the pour to accommodate this.





Additional Support

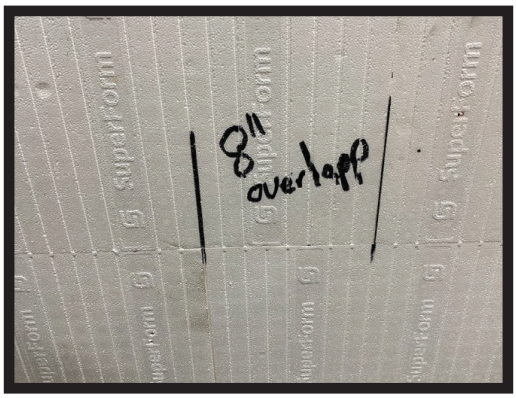
Superform is known for its very strong block and corners. If blocks were never cut no additional support would be needed. However blocks often need to be cut for openings, filler blocks etc. At times additional form support will be needed to prevent blowouts and issues.

If 4 bars of foam extend past a tie additional support will be needed to prevent those 4 bars (4") of foam from breaking.

If it is beside a window or door 3 bars (3") should be additionally supported as well. If it's in the wall 3" will be ok.

Overlaps less than 8" need additional support

A line across can indicate the need for additional support.

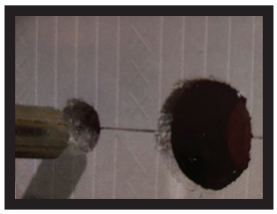


Wall Penetrations

Wall penetrations will need to be placed in strategic locations when ICF is going past the floor system and up into the main floor walls. Consideration to where floor trusses are located along with consulting the mechanical contractor are all important considerations so they don't conflict. In ICF basement applications this isn't as critical as the mechanical penetrations are cut in after the floor is on typically. However there still may be a few penetrations needed.

Before the concrete pour check in with your electrician and plumber and any other sub trades that may need to run utilities through the wall. Putting these in beforehand is a lot less labour intensive then drilling a hole through concrete later.

Use a reciprocating saw or a hole saw to cut the hole. Draw a circle around the hole and proceed.



Use spray foam to fill any cracks bigger then ¼ inch around wall penetrations.

Vertical Cold Joints

Vertical cold joints are only installed in special situations where necessary, often large jobs with multiple pours. Typically lumber is used as a buck and then taken off before the next pour and rebar is installed per specification.

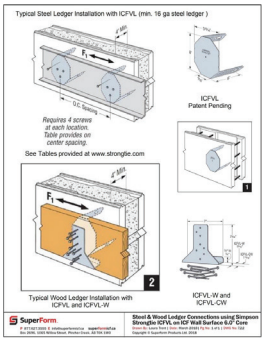
Floor Connections

Depending on the building plans and customer desires a couple different options are available to attach your floor to. It is very important to always check plans and make sure beam pockets and all framing/ floor requirements are in place and manufacturers floor connections manuals are followed.

Beam pockets: Beam pockets may be necessary for porch, roof or deck beams as well. Check your plans.

Wood or foam can be used to block out for a beam to sit in later.

Simpson tie hanger step 1 - step 1 is to put the ICFVL through the foam into the concrete void before the pour. Spacing of this ledger board is per manufacturer's tables. See link below. Also see drawing 7.2.1 and drawing 7.2.2 in our technical drawings.

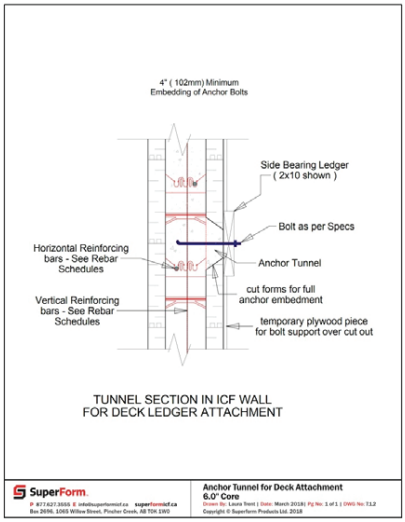


https://www.strongtie.com/concrete_miscellaneousconnectors/icfvl_system/p/icfvl#LoadTables

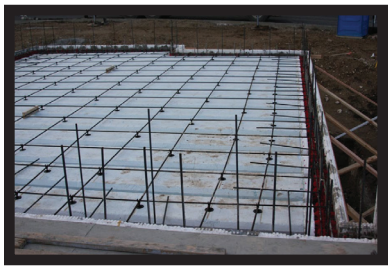
Simpson hanger step 2 - Structural hangers fasten the ledger board to the cast in place plate or connector. Trusses can be top cord bearing or common joists with common joist hangers.

Floor Connections

Anchor bolted ledger. A 4” hole needs to be cut out of the foam to make this option work. **Sufficient concrete must encapsulate the anchor bolt.** The ledger board can be permanently screwed **(the screws are not structural they only hold the ledger board on strait and keep concrete from coming out)** on with anchor bolts at the required locations, however often the vertical bracing is in the way of accomplishing this so some planning must be involved. See drawing 7.1.1 and 7.1.2 in our technical manual.



Concrete floor: The exterior ICF panel should continue through with the interior one being cut off the thickness of the floor. There are numerous types of concrete floor systems. All systems must bear on the concrete.



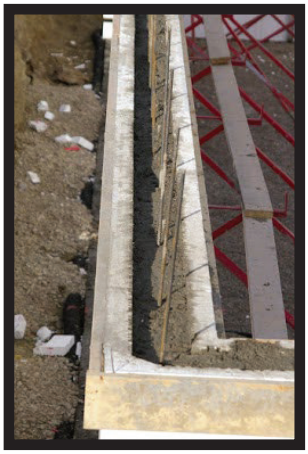
For ICF not continuing on anchor bolt are placed in level concrete.

A sill plate will be installed and trusses will be attached.

Prepour Inspection

Pre pour inspections are very important. They ensure you are 100% ready for concrete.
If you are in doubt add additional support.

- [ ] Quick visual check to confirm block is still on the chalk line.
- [ ] All walls are level and plumb.
- [ ] Wall dimensions are correct.
- [ ] String line is ready to straighten top of wall.
- [ ] All joints are additionally supported if necessary.
- [ ] Anchor bolts are ready if needed.
- [ ] Short wall sections are strapped.
- [ ] Beam pockets are in place.
- [ ] Floor embedments are in place.
- [ ] Concrete placing equipment is ready.
- [ ] Bracing/ICF wall is leaning slightly inward for concrete.
- [ ] Concrete placement plan with crew.
- [ ] Openings are braced and framed.
- [ ] Spray foam can be used to fill any gaps that are left.Any gap bigger then ¼" should be spray foamed.
- [ ] Trim off the knobs if desired. Even if you are going up with a second level Superform recommends trimming off knobs because cleaning is difficult and finishing the top of the wall after the pour is more difficult. The next layer of blocks can be glued on with adhesive foam if continuing ICF.
- [ ] Vertical rebar is extended through the pour or pieces are cut to wetset in if ICF is continuing.



Concrete Pour

The Concrete mix design must meet engineered spec and/or conform to national and local code jurisdiction. The concrete slump should be 5”-6”. Judge the slump by the angle in which it flows. Have a concrete pour plan confirmed with the pump operator and your crew. If possible have at least a 3-4 man crew.

The most common method of pouring concrete into ICF is with a concrete pump truck however a crane and bucket and possibly the chute off the concrete truck can be an option.

According to ACI 318 and building codes, pour concrete in 4’ lifts. Go around the first time and fill beneath the windows and make sure there are no voids beneath them. Pouring in 4’ lifts will allow entrapped air to rise to the surface.

On the majority of pours the second round can top off the wall.

Consolidation is the removal of entrapped air in the concrete. Because the EPS does not come off you need to be sure that there are no voids in the wall. Consolidation ensures that the rebar is properly embedded in the concrete.

- Use a vibrator - 1” head max. (cordless vibrator works great)
- Insert it quickly into the depth of the concrete lift. Pull it slowly out.
- Use a hammer to tap window bucks along with a vibrator to consolidate concrete below the window.

Do not place concrete directly into corner forms. Stay 2-3 feet back and let it flow through.