ACOTEC PRECAST WALL PANELS

Used Commercially Worldwide

Europe, Middle-East & Asia

Asia

Sri Lanka
Japan
Singapore
South Korea
China
India
Indonesia
Philippines
Taiwan
Thailand

Europe & Middle-East

Germany
United Kingdom
Spain
Ireland
Portugal
Saudi Arabia

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ICC-ACOTEC

Precast Wall Panels

Technical & Installation Manual

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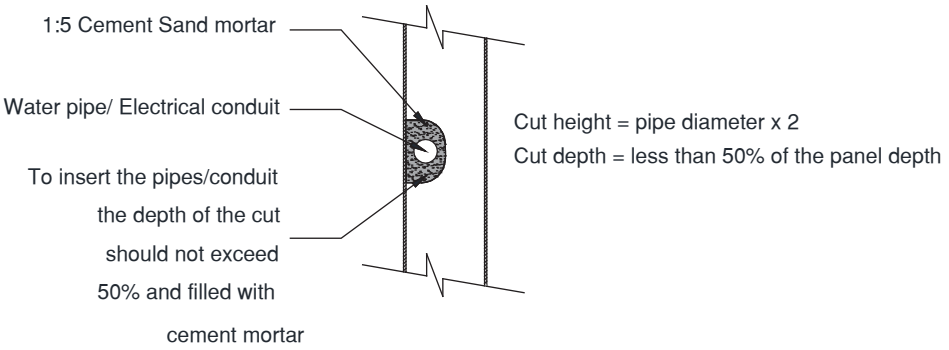
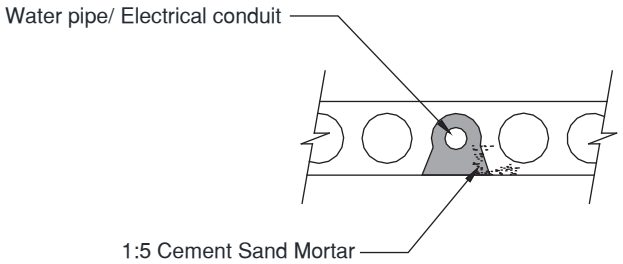
Revision 02 : 15th march 2018



SECTION A-A/SECTION C-C

Figure15 : Horizontal cross section



SECTION B-B/SECTION D-D

Figure16 : Vertical cross section

1. Product description

The ICC-ACOTEC non- load bearing precast wall panels are manufactured with Grade 30 concrete through an extrusion process. The sides of the panels are finished with tongue and groove to facilitate the assembly of panels. the panels are manufactured in three thicknesses 75mm,100mm and 140mm.Width of the panel is 600 mm.

2.Raw materials for manufacturing of ICC- ACOTEC wall panels

Raw materials for the manufacturing process of ICC-ACOTEC wall panels are summarized in the table below. Each material shall comply with their respective standards.

Table 1: Material specifications

Material	Standard/ specification
Ordinary Portland Cement	SLS 107:2015 BS EN 197 – 1:2011
Fine aggregates	BS 410 : 1986
Coarse aggregates	BS 410 : 1986
Admixtures	EN 934-2
Water	BS 3148 : 1980

3. Production process

The following production process is maintained in the manufacture ICC-ACOTEC wall panels using the specified materials in table 1.

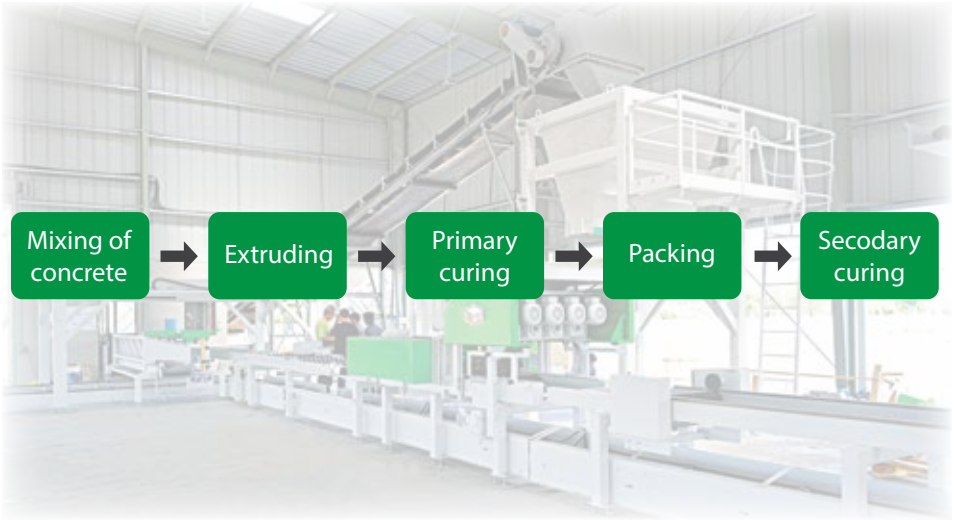


Figure 1: Production process

- Mixing of concrete : Raw materials summarized in table 1 are mixed as per the approved mix design
- Extruding: The mixed concrete shall be poured into the extruder of the ACOTEC plant where the hollow cores are formed
- Primary curing: once the panels are cast each of them will be stacked on steel pallets covered with tarpaulin for 24 hrs.
- Packing : After completing its primary curing stage all panels will be uncovered and bundled
- Secondary Curing: The bundles are then air cured for 18 days.

- Filling of concrete shall be done prior to installation
- Installation shall be done after 24 hrs. of filling the chip concrete.
- Cut and remove a portion of minimum width 300 mm either side of wall panel for the door frame installation.
- The cutting has to be done from the highest point of the door frame to the soffit.
- Insert the cut portion of a wall panel in the horizontal direction as shown.
- Fill the gap with construction grout
- The lintel shall be fixed after 24 hrs at erection of side panel

11.4 Electrical and plumbing provisions

- Hollow cores can be used for plumbing & conduits.
- The ICC-ACOTEC panel can be cut or drilled as required
- Electrical conduits can be easily placed by cutting the wall panels using a concrete cutter To insert the conduits depth of the cut should not exceed 50% of the panel thickness.
- Conduits can be placed in any direction.
- Distribution board can also be fixed in the 100mm and 140mm thickness panels as shown below.
- MEP work should commence after 7 days of panel installation

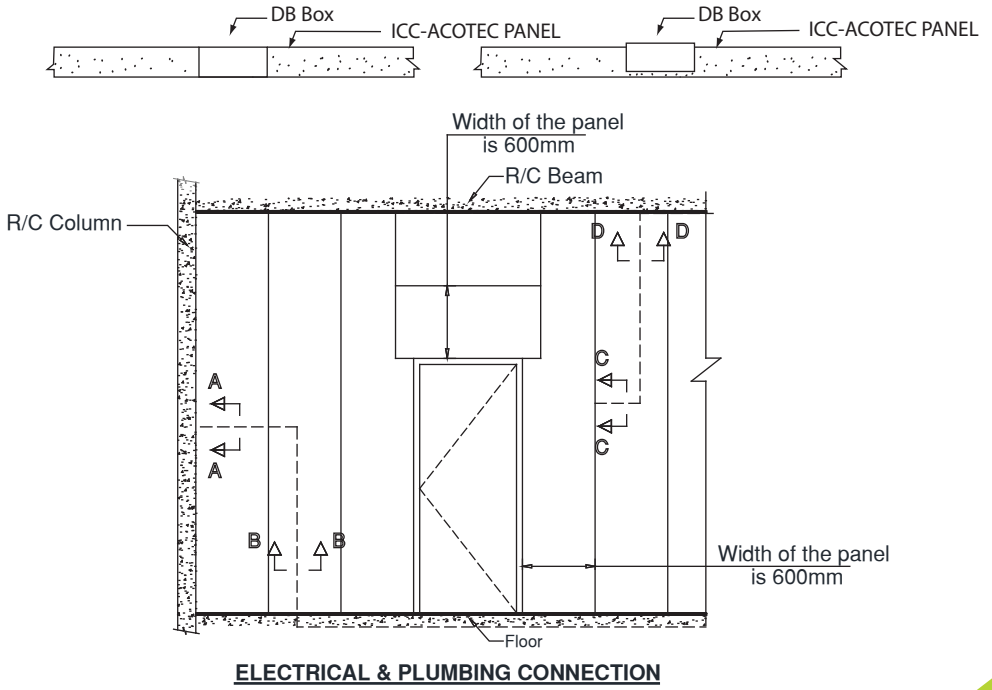
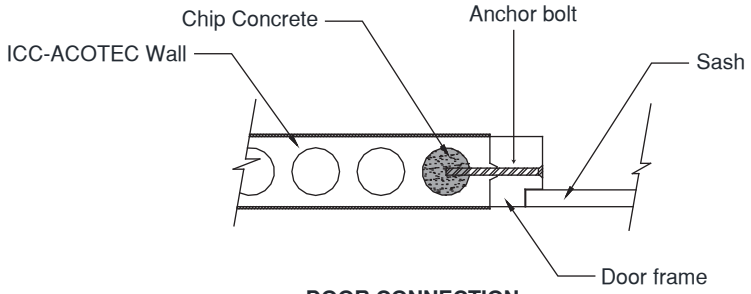


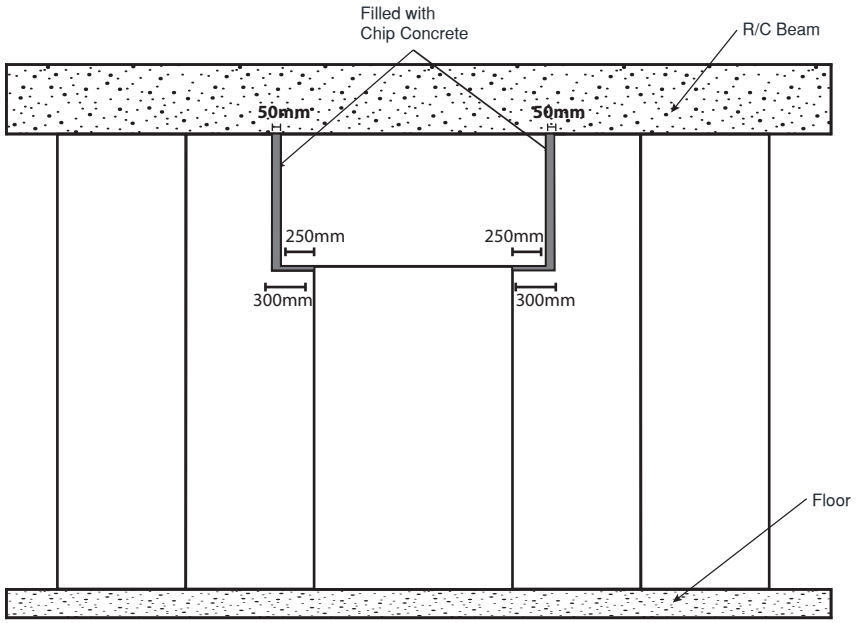
Figure 14 : Electrical & plumbing connection

11.3 Door and Window openings with lintels



DOOR CONNECTION

Figure 1.2 : Door connection



LINTEL CONNECTION

Figure 13 : Lintel connection change diagram with R/F bars and insert a new one with concrete gap. Or otherwise we can keep the RF one as an option.

Note: The hollow cores of side wall panels and lintel panel adjacent to the door frame should be filled with chip concrete.

4. Panel dimensions

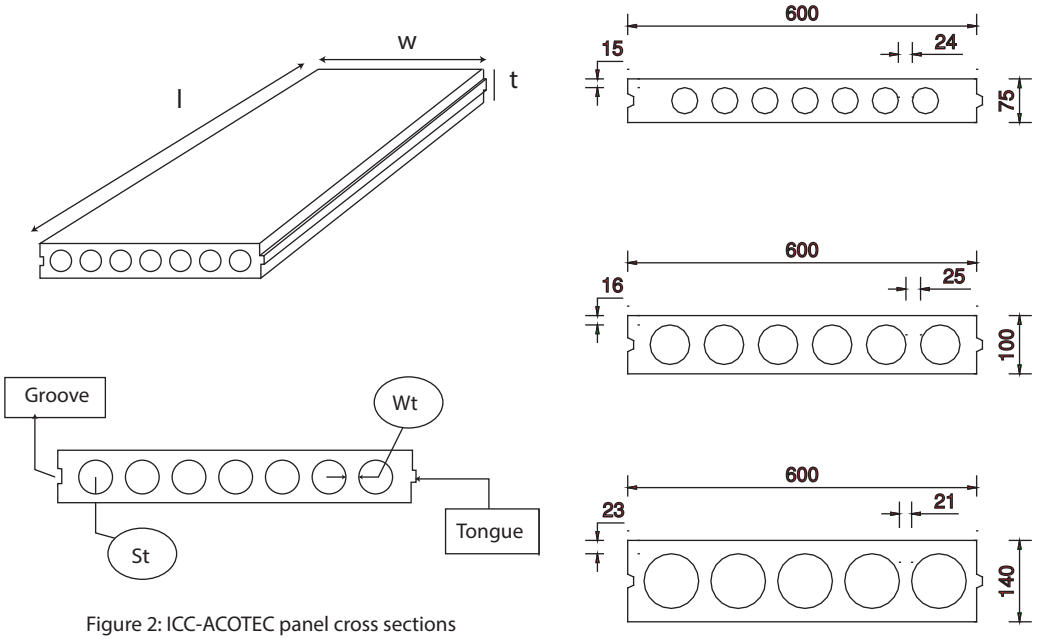


Figure 2: ICC-ACOTEC panel cross sections

Table 2: ICC-ACOTEC wall panel dimension with maximum tolerances

t=Thickness (mm)	l=Length (mm)	w=Width (mm)
75±3	2700	600±5
100±3	3300	600±5
140±3	3300	600±5

Panel Thickness (mm)	St=Shell Thickness(mm)	Wt=Web Thickness
75	Minimum 12	Minimum 20
100	Minimum 15	Minimum 20
140	Minimum 20	Minimum 20

ICC-ACOTEC manufacturing process has the facility of producing panels of varying Lenghts according to the customer requirements within the range of 2100mm to 3300mm

5. Physical properties of the ICC-ACOTEC wall panel

Table 3: ICC-ACOTEC wall panel properties

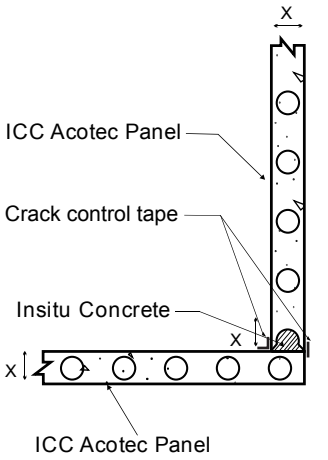
	ICC-ACOTEC wall panel thickness (mm)		
Parameter	75	100	140
Weight	110 kg/m^2	124 kg/m^2	164 kg/m^2
Bulk density	1200 kg/m^3	1200 kg/m^3	1150 kg/m^3
Concrete cube strength (28 days)	30 N/mm^2	30 N/mm^2	30 N/mm^2
Panel Strength	>5.0 N/mm^2	>5.0 N/mm^2	>5.0 N/mm^2
Fire resistance *	120 mins	>130 mins	>130 mins
Sound insulation *	41 dB	43dB	>43 dB
Thermal resistance *	0.4 m^2 K/W	>0.4 m^2 K/W	>0.4 m^2 K/W

*According to international references.

11. Special Details

11.1 Installing two panels at an angle

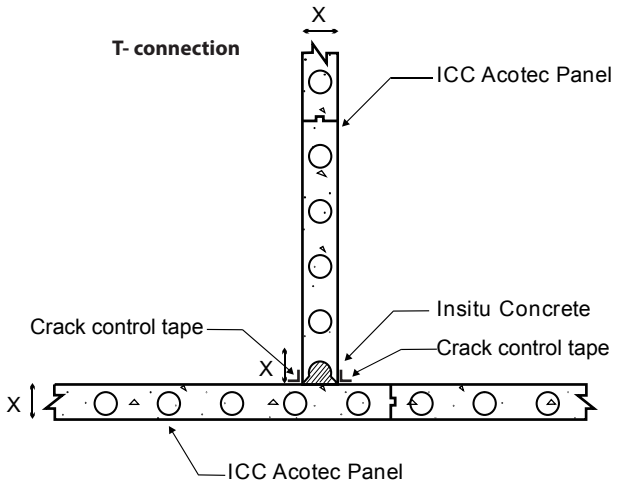
90° angle



X = 100mm or 140mm

Figure 10 : ICC-ACOTEC 90° connection

T- connection



X = 100mm or 140mm

Figure 11 : ICC-ACOTEC **'T'** connection

11.2 Crack repairing procedure

- Due to various reasons, hair line cracks may appear at few locations of installed wall area at joints.
- Since cracks are hair line nature, most of the time it can be visible only after skim coat. So make sure to keep the skim coated wall for sufficient period (at least 02 weeks) to observe the cracks.
- Such observe cracks should be repaired as follows.

1. Identify the crack formed area
2. Grind the area of the appeared crack to a width of 50mm at 25mm offsets both sides to a depth of 1-1.5 mm with grinder machine.
3. Clean the respective area with brush to make sure it is free from the dust and debris.
4. Apply the crack bridging wall primer (CIC-Dulux) one layer on the same area by 50mm roller brush.
5. Rest the treated area for 24 hours to settle the crack wall bridging primer.
6. Prepare the mix of Glidden precoat (CIC-Dulux) and Crack bridging wall primer (1Kg: 35ml) and apply on the respective area.
7. Level and smoothen the treated area.

Note : Painting to be proceeded only after rectifying the visible cracks.
Complete all the vibration induced site works before final painting.

10.2.16 Applying crack control tape

Non water proofing areas

- Firstly identify the joints to be treated with crack control tape.
- Grind the joint area with grinder machine to create even surface.
- Clean the respective area to make sure that it is free from the dust and debris.
- Inspect carefully the fiber tape applying area to ensure it is free from cracks and damages.
- Apply the 1st layer of crack bridging wall primer (CIC-Dulux) on grinded area by 50mm roller brush.
- Afterwards apply the crack control tape on center of the joint with symmetrical offsets.
- Finally apply the 2nd layer of crack bridging wall primer (CIC-Dulux) on the applied crack control tape and ensure the quality of joint.

Water proofing areas (bath room & pantry)

- Firstly identify the joints to be treated with crack control tape.
- Grind the joint area with grinder machine to create even surface.
- Clean the respective area to make sure that it is free from the dust and debris.
- Inspect carefully the crack control tape applying area to ensure it is free from cracks and damages.
- Apply the 1st layer of crack bridging wall primer (CIC-Dulux) on grinded area by 50mm roller brush.
- Afterwards apply the crack control tape on center of the joint with symmetrical offsets.
- Finally apply the 2nd layer of crack bridging wall primer (CIC-Dulux) on the stuck crack control tape and ensure the quality of joint.

- Additional tape should be installed with similar procedure for following areas.

- At lintel joints - Last panel of the wall - Column, Wall joint

Note: Apply crack control tape after placing of plumbing & service lines.

10.2.17 Skim coat application

No plastering required, just a thin layer of skim coat (3-5mm)

6. ICC-ACOTEC wall panel application

- Used for internal non-load bearing wall partitions
- ICC-ACOTEC walls can be used as single walls, double walls or double wall with cavity

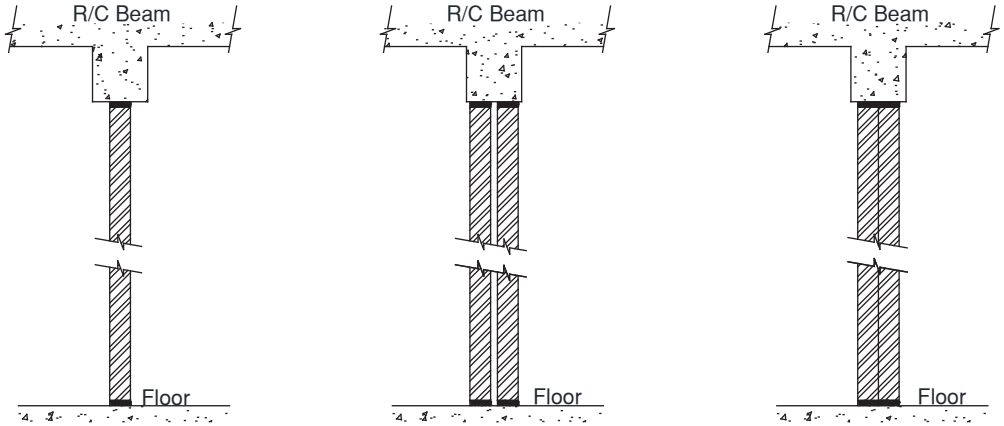


Figure 3: Types of internal partitioning

- When having double walls, it is preferred to adopt a staggered pattern.
- For wet area erection at places such as bathrooms, water proofing application followed by wall plastering is necessary
- All the other areas shall be finished with 3mm skim coat without any wall plaster.

Application limitations

- The maximum length of the wall which can be erected without a cross wall or a vertical stiffener is 6m.
- Maximum height of ICC-ACOTEC wall panel is 3.3 m.
- Maximum span of an ICC-ACOTEC lintel is 2.4m.Any span exceeding 2.4m needs structural engineers recommendations
- Skim coat shall be applied only after site rectification are completed.

7. Accessories and material for erection

Table 4: List of accessories

Accessory	Description	Image
Steel U bracket	The steel brackets shallbe used to stabilize the wall panel in vertical direction. Material : Zinc coated mild steel [1mm thick]	
Polyurethane Foam	PU foam is used to obtain flexible top joint in order to facilitate un due movements and settlements.	
Crack control tape	Crack control tape is used to prevent crack development between panels	
Construction grout	Non shrink grout for joint gap filling between structural elements and acotec panels	
ICC-ACOTEC grout	Specially formulated non shrink grout to fill gaps between panels (Flow cable 50, Cement & Clean Water are used as raw materials)	
Crack bridging wall primer (CIC-Dulux)	Crack bridging wall primer is used when applying the crack control tape.	
Glidden pre-coat (CIC-Dulux)	Glidden pre-coat is used only in the crack repairing process if required	

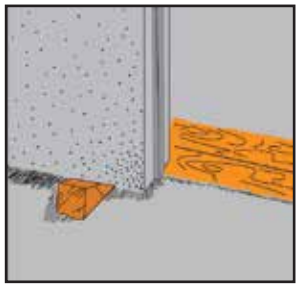
10.2.14 Placing the next ICC-ACOTEC panel

- Apply ICC-ACOTEC grout on tounged end of the erected panel and the grooved end of this panel.
- Place the panel as already described steps.

10.2.15 Final finishing

- One the Panels are joined the surplus grout is removed from the joints immediately after installation.
- 24 hours after installation, remove the wooden wedges & fill any gaps with relevant filling material.
- Recommend to sand the joint with sand paper to get even surface.
- Joint treatment to prevent shrinkages between panels to be done after 2-3 weeks of installation.

10.2.12 Placing of the corner panel and fixing



- Cut the side of panel to open the first hole
- Chip the concrete column of panel- column inter face
- Drill the column at 3 location (Bottom, Middle & Top) and fill with ICC ACOTEC grout and insert the dowel bars (see 8.1.4)
- Once the gluing material is applied lift the Panel to the upright position using the lifting machine.
- Place the panel next to the RC column.
- Using the installation steel bar adjust the Panel position until it makes contact with RC column•
- Make sure the bottom & the top of the Panel are in contact with the guide boards.
- lift the panel using the installation tool until the top joint gap reduces to 10-15mm.
- Once the panel is lifted nail the U bracket to the top beam.
- By using wooden wedges at the top and bottom, fix the panel & release the installation steel bar
- Minimum allowable width of the cut panel is 200mm

10.2.13 Finishing of joints

- Fill joint gap at the bottom with 1:5 cement sand mortar.
- Fill the joint gap at the top with PU foam.
- Fill the joint gap at the column face with construction grout.
- Keep the installed panel for 7 days undistured for joint hardening.

8. Typical ICC – ACOTEC wall Panel layout and connection details

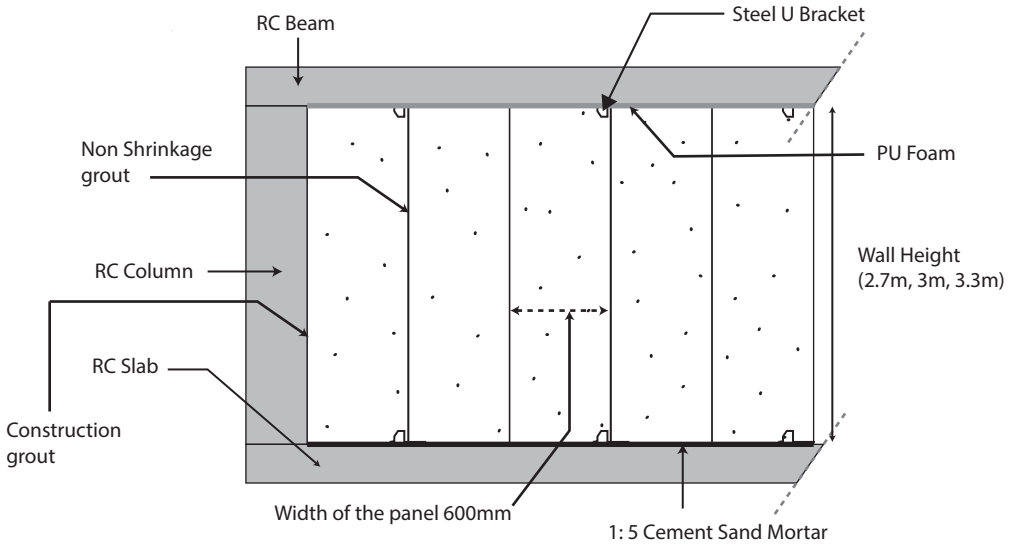


Figure 4 : ICC Acotec Panel layout

8.1 Connection Details

8.1.1 Top Connection-(At beam or slab soffit)

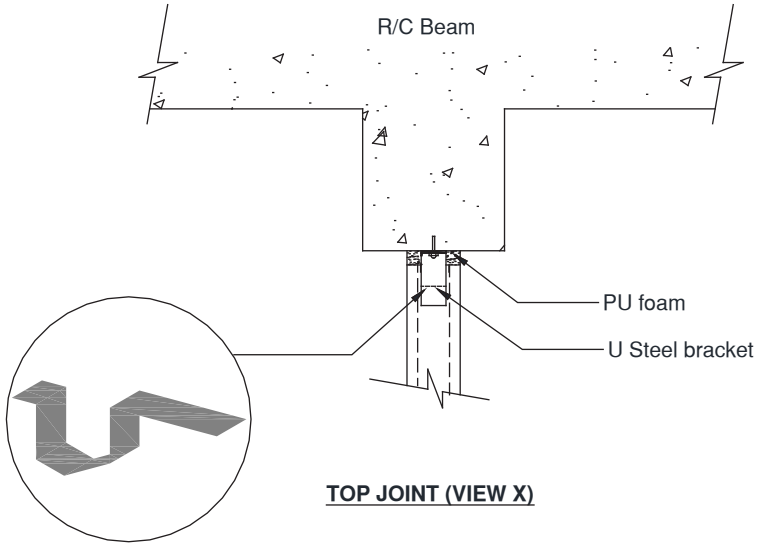


Figure 5 : Top connection

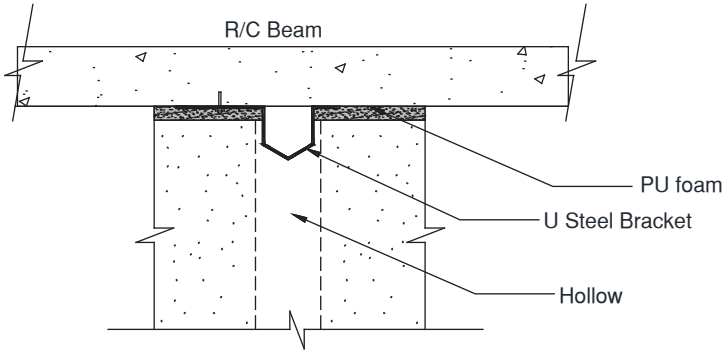


Figure 6 : Top Connection (front elevation)

Note:

- Steel U bracket will be fixed at top of the panel. Sequence of bracketed panels are 1st,03rd, 05th, 7th etc.
- There are three different sizes of U brackets for three types of panels
- Allowable thickness of the jont is 10-15mm

8.1.2 Bottom Connection-(On slab top)

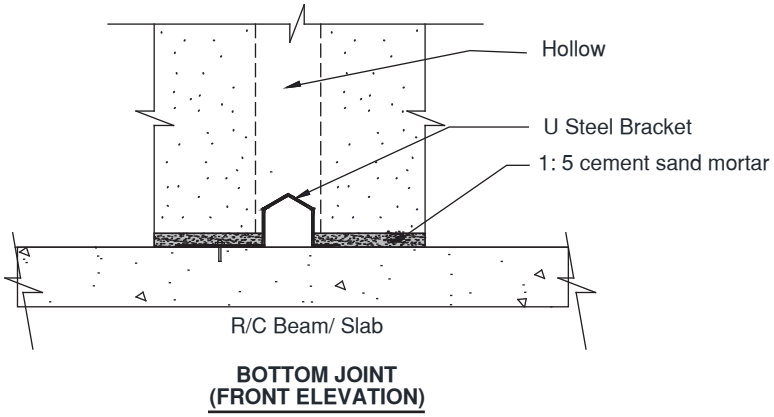


Figure 7 : Bottom Connection (front elevation)

- Steel U bracket will be fixed at bottom of the panel. Sequence of bracketed panels are 1st,03rd, 05th, 7th etc.h
- There are three different sizes of U brackets for three types of panels
- Allowable thickness of the joint is 15-20mm

10.2.9 Applying ICC-ACOTEC grout

- Bring the ICC-ACOTEC panel as close as possible to the bottom guide board using the lifting machine.
- Apply construction grout at the surface of RC column and top of slab
- Apply ICC-ACOTEC grout on the side of the panel.

10.2.10 Fixing of the steel U bracket

- Insert the U bracket through the last hollowcore and make sure it is firmly inserted

10.2.7 Fixing guide boards before installation

- Fix the guide boards to the ceiling and the floor, along the guide lines using props.

10.2.8 Mixing the ICC-ACOTEC grout

Raw materials

- Cement – 01 Kg
- Clean Water – 500ml
- Flow cable 50 – 05 g

Procedure

- Select a clean and suitable bucket for preparing the grout.
- Firstly pour clean water (only 60%) into the selected bucket
- Secondly add 1Kg of cement (portion by portion in 3 steps) in to the mixing bucket and use the grout mixer to mix it firmly (2-3min.) until all cement powder has been dissolved.
- Afterwards pour the flowcable 50 (5g) to the mixture & mix using the grout mixer firmly (2-3min.)
- Next get the mixture checked by the QA officer to ensure the quality.
- Once approved by the QA officer use it at the panel joint within 30 mins.
- Finally maintain the workability by adding the rest 40% of water.

Ref: Technical data sheet for Flowcable 50.

Safety Fact: Use personal protective equipments(PPE) during mixing process (eg: hand gloves & eye protectors)

8.1.3 Panel To Panel Connection

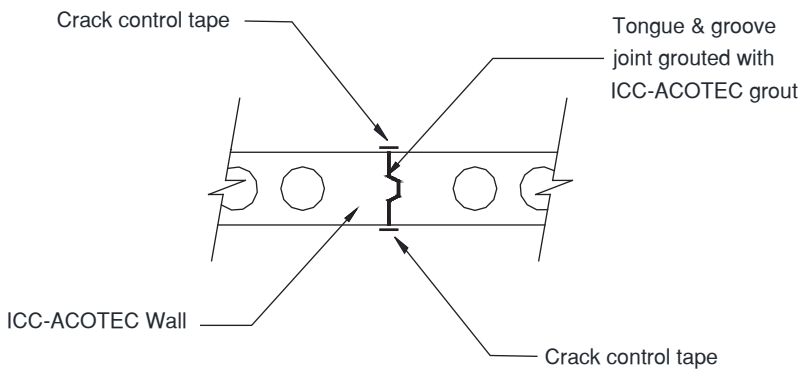


Figure 8 : Panel to panel connection

Note: The tongue and groove creates a mechanical connection between the erected panels & maximum allowable width of the joint is 5mm.

8.1.4 Panel To Column Connection

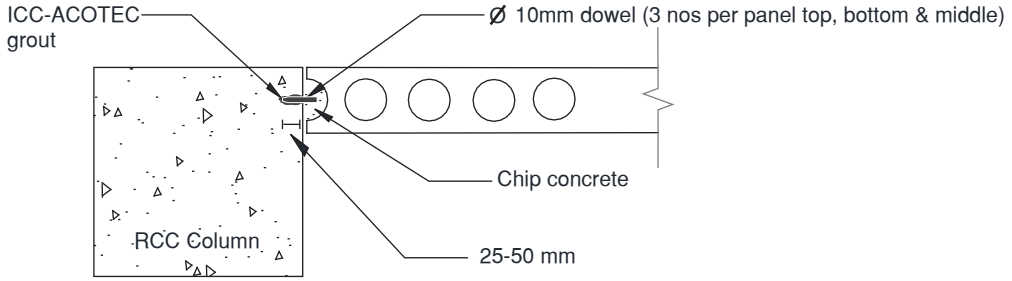


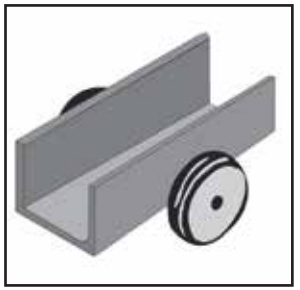
Figure 9 : Panel to column connection

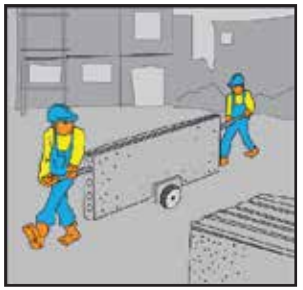
Note: Maximum allowable width of the joint is 10mm.

9. Required site conditions before mobilization/installation

- The area should be clean and free of debris
- Rectification of structural and architectural misalignments of elements
- Conforming the position of electrical conduits which may affect the panel erection
- The structural floor shall be levelled
- In wet areas ledges are to be placed for the required height

Option - 03





- One panel can be easily moved using an ACOTEC trolley.
- Always move the panel in vertical position.
- Maintain balance to avoid any damage to the front & the rear corners.
- Option 3 is the most convenient method since it's faster and causes less handling damage

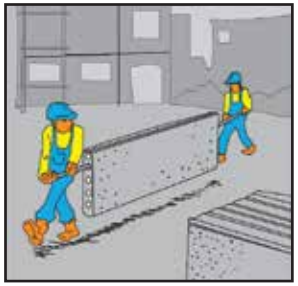
Safety Fact: Take the necessary safety precautions during & after unstrapping the stacked panels

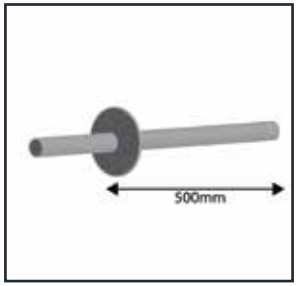
10.2.6 Marking guide lines before installation

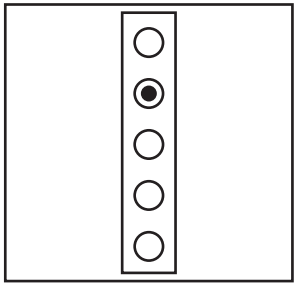
- Identify the location where the panels are to be installed.
- Mark the guide lines using carbon threads in specified locations.

10.2.5 Moving an individual panel within the floor

Option - 01







- Individual ICC-ACOTEC Panels can also be moved manually.
- Insert a short steel tube / bar (500mm long) into the 2nd hollowcore to act as a handle.
- The steel tube / bar is not continuous therefore should be inserted from both ends.
- Panels should always be moved in their vertical position as shown in the above picture

Option - 02

- Panels can be easily moved using the lifting machine.
- Transfer one panel on to the lifting machine from the stack(manually using handle as above).
- Maintain the position as shown in the figure.

10. Installation Guide line of ICC-ACOTEC wall panels

10.1 Required tools for installation

Table 5: Tools required for the erection process

Tools	Image
Nail gun	
PU foam gun	
Concrete cutter	
PU foam	
Trolley	
Drilling machine	
Lifting belts	
Angle grinder	

Tools	Image
Mixing drill	
Lever	
Buckets	
Scraper	
Masonry trowel	
Lifting bar	
Spirit level	
Timber wedge	

10.2 Installation process

10.2.1 Loading to the vehicle

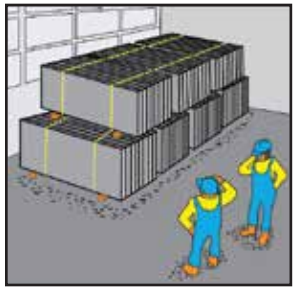
- Check if the panels are perfectly strapped together.
- Make sure the uniform timber beams are underneath the panel stacks.
- Always stack the panels in the vertical position.
- Use forklift or crane to load panels on to the vehicle.
- Do not load more than two stacks of panels on top of each other.
- Timber supports must be vertically in line.
- Panels have to be properly fastened before transportation.
- Make sure to put uniform timber beams between the panel stacks to avoid colliding during transportation.
- Make sure the bed of the truck has a flat surface.

10.2.2 Transportation

- Stack the panels in the pattern shown above
- Remember to tighten the loaded panels with the loading ropes to avoid any panel movements.
- Cover the panels with tarpaulins. (Do not expose to rain)

Safety Fact: Prevent ICC-ACOTEC panels tipping over to provide maximum safety during transportation

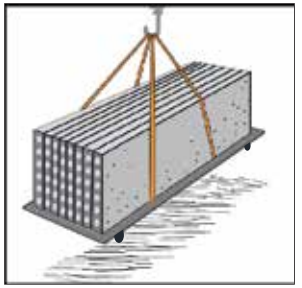
10.2.3 Unloading and stacking at work site



- Use a forklift / crane to unload
- The unloading platform should be leveled
- Make sure to unload on top of square wooden logs
- Panels cannot be exposed to rain (keep in a shelter / cover with tarpaulin)
- Do not load more than two stacks of panels on top of each other.
- keep a gap between each Panel stack for air circulation & to gain easy access for lifting

Safety Fact: Be aware of any contacts of the edges of the stacked Panels when loading & unloading

10.2.4 Lifting panels to specified floor



- Make sure to wrap the belt around the panel stack firmly at strap locations.
- Use a forklift or crane.
- Maintain the vertical stacked position of the panels
- Unload the panel stacks on top of uniform timber beams
- Place the panel stack on a rigid bottom frome when lifting

Safety Fact 1 : Please use caution during crane movement to avoid any injury
Safety Fact 2 : Do not lift panels without the rigid bottom frame