



Australia & New Zealand Site Guide

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Use of this Guide

Thank you for choosing to design with mass timber. XLam manufacture Cross Laminated Timber (CLT) from one hundred percent natural and renewable radiata pine. Each lamella and panel is unique, even with great care by XLam, slight deviations in grain pattern, knot location and colour will occur. By choosing to design in mass timber you are embracing the natural beauty of a renewable building material, its perfection is in its natural imperfection.

The information in this guide is based on testing methodology and certification owned by XLam. The information is provided for use in the design and specification of XLammanufactured Cross Laminated Timber (CLT) only. The guide is not intended as general information and guidance for all manufactured Cross Laminated Timber (CLT). The guide and information is specific to XLam CLT and no warranty is given to the suitability and application of the information to other manufacturers CLT.

1 Preparatory

1.1 Construction Programme

XLam panels are manufactured within a pre-allocated factory production schedule. A production slot will have been reserved during the negotiations with the XLam Sales Manager. At signing of the contract, an XLam Contracts Manager will review the project to reconfirm the production date and will issue a pre-manufacture programme advising the required deliverables to meet the agreed manufacture date. Prior to manufacture the Contracts Manager and customer will agree on a panel assembly plan and schedule of deliveries. The customer must also provide XLam with timely updates to the programme which may affect requested manufacture or delivery dates.

1.2 Logistics

Delivery to the site is typically by flat deck truck up to 20m in length. Consult XLam on any restrictions applying to the trucking transport route, load dimensions and timing of deliveries. In some cases piloting, traffic management and road closure may be required. Load piloting is generally not necessary for loads up to 3.1m overall width.

1.3 Site Access and Planning

Ensure there will be practicable site access for delivery trucks. Check street and crossing widths, gradients and obstacles including site services, overhead cables and construction in progress. Determine whether panels will be unloaded by crane or forklift. Allocate adequate manoeuvring, unloading and temporary storage areas.

1.4 Temporary Storage

Arrange on or off-site temporary panel storage as required to suit the project. Plan storage so that panels will be accessible in the required order. Suitably protected off-site storage, including unloading, reloading and transport to the site can be arranged by XLam as a variation to the customer's account, or alternatively this can be left as the customer's responsibility.

1.5 Crane

Plan the project around a suitable lifting capacity crane and location to cover the unloading and installation areas. Panel dimensions, panel weights and pack weights will be advised by XLam. Where mobile cranes are used, a well thought out and managed lifting plan will minimise the cost of standing time. Where site space is insufficient for a truck and crane, XLam can arrange to trans-ship the panels onto a HIAB for local delivery and craning. It should be noted that MOL solutions (HIAB), mobile and static crane capacities vary considerably and must be accounted for when planning. Pack loading may have to be adjusted accordingly.

1.6 Supplies

Have all associated construction components ready on site at receipt of XLam panels. Determine in good time the supply sources and availability of specified screws, bolts, brackets, glue, sealants, shims, epoxy grout, acoustic seal, preservative sealers, protective wraps etc. By prior agreement, most fixings and accessories can be supplied by XLam. Where the customer elects to supply fixings, XLam requires confirmation that they have been ordered.

1.7 Assembly Tools

XLam recommends the use of its Installation Kit comprising a selection of Rothoblaas tools and accessories to assist rapid and accurate panel assembly. The Installation Kit may be purchased.

1.8 Site Safety

The large panel size, weight, overhead lifting and speed of XLam construction demands stringent attention to site safety. Procedures for unloading, lifting, securing panels and working at heights must be fully covered by on-site safety procedures and work method statements.

2 Factory Dispatch

2.1 Loading and Wrapping

Panels will be loaded horizontally to a flat deck truck in packs, several packs to a truck load and each pack on a pallet. Pack weights will not exceed 6 tonnes. Within each pack the panels will be separated by dunnage and ideally will be ordered for a top down installation sequence. There will be exceptions where practical or safe loading is otherwise dictated by panel shape. If the transport operator requires any last minute load adjustment, XLam will immediately notify the customer. Some sorting at the site must be expected and planned for. Panel packs are factory-wrapped and strapped. The wrapping is a temporary protection for transport and should panels be stored for a prolonged period, additional cover is necessary after delivery to the site.



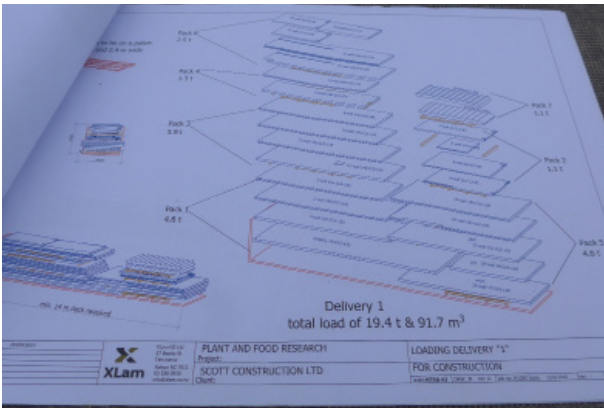
Wrapped panel packs leaving the factory.



Packs are strapped to pallets ready for lifting off at the site.

2.2 Panel Identification

The customer will receive an itemised truck loading plan in advance of each delivery. The loading plan will designate the panels contained within each pack, which will also be identified on the pack wrapping. Each panel within a pack is labelled by number to match the XLam shop drawings. Each panel label will state the manufacturing specification, timber treatment, appearance grade, panel dimensions and weight.



Truck delivery loading plan.



The pack number and weight is recorded on the wrapping.



XLam panels are individually labelled with full manufacturing details.



XLam AirStairs are similarly labelled.

3 Unloading Panel Packs

3.1 Road Occupancy

For restricted sites it may be necessary to unload trucks from the road, requiring local authority consent for full or partial road closure. XLam require to sight appropriate approvals prior to delivery.



Partial road closure at a restricted construction site.

3.2 Truck Standing Time

Unless otherwise agreed with the transport operator, the freight cost is based on immediate unloading of panels at the site. Extended standing time will be entailed where panels are craned from the truck directly to their final assembled positions. Standing time needs to be pre-agreed prior to delivery and will normally incur additional costs.

3.3 Panel Identification

Before unloading, check the labelling on each pack to determine whether any sorting will be needed. Do not rely completely on the accuracy of the XLam loading plan for location of the panels in case last minute loading adjustments have been necessary.

3.4 Unloading by Crane

Lifting slings for panel packs must be supplied by the crane operator. Lift packs off the truck with the slings fitted under or through the oversized supporting pallets so that panel edges are protected. Where there will be any contact between the slings and panel edges, insert rigid packers to prevent crush damage.



Panel packs craned off the delivery truck.



Craning a pack to temporary storage location.

3.5 Unloading by Forklift

Long tines or extension slippers will be necessary if unloading with a forklift. Insert the tines through the pallets to avoid contact with the panels. If unloading or moving individual panels, protect the panel surfaces and edges from direct contact with the forks. Special care is required to avoid disfiguring Natural Appearance Grade panels as these are typically stacked Natural Appearance Grade face down.



Panels are vulnerable to forklift damage.



Marking by unprotected forklift tines.

3.6 Unloading Containers

Specific provisions apply to unloading of panels shipped by container. Consult with XLam for details.

3.7 Inspection for Damage

Inspect the panels on receipt at the delivery site or off-site storage location as applicable. Report any damage immediately to XLam, supported by details and photographs. Failure to do so is construed as acceptance of the panels and responsibility for any remedial work required. XLam accepts no liability for damage caused during delivery and unloading, or during off-site storage and transfer arranged by the customer.

4 Storage and Protection

4.1 On-site Storage

Designate storage space for panel packs. Support panels at least 100mm clear of the ground or floor surface, placed flat on timber gluts spaced at 2m maximum centres running perpendicular to the face laminates.

Leave packs in the factory wrapping until the panels are required. Once unloaded, additionally cover the packs against rain and sun with secured tarpaulins. For Natural Appearance Grade panels, avoid using polythene covers which may promote condensation and consequential mould stain.

Where panels are stored on erected structure, allow for an imposed load at 500kg/m³. This may require temporary floor propping. Consult with the engineer on temporary loadings.



Even pack support well clear of the floor slab.



Insufficient end support may cause panel deformation.



Panels must be well covered until needed for assembly.



Surface mould spores developing under a polythene cover.

4.2 Off-site Storage

Protection of XLam panels held in off-site storage arranged by the customer is the customer's responsibility. Off-site holding storage must be roofed and fully protected from the weather, including direct sunlight. XLam factory wrapping should be kept in place.

5 Handling and Lifting

5.1 Panel Weight

For lifting purposes, the dry weight of XLam Radiata pine panels may be taken as 500kg/m³. The actual weight of each panel is marked on its attached label.

5.2 Lifting Slings

Panels are typically lifted by crane using webbing slings factory-threaded through pre-bored holes at positions calculated relative to the centre of gravity of the panel. No additional rigging should be required. The slings are certified for single use only and must be discarded after use.



Factory-threaded webbing sling ready for lifting.



Lifting slings for an XLam AirStair.

5.3 Alternative Lifting Connections

For specific lifting applications, XLam may fit the panels with threaded Rampa inserts for use with customer-supplied screw-in lifting eyes. Alternative engineer-approved lifting devices will be factory-installed to an engineering specification. Alternative lifting connections can be priced to suit individual project needs.



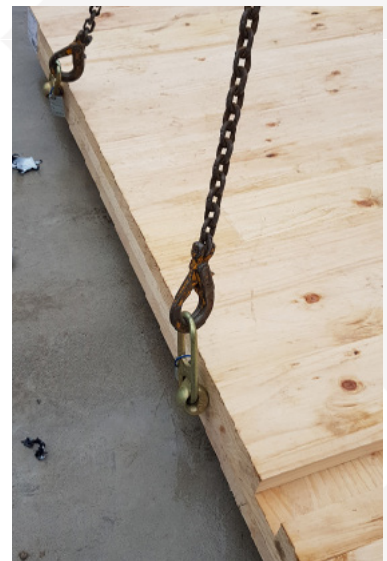
Rampa lifting inserts screw into pre-drilled holes in a panel top edge.



The sacrificial Rampa insert accepts a threaded lifting eye.



Hornet lifting anchor.



Hornet anchors attached to panel edge.

5.4 Control During Lifting

It is the customer's responsibility to ensure all lifts are carried out in accordance with an approved lifting plan and executed by a suitably qualified operator. A lifting plan briefing should be undertaken and attended by all stakeholders prior to the initial lift taking place. All site workers must be clear of the lifting path. Before lifting panels into position, attach guide lines to the panels or to the slings to enable physical control of the lowered panel in suspension.

5.5 Lifting Wall Panels

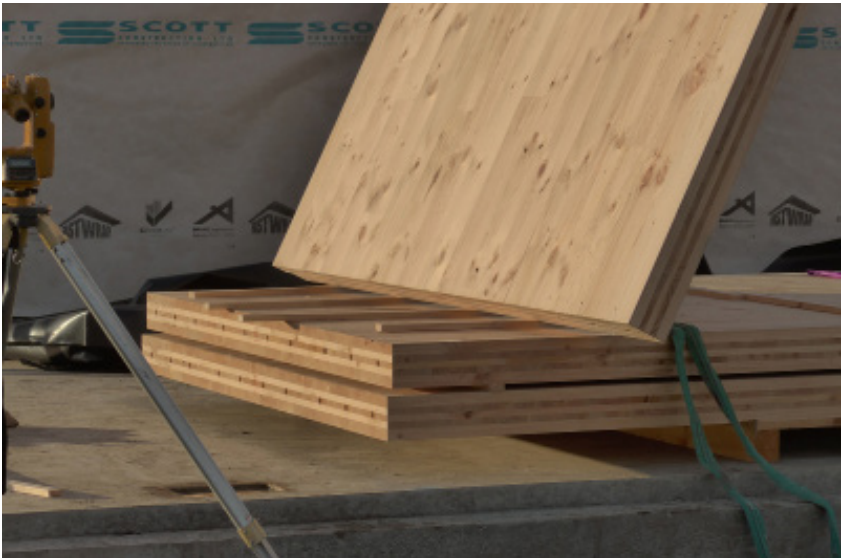
Lifting holes for walls are positioned near the top edge of the panel, wherever possible where they will be in concealed locations. Where the top edge of a wall panel is raked, the lifting holes will be horizontally aligned so that the panel hangs true. When lifting a wall panel off the stack into vertical orientation, protect the panel beneath from drag damage.



Lifting holes are located so that panels will hang vertically.



Lifting a wall panel off the stack.



Protect the panel beneath from damage by surface drag.



Lowering a panel into place.

5.6 Panels with Large Openings

Where necessary to reduce lifting stress loads in panels weakened by large or irregular openings, XLam will fix temporary support and bracing which must remain in place until the panels are fully secured. Door openings will be delivered with partly cut thresholds, for removal and disposal after the panel is fixed in position.



A typical panel with door opening, strengthened at the sill.



The door threshold will be cut out after installation.

5.7 Lifting Sloped Panels and Stairs

Adjust the crane strop lengths to achieve the correct inclination for lifting sloped roof panels and stairs into position. Depending on weight, AirStair flights may be supplied with a pair of lifting holes centrally located at the point of balance to enable manual tilting into position.



Lifting an inclined roof panel into position.



Centrally located lifting allows manual tilting of a suspended AirStair.

6 Pre-Assembly Checks

6.1 Avoiding Delays

Care, accuracy and forward planning makes for a quick and efficient assembly process. Problems discovered only after lifting commences will be more difficult to rectify, extend crane time, and slow the assembly process. Take the time to identify prospective delays and remedy them in advance.

6.2 Accuracy of Structure

Carefully survey the building structure to receive the XLam panels. Check dimensions, line and level of bearing surfaces for accuracy. Ensure all pre-installed receiving, connecting and fixing components are accurately located.



A setout error requires remedial work with the panel held in suspension.



Prior checking avoids delays and minimises crane time.

6.3 Construction Tolerances

Review design and construction tolerances. Check the tolerance allowance between XLam panels and other flanking structure in hybrid construction. Where AirStairs are designed to abut both flanking walls, consider how they will be placed in position and fixed.



Insufficient tolerance leads to time lost in site trimming.



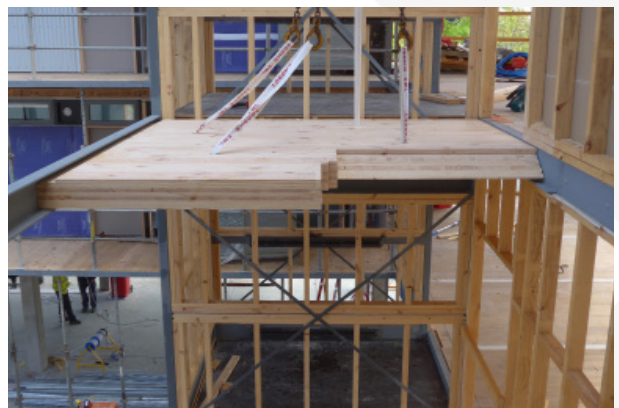
Hybrid structures need adequate tolerance for assembly.

6.4 Physical Impediments

Check there are no design or construction impediments to the dropping of panels into correct position by crane. Review the practicality of assembly and of making connections.



The upper PFC flange impedes placement of a stair landing.



Impractical construction details can slow panel assembly.

6.5 Panel Dimensions

Check the panel dimensions before lifting. If there is any discrepancy between the panels and shop drawings, immediately advise XLam.

6.6 Assembly Components

Ensure all components for and necessary to the panel assembly have been correctly supplied and are immediately available on site. Tools, measuring equipment, fixings, bracketry, plates, glue, sealing components, props and wraps must be on hand to allow prompt securing and protection of the panels.

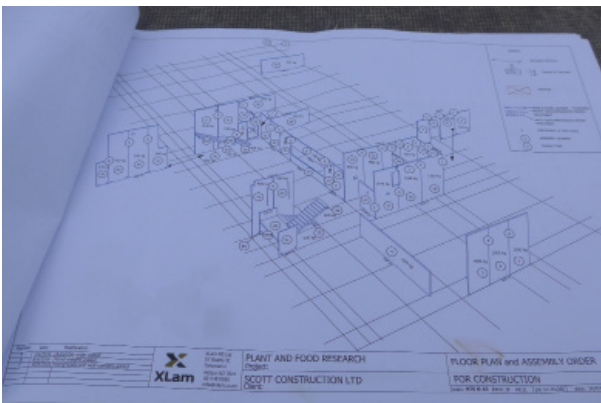
7 Panel Assembly

7.1 Weather Conditions

Avoid assembly during unsuitable weather and particularly in strong winds which will affect safety during lifting.

7.2 Assembly Sequence

Panel installation sequence must be agreed with XLam prior to commencing the shop drawing and modelling process. All panels are numbered with their locations shown on the shop drawings. The overriding objective is to safely enclose the CLT structure against weather as quickly and efficiently as possible. The assembly plan will also be influenced by site constraints, whether the design utilises platform or balloon construction, and efficient follow-on by subtrades. Site assembly will normally start at an end or corner with panels installed sequentially in runs. The installation sequence for lap-jointed floor and roof panels is dictated by the under and over half laps.



Typical panel assembly drawing.



Sequential placement of wall panels.

7.3 Setting Out

Maintain reference to the construction grid lines throughout the installation. Work to running dimensions shown on the XLam shop drawings to avoid compounding discrepancies. Unless otherwise indicated, there is a built-in fixing tolerance of 3mm for Industrial Appearance Grade panels. For Natural Appearance Grade panels where tight joints are required, there may be no tolerance allowance on the Natural Appearance Grade face. Any slight overrun can be easily trimmed off at the external end of the run where it can be accommodated at the cladding cavity. If unsure of the set-out requirements, refer to XLam for guidance.

7.4 Levelling at Floor Slab

A floor level survey should be completed prior to commencement of installation. Concrete floor slabs and anchor brackets to receive the wall panels must be level. Castle or equivalent heavy duty packing shims may be used to deal with minor surface irregularities and provide temporary support. Shims can be supplied by XLam if required. Wall panels must be supported exactly level and clear of the floor slab to allow the injection of continuous grouting.



Graduated shims for base-levelling wall panels.



Packing to suit the anchor brackets.

7.5 Propping and Plumbing Walls

Propping requirements should be covered by the engineer’s temporary works plan, including the location, angle and connections of props, and when they can be removed. To speed up the lifting cycle, props can be attached to the wall panels away from the critical path when the panels are in laydown. Once a wall panel is lifted into position, its props can be pulled out and secured to the specified attachment points. When the base of the wall panel is secured, it can be brought to precise plumb by adjustment of the prop length. Measure for plumb at the top and bottom edges to counter any possibility of panel distortion.



Walls are propped from the Industrial Appearance Grade side.



Prop connection with packing to a Natural Appearance Grade panel.



Prop connection to a concrete floor slab.



Rothoblaas Giraffe props from the XLam Installation Kit.

7.6 Propping Floors

Consult the engineer over temporary propping requirements for floors. Long floor spans may need intermediate propping where interior framed support walls are not yet in place, during surface acoustic screed application and curing, or under temporary loads such as stacked panels or paletised drywall linings. In general, temporary floor loads should be spread and placed close to lines of support.

7.7 Fixing Procedure

Subject to running dimensional and gridline checks, panels should be tightly butted and pinned together with sufficient fixings to secure them in place. All tolerances will be noted on the XLam shop drawings. Once the structure is aligned and levelled the panels should be fully fixed together. Tools supplied with the XLam Installation Kit will assist with panel manipulation and abutment.

7.8 Panel Distortions

XLam panels are in true plane when loaded at the factory, and should be so at the time of delivery to the site. If properly stored level, covered, continuously protected from sun and rain during assembly, and not exposed to adverse conditions over a prolonged construction period, there should be little if any out-of-plane distortion to deal with. XLam wall panels have some flexibility and once fixed plumb at top and bottom, any minor panel bowing can be pulled out by adjustment on the temporary props and the use of bolts and partially threaded screws to draw faces into plane and meeting edges together. Use surface packers with temporary bolts where necessary to prevent damage to Natural Appearance Grade panels. Work progressively along the joint to stitch panels together in a tight fit.

Bowing may become more pronounced if a panel is exposed to differential climate conditions (sun or moisture) on opposing sides. Heat transfer and moisture resistance should as far as practicable be kept equal on both sides until the building is enclosed and clad. Any final surface discrepancies can be addressed by packing at the cladding and lining battens.



Clamping and screwing a wall panel joint at the top edge.



Partially threaded screws will draw a wall joint tight.

7.9 Site Cutting and Chasing

Unauthorised site cuts, penetrations and surface chasing may potentially affect structural integrity, and must have prior written approval from the engineer. Any necessary site cutting or trimming can be simply done with power tools. Immediately seal all site-cut edges.



Chasing out for building services will weaken a panel, particularly when cutting perpendicular to the outer boards.

7.10 Plugging

Unless concealed and in non-critical locations for fire or acoustic performance, crane lifting holes must be plugged after assembly. Radiata pine surface plugs matching the panel specification are supplied by XLam. Fix the plugs in place using Holdfast Gorilla Glue or equivalent polyurethane adhesive.

For fire or acoustic rated panels there may be a requirement to fill between opposing surface plugs.



Glue-in lifting hole plug.

8 Panel Connections

8.1 Engineered Design

This Site Guide gives an overview of typical connection systems for XLam panels. All panel connections and fixings are to project-specific engineered design. Where any doubt exists or an alternative is to be considered, consult with the engineer for guidance and obtain prior written directive and approval.

8.2 Screws

Engineered wood screws (Spax or equivalent) specified by the engineer, will be used for the majority of panel-to-panel connections. Both fully and partly threaded screws are utilised for specific applications. The screws are self-tapping and do not require pilot holes. A heavy duty driver such as a Makita DTW450 will be needed to provide the torque for sinking long screws. Follow the engineer's specifications for the application of fully or partially threaded screws, durability protection, head type, angles of insertion, minimum edge distances etc. Engineered wood screws will be supplied by XLam and require advance ordering.



Spax engineered wood screws supplied by XLam.



Screw types are specific to their design function.

8.3 Supply of Fixings

Unless otherwise agreed, XLam offers the supply of timber-to-timber fixings only, typically screws and brackets. Once the engineering design is finalised and shop drawings are prepared, XLam will order and supply the fixings, including a non-reimbursible allowance for spares. The supply of fixings is typically made in the week prior to site installation. XLam will confirm the delivery time and location. Upon receipt of the fixings, all items become the responsibility of the customer.

8.4 Wall to Concrete Slab

Proprietary fixings or a range of custom-designed alternatives may be specified. Bracket and plate fixings should be accurately set to the slab prior to lifting the panels into position. Where the panel will come into contact with concrete or epoxy grout, the damp proof course can be stapled to the bottom edge of the panel before lifting.



Angle brackets for tensile and shear connection.



Fixing to a preservative-treated timber plate over a damp proof course.



Factory-drilled panels fitted over steel dowels.



Pumping in epoxy adhesive to the encased dowels.

8.5 Wall to Floor Panel

Angle brackets in combination with plates and screws typically provide anchoring and shear connections. Brackets are set out to line and pre-fixed to the floor to enable precise location of the wall panels.



XLam supplies a variety of Rothoblaas anchoring options.



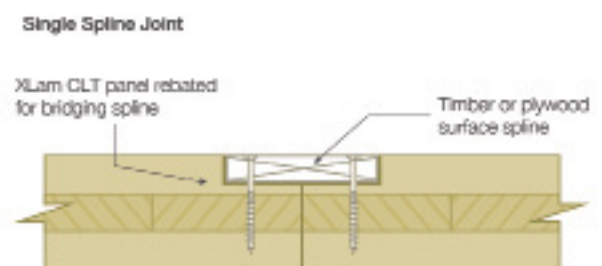
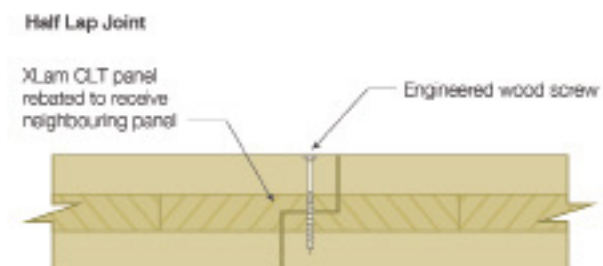
Typical angle shear and tensile wall-to-floor brackets.

8.6 Wall to Wall

Wall panels are connected together using engineered screws, typically at 150mm–200mm centres. The screw type, dimensions and spacing will be specified by the engineer.

8.7 Edge to Edge

Meeting edges of adjacent panels in the same plane are connected using either half-lapped or rebated spline joints. Wall panels are typically half-lapped with each successive panel lapped over the previous, whereas floors and roofs may utilise either method. Where adhesive is specified by the project engineer, it must be applied in accordance with the manufacturer's specification unless otherwise directed by the engineer. Once the panels are butted and correctly aligned, immediately fully screw the joints to eliminate any potential for misalignment to develop. Drive floor screw heads below the surface to facilitate later floor sanding. Refer to the project specification for Natural Appearance Grade panel fixing requirements.



8.8 Drawing Panels Together

The XLam construction system relies on achieving accurately fitted panel joints. The XLam Installation Kit includes bars and Rothoblaas pullers for drawing both horizontal and vertical panels together into a tight joint fit. If improvising, panel edges must be protected from damage.



Skorpio hooks puller.



Geko panel puller.



Bar and Xtraint safety anchor.



Jacking from a bolted floor anchor to tighten a joint or take out edge bow.

8.9 Fixing XLam AirStairs

XLam AirStairs are manufactured to span between landings. Landings are fixed in position and the stair is then set to the landings. Ideally, the design will incorporate a gap between the edge of the stair and its flanking walls. Where no gap is detailed, the assembly sequence may require making wiggle room to get the stair flights into position before one flanking wall is fully secured.



XLam AirStair spanning between landings and clear of side walls.



Screwed stair connections at the landings.

8.10 Fire and Acoustic Applications

Take care in following the requirements of the XLam Design Guide, together with the consultant details and specifications for installing fire and acoustic design components. Have all specified fire and acoustic sealants, sealing strips, resilient mountings and other integrated assembly components immediately to hand when needed.

9 Weather Protection

9.1 Minimise Exposure Time

Plan the panel installation sequence to achieve progressive and rapid closing in against weather. Rapid closing in will ensure against potential adverse weather impacts on the panels, reduce costs of temporary protection, and eliminate or minimise remedial work associated with any consequential surface defects.

9.2 End Grain Sealing

Panels are supplied with a water repellent sealer applied to cut edges to inhibit water penetration into end grain. This is not a substitute for protecting panel edges from wetting during assembly and until the building is enclosed. Any site-made cuts must be immediately sealed.

9.3 Surface Sealing

Where panels are likely to be exposed to weather for more than 4 weeks, the additional site sealing of panel surfaces is recommended with an appropriate water repellent end grain sealant.

9.4 Taping Joints and Edges

Apply a durable waterproof surface sealing tape along the joints between floor panels, roof panels, and on external joints to wall panels, immediately after they have been screwed together. Continually inspect and replace damaged tape to maintain a waterproof joint until the building is enclosed against weather. Use self-adhesive flashing tape with bandaged corners to edges of external wall openings to fully seal off end grain wood. XLam can recommend and supply suitable edge and joint tapes.



Taped joints to floor panels.



All end grain exposed to weather during construction is taped.

9.5 Bottom Edge Moisture Protection

Wall panels are vulnerable to end grain moisture penetration arising from rainwater ponding on floors and wicking up into the bottom edge of the panels. Immediately sweep any ponding water away from walls. Keep floor surfaces clean and avoid the accumulation of water-absorbing rubbish at the wall to floor junctions. Wall panels will ideally be detailed to stand clear of concrete floor slabs and must be separated from the slab and grouting by a waterproof damp course in accordance with the project specification and weathertightness detailing by the architect.



Keep walls clear of moisture-accumulating rubbish.



Clearance from the concrete floor slab prevents moisture penetration.

9.7 Moisture Testing

XLam panels are manufactured at a maximum moisture content of 15%. A higher moisture content will be due to weather exposure. Take regular moisture meter readings at the building envelope, including before and after weather events, and maintain a logged record of moisture content and weather conditions. In normal circumstances construction moisture will dry out quickly after the building is enclosed. The NZ Building Code E2/AS1 requires a maximum moisture content of 18% when linings are applied.

9.8 Fungal Staining

Non-breathable temporary coverings over XLam panels can result in entrapped moisture which promotes mould growth and staining on the timber surface and can lead to long term structural deterioration. The temporary covering of Natural Appearance Grade floors is not recommended and an allowance for floor sanding may be required. It is the specifier's responsibility to determine and detail appropriate vapour wraps and membranes which ensure the long term durability of the XLam panels. XLam can recommend experts to assist in specifying products appropriate to building location and seasonal temperature and humidity variations.



Mould spores can develop under a floor overlay.



Non-breathable building wraps promote surface fungal staining.

10 Appearance of XLam CLT Panels

10.1 XLam CLT Panel Surface Appearance Specification

Refer to the XLam Product Guide for guidance on the appearance characteristics and quality expectations for XLam Natural Appearance Grade panels. During the project scoping phase samples of the desired finish should be agreed upon. Natural Appearance Grade surfaces will be identified on the panel labels. Immediately on unwrapping the panels, report any concerns over Natural Appearance Grade quality to XLam.



A typical XLam Natural Appearance Grade surface.



XLam Natural Appearance Grade panels showing a range of appearance quality.

10.2 Care on Site

Natural Appearance Grade surfaces are inspected at the factory before wrapping and should arrive at the site clean and free from unwanted markings. Take special care with storage, handling and protection. Walking on uncovered Natural Appearance Grade surfaces is not permitted.



Natural Appearance Grade surfaces damaged by poor storage and handling.



Disfigurement from contractors walking on uncovered panels.

10.3 Screw Fixing

Where possible, screw Natural Appearance Grade panels together and to the supporting structure from the Industrial Appearance Grade side. Where fixings will be exposed to view, achieve a neat and even setout. Unless countersunk, the panel surface may crush or tear around the screw head. Screws in Natural Appearance Grade surfaces will be obvious unless counter-bored and plugged.



Screws neatly set out with heads counterbored to receive timber plugs.



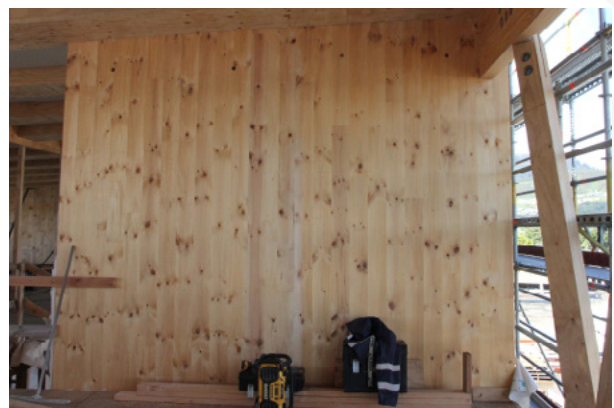
Countersinking the timber surface will prevent crushing around the screw head.

10.4 Surface Protection

After assembly, shield damage-prone surfaces in high construction traffic areas with temporary rigid overlays or barriers. Keep Natural Appearance Grade faces fully covered against rain and UV effects with a non-woven polypropylene wrap free from manufacturers' markings which could cause differential transfer of UV light to the panel surface. Secure the wrap using only plastic or stainless steel staples fixed through tear-proof fabric washers, and maintain in place until the building is enclosed.



Use of fibreboard sheets to protect Natural Appearance Grade panels in high traffic areas.



Prolonged weather exposure may cause differential UV absorption through the wrap, requiring sanding out.

10.5 Water Staining

Take extra care to keep end grain protected and away from accumulating surface moisture. The bottom edges of wall panels are particularly vulnerable to staining by ponding water wicking into the end grain of the surface boards.



Ponding water migrating into unprotected end grain.



Water stains can be difficult to remove.

10.6 Fixture Staining

Panel surfaces are vulnerable to staining by temporary fixtures and fixings. Insert timber packers or other inert separators at connection points between panels and metal fixtures such as temporary props. Wherever possible prop Natural Appearance Grade panels from the Industrial Appearance Grade side.



Construction moisture reaching this connection will stain the surface.



The wrap and a timber packer properly protect the Natural Appearance Grade surface.

11 Natural Appearance Grade Surface Finishing

11.1 Lifting Hole Plugs

Choose plugs which match the timber grain and coloration. Fix plugs in place with suitable glue immediately after assembly, before any UV exposure can darken the panel. Align the grain direction with the surrounding timber. If lifting slings have crushed the surface edge, some making good may be necessary. Plugs can be planed or sanded as required.



Carefully selected plugs will blend with the surface.



Edge crushing has required some repair around the plug.

11.2 Use of Fillers

Some filling is usually required at small holes left by the factory lifting screws, at any crushed fibre around the lifting holes and to any blemishes deemed unacceptable to the customer. When selecting a filler, bear in mind that clear-finished wood will generally darken with the finish application, and increasingly darken over time. Light coloured fillers will appear unnatural. XLam recommends using a dark filler which is consistent with the colouration of natural knots across the panel and therefore is more effectively disguised within the overall surface appearance. Provided the bond will not be compromised, consideration can be given to applying the first clear finish coat to the surface prior to using the filler as this will provide a more accurate representation of the finished tone of the wood.



Light fillers look unnatural.



Dark fillers blend with the overall surface appearance.

11.3 Defect Repair

Consult with XLam over the availability of specialised tools for repair of significant defects or surface damage. XLam can also undertake specialist repairs of damaged panels as a cost variation to the supply contract.

11.4 Sanding

Despite all due care, it is unlikely Natural Appearance Grade panels will survive the transport, handling and construction process free of some dints, scrapes or other blemishes. Most individual blemishes can be remediated by sanding. XLam recommends the complete sanding of all Natural Appearance Grade surfaces immediately prior to the application of clear finishes. Industrial Appearance Grade floor surfaces which have been exposed to weather and construction traffic will also require sanding before applying substrates and sheet flooring finishes.

11.5 Clear Finishes

XLam Radiata pine panels will take a range of finishes as for normal timber. Usual clear finishes are polyurethanes, oils and stains. A lightly blonded product can counter the natural darkening of Radiata pine which occurs over time. XLam will provide samples on request and testing on location is recommended. Dark stains should be avoided if in locations where they are likely to draw heat, which may induce board shrinkage or bowing of unrestrained panels. Clear fire-rated intumescent coatings are available. Clear finishes should be applied immediately after surface sanding, before UV exposure can take effect. Check that finishing systems will be compatible with any temporary water-resistant sealer previously applied to the panel.

12 XLam Support

12.1 XLam Installation Tools

Construction efficiency is enhanced by use of the XLam Installation Kit which comprises specialised Rothoblaas tools for manipulating, pulling together, propping, site cutting and screwing connections. Contact XLam for details.

12.2 Project Liaison

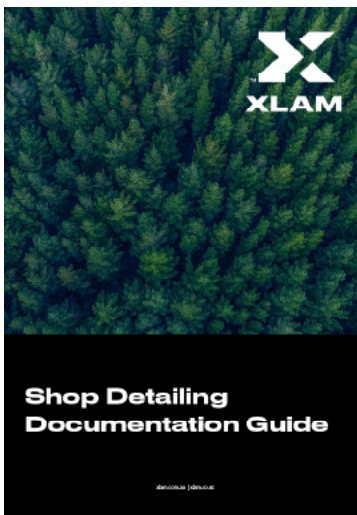
An XLam Contracts Manager experienced in CLT construction is assigned to each project and is the first point of contact for all design, delivery and construction-related queries.

12.3 Site Observation

XLam Contract Managers make periodic visits to the site to observe progress. Following each visit, a site observation report will be issued by XLam. Additional site visits can be arranged by specific request.

12.4 Other Technical Documents

The XLam Design Guide, Product Guide and a range of Site Solutions can be downloaded from the XLam website www.xlam.co.nz and www.xlam.com.au. These form part of the XLam technical documents and should be read in conjunction with this Site Guide.



Disclaimer

This Site Guide provides general information on the use, preparation and attributes of XLam's CLT panel and is not intended to be used for certification purposes. The information provided in this document is supplied in good faith and to the best of our knowledge was correct at the time of preparation. No responsibility can be accepted by XLam, its staff or its agents for any errors or omissions. Users are advised to make their own determination as to the suitability of this information in relation to their particular purposes and specific circumstances. No warranty or assurance can be given that XLam CLT panels will suit individual projects. XLam disclaims all liability and responsibility for any loss or damage, direct or indirect, which may be suffered by any person acting in reliance on anything contained in or omitted from this Site Guide.



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