

INSTALLATION MANUAL

For the SIPpro™ Rapid Construction System
by SIPSOLUTIONS LTD

SIPpro™ Structural Insulated Panel



021 343 312 / 021 740 477



enquires@sipsolutions.co.nz



97 Hull Road
Mount Maunganui, 3116



SIPSOLUTIONS

SIPpro™ Installation Manual v 1.0

For the SIPpro™ Rapid Construction System

It is essential that this installation manual be read carefully and completely before installing SIPpro panels.

Contents

Terms and Conditions of Use and System Copyright	2
Licensed Building Practitioner (LBP) Requirement	3
Installer Requirements	3
Installation checklists Requirement	3
Sub-Contractor Co-ordination	3
Timber Quality	3
Structural Engineering, Site Observation and Producer Statements	4
Building Inspections	4
Equipment and Tools List	5
SIPpro™ Accessories Supplied in SIPSOLUTIONS Panel Pack	9
Items Supplied by Owner / Builder	9
Guidance for Installation	10
IMPORTANT TO NOTE!	11
The Do's and Don'ts When Handling and Installing SIPpro™ Panels	12
Panel Lifting Requirements	13
Field Cutting Panels	16
Recommended Personal Protective Gear	17
SIPpro™ Panel Numbering and Orientation	18
Site Setup.	18
Step 1: Floor Construction Square and Level.	19
Step 2: SIPpro™ Panel Floors.	20
Step 3: Bottom Plate Installation.	22
Step 4: Wall Corner Panel Set Up.	25
Step 5: Installing Splines for Connecting Panels.	27
Step 6: Installation of Walls	28

Step 6b: Installation of Bracing Walls	30
Step 7: Construction of Window and Door Openings.....	31
Step 8: Installation of Footer Panels and Header Panel Lintels	31
Step 9: Upper Storey Floor Installation Process	32
Step 11: Installation of Beam Pockets	33
Step 12: Roof Panel Installation Process	33
Step 14: Sealing Panel Joints with SIPpro™ VBT Tape	34
Step 16: Final Checks and Quality Control.....	35
Step 17: Long-term Product Maintenance.....	36
Planning MEP Services Installation.....	36
Electrical Installation.....	36
Plumbing and Gas Installation	37
Mechanical Ventilation Heat Recovery (MVHR) Installation	38
Interior Linings	38
Fixing Plasterboard to Panels	38
Fireplace Flue Installation	39
Solar Panel Array Installation	39
Weathertightness	40
Warranty	40
GLOSSARY OF TERMS:.....	41

Terms and Conditions of Use and System Copyright

By downloading or using the Design and Installation manuals for the SIPpro™ Rapid Construction System (hereinafter referred to as "the System"), the user agrees to be bound by these terms and conditions (Terms).

The System including but not limited to all designs, documentation, components, software, and branding, is the intellectual property of SIPSOLUTIONS Limited. The System is protected by New Zealand and international copyright law.

The user accepts the intellectual property rights in the system are the property of SIPSOLUTIONS Limited.

The user accepts that the information in this manual can only be used in connection with the supply and installation of SIPpro™ products.

Licensed Building Practitioner (LBP) Requirement

All restricted building work must be supervised or carried out by a licensed building practitioner (LBP) suitably qualified for that specific restricted building work.

Installer Requirements

The installation of the SIPpro™ Rapid Construction System and SIPpro™ panels.

It is a requirement that the builders installing the SIPpro panels, complete the 'SIPpro™ Builder' Training Program' to ensure best practice of SIPpro™ panel installation.

Installers must complete and sign off the relevant SIPpro™ Installation checklists during installation to avoid missing critical steps in the installation process.

Installation checklists Requirement

The 'SIPpro™ Installation checklists' are found in the appendix at the back of this installation manual and can be downloaded from the SIPSOLUTIONS website www.sipsolutions.co.nz

These checklists are to be filled out by the approved SIPpro™ Installer LBP builder responsible for the on-site installation of the SIPpro™ Rapid Construction System and SIPpro™ panels for warranty requirements.

Checklists are available on the handy SIPpro™ Streamline webpage. The app allows checklists to be completed on your tablet or phone and uploaded automatically to SIPSOLUTIONS. Contact SIPSOLUTIONS to find out more.

Sub-Contractor Co-ordination

Thorough co-ordination and communication with all subcontractors responsible for the preliminary site work should be performed prior to the construction of the building. Ensure all subcontractor works are completed in accordance with the building consent plans and specifications.

Timber Quality

All timber provided to be inserted into SIPpro™ panels must be...

- Minimum SG8 graded timber.
- Minimum H1.2 treated.
- Between 12-18% moisture content.

- Suitable length for the application.
- Correct dimensions.
- Straight and true without warps or twists.
- Free from defects, loose or missing knots.
- In accordance with the building consented design and SED requirements.

Structural Engineering, Site Observation and Producer Statements

When structural engineering is required for part or all of the SIPpro™ design, it is then a requirement that a Chartered Professional Engineer (CPEng) will oversee construction monitoring (and provide a PS4 producer statement).

Any restricted building work undertaken during installation is still required to be carried out or supervised by a suitably qualified Licensed Building Practitioner (LBP). The LBP must also provide a record of work for the restricted building work they undertake or supervise.

Councils may make it a condition of the building consent that a CPEng (structural engineer) monitors elements of the construction work and reviews construction, completing a PS4. The CPEng is often the best person to undertake the SIPpro™ construction monitoring because they understand and can verify any relevant design assumptions.

When required, engineering involvement is encouraged in the entire building process from concept through to detailed design, design review and construction monitoring. The degree of involvement in all aspects will vary depending on the complexity of the building work.

Building Inspections

When your building consent is issued you will receive a list of inspections required. These are carried out over the course of the work and at the end. The following is an example list of typical inspections that may be required for a SIPpro™ build. Inspection schedules will vary from council to council and the following example may not include all possible inspections.

1. Pre – pour for piles, footings and slabs.
2. Bottom plate fixings (because the fixings are hidden by the solid SIPpro™ wall panel enveloping the bottom plate) before the wall panels are installed.
3. Tanking/waterproofing (before backfilling retaining walls, covering membranes on decks or laying tiles in wet areas such as showers).
4. Pre-clad Panels (before wrapping the building in building paper or building wrap and installing the cladding) to check wall panel fixings, lintel size and fixings, roof panel fixings.
5. Building wrap and window / door openings taped and cavity batten fixings.
6. Flashings.
7. Claddings.
8. Pre-line (before installing internal linings in wet areas with timber framing for plumbing). This inspection may include checking the plumbing installation under pressure test).

9. Pre-stopping.
10. Final inspection for plumbing, building and drainage work (once the work described in the building consent is complete).

The Structural Engineer will need to be booked to inspect any SED structure at the required stages in the building for the PS4 producer statement to be completed.

NZS 3604:2011 timber lintels and beams must be inspected before the SIPpro™ header panels are fitted. (because the fixings and timber are hidden by the OSB facers of SIPpro™ panels enveloping the lintels and beams).

The bottom plate fixing and the pre-clad panels inspection are especially important inspections for a SIPpro™ building with their unique requirements, different from timber framed buildings. Attention to these areas is key to efficiently passing these building inspections.

- Timber bottom plates must be fixed to concrete floors to the requirements of the SIPpro™ Design manual.
- Timber bottom plates must be fixed to SIPpro™ panel floors to the requirements of the SIPpro™ Design Manual.
- Timber bottom plates must be fixed to conventional timber joist floors to the requirements of NZS 3604:2011.
- Ensure all bracing panels and lintel studs are clearly marked on the bottom plate ready for panel installation.
- Check all SIPpro™ bracing wall panels for bracing hold down fixings, nail spacings, steel straps and studs.
- Check all lintel sizes and fixings match the building consent and panel setout drawings. Leave NZS3604:2011 lintels uncovered until after the inspection is passed.
- Check the fixings at the junction between SIPpro™ panels and load-bearing internal walls.
- Check all SIPpro™ panels for nail spacings and SIP screw spacings at wall panel corners.
- Check all panel joints and penetrations are sealed airtight with SIPpro™ VBT tape and low expansion foam / sealant.

The details of timber bottom plate fixings can be altered by SED accepted by SIPSOLUTIONS.

Equipment and Tools List.

Builder supplied equipment and responsibilities.

On-site construction team

- 1 LBP certified builder
- 1 carpenters
- 1 – 2 apprentice / labourer.

Tools Required – Refer Table 1

- 2 x Nail Guns (90mm framing guns)
- 2x Impact drivers (Impact Rate: 4400 IPM / Max Torque: 2500 in-lbs) and 1 x Hi-Torque Drill.
- T-30 Head Bit suitable for 6 Lobe Drive – To install SIP screws.

- 2 x levels - long & short to straighten, plumb and level walls.
- 400mm x 600mm Metal Framing Square.
- Mobile Scaffold Unit. For lintel and header installation. *(To suit the wall heights)*
- Work safe ladders.
- Panel Bracing timber for straightening and holding walls in place.
- Waratahs or timber pegs.
- Gorilla Click and Fix Foam Gun.
- Cordless 600ml Sausage Style Caulk Gun.
- Hand Saw
- Circular Saw *(235mm blade)*
- Heavy duty cargo ratchet straps – to pull big panels together when required.
- Spade bit (35mm) to drill holes in top plates or timber to access electrical chases.

Table 1: Required Tools

		
2 x Nail Gun	2x Impact drivers and Hi-Torque Drill	T-30 Head Bit
		
2 x levels - long & short	400mm x 600mm Metal Framing Square	Mobile Scaffold Unit

		
Work safe ladders	Panel Bracing timber	Waratahs or timber pegs
		
Gorilla Click and Fix Foam Gun	Cordless 600ml Sausage Style Caulk Gun	Hand Saw
		
Circular Saw	Heavy duty cargo ratchet straps	Spade bit (35mm)

Suggested Tools (Optional)

- SIP Groover Tool or Hot knife. Adjustable electric foam cutter. Use as a foam scoop to recess the EPS foam for edge blocking, plates, studs, etc, if on-site adjustments are required.
- Cordless Cut-Out Tool.
- SIP (Geko) Panel Puller – With the largest big-format panels weighing up to 385kg's, the panel puller is helpful to slide large panels together on base plates or slide up roof panels into exact position. Regular SIP builders find this tool very useful.

Table 2: Suggested Tools

		
SIP Groover Tool or Hot knife	Cordless Cut-Out Tool	SIP Panel Puller

Key Tasks before installing SIPpro panels

- Review all plans and details as per the construction issue of engineers drawings, designers drawings and SIPpro™ Panel Setout Drawings.
- Pre-plan your panel installation sequence with your on-site construction team.
- Book your floor, wall and roof panel delivery accordingly.
- Ensure the bottom plate is installed as per approved panel drawings before the panels arrive.
- Book a hi-Ab / tele-handler or crane for unloading the panel packs.
- Book a hi-Ab / tele-handler or crane installing the floor, wall, large headers and the roof panels.
- Check the sub-floor pile and bearers for correct setout, square, level, height and dimensions. Ensure it is in accordance with the Fixing Schedule and NZS3604.

SIPpro™ Panel Pack components supplied to site

- SIPpro™ Panel Setout Drawings *(Supplied prior to panel pack delivery)*
- SIPpro™ floor panels, wall panels, roof panels, thermal splines, lintel panels, footer and header panels in weatherproof wrapping. *(Supplied as per the SIPpro™ Panel Setout Drawings)*
- 2 x SIPpro™ Steel Lifting plates. *(For picking up large floor and roof panels by attaching lifting plates with TEK screws to the top OSB surface)*
- 2 x SIPpro™ Steel Rigging hooks. *(For picking up large wall panels vertically)*
- SIPpro™ SIP TP screws. *(For floor, wall and roof panel joint connections)*
- SIPpro™ VBT tape. *(For airtight sealing of floor, wall and roof panel joint connections internally)*
- SIPpro™ Adhesive. *(For airtight sealing and strong wood to wood panel joints)*
- SIPpro™ expanding foam *(Low expansion foam for airtight sealing of foam to wood joints)*

BUILDERS TO SUPPLY - NOT supplied as part of the panel pack

- All dimensional timber materials for piles, bearers, plates, studs, battens, lintels, beams, purlins, rafter, truss etc. *(NZS3604 timber lintel frames are typically made on site by the builder)*
- Nails, screws, bolts, plates, brackets and other fixings.
- Building underlay, tapes and wraps.

- Other building materials not listed under Panel Pack components.

SIPpro™ Accessories Supplied in SIPSOLUTIONS Panel Pack

Gorilla Pro Expanding Foam *Low Expansion*

Thermakraft Premium Joining Tape

SabreFix PU 2hr Construction Adhesive

SabreSeal_MS_Facade_Sealant

SIPpro SIP TP Fasteners 6-Lobe Drive 4.8mm dia.

Items Supplied by Owner / Builder

- Timber H3.2 bottom plates and Timber H3.2 sole plates with DPC. (Fixed to the floor prior to the delivery / installation of the wall panels). Sole plates are an additional requirement only for concrete floors.
- M10 / 200mm long double bottom plate (concrete floor) screw bolts.
- M10 screw bolts with 6mm galv. washers and handibracs. (To be installed as the bracing panel fixing for floor panels).
- Timber top plates. (fitted to the top of all wall panel and header / lintel panel rebates after splines and panels are installed plumb and fixed off to the bottom plate)
- Timber cap plate. (Fitted on top of the wall panel top plate to the full width of the panel. Capping to be continuous over vertical joints between panels)
- All internal wall and mid-floor framing.
- Timber for floor panel joist splines.
- Timber for wall panel stud splines.
- Timber for roof panel rafter splines.
- Timber plates around window and door rough openings, sill, jamb, head plates, and underside of header / lintel panels.
- 50mm x 2.80mm Ø galv. annular grooved flat head nails. (For fixing OSB facers to splines and panel boundary timber plates)
- Damp proof course between timber and concrete,
- Roof cladding, all flashings, water resistive vapor permeable roofing underlay, timber purlins and all associated fixings.
- Gutter, spouting, drainage, and all associated fixings.
- Exterior cladding, cavity battens, water resistive vapor permeable wall underlay, window / door, flashing tapes.
- Exterior windows / doors, flashings, water/air seals.
- All items for the interior fitout.

Guidance for Installation

- Cross check the approved shop drawings with the engineering and architectural drawings.
- Confirm your delivery date for panels to site at least 4 weeks prior to installation.
- Ensure to fill all voids in panels with expanding foam.
- Ensure the minimum end bearing to any panel is 38mm minimum.
- Book a pre-construction meeting with your plumbing, electrical, concrete floor, roofing etc contractors to discuss installation methodology and build schedule.
- Keep a record of panels received on site.
- Check all panels received match the shop drawings for correct cuts and panel dimensions.
- Engineer's details take precedence over shop drawings.
- Follow all SIPpro™ details for expanding foam, sealant adhesive and SIPpro™ VBT tape installation locations.
- Confirm approval in writing for any proposed panel changes (including fixings) on site with the SIPpro™ representative before to making changes.
- Confirm the floor and subfloor are level and square prior to panel installation.
- Complete all required SIPpro™ checklists before commencing panel installation stages.
- Cross check engineering plans and shop drawings for bracing panel hold down fixing locations.
- Detail the bottom plate timber 11mm from the panel/timber floor edge to allow seating of the panel OSB facing sheet thickness.
- Check the bottom plate and sole plate (concrete floors) are dimensionally accurate, installed level and square.
- Allow a 15mm gap at bottom plate corner junctions for the OSB facing sheet thickness to match the panel setout drawings.
- Ensure to re-drill the top and bottom plates for the electrical chase locations to match the shop drawings.
- Do not install any plumbing within a SIPpro™ panel. Strap and line SIPpro™ panel if plumbing is required on that wall.
- Do not under any circumstances, cut the OSB facing material horizontally for additional electrical or plumbing chases. Horizontal cutting will affect the structural integrity of the wall.
- Ensure to clean bottom plate timber of dirt and debris prior to panel installation.
- Ensure the edge of both OSB facers are loadbearing on the floor or plywood sole plate (concrete floors).
- Follow the details and engineering for correct nailing, screw fixing centers and patterns.
- Maintain a 3mm expansion gap between each SIPpro™ panel OSB facing sheet.
- Plumb and level each SIPpro™ panel in both directions then fix it into position with nails.
- Ensure SIPpro™ panel is dry (less than 18% moisture content) before fixing interior and exterior linings.
- Pre-install engineers' structure before SIPpro™ panel installation.

IMPORTANT TO NOTE!

1. No changes or customizing of the panel design shall be done without the written approval of Sipsolutions, failure to do so will void the SIPpro panel warranty.
2. After panel installation is completed, cover the exposed SIPpro panel edges, foam insulation with polythene to prevent contact with water.
3. Install the weathertight building wrap to all exterior wall and roof panel faces as soon as practical after installation.
4. Do not install recessed lights into SIPpro™ panels under any circumstances.
5. Builder to agree with SIPSOLUTIONS on the best unloading method for panel packs depending on the site's requirements.
6. SIPpro™ Roof panels can be delivered to site later than the SIPpro™ Walls if required by prior arrangement and associated cost.
7. For standard homes the panels will be delivered to site by Hiab truck. We recommend a Tele-handler or Hiab for unloading panel packs.
8. Do not lift SIPpro panels with straps around the panel edges as the strap will damage the OSB panel edges and straps are difficult to remove when the panels are placed into position.
9. SIPpro™ panels need to be stored clean, dry and protected from wet weather on level timber supports 90mm minimum above level ground.
10. Staple protective polythene strips over timber bottom plates installed on the slab or timber floor to protect the bottom plates from exposure to wet weather to avoid the timber swelling and making it difficult to install wall panels over the plates.
11. Staple protective polythene strips over the open tops of installed SIPpro™ walls to protect these from exposure to wet weather.
12. Chamfer the top corners of the bottom plate for easy fitting of the SIPpro™ wall panels when they are positioned over the bottom plate before the panels are installed.
13. Please refer to your SIPSOLUTIONS Panel Setout Drawings and note any additional timber not supplied by SIPSOLUTIONS that needs to be sourced from your timber merchant.
14. The engineers' drawings and specifications shall take precedence over SIPSOLUTIONS Panel Setout Drawings construction and fixing information.
15. Allow for a 3mm expansion gap between SIPpro™ panel OSB sheets at all panel joints
16. Ensure continuous beads of adhesive are applied where these are indicated in the Panel Setout Drawing details. Make sure these beads are continuous or cross each other when stopping and restarting beads to ensure airtightness.
17. Bracing wall panels **must not** have adhesive applied when installing the timber stud splines and timber bottom plate. DO NOT use adhesive with Bracing wall studs and bottom plate!
18. Do use SIPpro™ adhesive on Bracing wall timber top plate panel junction.
19. Do use Low Expansion Expanding foam on Bracing wall studs, bottom and top plate to foam junction.
20. All other panels are to have adhesive and expanding foam used when installing the timber splines and timber plates.
21. Always try to apply low expansion expanding foam from the lowest part of the panels foam recess as this helps keep the foam stable and better supported, not breaking away from the EPS as easily during installation.

22. Low Expansion Foam provides a small curing window of time before the foam starts to harden, 6 minutes or so depending on temperature. Make sure the foam is applied just before the panel or spline is fitted and the foam has not hardened. The foam cures faster on hot days and slower on cold days. Hardened foam must be scraped out of any recess to allow new foam to be applied for fitting the panels.
23. Internally applied SIPpro™ vapour barrier tape is the primary airtightness method after the foam and adhesive is installed. SIPpro™ vapour barrier tape is applied after the panel installation is complete and before linings are installed.
24. For first time build's call SIPSOLUTIONS for phone support and training from one of our team before installation.

The Do's and Don'ts When Handling and Installing SIPpro™ Panels.

The Do's of Handling and Storing SIPpro™ Panels

SIPpro™ structural Insulated panels are valuable material, and it's important to take care of them prior to use.

DO remove strapping and shrinkwrap immediately on arrival at site.

DO cover SIPpro™ panels with waterproof breathable tarps to protect them from getting wet. Exposure to a brief light rain shower is tolerable, but prolonged rain is not.

DO protect the OSB edges of the panels from damage.

DO store the SIPpro™ on level ground.

DO stack the SIPpro™ carefully and efficiently, to preserve panel installation sequence, and labels are readable.

DO use proper level 90 x 90mm timber supports @ 1.2m crs max for the panels to prevent sagging.

The Don'ts for Handling and Storing SIPpro™ Panels

While in storage it's important to keep SIPpro™ insulated panels protected from damage. This means...

DON'T lift SIPpro™ panels with straps without solid timber blocking in the foam recess and reinforced edge protection, as this will damage the OSB edges.

DON'T lift SIPpro™ panels by the top edge of the OSB facing material as this can cause delamination.

DON'T store SIPpro™ in direct contact with the ground. Allow at least 90mm of airgap to ground.

DON'T allow SIPpro™ to be exposed to the weather. Protect bottom plates and panel tops from rain.

The Do's for Installing SIPpro™ Panels

One of the best things about SIPpro™ insulated panels is how quick and easy installation is. However, for the best results, there are several important things to keep in mind.

DO measure and check your floors are square and dimensionally correct before your panels are delivered.

DO create a plan for your installation. The easiest installation will be a well-ordered one. This means being very familiar with the installation drawings before setting the panels.

DO set the panels in order. A plan is so important because it allows you to make certain all the panels are installed correctly, and that you don't get stuck in a corner. It's important to keep track of the short panels and long panels, and which are meant to slide, and which are meant for stopping.

DO be precise and careful about laying all wall timber bottom plates and trim to an exact fit as needed.

DO follow all the instructions for joint sealing with SIPpro™ Vapour barrier Tape. SIPpro™ thermal properties are only as good as the sealing of their joints. It is also critical to be certain that all rough openings and penetrations are properly sealed.

DO install plumbing in interior framed walls or strap and line exterior walls for plumbing install to exterior walls.

DO install the selected weather resistive cladding and roofing underlay as soon as reasonably practicable. Exposure to a brief light rain shower is tolerable, but prolonged rain is not.

DO protect installed SIPpro™ floor panels from rain wetting with waterproof breathable tarps.

The Don'ts for Installing SIPpro™ Panels

Installing SIPpro™ is a straightforward process so long as the following is avoided...

DON'T cut wall panel facers horizontally. This may be tempting when installing electrical cabling, but while minor trimming vertically is fine, horizontal cuts must be avoided.

DON'T cut the roof or floor panel skins. If you need to do this for a project, send us an email, or give us a call first.

DON'T use recessed lighting in panels.

DON'T install directly on concrete. Install a sole plate on DPC between the bottom plate and concrete slab.

DON'T leave the panels unprotected from the weather.

Panel Lifting Requirements

The crane/hiab/telehandler operator must comply with all Occupational Safety & Health requirements and the Approved Code of Practice for Cranes.

SIPpro™ panels should be lifted and manoeuvred in accordance with SIPpro™ Panel Lifting requirements, using appropriate mechanical lifting equipment and certified lifting points.

Under no circumstances is anyone to stand or walk below a panel being lifted by crane/hiab.

The Dogman is responsible for communicating with the crane or hiab operator when a SIP panel is being lifted and moved and not in the crane operator's view.

Panels can be hoisted onto the roof using various methods, but a crane/hiab is usually used to lift the panels into place. Ensure that all local health and safety regulations are met.

For most efficient use of crane/hiab time, make sure the crane/hiab operator is experienced with lifting SIPpro™ roof panels into place.

Stage the panels into the installation sequence needed for efficient use of crane/hiab time.

Agree the lifting method with SIPSOLUTIONS prior to panel production.

Floor and wall panels

Panels can be ordered with the top plate or endplates installed for SIPpro lifting points to be screwed into allowing...

- Wall panels can be lifted in a plumb, vertical orientation.
- Floor panels to be lifted in a flat, level, horizontal orientation.



Figure 1: Wall panel being lifted into position

Floor and roof panels

For smaller panels use 2 x SIPpro™ Lifting plates.

For larger panels use 4 x SIPpro™ Lifting plates.

Fix all 16 screws to the top OSB facing of the panel (*make sure all plate screw holes have screws fixed through into the OSB*) the plates must be approximately fixed just above the center line of the panel and in a 1/4 of the width of the panel from each side. Make sure to position the lifting plates on the roof panels to match the roof pitch being installed too.

Or

Connect SIPpro™ Lifting plates with M12 bolts fully through the panel. 2 x M12 bolts per plate. Drill 12mm diameter holes just above the center line of the panel and in a 1/4 of the width of the panel from each side. M12 bolts must be inserted through the holes and secured on the bottom side with a 50 x 50 x 3mm washer and nut. that are secured with straps to the cable from the crane (Figure 27).

Make sure all screw or bolt fixings holes are sealed for airtightness and moisture ingress immediately after the fixings are removed. Use expanding foam to fill the cavity and install a SIPpro vapour barrier tape patch to cover the hole and surrounding panel on both sides of the panel.



Figure 2: Roof panel being lifted into position

IMPORTANT TO NOTE:

Do not lift SIPpro panels with lifting straps around the panel edges as the straps will damage the OSB panel edges and are difficult to remove when the panels are placed into position.

Checking of the concrete floor slab, SIPpro™ panel floor or timber framed floor (NZS3604) for square, level and dimensional correctness should be performed prior to the panel pack delivery to allow for any adjustments to be made.

Before Lifting SIPpro™ Floor Panels

Check the timber bearers are level, fixed and setout in accordance with the Bearer Plan in the Panel Setout Drawings and details.

Before Lifting SIPpro™ Wall Panels

Check the pre-installed bottom plate and sole plate are square, plate length / width, setout and fixings are installed in accordance the Bottom Plate Plan in the Panel Setout Drawings.

Before Lifting SIPpro™ Roof Panels

Check all wall panels are square, plumb and braced.

Check all wall panel top plates are inserted, cap plates are fitted, and timber angle plates are fitted and fixed correctly.

Check Beam Pockets are correctly installed.

Check that all electrical chase access points have been drilled through the timber plates.

Check that end plates are pre-fitted to the roof panels where nailing of OSB edges is prevented because walls or structure cover those areas.

For roof panels installed over rafters, beams or trusses, ensure all structural support members are installed correctly before lifting roof panels.

Confirm and check-measure all roof panel measurements and site structure measurements to ensure you are installing the panel position correctly.

TOOLBOX TIP: When installing steeper roof panels, it can be helpful to temporarily screw fix a timber block to the underside of the roof panel to align with the inside face of the exterior supporting wall. This prevents the roof panel from sliding out of position while its fixed into place.

Field Cutting Panels

While SIPSOLUTIONS is well equipped to engineer, design and cut SIPpro™ panels accurately, panels can still be cut in the field. If field-cutting of panels is necessary, it can be done using tools commonly available to the builder. A circular saw, reciprocating saw, and hand saws can perform all cuts required in an installation

Oversized panels can be cut using a beam saw or a beam cutting attachment to a circular saw.

A SIP Groover Tool or Hot Knife should be used to cleanly remove the EPS foam to panel recesses for the spline inserts.

EPS Foam control is VERY IMPORTANT!

Take great care to contain all offcut EPS chips and waste and secure in bags for recycling and disposal when field cutting the foam within a panel to form the recess for timber plates. This is essential. Protect our environment and prevent EPS waste from being left on the ground to blow away into the environment.

TOOLBOX TIP: Correct use of the SIP Groover Tool or Hot Knife allows whole strips or blocks of EPS foam to be cleanly removed in solid recyclable pieces.

Recommended Personal Protective Gear

Approved dust/particulate masks and protective gloves are recommended when cutting and handling treated timber to be fitted into SIPpro™ panels or using proprietary foams, sealants and adhesives. These should be used in well-ventilated areas.

Personal protective equipment (PPE) helps keep workers safe on the job. The following PPE is typically recommended for all workers handling and working with panels. Check with Worksafe that you have the correct PPE. It is essential that the PPE is right for the work being done, fits reasonably comfortably, works as it's supposed to.

Table 3: Recommended Personal Protective Gear

		
Hard Hat Compliant with AS/NZS 1801:1997	Safety Glasses Compliant with AS/NZS 1337.1:2010	Dust Mask Compliant with AS/NZS 1716:2012. Recommended - 3M Particulate Respirator P2 Valved

		
High Vis Clothing	Protective Gloves	Steel cap boots

SIPpro™ Panel Numbering and Orientation.

The SIPpro™ panels will arrive at the site individually marked and labeled to correspond with the panel numbering of the Panel Setout Drawings.

Each panel number will correspond to a panel number in the Panel Setout Drawings that will accompany the panel delivery.

These drawings are referred to as the “SIPpro™ Panel Pack”. This will typically be in a large envelope. When panels are manufactured, they are numbered to indicate the panel location in the building.

The sequence-of-assembly typically will correspond to the number sequence on the panel.

Check the SIPSOLUTIONS panel plans for the panel start points for floors, walls, and roofs.

Please note that while some panels may appear to be out of order, the numbers will always correlate to the panel drawings.

Panels are loaded on the truck to reduce wasted space and to support logical unloading order.

TOOLBOX TIP: Make sure to keep all copies of the freight dockets and packing slip to check off the SIPpro™ panel package against the Panel Setout Drawings to ensure you have received all the ordered panels.

Site Setup.

Installation Team

Typically, a five-person crew is optimal. With two people installing, two people preparing the next SIP for installation, and one person applying the adhesive and expanding foam, cutting what little timber is required, and helping lift the panels into place, the SIPpro™ panels will be up in no time.

Lifting Equipment

Organize a hiab or telehandler on site for fast, efficient unloading of SIPpro™ panel packs. Panel pack shipments can be sent on Hiab truck units.

Panel Pack Delivery

SIPpro™ panel packs are delivered in weatherproof wrapping on packers. Check the packing slip to confirm quantities and sizes of the panels are delivered as ordered.

You will need a clear space for panel delivery as close to the site as possible. Panels can be delivered by hi-ab truck. You will unload the truck with the hiab or telehandler.

Panel Pack Storage

SIPpro™ Panels must be stored in a flat clear area that is not prone to flooding. Ensure you have a clear dry level area to store panels. Keep panels raised off the ground by a minimum of 150mm and with level timber supports at 1.2m crs maximum.

Keep SIP spline and top plate timber materials dry and flat. All timber to be used for sills, plates, and splines should also be kept flat and dry.

Site stored panels and materials must be kept dry and always covered with waterproof tarps / wraps until ready for installation.

TOOLBOX TIP: It is essential to keep all timber to be inserted into the panel foam recess protected from precipitation and dry at all times. Wet timber swells and can be problematic to fit into the panel recess. This rule also applies to SIP splines as wet splines must not be fitted to panels.

Step 1: Floor Construction Square and Level.

Successful SIPpro™ construction works best when the foundation and floor are square and level within tight tolerances. If the foundation is out of square or not level, then SIPpro™ panel installation will be a lot more difficult.

- Floor length to be within 5mm of the dimension length shown on the foundation plan.
- The top level of the floor is not to vary by more than +/- 5mm of the FL floor level shown on the foundation plan.
- Check the diagonal measurements of the floor areas. Pairs of diagonal measurements should be within +/- 5 mm.

Check the dimensions of the floor against the dimensions of the Panel Setout Drawings and the building consent foundation plan.

Use the 3-4-5 method to ensure the sub-floor and floor are square. The SIPpro™ SIP screws need to secure the bottom plate onto the floor panel penetrating through into the bearer.

TOOLBOX TIP: It is recommended you check the floor for square and level at the earliest opportunity. Adjustments to out of level / square floors are best made well in advance of the panel installation.

Step 2: SIPpro™ Panel Floors.

SIPpro™ floor panels can be ordered in widths of up to 2.4m and lengths up to 7.32m for rapid installation.

Ensure the subfloor timber pile and bearer foundations are installed well in advance of the floor panels delivery to site.

If using concrete pile footings, ensure adequate concrete curing time has passed before installing the panels.

- All timber subfloor foundation structures are to be designed and installed in accordance with the requirements of NZS3604:2011.
- All proprietary specific engineered design (SED) steel pile systems are to be installed in accordance with the system engineer's design and requirements.

Check the top of the subfloor timber bearers are level and flat. Clear any debris from the top surface prior to installing panels.

- The top of the timber bearer is not to vary by more than +/- 5mm of the RL level shown on the foundation plan to provide a level surface for the floor panels.

Check the bearers are installed square and match the dimensions setout in the Panel Setout Drawings and building consent plans.

Check the bearer position match's the position of the bearer in the Panel Setout Drawing details for fixing the floor panels to the subfloor timber bearer.

CHECKLIST: Complete the SIPpro™ On-Site Floor Pre-Installation Checklist.

Prepare all required timber spline double joists prior to the delivery of the floor panels. Precut to length and nail together the timber spline joists according to the Standard Fixings Schedule. Check dimensions of the spline fit the floor panel recesses. Adjust by planing if needed. Setout all splines and materials at handy points for your planned panel installation sequence.

It is recommended SIPpro™ floor panels be pre-ordered with self-adhesive water resistive vapour permeable barrier wrap fitted to the underside of the panels for subfloor moisture protection. With large floor panels this saves time and hassle fitting weather resistive wrap to the underside of the panels.

SIPpro™ floor panels for floors are typically positioned over a post and bearer subfloor or SED subfloor structure. Your engineer or designer will design the bearers for the correct panel span. The bearer set out will depend on the floor panel lengths being used and should be in accordance with the building consent foundation plans, Engineers drawings and the Panel Setout Drawings.

SIPpro™ floor panels are installed on top of the timber subfloor bearers.

SIPpro™ floor panels are typically 165mm or 215mm thick and have an EPS (expanded polystyrene) core. Each floor panel is joined with a timber spline which forms a double joist within the floor panel, contributing to the floor's composite strength.

Typically, SIPpro™ panels are junctioned below internal load bearing walls or bracing walls which have a timber joist spline and bearer inline below. Timber spline joists are installed to join these floor panels together directly below these walls. Screws are installed in pairs through the bottom plate into the timber spline joists. Bottom plates below bracing walls have the M10 threaded rods fixed through the bottom plate, spline, and through the bearer with 6mm 50 x 50mm galv. washers.

Non-Loadbearing walls installed on top of floor panels with either 20mm or 18.5mm thick OSB facing sheets on the top and do not require the floor panel to be divided for a spline below them.



Figure 3: Floor panels installed on subfloor bearers

It is essential to keep all timber spline material to be inserted into floor panel recess protected from precipitation and dry. Wet timber swells and can be problematic to fit into the panel recess. If the timber swells, it should be planed to suit the panel recess for a snug fit. Apply Protim Framesaver or Metalex to planed areas to preserve the timber treatment before installation.

Prepare the first SIPpro floor panel for installation by fixing the timber spline joists into the appropriate side, floor panel recess, prior to lifting into place.

Apply a continuous line of expanding foam to the EPS surface in the recess of the panel to be installed and a continuous bead of adhesive to the inside faces of the OSB. Then insert the spline and nail it into place on both the top side and the underside of the floor panel according to Standard Fixings Schedule in the Panel Setout Drawings. Nail the underside first and when that is complete then nail the top side.

A level floor is the required outcome. Ensure there is no additional load on the floor during the fixing process to avoid any chance of deflection being fixed into place.

Ensure that the installed spline length and position will sit flush with the edge of the panel end foam recess, 45mm in from the outer OSB edge of the floor (subject to SED) to allow the final timber boundary joist to be installed.

(Don't delay in fitting the timber spline joists as the expanding foam will only give a limited amount of time before it cures hard preventing correct installation).

Prepare the first SIPpro™ floor panel for lifting, by following the SIPpro™ Panel Lifting Requirements.

Maneuver the first SIPpro™ floor panel into the required position.

It is essential that the first-floor panel installed is positioned correctly, square and level when seated on the subfloor structure. Check with the building consent floor plans and Panel Setout Drawings for correct set-out. As this panel will assist the set out and accurate positioning of the remaining floor panels.

Then fix the floor panels to the bearer in accordance with the building consent foundation plans, engineers SED and Standard Fixings Schedule in the Panel Setout Drawings.

Prepare the second SIPpro™ floor panel for installation and repeat the same process until all the floor panels are installed. Make sure all splines inserted are suitably nailed on the top side and the underside of the panel. Refer to the Standard Fixings Schedule in the Panel Setout Drawings.

When all the panels and splines are installed, you can fit the boundary joists plates to the outer recess of all the floor panels with expanding foam and adhesive applied and nailed through the OSB into the boundary joists. Ensure to nail the top side and the underside. Ensure that the boundary joist plates are continuous over the joints between panels and the fasteners are end fixed into the timber spline joists at each joint with adhesive and skew nails. Refer to the in the Panel Setout Drawings.

SIPpro™ floor panels are not a finished floor by themselves, it is required that H3.2 treated Plywood flooring sheets of 9mm minimum thickness are glued and screwed on top of the SIPpro™ floor panel.

TOOLBOX TIP: Careful planning of installation procedures and material preparation is key to a successful floor panel installation.

It is important to protect installed SIPpro™ floor panels from rain wetting with waterproof breathable tarps.

Step 3: Bottom Plate Installation.

Lay DPC down between concrete floor and bottom plate.

Please refer to your foundation engineer drawings for correct installation detailing.

Bottom plate timbers and hold down fixings are to be provided and installed by the builder.

For bottom plate fixings refer to the specific engineered design (SED).

Remember to allow a 15mm gap between the end and side joint of wall corner bottom plates to allow the OSB facing to slot into place.

Make sure the floor is clear of dust & debris that could affect the airtight bond of the base plate with the floor.

Ensure continuous beads of adhesive are applied where these are indicated in the Panel Setout Drawing details. Make sure these beads cross each other when stopping and restarting beads to ensure airtightness.

Layout timber bottom plates to insure correct fixing positions.



Figure 4: Timber bottom plate installed on concrete floor

Mark the SIPpro™ wall panel, window footer positions and panel numbers on the bottom plate as per the supplied panel drawings around the perimeter of the pad.

Allow for a 3mm expansion gap between panels.

Mark which panels are the bracing panels on the bottom plate as per the supplied panel drawings around the perimeter of the pad and any internal SIPpro™ panel bracing walls.

NOTE:

1. Steel galvanized bracing straps must be pre-nailed to the underside of the bottom plate in the correct location for the bracing panel, prior to the bottom plate installation on top of the sole plate on a concrete floor slab or timber floor or SIPpro™ floor panel.
2. Always install DPC between the timber sole plate and the concrete slab floor.

Mark the position of all lintel studs and load bearing studs on the bottom plate as per the supplied Panel Setout Drawings around the perimeter of the pad. (Also to the bottom plates for any internal SIPpro™ panel walls).

CONCRETE FLOORS: Drill holes for bolts, pre-cast or chemset hold down bolts into the concrete slab perimeter. Refer to the Fixing Schedule in the Panel Setout Drawings.

Install the bracing steel straps below the bottom plate. Refer bracing details.

PANEL FLOORS: Install all the bottom plate bracing screw fixings through the bottom plate into the floor panel and bearer below. Refer to the bracing details and Fixing Schedule in the Panel Setout Drawings.

Chamfer the top corners of the bottom plate for easy fitting of the SIPpro™ wall panels when they are positioned over the bottom plate.

Fix bottom plate lengths as per the bottom plate plan drawings. We recommend using bottom plate timber that is less susceptible to swelling.

Protect the bottom plate from rain with polythene sheet strips stapled to the plate to prevent the timber swelling.

- **Building control officer or engineer to inspect installed bottom plate prior to SIPpro™ wall panel install.**

NOTE:

- Ensure an 11mm gap between the bottom plate and the floor perimeter edge to support the OSB facing.
- When the wall panels are installed, both bottom edges of the OSB facers must be resting fully supported on the H3.2 treated plywood sole plate for concrete floors or resting fully supported on a timber or panel floor.
- Double bottom plates on DPC are formed with an H3.2 plywood or timber sole plate the full width of the SIPpro™ panel and an H3.2 treated 45mm thick bottom plate are required with for concrete slab floors.
- Ensure the bottom plate stays as dry as possible to avoid swelling for an easier fit of SIPpro™ wall Panel.
- Use low expansion foam to seal timber to EPS.
- For Bracing wall panels do not use adhesive when installing timber splines and timber bottom plates.
- For standard wall panels use SIPpro™ adhesive when installing splines and timber plates.
- When applying SIPpro™ adhesive position, a continuous 9-10mm bead of adhesive the full length of the OSB inside face, spline or timber plate, or top / bottom plate.

TOOLBOX TIP: Chamfer (take the square edge off) the bottom plate to help the wall panel slide on.

Pre-cut your caulking gun nozzle for a 9-10mm bead of SIPpro™ adhesive. It makes life a lot easier if you use a Cordless 600ml Sausage Style Caulk Gun when applying the adhesive.

Step 4: Wall Corner Panel Set Up.

Start on the external corner furthest away from the main panel stack first. This external corner will allow for bracing the panels and then work in the direction shown on the panel plan.

This allows for...

- Self-bracing.
- Ensure's square and level walls.

To prepare the first panel, you will need to fit an end stud into the vertical panel recess and connecting stud to the first panel.



Figure 5: Continuous bead of adhesive applied to OSB inside face

Apply a continuous line of expanding foam to the EPS and a continuous bead of adhesive to the OSB inside faces. Secure the end plate and connecting stud to the OSB with fixing nails on both sides.

- With your sealant gun apply a continuous bead of adhesive on each side of the bottom plate.
- With your foam gun apply a line of low expansion foam on the top of the bottom plate ready for the panel.

Position the first panel into place.

Use bracing timber to temporarily brace the panels throughout the installation.



Figure 6: Panel being set plumb and level prior to fixing to bottom plate

Now apply foam and a continuous bead of adhesive to the bottom plate and connecting stud ready for the second panel of the corner.

Pivot the second panel on its bottom corner and position the other bottom corner along the connecting stud attached to the first panel. The panel will now fall into place. Using a persuader block, the two panels can be nudged to create a tight connection.

It is important both OSB sheet edges are fully supported by the sole plate or timber floor

Ensure each panel is square, plumb and level, then both panels can be nailed to the bottom plate and then to each other through the OSB. Nail the OSB on both the interior and exterior sides.

On the external corner fasten the panels together using the supplied SIPpro™ SIP screws. Fix screws through the panel into the connecting timber stud end plate of the other panel refer to the Fixing Schedule in the Panel Setout Drawings. Ensure a minimum of 40mm embedment into the timber.



Figure 7: Corner panels being connected with SIP screws

TOOLBOX TIP: Avoid applying the expanding foam and adhesive too early before the panels, splines and timber studs are installed as the foam cures quickly and can form a solid mass that will prevent you from fitting the timber into the panel recess properly. Solid expanding foam must be cleaned out of the recess by scraping.

Step 5: Installing Splines for Connecting Panels.

Use either SIPpro™ Thermal splines or timber splines in accordance with the Panel Setout Drawings.

SIPpro™ Thermal splines provide uninterrupted insulation and are the preferred method for a continuous thermal envelope.

- When installing larger panels, it can be easier to secure the spline into the already installed panel before positioning the next panel to the already installed wall section.

Apply a continuous line of expanding foam to the EPS surface within the recess of the panel to be installed and a continuous bead of adhesive to the inside faces of the OSB. Then socket the panel over the spline and nail it into place on both sides of the OSB.

Ensure that the installed spline length and position will sit flush with the top of the bottom plate and not project into the 45mm deep recess area where the top plate fits.

With your foam gun apply a line of expanding foam on the top of the bottom plate ready for the next panel.

With your cordless caulking gun apply a continuous bead of adhesive on each side of the bottom plate.

Lift the SIPpro™ wall panel into position and slide as close to the previously installed panel as possible. You can use a persuader block, to tap the panel into position or use heavy-duty cargo ratchet straps to pull larger panels together when required. The spline attached to the vertical edge of the previously installed panel should fit snugly into the recess of the panel.

Always allow a 3mm expansion gap between OSB sheet panel edges.

Use bracing timber to temporarily brace the panels throughout the installation.

Ensure the panel is square, plumb and level, then nail the panel to the bottom plate and then to the previously installed panel through the OSB into the spline on both sides interior and exterior. Refer to the Standard Fixings Schedule in the Panel Setout Drawings.

With short panels you can pivot the second panel on its bottom corner and position the other bottom corner along the connecting stud attached to the fixed panel.

Both bottom edges of the OSB facers must be resting fully supported on the timber sole plate for concrete floors or resting fully supported on a timber floor.

Ensure the panel is square, plumb and level, then nail the panel to the bottom plate and through the OSB. Nail the OSB on both the interior and exterior sides.

TOOLBOX TIP: Ensure 3mm expansion gaps are allowed between all OSB sheet panel edges.

Step 6: Installation of Walls

Prepare the next SIPpro™ panel for lifting while fixing the spline or timber end studs as before and prior to lifting the next panel into place.

Apply a continuous line of expanding foam onto the EPS face in the vertical recess of the previously erected panel and a continuous bead of adhesive to the interior sides of the OSB to ensure an airtight seal is achieved before fixing the spline or timber end studs.

Apply a continuous line of expanding foam onto the bottom plate, and a continuous line of adhesive to both sides of the bottom plate to ensure an airtight seal is achieved.

Ensure that the splines and timber studs do not intrude into the 45mm recess at the top and bottom of the wall panels.

Lift the SIPpro™ wall panel into position and slide as close to the adjoining panel as possible. You can use a persuader block, to tap the panel into position.



Figure 8: Big format panel being craned into place

Allow a 3mm expansion gap between panels.

With short panels you can pivot the second panel on its bottom corner and position the other bottom corner along the connecting stud attached to the fixed panel.

Use bracing timber to temporarily brace the panels throughout the installation.

Ensure the panel is square, plumb and level, then nail the panel to the bottom plate and through the OSB. Nail the OSB on both the interior and exterior sides.

Continue installing wall panels by following the panel drawings and construction details and work in sequence around the building. Install splines or timber studs to the already installed panels while preparing the next SIPpro™ wall panels for installation to save time and for ease of installation.

The last wall panel along the wall length must be fitted with an end timber stud, which should have a continuous line of foam applied to the EPS surface in the recess of the connecting panel and adhesive to the inside faces of the OSB. Then the end stud can be fitted and nailed into place through the OSB in accordance with the Fixing Schedule in the Panel Setout Drawings.

The final wall panel is always an overlapping panel, and the end timber stud within the wall panel must be perfectly flush with the outer edges of the corner. This will provide the correct corner assembly.

Ensure the top of the wall panel recess stays as dry as possible to prevent water collecting in the recess on the top of the foam. Staple polythene strips over the top of all SIPpro™ panel walls to protect from wet weather.

Use adhesive on all wood-to-wood connections (except bracing panels which require MS Sealant) and expanding foam sealant on all wood-to-foam connections.



Figure 9: Panel with expanding foam being fitted to bottom plate

Make sure to double check the Fixing schedule in the Panel Setout Drawings for all fixings and spacings. If any fixing is missed during the installation process, make sure to go back and complete all fixing requirements.

For SIPpro™ wall structures, a vapor-permeable wall cladding underlay must be installed on the exterior side of the wall panels as soon as reasonably practical.

TOOLBOX TIP: If the panel proves difficult to install onto the bottom plate check the width of the bottom plate and wall panel recess. It may help to plane a few mm off the plate in places for easier fitting. Apply Protim Framesaver or Metalex to any planed areas to preserve the timber treatment.

Step 6b: Installation of Bracing Walls

IMPORTANT TO NOTE:

1. Do not use adhesive when installing timber studs and bottom plate to SIPpro™ Bracing panels under any circumstances.
2. You must use SIPpro™ adhesive when installing SIPpro™ Bracing panels to the timber top plate.
3. Be sure to carefully follow the Fixing Schedule requirements in the SIPpro™ Panel Shop Drawings for Bracing Wall panel fixings. As Bracing Panels have specific fixing requirements.

Step 7: Construction of Window and Door Openings

Window and door openings will have timber plate blocking installed all the way around the edge of the opening into the foam recess. These timber plates are installed in a similar way to timber end plates. Check your window manufacturer's specifications for the rough opening size as they vary for each manufacturer.

SIPpro™ panels are factory pre-cut and recessed for all window and door openings. SIPpro Ready to Assemble (RTA) package has the timber plates pre-installed into the window or door rough opening when the openings are cut from the central area of a big-format panel.

Panels and headers that form the window and door openings are not pre-assembled in the factory. They must be assembled in accordance with the SIPpro™ Panel Setout Drawings. The panels, headers and footer panels come recessed for the timber plates to be installed.

The timber plates lining the rough opening provide the nailing base to fix the window and door frames to.

Header panels are installed over the door and window openings. Timber stud framing and trimmer studs support the header panel. Install as per the requirements of the SIPpro™ Panel Setout Drawings.

Step 8: Installation of Footer Panels and Header Panel Lintels

Unless a window opening has been CNC cut from the center portion of a big-format SIPpro™ panel, the window / door opening will usually be framed by timber studs and trimmer stud to each side of the header / footer area. The panels will consist of two side panels, a lower (Footer) panel and an upper (Header) panel. Door openings are the same but without the footer panel.

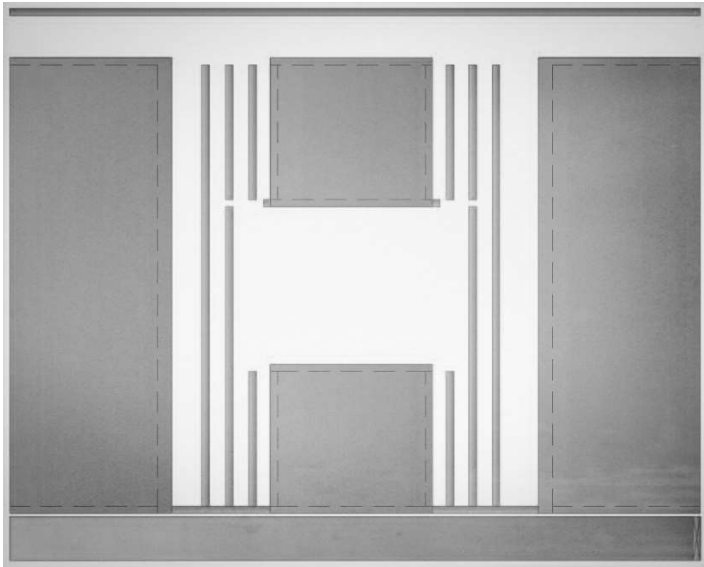


Figure 10: Exploded view of header and footer panels and trimmer studs

For windows install the side panels and install the timber studs and trimmer stud and timber lintel to the side panels. It is sometimes easier to build pre-nailed frame of the timber studs / trimmer stud and timber lintel to the requirements of NZS 3604 or SED. Planing down the timber ensures a good fit into the side panel recess. (apply Protim Framesaver to planed areas)

Then you are ready to fit the pre-nailed frame. Ensure the timber frame is square, plumb and level, then nail the frame to the bottom plate and nail the OSB on both the interior and exterior sides. Refer to the Fixing schedule and the Panel Setout Drawings details for all the lintel fixing requirements.

Then install the next full height wall panel at the other end of the lintel frame.

Back at the timber frame area apply a line of continuous expanding foam to the top of the timber lintel and sides of the header studs and adhesive to the inside faces of the header panel recess. Now raise the header panel above the timber frame and slide the panel down into position. Check the header for level and then fix through the OSB into the timber framing on both sides. Refer to the Fixing schedule for fixings.

Allow to fit the timber sill and head trimmers in accordance with the SED drawings and SIPpro™ Panel Setout Drawings. It is recommended to leave any NZS3604:2011 timber lintels and SED beam structure uncovered until after Pre-Clad building inspection is passed.

Step 9: Upper Storey Floor Installation Process

For two and three storey buildings, three methods are able to be used at the transition from a lower wall section to the upper wall section.

In all three methods the panel tops are cut square and the foam is recessed to accept the timber top plate and cap plate on top of that.

The first method is building a conventional NZS3604 timber joist floor or engineered floor joist design on top of the timber top plate/cap plate of the floor below at the desired height. Then building the upper SIPs wall on top of this floor.

The next method is cutting the panel top at the desired height installing the timber top plate/cap plate. This involves hanging the joists from the tops of the lower wall panel. This is done by installing a timber stringer plate to the inside of the wall panel to support joist hangers and the selected floor joist structure. The upper SIPs wall is then installed on top of this floor. (No stringer shall support more than one floor and its associated non-loadbearing walls).

The final method is SED and takes advantage of the SIPpro™ big-format panel dimensions of 7.32m vertically and 2.44m wide panel, allowing up to two storeys and a third loft storey. This involves hanging the joists from the side of the wall panel at the desired first floor height and the desired second floor height. This is done by installing a timber stringer plate to the inside of the wall panel to support joist hangers and the selected floor joist structure. Structural SED splines are installed at the big-format panel vertical joints.

Step 11: Installation of Beam Pockets

Pitched roofs in SIP panel buildings require ridge beams or trusses to support the panels at the ridge. Larger roofs can require intermediate beam supports. Large floor areas may require beams for structural support of the roof panels, similar to NZS3604 timber stud framed construction.

Ridge beams and other heavily loaded beams are typically supported on posts of multiple timber dimensional studs or SED structure. These structural ridge beams are generally supported in beam pockets that are installed into the wall panel. Multi stud posts or SED structure supporting the ends of structural beams are usually installed in the panel.

When installed in the panels, the foam core is recessed to receive the structural posts. Structural posts must be cut accurately to length so that the beam rests directly on the end of the post since the end grain provides higher resistance to compression. Adhesive is applied at these joints for improved connection strength. Refer to the Fixing Schedule and Panel Setout Drawings and details.

Step 12: Roof Panel Installation Process

Lifting roof panels

Roof panels are usually lifted into place using a hiab, telehandler or crane. Ensure the dogman has positioned the lifting straps and lifting plates in such a manner as to allow the panel to be positioned easily with panel pitch and roof pitch aligned.

Roof Panels are usually large and can weigh up to 23kg/m². Roof panels can be as large as 7.32m x 2.44m. Therefore, it is normal to lift the panels into place by mechanical means. The first choice is

to use a Hiab or Tele-handler to lift the panels, and on occasion, due to site access, alternative means of lifting need to be considered such as a Mobile Crane. Crane panel lifting requires lifting straps attached to a metal rated lifting plate. These plates are provided with the panel pack. Check all lifting plates are correctly rated for the lift load and suitable for the application.

Ridge beams or mid span beams are generally lifted into position by Hiab or Tele-handler and secured to the gable panels in accordance with the technical manual or engineer's specification.

Before fixing the first roof panel into place, check that setout is square and has correct dimensional positioning, check eave overhangs to ensure the roof panel is positioned correctly then fix this roof panel onto the ridge beam, gable and eaves wall head timber closures, using the SIPpro™ SIP screws.

Lift the next roof SIP panel into position and check overhangs as above, As with wall panels fit the splines into the panels prior to lifting. Just prior to installing the the roof panel, apply expanding foam onto the into the previously installed panel recessed edge, apply sealant adhesive to the sides of the of the OSB of the panel recess. Then position and fix the roof panels together. Fix along the joining splines with fixings from the fixing schedule on both the inside and outside.

Fix the roof panel to the ridge and the wall head using SIPpro™ SIP screws. Repeat the process, continually checking the overhangs until the roof is fully installed.

The SIPS structure must be suitably covered with a water resistive, vapour permeable roofing underlay and this must be installed as per the manufacturer's guidelines. The roofing underlay must be fixed to the substrate as per the manufacturer's guidelines. Ensure adequate fixings or high winds may damage the paper. When installing roof purlins over roofing underlay, ideally install small packers (10mm) under the purlins in order to leave a gap between the roofing underlay and the roof purlins for any moisture to easily drain off.

For SIPpro™ roof structures, a vapor-permeable roof cladding underlay must be installed on the exterior side of the roof panels as soon as reasonably practical.

TOOLBOX TIP: Ensure a wide strip of SIPpro VBT tape draped over the ridge beam or any other rafter/truss/beam with a roof panel joint directly on top of it, prior to roof panel installation. This will assist with maintaining a high level of air-tightness and protects against interior water vapour infiltration.

Step 14: Sealing Panel Joints with SIPpro™ VBT Tape

Vapour Barrier Tape Installation

SIPpro™ VBT Tape is to be used to form an airtight seal at all floor, wall and roof panel joints and junctions on the interior side. The purpose of this is to ensure the airtightness of the structure by preventing airflow, water vapour moisture entering the structure through panel joints. The airtight tape also prevents heat loss. The is especially important at the internal apex of pitched roofs at the ridge beam junction. Apply an airtight seal to all...

- Floor panel to floor panel joints.
- Floor panel to wall panel junctions.
- Wall panel to wall panel joints.
- Wall panel to roof panel junctions.
- Roof panel to roof panel joints.
- Internal corners and external corners.
- Window and door openings.
- Penetrations and holes.
- Exposed beams, rafters and structural junctions with panel.

Note: Without adequate panel sealing and airtight vapour barrier tape protection. Airflow from a warm, humid environment infiltrating to a colder, drier environment can result in moisture condensating on the cold side of the panel. Long term exposure to moisture can damage the OSB material reducing the structural strength. This moisture may accumulate over time, leading to the deterioration of the panel skin and a reduction in structural integrity at the affected locations.

Correct installation of timber and splines at panel joints in combination with correctly installed SIPpro™ VBT tape installed in accordance with the SIPpro™ Installation Manual will protect against moisture intrusion occurring.

SIPpro™ VBT Tape Installation Instructions

Ensure surfaces are clean and dry. Clean off any dirt, grease and oil.

Ensure surfaces are smooth and undamaged.

Position the tape centrally over the panel joint.

Peel off approximately 50mm of backing paper and press the tape firmly into place.

Ensure a tight seal by smoothing out air bubbles and wrinkles, press the tape into the OSB at the center, working outward to the edges.

Continue removing the backing paper in sections while pressing and smoothing the tape over the OSB panel joint.

Use an Ink Roller to apply firm pressure to the tape and remove any wrinkles or bubbles. SIPpro™ Vapour Barrier tape is pressure activated.

Step 16: Final Checks and Quality Control

Interior Panel and Joint Inspection

Panel holes from removed fixings and patched OSB must be carefully sealed on the interior side before lining to prevent the infiltration of air into the inside of the panels. A careful inspection should be made of all surfaces of the floor, walls, and roof panels to identify any holes or joints not sealed properly with SIPpro Vapour Barrier Tape and expanding foam.

Holes From Fixings

Holes in the OSB facers from removed fixings (these can be caused by panel lifting plate fixings being removed) and any patched OSB must be carefully sealed on the exterior side before installing underlay to prevent the infiltration of air into the interior of the panels.

Step 17: Long-term Product Maintenance

As with any construction method, the long-term performance of the building will be largely dependent on repair and maintenance, as required.

It is important to ensure that guttering and rainwater down pipes are regularly checked and cleaned to ensure that water runoff is collected and diverted away from the building.

Flashings around the roof should be checked and repaired or replaced as necessary.

If the build is clad in render, any cracks or damage to the render should be repaired promptly. The above examples are for illustrative purposes, and general good 'housekeeping' practice should be maintained.

Planning MEP Services Installation

For a SIP building to function properly as a system, it is important to thoroughly coordinate the installation of electrical, plumbing and mechanical installation contractors. In traditional timber frame construction, plumbing and electrical work typically takes place before insulating and air sealing.

With SIPs, each trade runs the risk of creating air leaks that could potentially cause moisture issues over the life of the building.

Booking a pre-construction meeting with subcontractors is a good way to inform them of the importance of maintaining an airtight building envelope. It gives everyone a chance to discuss any issues, ask questions and get answers prior to SIPpro™ panel installation. This will allow for an easier, more efficient build for all parties involved

Electrical Installation

IMPORTANT TO NOTE:

1. Electrical Installation to be completed by a NZ registered Electrician.
2. All cables in contact with Polystyrene to be non-migratory.
3. Do not install recessed lights into SIPpro™ panels under any circumstances.
4. Do not cut horizontal slots or remove large sections of OSB sheet to install electrical items.
This will reduce the structural strength of the panel.

Pre-order Electrical Chases

With efficient pre-planning, SIPpro™ panels can be delivered to site with pre-installed vertical and horizontal electrical chases and socket/switch electrical box cutouts pre-cut for electrical installation.

Installation

- Agree before panel installation if the Builder or Electrician is to drill the holes through the timber top, cap, end or bottom plates to align with the electrical chases for running the electrical cables through.
- Where the electrical box cutouts are not pre-cut by the factory. Electrical boxes should be installed at standard heights to align with the horizontal or vertical cabling chase.
- To install the boxes, mark the outline on the interior OSB facing and cut through interior OSB facing with a router or saw.
- Remove the foam out to the depth of the box, allowing for the interior gib or other finish of the wall.
- All cutouts into panels for electrical boxes must be made before running electrical cables to avoid damage to the cable wires.
- After running cables to the location, fix electrical boxes in place with screws to the OSB.
- Before final positioning of the electrical box, seal the cable chase by filling with expanding foam sealant to prevent air-leakage.
- Ensure all penetrations are properly sealed to prevent air-leakage after the cabling is installed through the panel.

Plumbing and Gas Installation

IMPORTANT TO NOTE:

1. Do not install plumbing into SIPpro™ panels under any circumstances.
2. Do not cut horizontal slots or remove large sections of OSB sheet to install plumbing items. This will reduce the structural strength of the panel.
3. It is acceptable to install pipe penetrations directly through SIPpro™ panels. These must be suitably taped and sealed with gaskets on the outside to protect against water ingress. Use low expansion foam to fill the cutout cavity around the pipe to prevent air-leakage.

It is recommended to install plumbing pipework, brass wingbacks, hot and cold-water pipes etc in the internal timber framed walls or strap and line the exterior SIPpro™ walls with batten framing and water resistant, wet area approved plasterboard linings.

Ensure all penetrations are properly sealed to prevent air-leakage after the pipework is installed through the panel. Always apply a low-expansion foam around the perimeter of a pipe, where it exits a SIPpro™ panel.

Mechanical Ventilation Heat Recovery (MVHR) Installation

Mechanical heat recovery ventilation (MHRV) systems provide fresh, filtered air for building occupants and extract damp, stale air to the outside.

There is no such thing as building a house too airtight. Issues only arise when careless builders or HVAC contractors fail to provide adequate ventilation in airtight homes.

There are a number of ventilation systems compatible with SIP homes. Systems typically involve incorporating fresh air through the central air handling unit and providing exhaust-only systems in kitchens and bathrooms. Heat recovery ventilation, automated fan cyclers, and fans equipped with humidistats are all popular options for SIP homes. Ventilation systems vary greatly by climate zone so make sure to discuss ventilation with a qualified HVAC professional and your designer.

Ensure all ductwork penetrations through SIPpro™ panels are properly sealed to prevent air-leakage after the pipework is installed through the panel.

Interior Linings

In general, SIPpro panel walls and ceilings can be lined internally with a variety of materials depending on the durability, finish and performance required. Most linings that can be used on a timber frame building can be used on SIPpro panel building. Check the building consented design for the specified interior linings.

- Plasterboard: is acceptable directly fixed to the OSB or used to create a services cavity over timber or metal battens.
- Fibre-cement sheets: are also acceptable and can be installed in the same manner. Painted T&G grooved sheets are a popular option.

Exposed OSB: Leaving the OSB exposed in a home is a way to highlight the texture of the wood. With options of whitewashing, staining, varnishing, oiling and painting the natural wood texture can be a popular rustic look.

Fixing Plasterboard to Panels

There are two common methods for fixing plasterboard linings to the inside face of SIPpro™ panels. For specific plasterboard systems follow their Site Guide installation requirements and the specifications and design of the projects building consented documentation.

Direct fixed to the 11mm OSB facer.

- Use 32mm x 6g GIB Grabber high thread screws (do not use nails)
- 300mm max crs to top and bottom plate area and end plate stud area.
- Place fasteners no closer than 12mm from paper bound sheet edge or 18mm from any cut edge.
- All plasterboard joints to be minimum 200mm offset from SIPpro™ panel joints.
- Fasteners at wall corners to be placed 50mm max in from the corner in each direction.
- Fasteners to be positioned no closer than 25mm from each other.

- Place daubs of plasterboard adhesive 300mm max centres to centreline of plasterboard sheets.
- Do not place plasterboard adhesive at sheet edges or within 200mm of fasteners
- Otherwise follow plasterboard site guides for installation

Fixed to Service Cavity Battens.

Plasterboard fixed to standard sized timber or steel cavity battens that are screw fixed to the 11mm OSB facer.

- Timber moisture content must not exceed 18%.
- To fix timber battens use 10g fully threaded timber screws long enough to ensure full embedment through 11mm OSB facer.
- Battens fixed at 600mm crs with screws at 400mm crs.
- Otherwise follow plasterboard site guides for installation to timber and steel framing.

Fireplace Flue Installation

Woodstoves, wood burning fireplaces and natural gas fireplaces require special consideration for installation in SIPpro™ panel homes.

The basic principles for a safe flue installation are:

- adequate ventilation
- sufficient separation from combustible materials.
- provide shielding and air gaps above heat-sensitive materials
- install a layer of non-combustible material at the top of the enclosure

Stainless steel flues are usually stand-alone items that get close to building elements when passing through a floor, ceiling, roof or wall. Separation from combustible materials is essential.

Solar Panel Array Installation

Solar Photovoltaic (PV) arrays may be attached to a SIP roof. The manufacturer of the solar panels and mounting racks will need to provide the weight (dead load) of the equipment being used. Along with the dead load of the panel, the design professional will need to consider the wind load, which is dependent on the geographic location of the project. When provided with this information, the design professional can determine how many and what type of fasteners are to be used.

The location of the PV array and mounts needs to be clearly defined on the plans. Details of the PV array mounts are also required. The SIP manufacturer along with the design professional will determine if additional support is needed and what connection details are required in the SIP roof

Weathertightness

Flexible floor, wall and roofing wraps, underlays and associated waterproof sealing tapes used must comply with the requirements of NZBC E2/AS1 and have a current New Zealand Appraisal. Refer to the building consented design and specification documents for the correct consented building wrap and underlays required.

Floor Panels

The sub-floor side of SIPpro floor panels must be protected with a water resistive water vapour permeable barrier from sub-floor dampness. Refer to the consented design and details.

Wall Panels

The exterior side of SIPpro wall panels must be protected with a water resistive water vapour permeable cladding underlay fixed directly to the OSB facer. Check the consented design details.

Roof Panels

The exterior side of SIPpro roof panels must be protected with a water resistive water vapour permeable roof cladding underlay. Check the consented design details.

Services, Flue and Extraction Penetrations

Services, flues and ventilation extraction pipes need to penetrate the floor, wall and roof panels to access the exterior and other services. Check the consented design details.

Holes From Fixings

Holes in the OSB facers from removed fixings (these can be caused by panel lifting plate fixings being removed) and any patched OSB must be carefully sealed on the exterior side before installing cladding and roofing underlay to prevent the entry of air and moisture into the interior of the panels.

Warranty

All SIPpro™ panels come with a warranty provided...

- It is not damaged.
- Is installed in accordance with the SIPpro™ Installation Manual, SIPpro™ Installation Checklists and Standard Details.
- Is protected from the elements.
- Is not left unprotected in the rain.
- Is installed by or under the guidance of Licensed Building Practitioners who have completed the SIPpro™ Builder Training Program.
- The cladding systems used are compliant with NZBC clause E2 and B2.

GLOSSARY OF TERMS:

Beam Pockets – are cutouts formed in the SIPs wall panel at the wall joint with the roof to accommodate the ridge beam or intermediary support beams when the roof panel is above the supporting beam. Beam Pockets have timber stud posts or SED steel posts installed below to support the ridge beam or intermediary support beams.

Cap Plate - Timber ripped to the width of the wall panel and is positioned on the top of both OSB facers of the SIPpro™ panel below. Not a top plate; it is positioned on top of the top plate.

Cut-outs – Cut-outs can be made to the internal OSB facer to access the electrical chases for electrical box fitting by the electrician.

Designer – Refers to the Architect, Architectural Designer, Architectural Technician or Draftsperson responsible for preparing the design, specification and working drawings.

Dogman - A Dogman is responsible for the usage of lifting strap / slinging techniques and the selection and inspection of slings and straps in addition to communicating with and the direction of a crane operator when a SIP panel is being lifted and moved and not in the crane operator's view.

Electrical Chase - Path for 'Non-Migratory' electrical wiring formed through the foam core of a SIP by the SIP manufacturer. Typically, 32mm in diameter.

Electrical Cut-out - an opening cut out of the OSB facer to recess an electrical box.

Metalex – Timber preservative brush applied available from your building merchant. To protect cut timber from decay and rot.

MVHR – Mechanical Ventilation Heat Recovery system. An essential part of a modern airtight home that removes moist humid air from the homes interior and replaces it with fresh, drier, filtered air preferably controlled by interior humidity sensors to maintain optimum relative humidity with minimal heat energy loss.

OSB - oriented strand board, an engineered wood product used for the outside facing sheets of SIPs structural insulated panels.

OSB Facers – The name given to the OSB sheets used in SIPs structural insulated panels, otherwise referred to as 'facings'.

Panel Setout Drawings – Are the approved set of panel setout drawings provided by the SIPpro™ panel manufacturer to the panel installer. These drawings show the location of all floor, wall and roof panels, and the fixing connections in the form of notes, panel sequence numbering, plans, panel elevations and details.

Persuader Block - a sledgehammer and block of wood for tapping panels together without damaging the OSB facing for a tight fit or onto a tight plate.

Precipitation - rain, snow, sleet, or hail that falls to or condenses on the ground.

Protim Framesaver – Timber preservative brush applied available from your building merchant. To protect cut timber from decay and rot.

SED - specific engineered design. (Structural Engineers design)

SIPs - Structural Insulated Panels, a high-performance building component for residential and light commercial construction.

SIPpro™ Rapid Construction System – A superior Structural Insulated Panel system, with greater strength, span capability and faster to install than conventional SIPs. Suitable as a high-performance building component for residential and light commercial construction.

SIPpro™ Panel Pack – A truck / trailer load of finished SIPpro™ panels for installation in a building project. Typically delivered directly to the job site. It comes stacked and wrapped in weatherproof wrapping on timber packers. Included in the pack is the screw fixing, adhesive, expanding foam and sealant required for the assembly of the panels, airtight vapour barrier tape, splines, lintels and header panels are supplied as per the Panel Setout Drawings.

Spline - connection system used to connect two SIPpro™ panels together at vertical, horizontal, in-plane joints. Different spline systems are available including thermal SIP, LVL, dimensional timber and engineered glulam timber.

Sole Plate - Timber ripped to the width of the wall panel, it is positioned underneath the bottom edge of both OSB facers of a SIPpro™ panel. The sole plate sits on DPC on top of a concrete slab floor. Not a bottom plate; it is positioned below the bottom plate.

Top Plate - Horizontal timber plate positioned between the OSB facers above the foam. Sits below the cap plate.

Structural Splines - I-joist, dimensional timber, or engineered timber like LVL.

Vapour Barrier Tape (VBT) – Adhesive tape to ensure the airtightness of the structure by preventing airflow and water vapour moisture entering through panel joints.

Weather Resistive Barrier - Wall or roof cladding underlay with high water resistance, is airtight and highly water vapour-permeable.

Water Vapour-Permeable – Water vapour-permeability refers to a material's ability to allow a vapour, such as water vapour, to pass through it. Weather Resistive Vapour Permeable barrier cladding and roofing underlays are used on SIPpro™ floor, wall and roof panel structures to allow water vapour to migrate outwards to the exterior cladding cavity and prevent any external moisture within the cavity entering the structure.



SIPpro

RAPID CONSTRUCTION SYSTEM



021 343 312 / 021 740 477



enquires@sipsolutions.co.nz



97 Hull Road
Mount Maunganui, 3116



SIPSOLUTIONS