

How to use these sheets

One sheet per step, in the order the work happens. Read the sheet before you start the step, not after. The sheet tells you what to do, the numbers you are working to, and the form you sign when you are done.

Four rules that apply to every sheet

- 1 Write the value, not a tick.** A tick records that somebody looked. A value records what they found.
- 2 Fill the form in ink, at the bed, when you do the work.** Not in the office afterwards. Not in advance.
- 3 A correction is one line through the error** with the right value beside it, initialled and dated. Nothing is erased or written over.
- 4 A blank field is not an accepted field.** If it does not apply write N/A and initial it. If the check was not done, the panel does not move.

Signatures

You sign your own line, in your own hand, with the date. Signing somebody else's line, or signing before the work is done, is falsifying a quality record. That is a corrective action against the process and action against the person.

HOLD POINT

There are six hold points. At a hold point the item does not move until the line is signed. **Anyone can stop an item. Only the named signer can release it.**

Hold point	When	Form	Signed by
Lifting insert placement	Before the pour, on roof strips and floor panels, which are the only things with cast-in inserts	QF-16 Lifting insert placement check, section 1	QC inspector
Pre-pour	Before any concrete goes in the slot	QF-13 Panel and unit traveler	QC inspector
Cure complete	Before the panel is stripped, 7 days minimum	QF-11 Cure log	QC inspector
Wall panel pick	Before a panel is lifted out of its slot for the first time	QF-16 section 2, wall panel pick check	QC inspector
MEP rough-in	Before the cladding goes on and before any cavity fill is pumped	QF-18 Shower house assembly, MEP rough-in and cladding inspection	QC inspector
Final release	Before anything leaves	QF-20 Final unit inspection and release record	Quality manager only

How to use these sheets (continued)

Where you see a bracket

NOT SETTLED YET

[PE TO SET: ...] is a number the engineer of record has not set yet. **[KEN TO CONFIRM: ...]** is something about this plant that does not exist yet. Neither one is a gap for you to fill from memory or from a job you worked before. Record the measured value, and take any doubt to the quality manager. No slot, panel or unit is accepted against a criterion that has not been set.

The sheets

Sheet	Step	Form signed at the end
WP-01	The panel and what it is made of	QF-13 Panel and unit traveler
WP-02	Preparing the bed	QF-14 Bed and form check
WP-03	Setting the steel	QF-15 Mesh and embedment placement check
WP-04	The mesh	QF-15 Mesh and embedment placement check
WP-05	Openings, bucks, boxes and sleeves	QF-15 Mesh and embedment placement check, QF-16 Lifting insert placement check
WP-06	The skin pour	QF-09 Daily batch and density log, QF-10 Cylinder cast and break log, pre-pour hold on QF-13 Panel and unit traveler
WP-07	Cure and stripping a green panel	QF-11 Cure log, QF-16 section 2, wall panel pick check, QF-17 Panel dimensional and surface inspection
WP-08	Standing the panels and screwing them together	QF-18 Shower house assembly, MEP rough-in and cladding inspection in the plant; QF-35 Panel erection record on site
WP-09	Rough in, in the open cavity	QF-18 Shower house assembly, MEP rough-in and cladding inspection in the plant; QF-35 Panel erection record on site
WP-10	The cladding sheet	QF-13 Panel and unit traveler for the sheet, QF-18 Shower house assembly, MEP rough-in and cladding inspection to install it
WP-11	Pumping the cavity full	QF-09 Daily batch and density log
WP-12	What good looks like and what gets rejected	QF-17 Panel dimensional and surface inspection, QF-22 Nonconformance report, QF-20 Final unit inspection and release record

How to use these sheets (continued)

One thing to be honest about

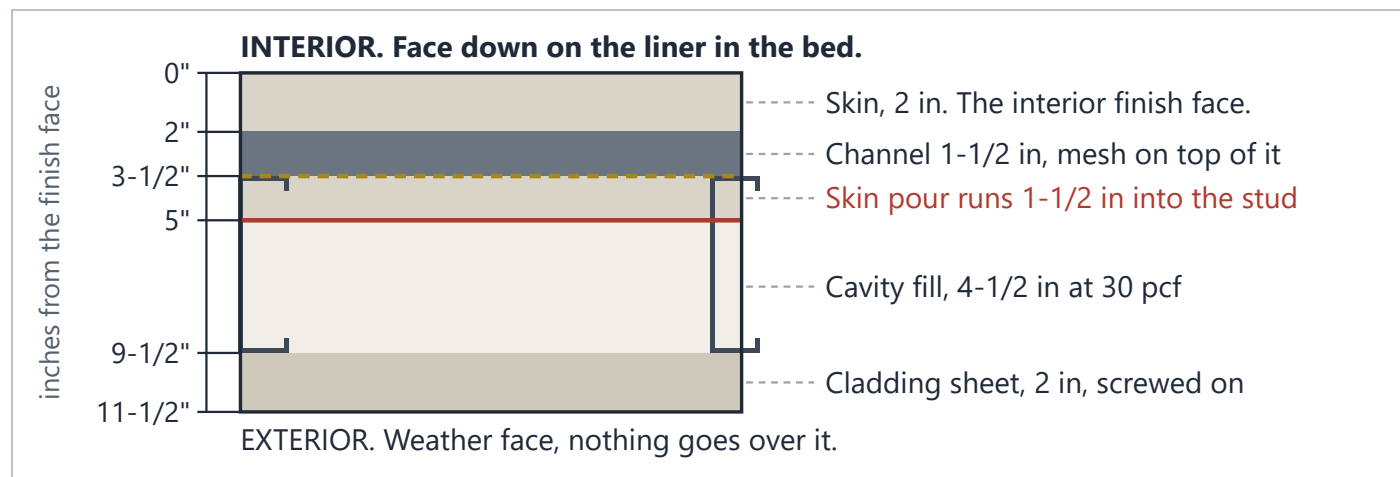
Nothing has been built yet. There is no cast panel, there are no cylinders and there is no test data. These sheets are the process as it is designed, written so that the first cycle is run the same way every time after it. [KEN TO CONFIRM: the station structure. Whether this runs at fourteen stations or at three, and whether the panel moves or the crew moves, is a decision nobody has made. One full trial cycle gets run before the station list is finalised.]

THE RECORD YOU SIGN

Nothing is signed on this sheet. The traveler, QF-13 Panel and unit traveler, is opened by the quality manager when the order is released, with the serial number already on it, and it stays with the panel from the bed to release.

The panel and what it is made of

A wall panel is 4 ft wide and 10 ft tall, and it finishes 11-1/2 in thick. It is cast flat, on its face, in a slot in the casting bed. The face that lies on the liner becomes the inside wall of the finished building.



Section cut through the wall, to scale. Across the page is the panel width, down the page is the 11-1/2 in thickness. The two C shapes are 600S162-54 studs at 16 in on centre. Dimensions are inches from the finish face. Every number is from public/config/wall.config.json.

The stack, from the finish face out

From the face	Layer	Thickness	What it is
0 to 2 in	Skin	2 in	Cast cellular concrete, 35 pcf. This is the interior finish face of the building.
2 in to 3-1/2 in	Channel zone	1-1/2 in	1-1/2 in cold-rolled channel rows, buried by the skin pour. The basalt mesh lies on top of them, on the 3-1/2 in line, under the stud flange.
3-1/2 in to 9-1/2 in	Stud zone	6 in	600S162-54 studs at 16 in on centre. The pour comes 1-1/2 in up into it; the rest is cavity.
5 in to 9-1/2 in	Cavity fill	4-1/2 in	Pumped full later, on site, at 30 pcf.
9-1/2 in to 11-1/2 in	Cladding sheet	2 in	Cast cellular concrete, 35 pcf, with mesh. Screwed on after the rough-in.

The panel and what it is made of (continued)

Sizes you will see

Panel	Width	Height	Where
Standard wall panel	48 in	120 in (10 ft)	Walls B, C and D of the house
Tall panel	48 in	150 in (12 ft 6 in)	Wall A of the shed roof design, which carries the high side of the roof
Shower house panel	48 in	96 in (8 ft)	The shower house on its skid

Panels sit 1/2 in apart at the joint. Each panel carries 4 studs, at 0, 16, 32, 48 in across the width. The two outside ones are the edge studs, and they are what the next panel screws to.

What it weighs

Out of the bed a panel is only the skin pour and the steel, about 17.6 lb per square foot. A 10 ft panel is 40 sf, so about **703 lb**. A 12 ft 6 in wall A panel is 50 sf, about **879 lb**. Finished, with the cladding and the fill in it, the wall weighs about 34.7 lb per square foot.

SAFETY

703 lb swings. Every wall panel move is a forklift boom pick, lift height 60 in. Nobody stands under a panel, nobody steadies a panel with a hand between it and something else, and nobody frees a snagged panel by pulling on it.

STOP

The cast face goes to the inside of the building. It is face down on the liner in the bed and it faces in when the panel stands. A panel stood backwards is a crane job to fix, not a screw gun job.

NOT SETTLED YET

The panel's own dimensional tolerances are [PE TO SET]: length, width, overall thickness, skin thickness, squareness, bow, twist, face flatness, opening size and position, and the cumulative run across a wall of panels. No published tolerance exists for a cast panel of this construction, so no number is written here. The engineer of record sets them. Sheet WP-12 lists every one.

THE RECORD YOU SIGN

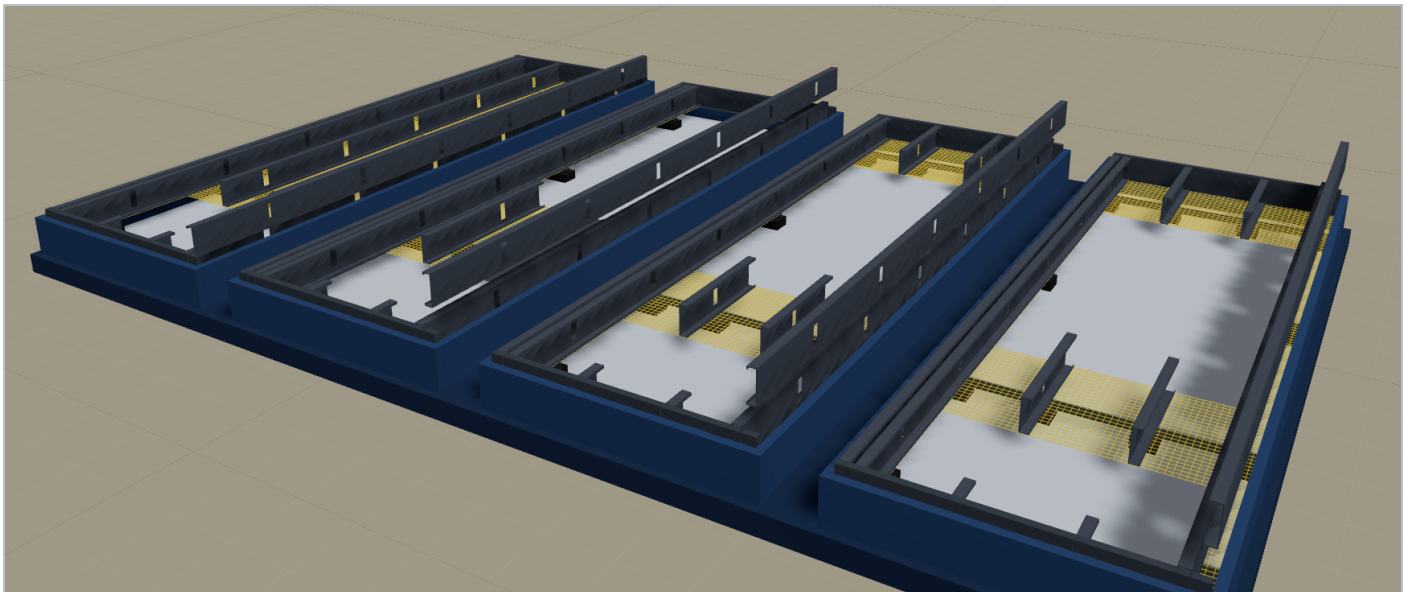
QF-13 Panel and unit traveler. The quality manager opens it when the order is released, with the serial number from QF-28 already on it. It carries the model, the order, the bed and slot, the pour date, the batch numbers and one line for every station. A traveler with an unsigned line cannot be closed and the panel cannot be released.

Preparing the bed

The bed has 4 slots, 12 in apart, sized for the tallest panel at 150 in. Everything on this sheet happens before any steel goes in the slot, because once the steel is in you cannot see the liner.

Do it in this order

- 1 Clean the slot out. No debris, no water, no ice, no snow.
- 2 Set the edge forms around the slot. They are 1-1/2 in thick and stand 8 in tall.
- 3 Check the forms are straight and plumb along the whole slot, not just at the ends.
- 4 For a short panel, set the movable end board and measure its position from the fixed end of the slot.
- 5 Lay the plastic liner. Pull it flat. No wrinkles.
- 6 Look over the liner: no tears, no wrinkles, no debris, no cured residue from the last cycle. Anything on the liner prints through onto the finish wall of somebody's house.
- 7 Apply release agent evenly, per the maker's instructions. Keep it off the mesh positions and off the steel bearing positions, because the concrete has to bond there.
- 8 Measure the slot length at both ends, and the width at both ends and mid-length. Write the values on the form.



The four-slot bed. Blue edge forms, the liner in the bottom of each slot, and the steel going in on top of it. The bottom of the slot is the finish face of the finished wall. Figure file: wall-01-casting-bed.png

STOP

Do this check **before** any steel, mesh or embedment is placed. A check made after the steel is in cannot see the liner, and the liner is the finish face.

Preparing the bed (continued)

NOT SETTLED YET

Every dimensional criterion on the bed check is [PE TO SET]: slot length, slot width, movable end board position, edge form straightness, edge form plumb and height, and the flatness of the bed and liner over a stated length. The flatness one matters twice over, because it is the flatness of the finish wall as well as a structural characteristic. Until the engineer of record sets them, **write the measured values and take any doubt to the quality manager. No slot is accepted against a criterion that has not been set.**

Weather

No slot is accepted with standing water, snow or ice in it. Concrete is not mixed or placed during freezing weather, during rain or snow, or over standing water, snow or ice. If the slot is not dry and clear, it does not get used today.

THE RECORD YOU SIGN

QF-14 Bed and form check, signed by the QC inspector. One line per slot, with the measured value in every cell. A failed slot is not used until it is corrected and re-checked on a new line. The completed form is attached to the travelers of the panels cast in that cycle, and station line 1 of QF-13 Panel and unit traveler is signed.

Setting the steel

Channel and spacers first, then the mesh, then the studs and the track. That order matters: the channel rows sit under the studs, and the mesh goes in before the studs cover it.

Spacers and channel

- 1** Set a spacer block under every place a channel row will cross a stud line. The spacers are 2 in high, which is what holds the channel up off the liner at the 2 in line.
- 2** Lay the channel rows. 1-1/2 in cold-rolled channel, 1/2 in flange, 54 mil.
- 3** Rows go at 48 in on centre, starting 12 in in from each end. A 10 ft panel gets 3 rows, at 12, 60, 108 in. A 12 ft 6 in wall A panel gets 4, at 12, 60, 108, 138 in.
- 4** Measure each row from the end of the panel and write the value. Check the row is continuous across the panel.

Studs and track

- 5** Read the marking on every member before it goes in. Studs are 600S162-54: 6 in web, 1-5/8 in flange, 1/2 in lip, 54 mil. It has to match the bill of material exactly. No substitution, not even a heavier one.
- 6** Set the studs at 16 in on centre: 0, 16, 32, 48 in across the 48 in panel, 4 studs. The last one is turned the other way so its web sits on the panel edge. That edge stud is what the next panel gets screwed to, so it has to be on the edge.
- 7** Set the 600T125-54 track at the top and the bottom. Seat every stud in the track.
- 8** Check the studs are straight, with no permanent kinks, and that the flanges face the way the drawing shows.
- 9** Line the punchouts up down the wall. Punchouts are 1-1/2 in by 4 in, the first 12 in in from each end and then every 24 in. A 10 ft panel has 5 per stud, at 12, 36, 60, 84, 108 in.

STOP

The punchouts are the path the wire and the pipe take later, through a wall that will be pumped solid. If the punchouts do not line up across the panel, the electrician drills your panel or runs the circuit somewhere it should not be. Line them up now. It costs nothing now and it costs a lot later.

Screws

2 screws at every channel-to-stud crossing. Stud to track per the approved detail. Screw type and count come off the drawing, not off the shelf nearest you.

Setting the steel (continued)

NOT SETTLED YET

The screw pattern and counts are model assumptions today, not a design. [PE TO SET: the screw pattern and counts for channel to stud (the model carries 2 per crossing) and for stud to track.] [PE TO SET: the tolerance on the 16 in stud spacing, and the tolerance on opening size and location.]

Clean steel

Steel goes in clean. No oil, no mud, no ice, and no release agent anywhere the concrete has to bond to it. If a member got dragged through the release agent, wipe it or change it.

SAFETY

Cut cold-formed steel is sharp on every edge, and a 10 ft stud is a whip. Gloves on for every piece, and keep the ends of long members under control when you turn them in the slot.

THE RECORD YOU SIGN

QF-15 Mesh and embedment placement check, signed by the QC inspector, with the measured value in every cell. Station line 2 of QF-13 Panel and unit traveler.

The mesh

Basalt mesh, 1 in grid. One layer per panel and one layer in every cladding sheet. It lies on top of the channel rows and under the stud bottom flange, so it goes in after the channel and before the studs and nothing has to be lifted to get it in.

Where it goes: 3-1/2 in from the liner

The mesh goes on the stud line, between the stud and the horizontal channel. Measured from the liner face, that is **3-1/2 in**: 2 in of skin, then the 1-1/2 in channel zone, then the mesh, then the stud sits down on it. Measure it from the liner with a tape and write the value. Do not measure down from the top of anything.

Placing it

- 1** Check the mesh product against the bill of material, by its label and its certificate. Not by what it looks like.
- 2** Roll it out continuous over the whole panel face, on top of the channel rows.
- 3** Trim it to every opening. The opening is a hole in the panel, so the mesh stops at the hole.
- 4** Lap it at every joint in the mesh and measure the lap.
- 5** Tie it down or hold it so it cannot float or shift while the concrete goes in. Foam concrete will lift loose mesh.
- 6** Measure the height from the liner face at the points the drawing calls for, and write the value. It should read 3-1/2 in.
- 7** Keep release agent, oil and debris off it.

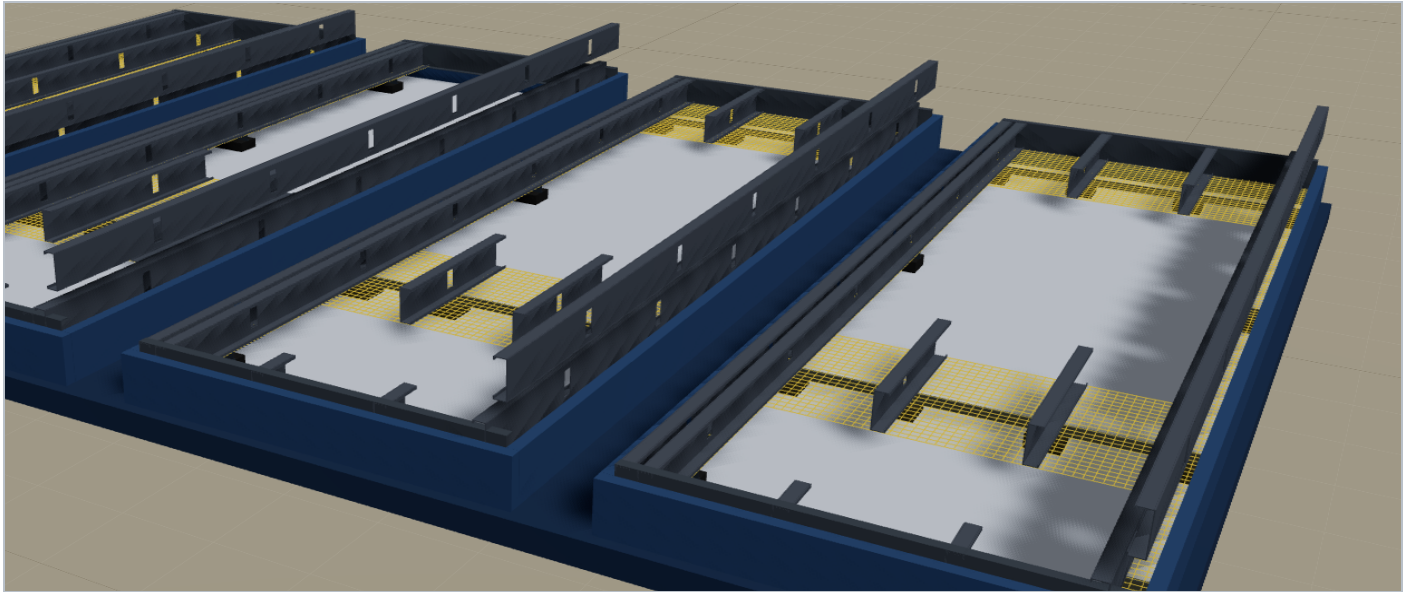
NOT SETTLED YET

The position is settled. The tolerance is not. 3-1/2 in from the liner face is Ken's ruling of 14 September 2026, and the quality manual, the contract, the design model and this sheet all now say the same thing. The roof panel puts its mesh at the same place, between the channel and the stud flange. [PE TO SET: how far off 3-1/2 in the mesh is allowed to be.] [PE TO SET: the minimum lap length at a joint in the mesh.] Until those two are set, measure and write the value, and take any doubt to the quality manager. If a drawing on the floor shows the mesh anywhere other than 3-1/2 in, **stop**: that drawing is not the current revision and the panel does not proceed.

What the mesh is for, today

The mesh is treated as crack control, not as reinforcement that carries load. That matters to you because it sets how tightly it has to be placed. [PE TO SET: whether the mesh is credited in any capacity. If it is, the placement tolerance and the lap become structural criteria and this inspection gets done more often.]

The mesh (continued)



The mesh is the yellow layer visible in the two right-hand slots, laid over the channel rows before the studs go on. Figure file: wall-01-casting-bed.png

THE RECORD YOU SIGN

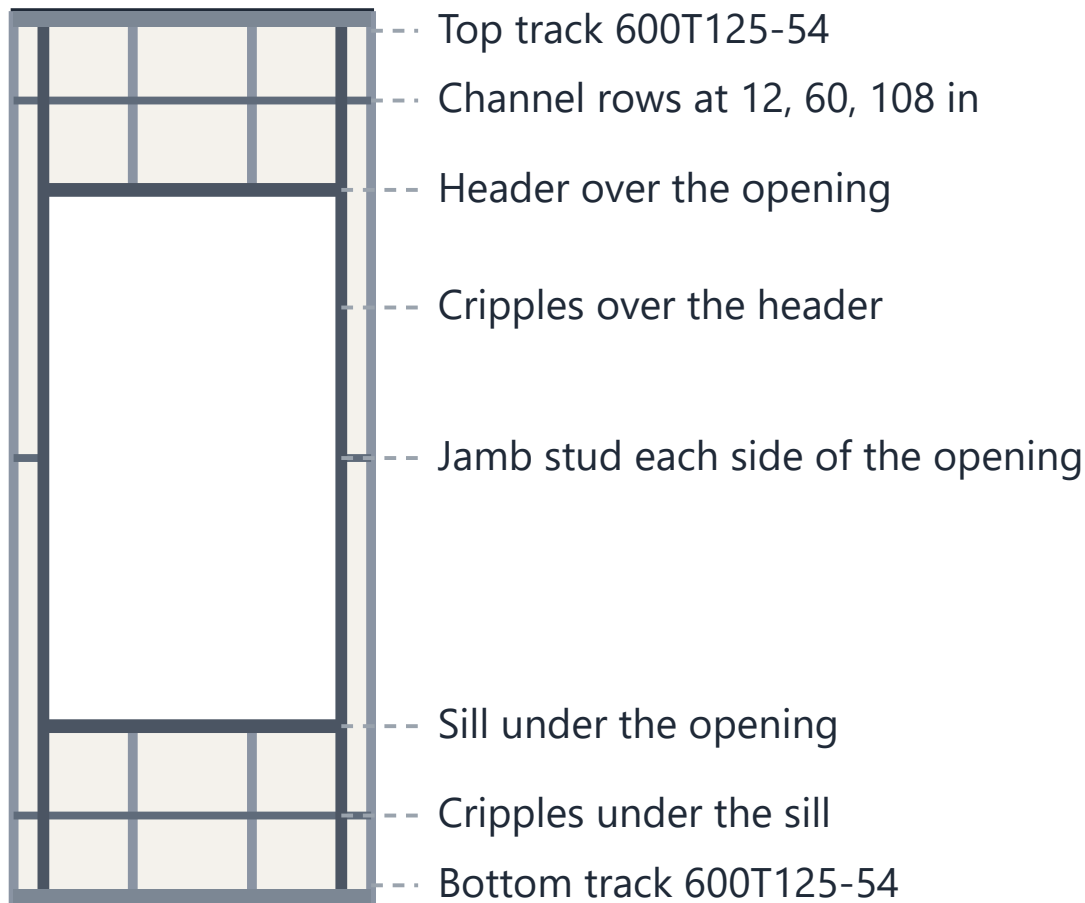
QF-15 Mesh and embedment placement check, the mesh section, signed by the QC inspector. Measured values, not ticks.

Openings, bucks, boxes and sleeves

Every door and window gets framed in the bed, before the pour. Nothing here can be corrected afterwards, because the concrete goes around it.

Framing an opening

- 1 A jamb stud each side of the opening.
- 2 A header across the top.
- 3 A sill across the bottom, on a window. A door has no sill.
- 4 Cripples above the header and below the sill, on the stud lines that the opening cut through.
- 5 Measure both dimensions of the opening and both offsets, and write the four values.



Panel elevation, 48 in by 120 in, with the 40 in by 72 in window of the wall A panels, sill 24 in. Openings are centred in the panel width. The skin, the cladding and the cavity fill all get the same hole, and the mesh is trimmed to it.

The skin, the cladding sheet and the cavity fill all get the same hole in the same place. If the opening is wrong in the bed it is wrong in all three.

Openings, bucks, boxes and sleeves (continued)

Sleeves and blockouts

- 6 Locate every sleeve and blockout from two stated datums and **write the measured position**. A tick is not a position.
- 7 Seal every sleeve so concrete cannot get into it.
- 8 Restrain every sleeve and blockout so it cannot move while the pour goes in.

On the shower house floor panel this includes the floor drains, the shower slopes and the plumbing sleeves. Those are the items that cannot be fixed after the pour and cannot be inspected at the site. Get them measured.

NOT SETTLED YET

[PE TO SET: the position tolerance for each class of embedment, separately for a plumbing sleeve, a floor drain, a blockout, and a cast-in electrical box.]

Electrical boxes

On the house, the boxes are not cast in. They go in the open stud cavity after the panels stand, which is sheet WP-09. Only cast in a box where the drawing on the floor shows one.

HOLD POINT

Lifting inserts. Where the drawing calls for cast-in lifting inserts, the insert check on QF-16 Lifting insert placement check is a hold point and it is the highest consequence check in this plant. Insert type and size against the schedule, count, the measured position of each one from two datums, embedment depth, orientation, and that each one is positively held against moving in the pour.

NOT SETTLED YET

No lifting insert has been selected and none has been pull-tested in this concrete. Published insert capacities are established in normal-weight concrete, not in 35 pcf cellular concrete. [PE TO SET: the insert, its rated capacity established by pull-out testing in this plant's own concrete, the required embedment, the position tolerance, and the concrete condition required before an insert may be loaded.] **Until that exists, no roof strip and no floor panel is picked on cast-in inserts.** Wall panels are picked on the forklift boom.

NO PICTURE EXISTS FOR THIS

No rendering shows an opening being framed in the bed. The shot that would serve this sheet: a **studs_track** frame shot in close on the slot holding a wall A window panel, from above at about 15 ft, so the jamb, header, sill and cripples read as separate pieces. The existing wall-01-casting-bed.png is the whole four-slot bed from about 41 ft away and the framing pieces at an opening are a few pixels across. The drawing on page 1 of this sheet is from the model geometry and is correct, but it is a drawing, not a photograph.

Openings, bucks, boxes and sleeves (continued)

THE RECORD YOU SIGN

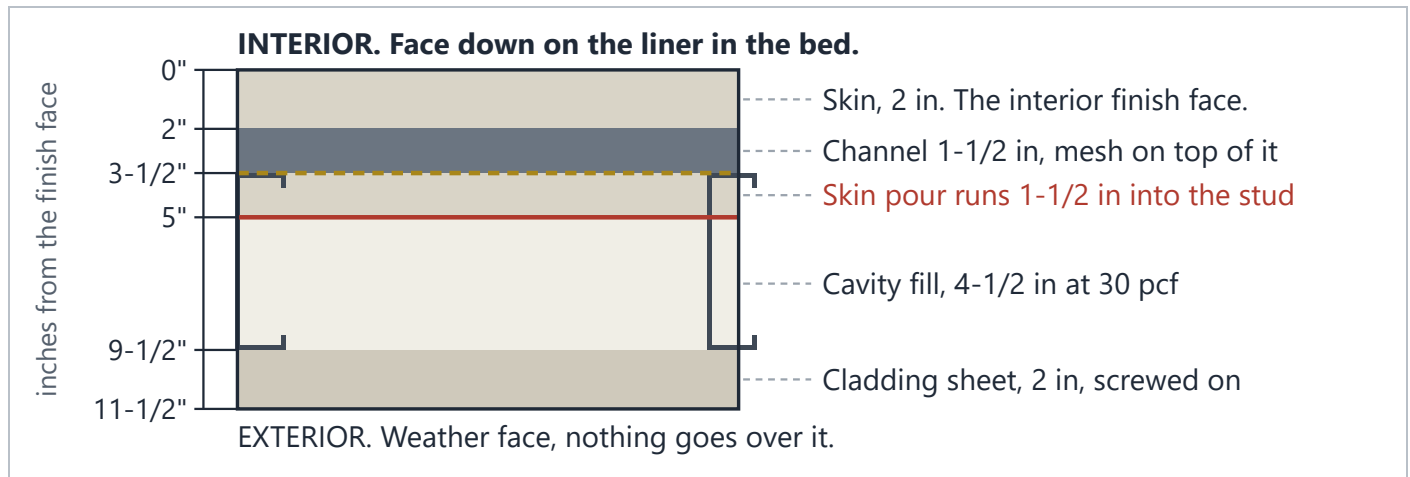
QF-15 Mesh and embedment placement check for the openings, the sleeves and the blockouts. QF-16 Lifting insert placement check where inserts are placed, as a hold point on QF-13 Panel and unit traveler.

The skin pour

The finish layer is 2 in. The pour is 5 in. Those are two different numbers and this is the one a new hand gets wrong.

Why it is 5 in and not 2 in

2 in of skin, plus 1-1/2 in of channel and mesh zone, plus 1-1/2 in up into the studs, is 5 in. That last 1-1/2 in is the whole point. It is what locks the studs into the panel, so that what comes out of the bed is one piece instead of a slab with loose steel lying on it. Pour to 2 in and you have poured a paving slab.



The red line is the top of the skin pour at 5 in. Everything between the finish face and that line is filled in one placement, including 1-1/2 in up the web of every stud.

Placing it

- 1** Check the pre-pour line on the traveler is signed. If it is not signed, nothing goes in the slot.
- 2** Batch only to the approved mix design. No water added for workability, ever, and no proportion changed at the bed.
- 3** Move the concrete from the mixer to the bed and place it without segregation and without a free fall that breaks the foam structure.
- 4** Fill the slot to 5 in.
- 5** Place continuously within a slot. A cold joint inside a panel is a nonconformance, so do not start a slot you cannot finish.
- 6** Consolidate only by the method written on the approved mix design. Do not vibrate it the way you would vibrate normal concrete: that collapses the foam and changes the density.
- 7** Screed to the edge forms and finish the top face.

The skin pour (continued)

STOP

The top face of the pour becomes the cavity side of the wall. The face against the liner is the interior finish face of somebody's house and it is **not worked after the pour**. Do not trowel it, do not touch it, do not walk on it.

Density and cylinders, while you place

- Fresh density at the point of placement: the first placement of every batch, then at least every 30 minutes while placing continues. Recorded on QF-09 Daily batch and density log.
- Concrete temperature and ambient temperature at the same frequency, on QF-09 Daily batch and density log.
- 3 by 6 in cylinders cast from the same placing stream, by the same method as the panel. Mark every cylinder with the batch number, the date, the mix, and the bed and slot, **before the concrete sets**. Cover them and leave them protected for at least 24 hours. Recorded on QF-10 Cylinder cast and break log.
- Weather at placement on QF-09 Daily batch and density log.

NOT SETTLED YET

[PE TO SET: the acceptance band around 35 pcf, and the acceptable concrete temperature range.] [PE TO SET: the cylinder sampling frequency, per batch, per bed cycle, per day or per cubic yard.] [PE TO SET: the design compressive strength at 28 days. No cylinder has been cast or broken for this product and no strength value exists.] [KEN TO CONFIRM: the placing and consolidation method, once the mixer and the pump are chosen, written into the mix design.]

When the density goes out of band

A density reading outside the band **stops placement**. Tell the QC inspector. The scale, the water meter and the foam nozzle get checked. Every panel that got concrete from that batch is identified by serial number, tagged, and held. A nonconformance report QF-22 Nonconformance report is raised and the quality manager dispositions it in writing.

Weather

Concrete is not mixed or placed during freezing weather, during rain or snow, or over standing water, snow or ice. If the temperature is going below 32 F within 8 hours of placing, the cold weather mix is used, not the normal one. Above 100 F, the hot weather provisions apply.

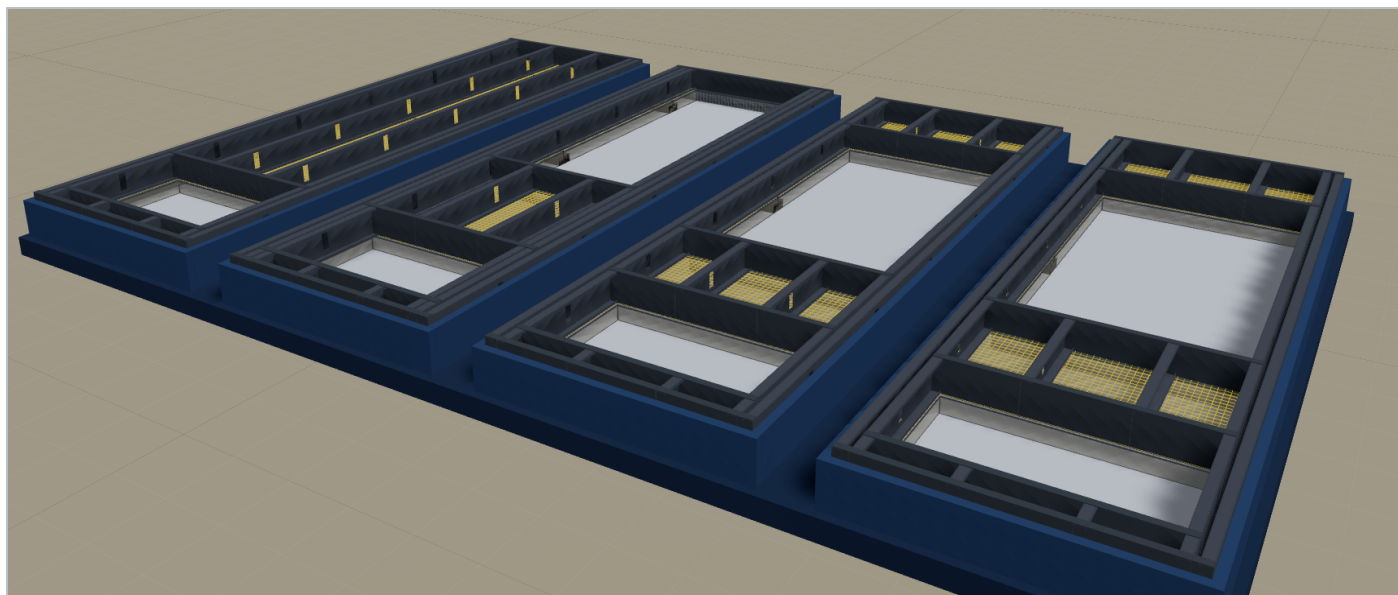
The skin pour (continued)

HOLD POINT

Pre-pour. Before any concrete goes in a slot, the QC inspector verifies the bed check, the steel, the mesh, the embedments and the inserts are all complete and signed, that the drawing on the floor is the current revision, and that the weather allows placing, and signs the pre-pour line on QF-13 Panel and unit traveler. **Concrete placed in a slot whose pre-pour line is unsigned makes every panel in that slot nonconforming**, because after the pour none of those checks can be made again. This hold is not waivable for production pressure.

SAFETY

Wet cellular concrete burns skin. It is strongly alkaline and the burn is slow, so it does not hurt while it is happening and you find out hours later. Gloves, long sleeves and eye protection for everyone in the placing crew. If it gets inside a boot or a glove, stop and wash it off. Do not let it sit against skin.



The bed filling slot by slot. The pour depth itself does not read in this view, which is why the section drawing above is the figure that matters on this sheet. Figure file: wall-02-skin-pour.png

THE RECORD YOU SIGN

QF-09 Daily batch and density log for every batch and every density and temperature reading. QF-10 Cylinder cast and break log for the cylinders. QF-12 Daily production log for the placement and finish. The pre-pour hold and the pour line on QF-13 Panel and unit traveler.

Cure and stripping a green panel

No panel comes out of the bed before 7 days have passed from the end of its pour. Not six. Not "it feels hard". Seven days, and the cure log has to carry a temperature reading for every one of those days.

The cure log: what you write down

- 1** The date and the **time the pour was finished** for that bed and slot.
- 2** The concrete temperature and the ambient temperature at placement, carried over from QF-09 Daily batch and density log.
- 3** The curing method that was applied, and whether it was still being maintained each day.
- 4** **The temperature at the bed, at least once every day**, off a calibrated instrument, with the time and your name.
- 5** Whether the enclosure or the heat was on.
- 6** The release date.

All six of those are **facts**. You write them whether or not anybody has told you what a good number looks like. Write the value, never a tick, including on the day it looks fine.

What the readings get judged against

The accepted range is a **criterion**, and it is not a fact. It belongs to the engineer of record, it gets written on QF-07 Mix design record, and it is then copied into the header of every cure log. **Right now there is no range.** Check the header of the log in front of you: it either says a range, or it says NOT SET.

What the log header says	What you do when a reading comes in
A range, e.g. `__ F to __ F` from a mix design revision	Write the value. Mark the "in range" column Y or N . If it is N: write the value, tell the quality manager the same day, and the panels are held under the nonconformance rules. Do not sign the release.
NOT SET , which is what it says today	Write the value and mark the "in range" column range not set . Nobody can judge a reading against a range that does not exist, and you do not invent one. If the reading is below 32 F or above 100 F, take it to the quality manager before the release is signed and the outcome gets written on the log. Those two numbers are a trigger to go and ask , not a pass mark: a reading between them is not "in range", because there is no range.

While the header says NOT SET, the release for stripping is made on the 7 day rule alone, with the temperature record complete, attached and unjudged. The moment the engineer sets a range it goes in the header and the log starts judging.

The 7 day rule is a handling rule, not a strength acceptance. It says the panel can be moved. It does not say the concrete has reached a strength, because no design strength has been set yet.

Cure and stripping a green panel (continued)

NOT SETTLED YET

[PE TO SET: **the accepted cure temperature range at the bed**, and whether the limit is on the concrete or on the air around it. There is no published range to borrow. ACI 523.1R-06 §5.6, the only guide written about this material, gives a curing *method* and no temperature at all; its 32 F and 100 F are rules about when you may *place*, not about how the panel is held afterwards. The cold weather and hot weather guides are written for ordinary structural concrete, not for a 35 pcf foam in a 5 in section. So this number comes out of this plant's own mix qualification and nowhere else.] [PE TO SET: whether release for stripping and for the pick may be made on a cylinder strength result instead of on elapsed time, and at what strength. Until the engineer of record sets that, the 7 day rule governs and is not shortened for anyone.] [KEN TO CONFIRM: the curing method itself. A curing compound has to be compatible with the finish that follows, and the cast face here is the interior finish face of the building, so the method has not been chosen.] [KEN TO CONFIRM: the cure enclosure or heated space that holds the temperature through the seven days. In a Montana winter that is not optional and it has not been bought, and until the range above exists nobody can even say what duty it has to meet.]

HOLD POINT

The QC inspector signs the release on QF-11 Cure log **before the panel is stripped**. Stripping a panel without that signature is a nonconformance against the panel.

The pick: the heaviest thing you lift all day

Taking a panel out of its slot is the heaviest routine handling in this plant. About **703 lb** for a 10 ft panel and about **879 lb** for a 12 ft 6 in wall A panel, several times a cycle, every production day. It has a written method, it has a hold point, and it gets signed for on every panel.

Cure and stripping a green panel (continued)

The pick	How it is done
Where from	Out of its own slot in the bed, lying flat and face down. The finish face is on the liner and the stud side faces up.
Where you take hold	The up-facing stud side, every time. The finish face is never a bearing face, never a rigging face, and the forks never touch it.
With what	The forklift with the boom attachment, equipment E-8. Lift height in the model is 60 in; carry it as low as the ground lets you.
Not with	No cast-in lifting insert. A wall panel does not have one. If a panel turns up with an insert in it, stop and tell the quality manager: it is built to a drawing this plant does not run.
Off the liner	Lift evenly along the panel to break the suction. No bar, no wedge, no prying an edge or a corner. A green panel breaks at the edge, and the break is in somebody's finished interior wall.
Turning it upright	With a tag line, panel clear of every person. Never with a hand.
Set down	On prepared dunnage in the storage area. Not face down on the slab, not leaned against a wall loose.

HOLD POINT

The pick check is a hold point, signed before the first lift of every panel, on QF-16 section 2, wall panel pick check, and it is station line 7 of QF-13 Panel and unit traveler. What gets checked before you lift:

- Cure released on QF-11 Cure log for this bed and slot, and the 7 days are up.
- The panel is identified and its pick weight is written on the traveler.
- The truck and the boom attachment are in service, and the pick weight is inside the capacity marked on them. [KEN TO CONFIRM: no truck and no attachment has been bought, so there is no marked capacity to check against yet.]
- The rigging has been inspected, is undamaged and is in service.
- **No cast-in lifting insert is in the panel.**
- The edge forms are struck, the end board is out, and nothing is fastening the panel to the bed.
- The travel path is clear, the dunnage is placed, and the set-down position is ready.
- Nobody is under it, nobody is at the pinch beside it, and nobody has a hand on it while it is still stuck to the liner.

A panel lifted before that line is signed is a nonconformance against the panel, damaged or not.

Look the panel over as it comes out of the slot and record any damage on QF-17 Panel dimensional and surface inspection. Damage found at the pick is a nonconformance and is handled the same way as any other one.

Cure and stripping a green panel (continued)

NOT SETTLED YET

The method above is provisional. It is not an engineered pick, and nothing on this sheet is a capacity. It is written so the operation is described, checked and recorded, which it was not before. What is waiting on the engineer of record, and what no one may fill in from experience:

- [PE TO SET: the attachment points on the panel, and whether the load is taken on the steel frame or on the concrete.]
- [PE TO SET: the stripping suction factor and the dynamic factor applied to the static pick weight.]
- [PE TO SET: whether the 12 ft 6 in wall A panel at about 879 lb needs a designed cast-in lifting insert instead of a forklift boom pick.]
- [PE TO SET: the rated capacity the truck and the boom attachment must have at the attachment load centre, for each panel weight.]
- [PE TO SET: the sling arrangement, the sling angle limit, and whether a spreader bar is required.]
- [PE TO SET: whether the flat-to-upright turn may be made in the air.]
- [PE TO SET: the dunnage and support point positions for set-down, storage and stacking.]

Until those are answered in writing, this method is followed because it is the only written method, and the signature on the form records that it was followed. It does not record that the pick is adequate.

SAFETY

About 703 lb for a 10 ft panel and about 879 lb for a 12 ft 6 in wall A panel, on a forklift boom at 60 in of lift. Nobody under it, nobody beside it at the pinch, and nobody hands-on to steady it while it is still attached to the liner. A panel that lets go of the bed suddenly swings.

Storing it

Panels go to the identified storage area, off the ground on dunnage, protected from weather and from mechanical damage. Moves in and out of storage use the same pick method; the hold point is signed once, before the first lift, and is not re-opened for later moves. Record where each serial number is stored, so a panel in the yard can be found again.

NOT SETTLED YET

[KEN TO CONFIRM: whether panels are stored flat and stacked or vertical in a rack. That decision sets the dunnage, the stack limit and the yard layout, and nobody has made it.] [PE TO SET: the maximum stack height, the dunnage positions and the bearing requirements for stacked panels.] **Do not invent a stack.** Until the stack limit is set, product is not stacked.

Cure and stripping a green panel (continued)

NO PICTURE EXISTS FOR THIS

No rendering shows a panel leaving the bed. The shot that would serve this sheet: the end of the **cure** phase with one panel lifted clear of its slot and the empty liner below it, camera at the bed from about 12 ft at eye level, so the panel edge and the suction break read. Nothing in the current shot list covers stripping.

THE RECORD YOU SIGN

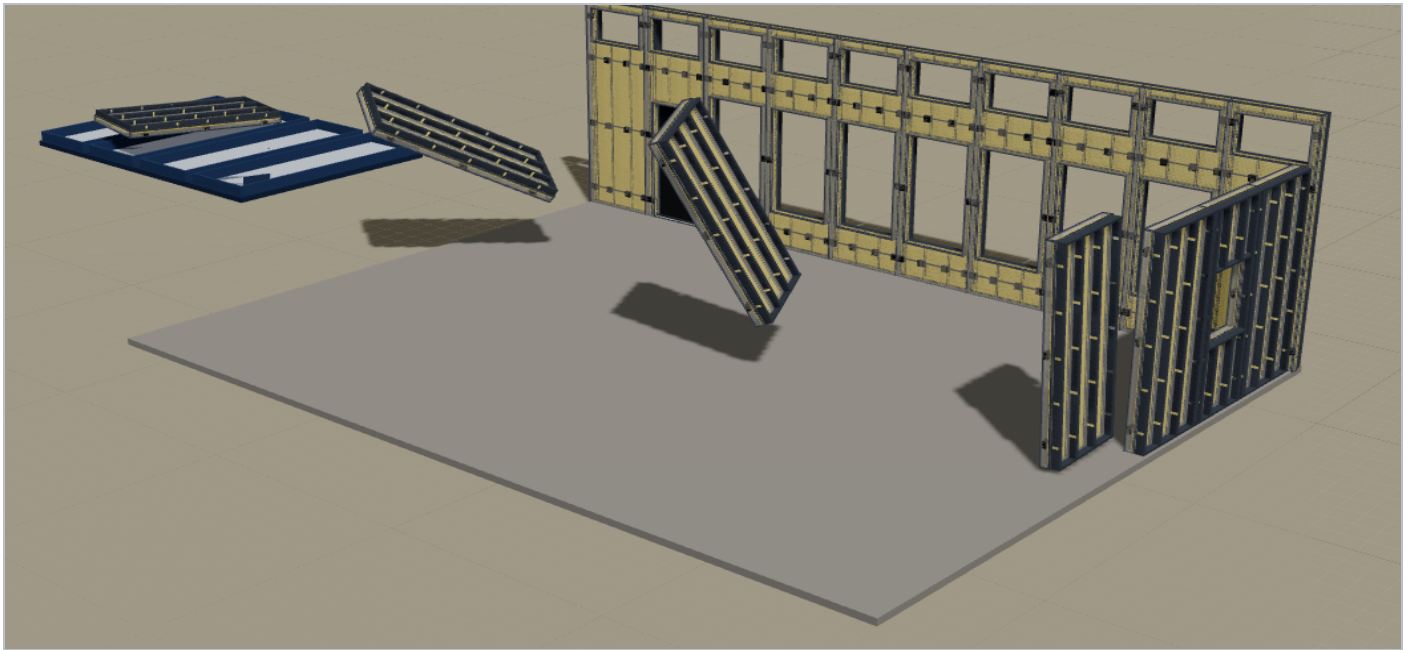
Two hold points on this sheet. QF-11 Cure log, with the QC inspector's release signature before the panel is stripped — and before the first daily reading goes on it, copy the accepted range out of QF-07 Mix design record into its header, or write NOT SET there. Then QF-16 section 2, wall panel pick check, signed by the QC inspector before the panel is lifted for the first time. Both are lines on QF-13 Panel and unit traveler: cure is line 6, the pick check is line 7. Damage found at the pick goes on QF-17 Panel dimensional and surface inspection and is handled as a nonconformance. Storage location and condition go on QF-32 Storage and stacking record.

Standing the panels and screwing them together

Panels stand at 4 ft widths on the slab, skin facing in, and get screwed to each other through the mating edge studs. They stand on two anchors and the joint screws alone until the cladding, the fill and the top track exist.

Setting a panel

- 1 Check the serial number against the key plan before it goes up. Panels are not interchangeable: the openings are in specific panels.
- 2 **Skin face in.** Check it before it lands, not after.
- 3 Land it on the slab on its bottom track and plumb it.
- 4 Anchor through the bottom track: 2 anchors per panel, 1/2 in diameter.
- 5 Screw it to the panel beside it through the two mating edge studs, and hold the 1/2 in joint gap.
- 6 Measure the joint gap and the plumb, and write the values.



Panels flying from the bed to the slab at 4 ft widths, with two walls already standing and screwed together. Figure file: wall-03-setting-the-panels.png

Standing the panels and screwing them together (continued)

NOT SETTLED YET

Three things on this sheet are assumptions in the model, not a design, and you must not treat them as one.

- **The joint screws.** The model carries 8 of #10-16 x 3/4" self-drilling, edge stud to edge stud per joint. [PE TO SET: the screw size, count and pattern between mating edge studs, and whether a corner wants a strap or a cast-in plate.]
- **The slab anchors.** The model carries 2 at 1/2 in per panel through the bottom track. [PE TO SET: post-installed or cast-in, the size, the embedment, and the base detail, which is still a choice between a slab recess, track on the slab, and a curb.]
- **Temporary bracing.** There is none in the design. [PE TO SET: a temporary bracing scheme, and the order the roof has to go on.]

STOP

Ten panels have to reach the end of a 40 ft wall. Nobody has set the cumulative run tolerance, the out of plumb limit, the joint gap range or the shim allowance at the base [PE TO SET]. So measure and record every joint gap and every plumb reading as you go, on QF-35 Panel erection record section 2, and the built length of each wall against its designed length on QF-35 Panel erection record section 3. Speak up the moment a wall starts to run long or short — **while there are still joints left to correct it in.** Do not absorb it silently in the last joint. **A criterion that has not been set does not make the line optional:** the measured value is the record, and it is the evidence the engineer will use when the tolerance is finally set.

Tying the tops

A continuous 600T125-54 top track runs along the wall tops and ties the panels together for the roof. It goes on after the walls are up and before the roof.

SAFETY

About 703 lb per panel, about 879 lb for a 12 ft 6 in wall A panel, on a forklift boom. Nobody under a suspended panel. Use a tag line, not a hand, to turn one. The tall wall A panels stand unbraced the longest of anything on the job, and they are the tallest and the heaviest. Treat a standing unbraced panel as a thing that can go over.

Standing the panels and screwing them together (continued)

THE RECORD YOU SIGN

In the plant, on the shower house: QF-18 Shower house assembly, MEP rough-in and cladding inspection, the assembly section. Panel serial numbers against the key plan, plumb, joint gap, joint screws by type and count and pattern, and the anchorage of the bottom track.

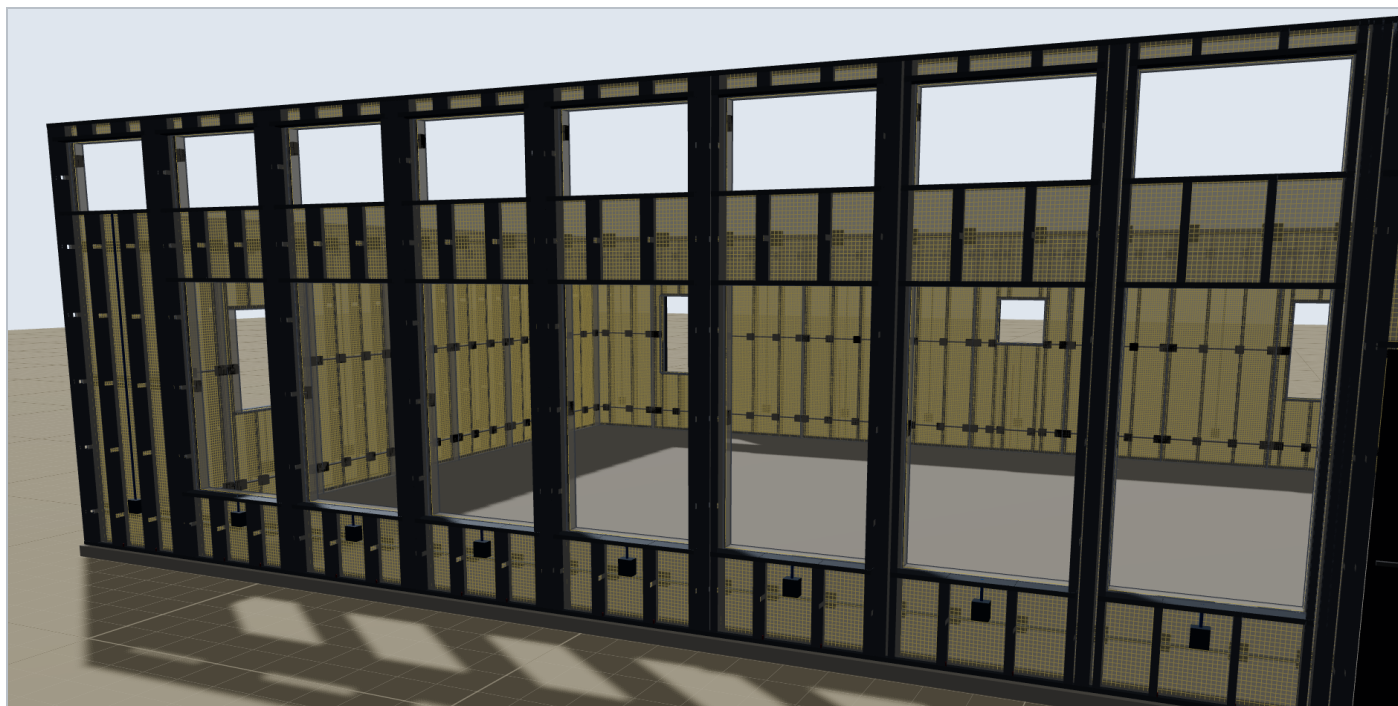
On site, on the house: QF-35 Panel erection record. The builder stands the panels, so **the builder's site supervisor writes and signs that record, by name and company. No plant signature goes on it.** It records what was received and what the slab was like, then panel by panel the serial number against the key plan, the skin face, the measured plumb, the measured joint gap and the joint screws and slab anchors as actually fixed; then wall by wall the built length against the designed length. The blank goes out with the shipment alongside the installation instructions, and the completed record comes back to the plant with QF-34 Delivery and receipt record and is filed against the order and cross-referenced from QF-13 Panel and unit traveler. The plant issues it, supplies the criteria through the engineer of record, and acts on anything it reports against a panel — the plant does not certify the erection. **The installation instruction that governs the work still does not exist** [PE TO SET: the panel to panel connection, the foundation anchorage and the erection tolerances]. What the plant itself signs is QF-33 Loading and unloading manifest at loading and QF-34 Delivery and receipt record at delivery.

Rough in, in the open cavity

The wall is open on the outside now. Everything electrical and everything plumbing goes in this cavity, and then it gets buried permanently.

STOP

The cavity fill is irreversible. Pumping the fill before the rough-in has been inspected and approved destroys the inspection, and the work has to be opened back up. There is no other way to see it again. This is the single most expensive mistake available on this job.



The standing wall from outside, still open: panels anchored through the bottom track, screwed to each other through the mating edge studs, and the boxes and conduit in the open cavity. Figure file: wall-04-open-cavity.png

Running it

- 1 Route through the stud punchouts. They are 1-1/2 in by 4 in, 12 in from each end then every 24 in. Use them. Do not cut new holes in a stud.
- 2 Outlet boxes at 16 in, 1 per panel in the model. Switches at 48 in.
- 3 Conduit 3/4 in. On the plumbing wall, 2 in drain and 3/4 in hot and cold supplies.
- 4 Support and protect everything. Once the fill is in, nothing can be re-clipped.
- 5 Seal every sleeve penetration.
- 6 Finish the pressure tests and the continuity tests that have to be made before the cavity closes. They cannot be made afterwards.

Rough in, in the open cavity (continued)

HOLD POINT

Shower house, in the plant. The QC inspector inspects and signs the rough-in hold on QF-18 Shower house assembly, MEP rough-in and cladding inspection **before the cladding goes on and before any fill is pumped**: pipe and fitting materials against the approved plumbing plan and the adopted Uniform Plumbing Code 2021; supports and protection; conduit, boxes and conductors against the approved electrical plan and the adopted NEC 2020 with the Montana amendments; bonding and grounding; sleeve penetrations and their sealing; and the completed tests. [KEN TO CONFIRM: the notification arrangement with the third-party inspection agency for this hold point.]

HOLD POINT

House, on site. The panels leave the plant with no plumbing and no wiring in them. The rough-in is done on site in the open cavity and **it is inspected and approved by the authority having jurisdiction before the cavity fill is pumped**. That instruction goes out with the shipment on its own page. **The approval is written down on QF-35 Panel erection record, section 5**, by the erector: the authority, the inspector, the inspection number and the date, with the approval attached, and then the date and time the fill started. The fill line sits under the approval line on the form on purpose. If the approval line is empty, the fill has not been authorised by anybody.

Who sees what

A unit carrying the Montana insignia is accepted throughout the state without further inspection, except for zoning, utility connections and foundation permits. Those connections, water in, sewer out, power in and the anchorage, are exactly what the local inspector does look at. Leave them clean and accessible.

THE RECORD YOU SIGN

In the plant: QF-18 Shower house assembly, MEP rough-in and cladding inspection, the MEP rough-in section, as a hold point signed by the QC inspector.

On site, on the house: QF-35 Panel erection record, section 5, written and signed by **the erector's site supervisor, not by anyone from the plant**. The authority having jurisdiction approves the rough-in on site; the erector records the approval and then the fill. The requirement itself is carried in the installation instruction issued with the shipment, and the blank form goes out in the same pack.

The cladding sheet

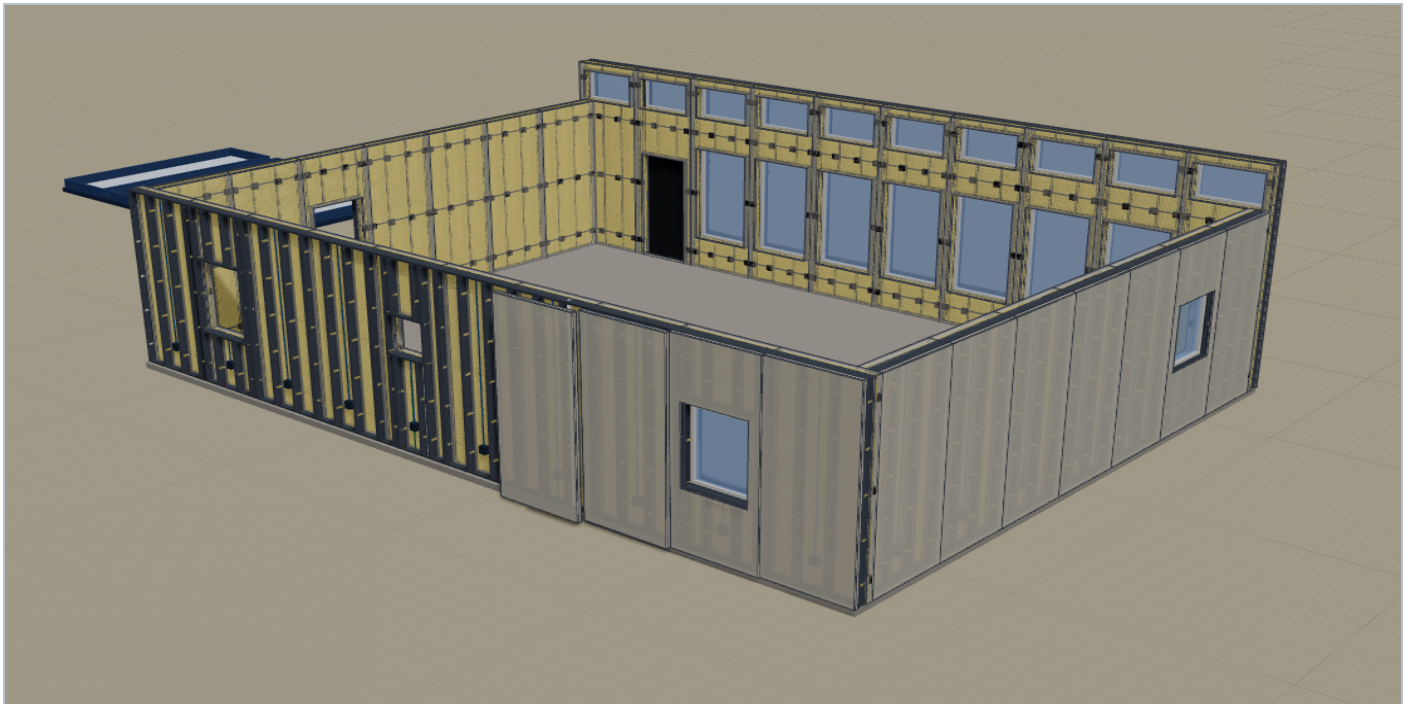
A 2 in sheet of the same 35 pcf cellular concrete, with mesh in it, cast in the same bed as the panels. It screws onto the outside stud flanges and it is the outside face of the building.

Casting it

A cladding sheet is a cast product with its own serial number and its own traveler, and it gets exactly the same checks as a panel: bed and form check, mesh placement, pre-pour hold, pour and density, 7 day cure, strip, and dimensional and surface inspection. Same mix, M-35 at 35 pcf.

Installing it

- 1 Check the rough-in hold is signed first.** The cladding is one of the two faces that hold the fill in, and once it is on, the cavity is closed to view.
- 2** Screw the sheet to the exterior stud flanges.
- 3** Hole at every opening, in the same place as the hole in the skin.
- 4** Check the sheet is tight to the flanges all the way along, because the fill is going to push on it.



2 in cladding sheets going onto the exterior stud flanges, half the building closed and half still open frame. Figure file: wall-05-cladding.png

The cladding sheet (continued)

NOT SETTLED YET

[PE TO SET: the screw pattern and count fixing the cladding to the stud flanges. The model carries an assumed count and no pattern.] [PE TO SET: confirm that bare cladding is acceptable as the weather face, or name what it needs. There is no exterior finish over the cladding on the walls, by Ken, 6 September 2026, so the cast face is the weather face.] [PE TO SET: the detail that keeps the air barrier, the vapour barrier and the flashing continuous at every panel joint and at the top track. No air sealing detail exists today, and the house has to test at 4 ACH50 under Montana's amended energy code, with the panel joint as the leak path.]

STOP

The cladding face is what the customer sees for the life of the building and there is nothing going over it. Handle the sheets like finish material, not like sheathing. Chipped edges and scuffed faces are the finished product.

THE RECORD YOU SIGN

The sheet's own QF-13 Panel and unit traveler, carrying QF-14 Bed and form check, QF-15 Mesh and embedment placement check and QF-17 Panel dimensional and surface inspection exactly as a panel does. Installing it on a unit is station 11 and is recorded in the cladding section of QF-18 Shower house assembly, MEP rough-in and cladding inspection, which is signed **after** the rough-in hold and **before** any fill is pumped. That is line 12 of QF-13 Panel and unit traveler, and the fill is line 13.

Pumping the cavity full

What is left is 4-1/2 in of cavity, between the top of the skin pour at 5 in and the back of the cladding at 9-1/2 in. It gets pumped full of 30 pcf cellular concrete, mix M-30.

STOP

The cladding goes on before the fill, and the order is not interchangeable. The cladding sheet and the cast skin are the two faces that hold this fill in. With the cladding off, the cavity is open on the outside and there is nothing for the fill to bear against. Cladding first, every time. See WP-10.

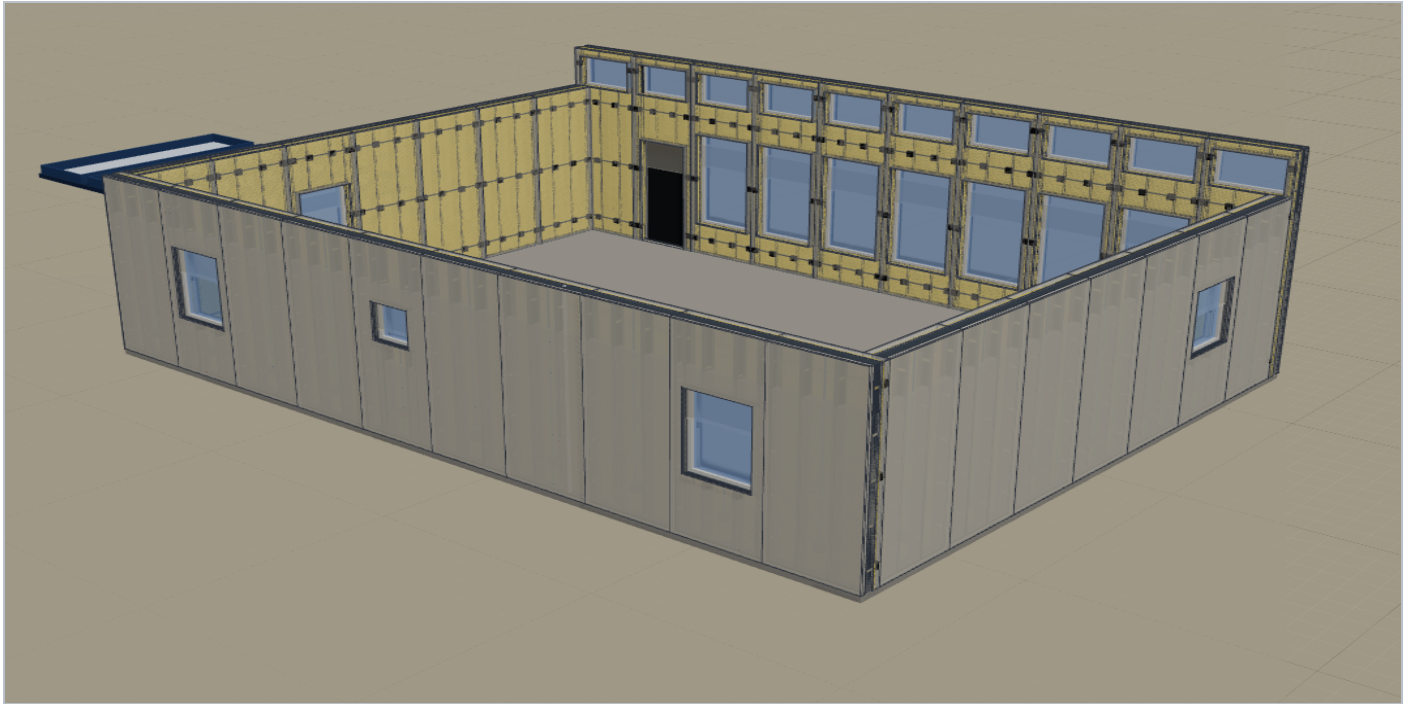
STOP

Before anything is pumped, check two signatures. The rough-in hold — in the plant, the QC inspector's line on QF-18 Shower house assembly, MEP rough-in and cladding inspection; on site, the authority having jurisdiction — and, on a unit, the cladding line on QF-18 Shower house assembly, MEP rough-in and cladding inspection that says the sheets are on and the dimensions are taken. If you cannot see both, you do not start the pump.

Pumping

- 1 Pump in lifts of 48 in. Do not try to take a 10 ft wall in one go.
- 2 Keep it continuous per wall. Do not leave a wall half full and come back tomorrow.
- 3 Watch the cladding and the joints as the level comes up. The fill is wet and it pushes. A sheet that was not screwed tight will tell you now.
- 4 Take fresh density at the point of placement on the first placement of every batch and at least every 30 minutes while placing continues.
- 5 Take the temperature readings at the same frequency.
- 6 Cast cylinders on the same frequency as the skin pour.

Pumping the cavity full (continued)



Every wall closed on the outside at the full 11-1/2 in thickness, with the 4-1/2 in cavity behind the cladding pumped full. Figure file: wall-06-pumped-full.png

NOT SETTLED YET

[PE TO SET: the acceptance band around 30 pcf for the fill.] [PE TO SET: the fill density and a minimum strength to specify, and whether the fill needs its own mesh or ties to the cladding. Today it has neither.] The density band is not a paperwork number: the 30 pcf figure is the basis of every dead load in the design and of the transport weight of a shower house. A density that drifts makes the structural design wrong, not just the concrete.

Weather, same as the skin pour

Not mixed or placed during freezing weather, during rain or snow, or over standing water, snow or ice. Cold weather mix if it is going below 32 F within 8 hours of placing.

SAFETY

Pump line pressure and wet cement. Never clear a blocked line by hand and never look into an open line end. Wet cellular concrete burns skin the same way the skin pour does: alkaline, slow, and you find out afterwards. Gloves, sleeves and eye protection on the whole pump crew.

Pumping the cavity full (continued)

NO PICTURE EXISTS FOR THIS

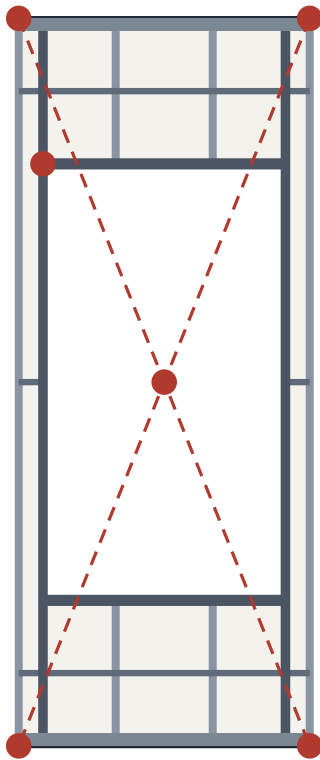
No rendering shows the fill actually going in. The existing wall-06-pumped-full.png is the finished wall from the outside, so the thing this sheet is about is behind the cladding. The shot that would serve it: a **pump_fill** frame with the section clip turned on, cut through a wall at about mid height, so the 4-1/2 in cavity, the rising fill line and the 48 in lift read against the skin pour on one side and the cladding on the other.

THE RECORD YOU SIGN

QF-09 Daily batch and density log, the fill density and temperature readings at the point of placement, with the serial numbers the batch went into.

What good looks like and what gets rejected

Every panel gets measured after it is stripped, and the measured values get written down. Not a tick. A tick says somebody looked. A value says what they found, and it is the only thing that can be checked later.



Measure and write the value.

Every criterion below is [PE TO SET].

Red dots: the four corners, the centre and the opening head.

- 1 Length, both edges and the centreline
- 2 Width, both ends and mid height
- 3 Overall thickness at the stated points
- 4 Skin thickness at the panel edge
- 5 Opening size and both offsets
- 6 Squareness, both diagonals
- 7 Bow, in plane and out of plane
- 8 Twist, all four corners on a flat reference
- 9 Face flatness of the finish face
- 10 Insert position from two datums, where inserts exist
- 11 Cumulative run across the whole wall of panels

Where the post-strip measurements are taken on a panel.

The honest problem with this sheet

NOT SETTLED YET

Every acceptance criterion on this page is [PE TO SET]. There is no published dimensional tolerance and no published surface or defect criterion for a cast panel of this construction, in any source this program has found. The engineer of record sets them. **Do not write in a number you remember from precast, from drywall or from a job you worked somewhere else.** Record the measured value and let the quality manager carry the question.

What good looks like and what gets rejected (continued)

Surface and defects on the finish face

Defect	What gets judged	Criterion today
Cracks	Width, length, location, and whether it goes through the skin	[PE TO SET] acceptable, repairable, and reject widths
Voids and bugholes	Diameter, depth, how many per area	[PE TO SET]
Edge and corner damage	How far in from the edge	[PE TO SET]
Honeycomb or segregation	Any	[PE TO SET], normally not acceptable in a structural face
Exposed mesh	Any	[PE TO SET]
Insert or embedment out of position	Measured position against tolerance	Nonconforming. Dispositioned by the engineer of record.
Finish face flatness and texture	Against the reference sample panel	[KEN TO CONFIRM] the reference panel does not exist yet

STOP

There is no reference sample panel yet. One has to be cast, photographed and accepted in writing by Ken, the engineer of record and the third-party inspection agency, and kept in the plant as the thing everything else is compared to. Until that exists, "it looks right" is one person's opinion and nothing on paper can stand in for it.

Repair

A defect in the repairable class is repaired by the written repair procedure and re-inspected. [PE TO SET: the repair procedure, the repair material and its compatibility with 35 pcf cellular concrete, the surface preparation, the cure, and the limit beyond which repair is not allowed.] **A repair made without a written procedure is itself a nonconformance.** Do not patch a panel because it seemed like a small thing.

What good looks like and what gets rejected (continued)

When something fails

- 1 Tag it.
- 2 Move it to the hold area. It does not stay in the line and it does not go to the yard with the good ones.
- 3 Raise QF-22 Nonconformance report.
- 4 The quality manager dispositions it in writing. Where the deviation affects dead load or capacity, the engineer of record dispositions it, in writing.
- 5 Rework or repair is re-inspected against the same criterion by the same inspection.
- 6 The disposition and the re-inspection go on the traveler. The traveler carries the panel's whole history, including its failures.

Two rules about the paperwork that are not negotiable

- **A blank line on a traveler is an inspection that did not happen.** The panel does not advance past it.
- **A line signed in advance is a falsification.** It is a corrective action against the process and action against the person who signed it.

Release

Nothing leaves until the final inspection and release is signed on QF-20 Final unit inspection and release record, and **only the quality manager signs it**. Not the production lead, not the QC inspector, not the owner in a hurry.

THE RECORD YOU SIGN

QF-17 Panel dimensional and surface inspection for the measurements and the surface. QF-22 Nonconformance report when it fails. QF-20 Final unit inspection and release record to let it go.