

Guidelines for Estimating Erection Cost of Siporex Elements

Erection Manpower

Four (4) man-hours per cubic meter of Siporex panels for residential construction is a good average figure. The figures cover erection of the superstructure on the prepared foundation base (level tolerance ± 1 cm) and include grouting of wall and roof joints as well as repair works to make the surface ready for application of finishes. The figures also include casting the normal ring beam behind the rebated wall panel upstand.

A typical erection crew with crane & operator consists of the following:

- 1 - crane helper
- 2 - erectors
- 1 - panel preparation man
- 2 - assistant erectors for general site works, grouting, repair works, dowel drilling, etc.

Note that one crane can serve 2 crews at a time.



Type of Crane & Crane Hours

Mobile telescopic crane 10 to 40 ton range depending on the reach is normally needed. A single crane with operator can serve two erection crews at the same time. Crane usage will be about 0.33 hours per cubic meter of Siporex elements considering two crews or 0.66 hours per cubic meter for one crew.

Cost of Auxiliary Materials and Consumables

SR 30 to 40 per cubic meter of Siporex elements. The figure includes cost of Siporex glue, sand-cement grout, concrete and reinforcements for ring beams, plastic wedges, nails and dowel bars. Cost of large beams/columns requiring form works shall be calculated separately. Major steel fixings and steel beams are not included.

Note:

Above data should be considered as general guidelines only. They are not substitute for careful evaluation of actual requirements of each project and a detailed bill of quantities. The data supplied are based on LCC's own experience and are correct to the best of our knowledge. However, no guarantee of any kind can be given as individual projects vary a great deal.

List of Auxiliary Materials	Approximate Consumption
• Siporex glue for bedding and minor repairs	10 kg per cubic meter of Siporex
• Sand-cement grout to fill joints between wall panels	45 kg per cubic meter of Siporex
• Fiberglass tape for joints	3.5 lm per sq. m. of Siporex wall
• Gesol (Adhesive liquid) for fixing fiberglass tape	1 kg per 18 lm of fiberglass tape
• Dowels, $\varnothing 5.5$ mm x 250mm long, stitches to connect walls	2 pcs per wall panel
• Plastic wedges - to support wall panels temporarily	2 pcs per wall panel - reusable
• Galv. nails: 100mm	4 pcs per cubic meter of wall
• Galv. nails: 125mm	2 pcs per cubic meter of slab
• Siporex Sand paper	1 lm per 200 cu. meter of Siporex
• Masonry nails, 50 mm	1 box per average villa
• Reinforcements for ring beam	1 kg per cubic meter of Siporex
• Concrete for ring beams	1 m ³ per 20 m ³ of Siporex slab

Hand Tools and Equipment

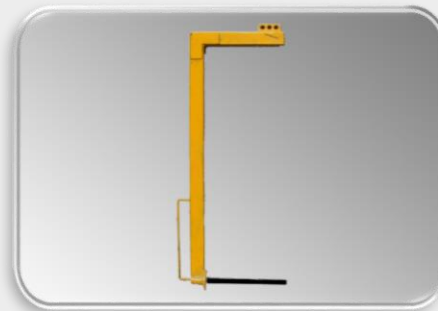
Siporex Erection Tools

The following tools are provided by LCC Siporex free of charge on return-basis against a refundable deposit as an extension of services to customers. They are to be returned to the Siporex factory upon completion of the erection works to serve other Siporex customers.



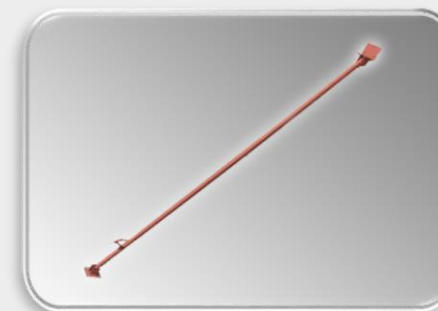
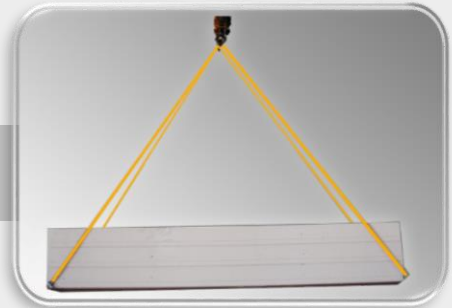
Roof Slab Grab
width of slab = 600 mm

Lifting Grab
for horizontal wall panels and lintels



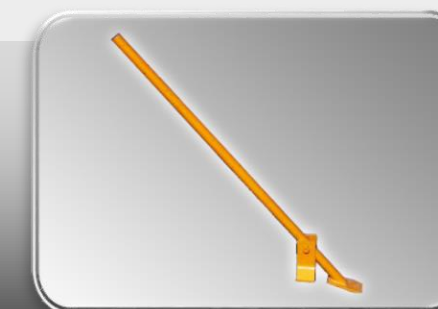
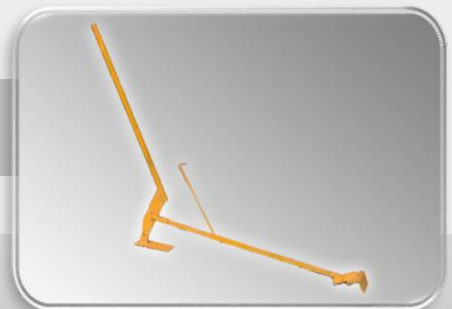
Lifting Hook
for vertical wall panels

Lifting Sling
for slabs (7.8 m long and 2 tons capacity)



Wall Braces
to temporarily support vertical wall panels

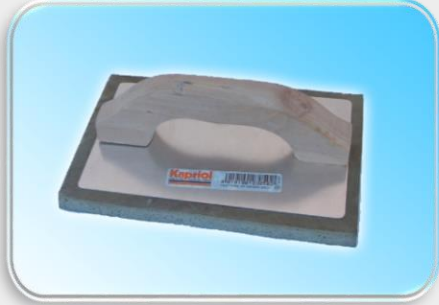
Cramp
for closing joints between floor/roof slabs



Lever
for raising partition walls against the ceiling.

Other Hand Tools and Equipment

The following tools (not provided by LCC Siporex) are also required in addition to the special erection tools during the installation of Siporex elements.

**Grinding board****Plane**
for chamfering sharp edges**Siporex Saw**
with special blade for aerated concrete (available for sale at Siporex factory)**Hack Saw Blade**
for cutting steel reinforcement**Electric Circular Saw**
with metal blade**Electric Grooving Machine**
for making grooves on panels.

Erection Procedure

- R.C. foundation should be cast with a smooth and leveled surface. This saves a lot of work in leveling the tops of wall panels later.
- Layout of wall panels should be marked on the foundation using chalk lines and ensuring that any overhang has been allowed for on the periphery of the foundation.
- Steel dowels connecting the wall panels to the foundation are either placed in their positions before casting the foundation or placed in a drilled hole of 4 cm in diameter in the foundation and then grouted.



Another alternative is to make a hole of 8 mm diameter and fix the steel dowels using Hilti C10 epoxy or equivalent. These dowels are placed at each wall panel joint as indicated on Siporex shop drawings.



- Nylon offset lines should be used to ensure outside line of panels is maintained.
- Aluminum straight edge should be set to line and level to inside face of the wall.
- The longest elevation with least number of openings at the farthest reach should be selected for initial installation. This is to maintain sight lines between operator and erector and ensures correct signals can be given to the crane operator.
- Siporex glue mortar is used as a bed for the wall panels. Wedges are used for temporary support of wall panels and allow fine adjustment for plumb.
- Corner elements are erected first and carefully positioned. Succeeding panels are erected as per mark numbers shown on Siporex shop drawings.

- Working with a fixed straight edge for alignment, the wall panels are lifted by a lifting hook, placed in position and checked for plumb. The top edges are also aligned and are steadied by temporary wall braces at every 3rd or 4th panel. Dowels of $\text{Ø}5$ mm x 250 mm long are used as stitches to connect the top joints between the panels.
- The tightly fixed together wall panels are grouted by thoroughly wetting the grooves with water and then pouring in fluid cement-sand grout (1:3) and then positioning steel dowels for the next storey panels.



Note that Siporex products should always be well wetted with water before applying any other materials (e.g, glue, grout, plaster,...etc.)

- Lintels are placed on top of windows and door openings using a lintel grab. They are supported on and connected to the wall panels adjacent to the openings. Steel dowels are drilled and grouted on top of the lintel prior to installation of vertical panels above.



- Floor and roof slabs are lifted with a grab and carefully positioned with specified end bearings on leveled wall panels. Minimum 50 mm side bearing is required on walls parallel to the span. Tongue and groove joint faces provide firm connection between the units which ensures the stability of the building.

- The notches formed between the floor or roof slabs are concreted along with the ring/bond beams after placing all the connecting and continuity steel bars. Refer to the figure showing the different details for continuity steel bars.
- Any damages are repaired and any spaces between the panels are filled flush with Siporex glue. After repair and setting of the mortar, the repaired areas and joints are rubbed down with sand paper to give smooth surfaces.

Repair of Siporex Panels

Guidelines

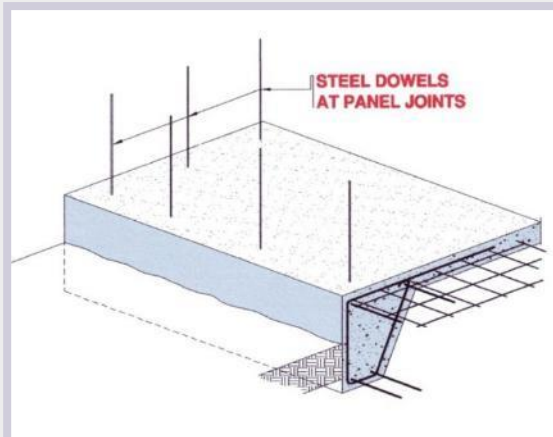
- Damage to Siporex panels may be repaired at site subject to certain limitations. Siporex units which are structurally defective and unfit for the purpose for which they are designed must not be repaired but should be rejected and replaced with sound units.
- Broken floor/roof slabs must be rejected. A broken floor/roof slab is a unit which due to fracture on its lower face (tension side) or through breakage and/ or fracturing of the bearing faces at the ends is no longer able to fulfill its structural functions for which it has been designed.
- Slabs with transverse cracks which extend through the thickness of the slab should be rejected. Slabs with hair-line cracks which do not penetrate to the tensile reinforcement will normally be suitable for use.
- Damage which exposes extensive parts of the reinforcement should not be repaired. Panels with major damage to the bearing surface which exposes the cross bars on the tensile steel should not normally be repaired.
- Spalling or peeling-off of fragments to face of panel can be repaired if maximum length of repair is 30 cm and depth is less than $\frac{1}{4}$ of the total panel thickness. Spalling to edge of panel can be repaired if maximum dimension of repair is 30 cm and maximum width is 20 cm.

Repairing Instruction

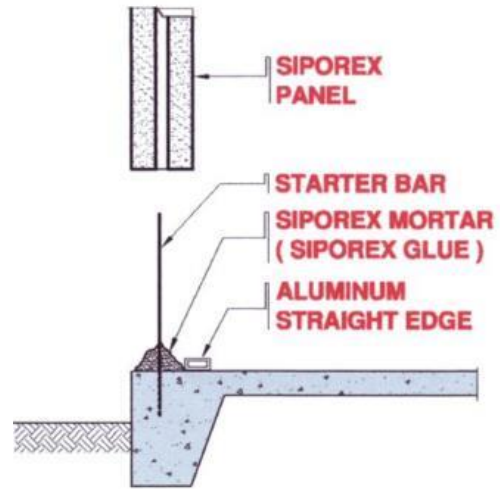
Siporex panels should be free from defects which would impair their strength and structural integrity. Slight damages are normal and can be repaired as per the following instructions:

- Clean the defective surfaces thoroughly with a stiff brush and remove all dirt and loose material. Wet thoroughly with water using a large brush. If a large piece has broken-off and the broken-off section is available undamaged, the piece can be glued on by applying Gesol to both surfaces and pressing the broken-off section into the unit to fit.
- Place a suitable amount of Siporex glue in a bucket. Add clean potable water with 10% Gesol and mix thoroughly with a mason's spoon till a soft putty consistency is achieved. Do not mix more mortar than can be consumed before the mortar starts to set. Do not add water when mortar starts to set in order to restore workable consistency.
- Deep repairs shall be reinforced with galvanized cut nails before Siporex glue is applied. Apply Siporex glue to the damaged area with a mason's spoon. During application, use slightly more material than is needed to fill the damaged area.
- After application, leave the material untouched till the mortar starts to harden slightly. Then level with a wood float. If necessary, apply a small amount of water to the surface during leveling. Level by moving the wood float towards the Siporex material.

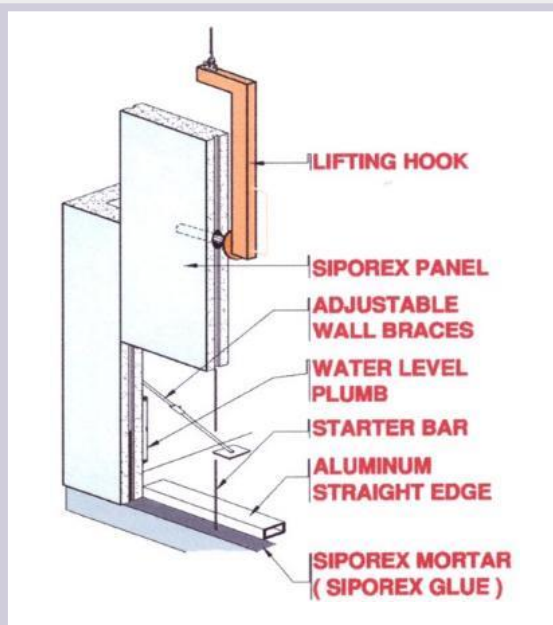
Illustrations Showing Erection Stages



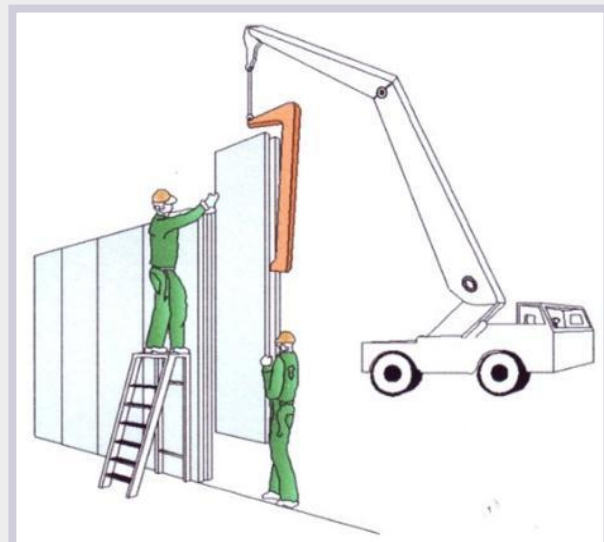
A) Starter bars are laid in position.



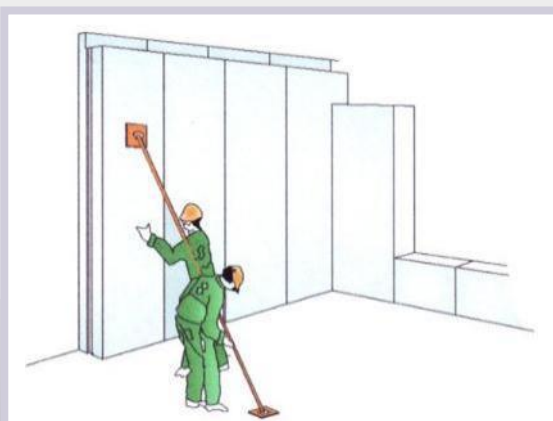
B) Siporex glue is applied for bedding.



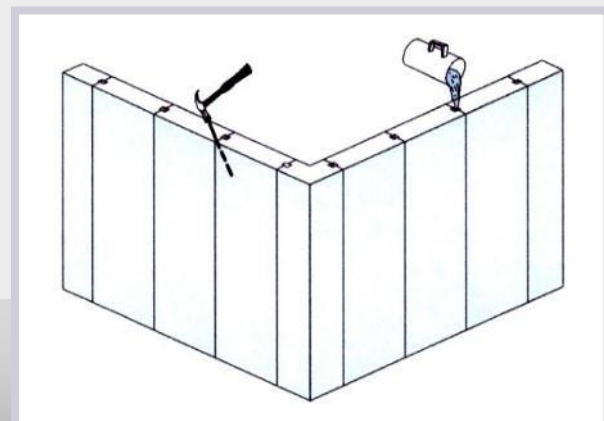
C) Corner panels are placed in position.



D) Succeeding panels are erected.

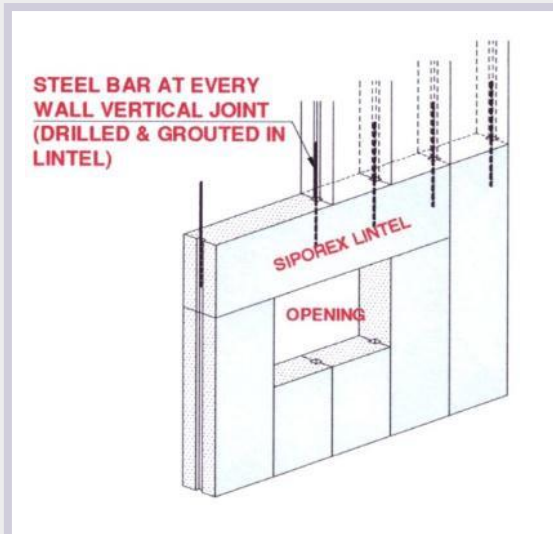


E) Provide temporary wall bracings.



F) Top joints are stitched and grooves are grouted.

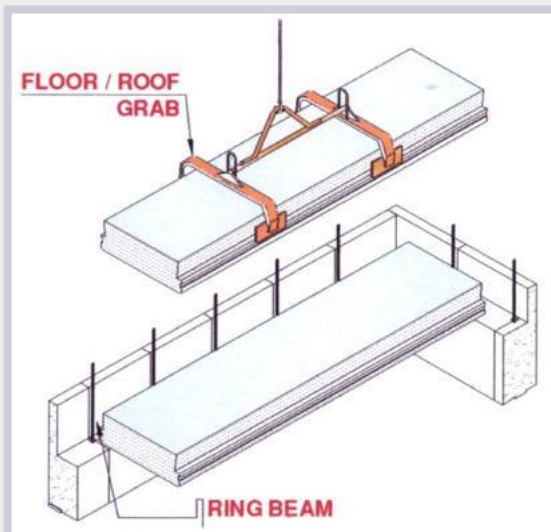
Illustrations Showing Erection Stages



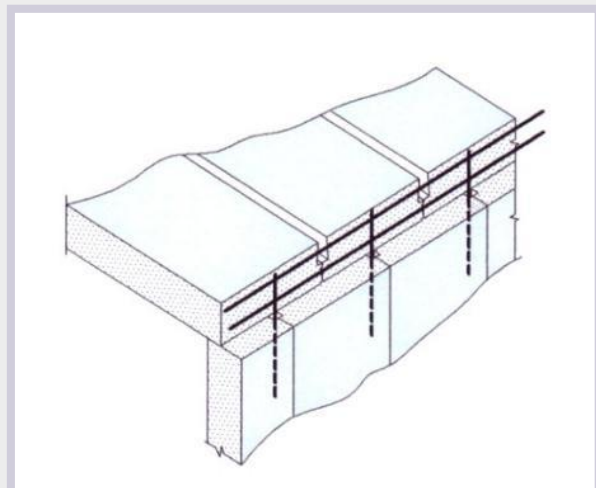
c) Lintels are laid above openings. Dowel bars are provided for next level.



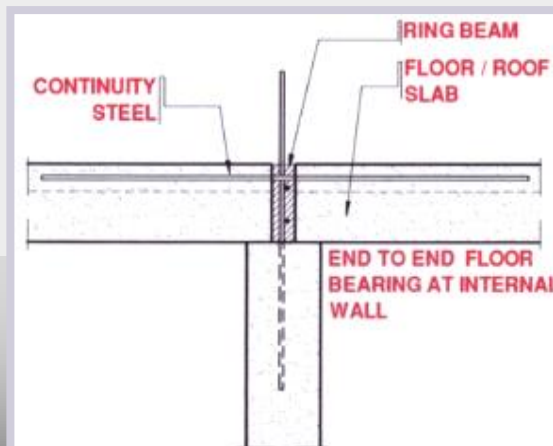
h) Siporex glue is used as leveling bed at top. Dowel bars are positioned for next level.



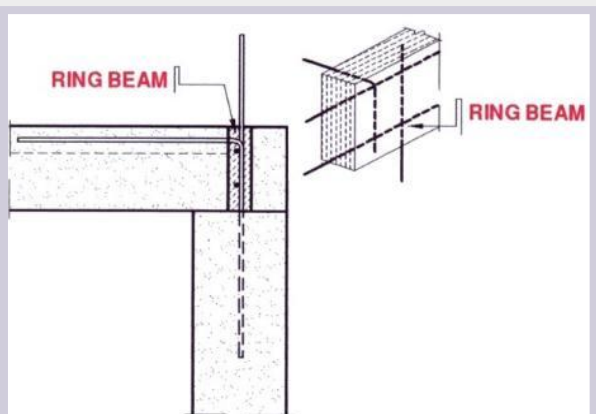
i) Floor/roof panels are laid.



j) Provide steel reinforcement for ring beams



k) Continuity bars between spans are laid.



l) Cast concrete along grooves and ring beams. Proceed with next upper level.