

Lockwood Assembly Manual

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Introduction

The instructions contained in this manual are designed to help the reader with those techniques, which are especially applicable to the Lockwood method of construction. In addition, normal sound trade practice and workmanship must be applied, as well as compliance with NZS 3604 (2011) and the New Zealand Building Code (NZBC) from commencement to completion of the job, to achieve the standard expected in a Lockwood building.

Unlike conventional buildings, most components to be erected are pre-cut / pre-finished materials to be finished to the owners' specification prior to them taking possession. The awareness of this is essential for achieving a high-quality finished product. Throughout this Assembly Manual various notes will underline this even more so.

The following Lockwood factory drawings are to be found and used throughout the erection of the building:

- Subfloor Plan
- Floor Plan
- First Floor Plan
- Tie rod and electrical Plan
- Sarking Plan
- Ridge Plan
- Exterior Walls
- Interior Walls
- Special Joinery
- Details
- Load sheet
- On-site crucial check list

When building, always have the current Lockwood Detail Manual handy and ensure all details are up to date. If in doubt with any point regarding the assembly of Lockwood components or technical information, contact Lockwood Group in Rotorua (07 3477691) immediately before proceeding.



Onsite Documentation

Please ensure the following documentation is available during the build

- Consent plans and engineering documentation
- Lockwood detail manual or copy of relevant pages
- On site crucial checklist

Onsite Crucial Checklist

With factory drawings or procure this document from the Building Contractor, the leading hand builder must sign off as having completed the relevant tasks according to those specified (copy only included at the end of this document.)

Field Report Form

During construction, if you have any problems, this should be reported to the Lockwood Contractor and recorded on a field report (Figure 1) and emailed to Lockwood Group Limited immediately. Any urgent issues, then a phone call should be made and followed up with an electronic field report.

We will retain all field reports in case you wish to make a claim at a later stage. Any claims must be submitted to Lockwood Group Limited within eight weeks from the delivery of the components.

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Checking Procedure for Proprietary Components

When your consignment arrives, look for the following in the hardware box:

- <u>In plastic bag</u>; Lockwood factory drawings and load sheets, on site checklists and any relevant technical updates
- <u>In cardboard tube</u>; Joinery pack, contains lintel screws, sliding door roller adjustment information and other helpful joinery information.

Plans and Load Sheets

The Load sheet list provides a full list of all components supplied from each Lockwood department.

As unloading commences, refer to the final Loadout section on the load sheets. Listed on this section is the number of packets from each department and these must be checked off, as the packets are unloaded. Care must be taken to ensure the correct job number is on all packets and that you have the correct number of packets from each department, e.g. Ridges, 1/2 and 2/2 (the last number refers to the total number of packets from the department, i.e. 2).

When unloading the joinery packet, refer to the joinery section of the load sheets and check each item off your list. Always remember that extra care at this time saves hold-ups later. It is easier to rectify the problem at this stage rather than two weeks later when the joinery frame is required.

If, after this check there is a shortage, contact the Lockwood factory immediately via a field report process.

If any components are damaged, follow the same procedure, but any claims for damage during transit must be made against the carrying company, and the damaged components should be listed on the driver's delivery docket along with any shortages that occur while unloading. If you fail to comment on the driver's docket, then no claim can be made against either the carrying company or Lockwood Group Ltd.

Always remember that once you sign the delivery docket you have accepted the components on site and in good condition, unless otherwise specified.

Unloading Components

Where possible, it is advisable to unload the components clear of the foundations to allow plenty of room to brace walls when they are erected and to allow freedom to work around the structure.

Alternatively, components may be unloaded directly onto a pre-erected subfloor, remembering to allow sufficient working room for temporary bracing, etc.

Exterior and interior wall packets should be stacked with top board packets at the bottom and the first wall boards at the top.

For two story designs, endeavour to keep ground and first-floor components separate, but it is not always possible. To check this out, carefully read the labels on each packet.

Joinery components must be unloaded from the pallet and the exterior frames carefully stacked and covered. Interior doors and frames must be kept dry and well protected from the weather. The rubber packers that are wedged between the joinery frames should be placed into a plastic bag and given back to the truck driver. The joinery pallet, complete with straps **must be returned** on the same truck that delivered the components; otherwise, a there will be a \$2,000.00 charge.



All packets should be kept covered completely with waterproof tarpaulins and **must not be laid directly on the ground**. Subject to site conditions a minimum of 45mm gap below boards is required. Increase this gap to provide good protection from rough ground conditions. Use packing paper between tarpaulins and planks to avoid any dirt or dye stains.



Unloading should be carried out by a forklift, hoist or crane. Crane unload is by far the quickest and most satisfactory method.

If it is found that the load must, for reasons of space, be unloaded by hand, extreme care should be taken particularly with the walls and sarking. The boards should not be allowed to slide over each other as this causes small scratches to the surface, which do not become obvious until the painter starts his work. Boards should always be lifted, as they are a pre-finished product.

Foundations

TIMBER SUBFLOORS

Set the pile layout according to the Consent subfloor drawings, the finished floor platform must be square, level and accurately set out to the Lockwood subfloor plan.

The extra time checking at this stage can prevent hours of frustration and cost later.

NZS 3604 section 7 FLOORS sets down construction requirements for timber framed floors.

Geographical zoning will determine if subfloor nails and fixings are to be galvanised or stainless steel. This should have been determined by the Contractor prior to the ordering of the components.

Notable timber sub floor details especially applicable to the Lockwood method of construction

- Tie rod nogs and fixings
- Recess sills
- Builders wrap to boundary and end joists
- Flashing base board

Reference Lockwood detail manual Section 1 Subfloor

Timber Noggins

Fitting and nailing instructions (refer to Nailing schedule; subfloor)



Exterior tie rod nogs (detail manual reference 1-130-107)

Refer to Lockwood subfloor plan for position of tie rods (centre of exterior rods is set 66mm from edge of subfloor)

Nogs should be fixed to joists and boundary joists

Fix with 4 multigrips and nails

Interior tie-rod nogs (*detail manual reference 1-140-107*) Refer to Lockwood subfloor plan for position of tie rods

Fix with 4 multigrips and nails

Recessed sill nog (detail manual reference 1-50-107)

Refer to Lockwood subfloor plan for positions of recessed sill 109 x length of frame x 20mm deep - the depth of the chip board floor- ex 100 x 50 nog on the flat between joists. At end walls attach ex 100 x 50 trimmer to double joist to support floor.

Builders wrap to boundary joists (*detail manual reference 1-01-107 to 1-60-107*) builder to supply and place builders wrap between joist and flashing base boards.



Important note for Timber Floors

- It is critical that floors are level particularly where ranch sliders, bi-fold, hinged and French doors are positioned, an un-level floor will lead to problems with the operation of these joinery frames.
- The over-all sub floor dimensions on Lockwood Subfloor plan must be followed at all times.
- Don't forget to cut out the flooring at the full height joinery recesses.
- Follow floor manufacturers floor laying instructions.
- Fit angle support bar to support stacker door sills



CONCRETE FOUNDATIONS & FLOORS

The concrete perimeter must be laid out accurately ensuring it is square and level.

The Extra time checking at this stage can prevent hours of frustration and cost later.

NZS 3604 section 7 FLOORS sets down construction requirements for concrete slab- on- ground floors

Lockwood specific concrete slab best practise; reference Lockwood detail manual Section 1 Subfloor

Notable concrete slab floor details especially applicable to the Lockwood method of construction;

- Recess sills
- Edge bearer option for garage floors
- Flashing baseboard

Recessed sills (*reference Lockwood detail manual section 1-90 & 100 - 107*) This position is shown on the Lockwood subfloor plan.

Edge bearer (reference Lockwood detail manual section 16-30/40-62)

PLACING OF EXTERIOR SEATING "S" PROFILES & BASE FLASHING

(Lockwood detail manual reference 1-110-107)

The 107 'S' profiles are best positioned by running a chalk line 88 mm in from the edge (43mm for 62mm exterior walls) of the foundation and around the complete perimeter. This line represents the inside edge of the exterior walls and measurements between these lines should be checked off against the Lockwood ground plan.

The profiles should start approximately 150 mm in from the corner (clear or tie rods) and spaced along the length of the wall at 900 mm centres. Where a 'B' profile occurs, place one each side of the join. 'S' profiles are not required under full height joinery.

Fitting and nailing instructions (refer to Nailing schedule; subfloor)

- 1. Nail 'S' profiles into place
- 2. Clip the base flashing onto the 'S' profile
- 3. For timber floors push the base flashing firmly against the joists and nail.
- 4. Ensure that flashing strips butt together at the centre of an 'S' profile.
- 5. External and internal corners are to be mitred and sealed.
- 6. Seal all joins in flashing.
- 7. Nail upstand of 'S' profile to exterior board prior to fixing skirtocia. Refer to crucial onsite sign off

Flashing Baseboard

(Lockwood detail manual reference 1-10/20/30/40-107 and Nailing schedule, subfloor)

The flashing baseboard can be fitted at this stage, or after the walls are erected. When recessed door sills are supplied, check the flashing baseboard around the sill so that the bottom line of the board continues the same line around the house. Always use sealant at all joints and between the back of the sills and the floor to avoid water entry. Note; for WC 21 option, position weather clip 130mm from floor level to clip centre line.



Erection of Walls

Prior to stacking the wall boards on the floor, **mark the interior wall outlines on the finished floor** following the dimensions given on the production drawing ground plan.

If the marked walls do not match the floor plan, recheck before continuing.



Sorting Wall Planks

Open the packet labelled first boards, to protect the other wall boards, keep all the other packets un-opened and away from the clear floor space.

Prior to construction of walls, the boards must be sorted into stacks which should be placed in an area where there are no walls, i.e. lounge, dining room, living room, rumpus room, garage, etc.

Ensure the numbered ends of the planks are all visible at one end of the stack. Stack the planks in piles, with the bottom boards on the top of the stack. The Lockwood floor plan shows where the various wall boards are to be positioned. During sorting keep the wall drawings at hand to check that all boards on the cutting list are there. This procedure is carried out once all the boards are sorted and is simply a matter of counting the number of boards against the plan.

Note: Always stack the wall planks on 45mm + dunnage to keep the wall surfaces off the floor or else the wall planks will get marked. Packets should be well off open ground and be well protected from moisture (above and below packets).

Handling of Wall Planks

Take extreme care when handling wall and roof timbers while sorting, stacking and erecting. They mark easily and dirt, rubber sole marks, etc., are very difficult to remove. Black rubber soled shoes should never be worn during the assembly process. Never walk on board surfaces and remember during erection that the solid timber surface will be the interior finish of the house.



NEVER ALLOW THE SOLID WALL BOARDS TO GET WET!

LOCKWOOD BEST PRACTICE GUIDELINES

Cover up

To keep your client happy and to avoid any possible discontent in the future we recommend that the following early steps are taken to protect their home during the build.

What are the 2 "natural" enemies of timber?

Rain and Sun (the natural elements)

Too much of either can lead to issues that you would rather avoid.

Your client is your best advertisement for a job well done but also your biggest critic if they have an issue that they are UNhappy with.

So, if we take early steps to eliminate some of these issues at the build stage it is generally the most costeffective time to do so.

The damage to timber that is not protected during the build can impact on the finished product, the best protection is to cover up.

The simplest procedures are the best

Use the timber dunnage from the Lockwood delivery, this procedure is best used for partially erected walls. Trim the dunnage to fit the length of wall and nail securely to the top tongue, this will provide a temporary soffit to the top of each wall to prevent most of the direct rain running into the exposed groves, power / tie rod holes and insulation cavity.

Dunnage cover will not provide a long-term solution if there is constant rain over a long period, while the LOSP treatment does offer some protection, this varies based on the properties of the timber, a rule of thumb is that it probably halves the timber movement had there been no treatment.



Once the walls are at door height the most effective cover is to use rolls of clear plastic. The plastic should be draped over the fully assembled walls and secured to the floor. While this could be judged as being very time consuming you should weigh this against the risk of not doing so.





While white plastic will not keep all UV rays at bay, it will keep the boards in dryer condition and be less affected by timber movement then wet boards - as they wait to dry - once the rain clears and the sun appears.

Remember your customer is more likely to be more understanding should an issue arise if they see you did all you could to protect their investment.

The rolls of plastic are supplied as part of the Lockwood supply or as a sundry order.

FACTORY WALL BOARD GUIDELINES

To avoid wall board growth / shrinkage issues the Lockwood factory will record the moisture levels of each piece of timber prior to beginning the manufacturing process.

Only timber with moisture readings of 9%mc minimum to 13%mc maximum will be accepted.

Any timber with moisture recordings that are outside these acceptable levels will be rejected and returned to the supplier.

The precut fabricators will also check the moisture content and the 172-mm wall coverage (+or- .5mm) during the precut process.



ON SITE WALL BOARD GUIDELINES

To avoid possible wall board growth on site please follow these guidelines.

Keep the walls off the ground, covered / dry as best as possible during the sorting and wall erecting process.

During the wall erection process, check the height at the V between the 12th /13th boards this should be 2074 from the floor (2077mm maximum). Excessive board growth will be noticeable at the head of full height joinery frames with the lintel board being higher than the head of the frame (do not pack the head packer to compensate).

Once walls are erected double check and confirm the height from the floor to V of the 13th board (inside face) is no more than 2250 over 13 boards (2246 plus 4mm allowance, say .3mm per board). Obvious out of line V's would indicate board growth.

Check main ridge heights (same tolerance) refer to "production floor plan" for dimensions to underside of beams

Erected walls should be covered at the end of each day or if threatened by wet weather. Minimum protection based on <u>returning</u> to site the next day and a fine weather forecast would be the fitting of dunnage to top of exterior walls, possibility of rain or away from site for unspecified time calls for greater weather protection. Rolls of plastic are included with a job loadout, but more can be requested, covers should be securely draped over the walls until the threatening weather has passed.

Continue with build, sarking should be checked and protected as per the walls. Perhaps check every 10 boards, from V to V these should be within 1850mm to 1853mm.

Thermakraft Vapour Shield101 is minimum sarking protection (light rain or overnight dew), as previously mentioned, time away from site or deteriorating weather conditions would require the fixing of covers.

<u>Avoid a wet build</u>, cover up when confronted with undesirable weather conditions, the payback is well worth the effort (a decision not to cover up and build in the rain could be a decision you will regret)

These guidelines if followed will result in a higher quality finish where the horizontal wall lines and V's provide a more uniform finish with less movement and a happy customer.

ERECTING WALLS

There are two methods for erecting walls. For larger more complex structures, method one carries the danger of an unstable structure during assembly and the problem of keeping all checkouts and openings plumb. These should be built progressively using method two.

Method One

The exterior walls are erected first to the height of 13 boards or to the full stud height as specified on the plans, and then the interior walls are erected to the same height. Exterior and interior gable walls are then completed. This method is the most commonly used as it gives you a larger working area in which to sort out your walls and helps in adverse weather conditions. Remember, when building the exterior walls first they must always be adequately braced .

Method Two

This method is the erection of the exterior and interior walls together, i.e. one exterior board, then one interior board.

Erection of the walls

As the Lockwood component erection system works with very precise and tight connections, the outline and positioning of the bottom boards needs close attention. Closely follow the Lockwood production ground plan drawing and start with the exterior perimeter boards. (When setting out use one exterior side and one exterior end of the floor as your fixed measuring points and always dimension everything from these two walls or sides.)



start by positioning the bottom boards over the 'S' seating profile. Place the 'B' profiles (full height wall jointers) in their respective positions. Check the profile lengths against the plan. Where timber flashing baseboards are specified, a timber block should be nailed to the base of the house at B profile positions. This block ensures that the 'B' outer profile is correctly positioned throughout construction of the walls. Ensure the rebated end of the profile is at the bottom.

At external corners *(detail manual reference 2-120, 130, 140-107)* remove 25mm off the tongues from the overlapping walls to allow for the base flashing.

Once all bottom boards have been placed, a drill bit should be placed down the holes in all the boards and drilled through the subfloor to enable the installation of tie-rods and power cables at a later stage.

Important; ensure that all PVC wedges are placed in the scallop of the board of all window (W) internal corners (L) and wall jointers (B) profiles- before placing the next board, corner profiles and wedges are fitted later.





For easier sliding of the profiles in the endmatching groove, bend the sharp end inwards a little

Throughout construction of the walls, check, as you place the next board, that all power and tie-rod holes are in the correct position. It is very difficult to drill a hole in the second board from 13 boards up. If not drilled correctly, this job should be done by you at the time. Never erect more than 3 boards high at a time on either side of a profile. At the same time, always check with the spirit level once you have placed three boards to ensure that the walls are plumb.

Never slide profiles down the boards, always slide the boards down the profiles. A little linseed oil, wax or silicone on the profiles makes for easier assembly. When the second layer of boards are in place, the stiffeners can be positioned in their respective positions.

Position the stiffeners on the floor and fix with two multigrips nailed to the floor and into the side of the stiffener. *(detail manual reference 1-150, 160, 170-107 and nailing schedule)*

Full height joinery frames should also be placed at this stage, check Lockwood floor and subfloor plans for joinery item number and position of each frame. They should be plumb and securely braced with 100 x 50 braces. Windows should be placed after two boards have been built up above sill level.

As the walls are going up, the 590 mm X-profiles should be placed, being sure to leave a 200-mm gap between the first and second profile. This save's having to lift the interior boards up to 13 boards and driving them down 13 boards when interior walls are erected.



When driving planks down, a 3-4-kilogram hammer should be used along with a striker plate to avoid damaging boards.

Always alternate the direction of the hammering of each board, i.e. left to right and right to left and so on.

Always ensure that each board is hammered home tight before placing the next one. Remember to check your walls are plumb. They can also be plumbed up by using the method below, i.e. driving 2 or 3 boards in the same direction.





Note: Before the placing of the top board, B-profiles, V-profiles and X-profiles should be cut so that when the top board is placed the top of the profile is about 20 mm below the top of the board. If this is not done, after the walls settle, the profile may hold up the sarking boards.

Once the exterior walls are up to the top board, the interior walls can be erected (if using method 1).

These walls should first be marked out on the floor using a chalk line. Nail the interior seating profile floor cleats at 900 mm centres to the floor and either side of any openings with two 40 mm x 2.8Ø galv. FH. nails in the groove of the profile. Avoid placing the seating profiles where tie-rods are positioned and where possible, the seating profiles -where possible-should be fixed directly over floor joists. This will help to eliminate wall movement.



After having positioned the interior bottom board temporarily with two nails per seating profile, recheck the room dimensions and, if necessary, adjust the bottom structure to the required dimensions. Check the width of the gaps for the interior door frames as well. When the bottom board structure complies with the dimensions on the ground plan, finish nailing off the interior seating profiles with two more 40 mm x 2.8Ø galv. FH horizontally into the first wall board. Do not allow any further horizontal movement to the bottom board layout during the fixing of the floor seating profiles.

Drill all power and tie-rod holes through the floor and follow the same procedure as exterior walls ensuring that all openings are kept square and plumb. As you reach three boards high, knock the next profile down thereby enabling another 3 boards to be built up and so on.

It is important to ensure that the grooves line up. This can be difficult at times, so always make sure that the grooves line up at eye height.

Recommended: Nail a temporary cap i.e. ex 50 x 50 batten, to door openings and wall ends to hold walls straight for easier fixing of door jambs and cappings at the finishing stage.





Joinery Installation

Joinery frames, head flashings and weather seals are installed as part of wall erection process

After placing the final board on either side of the joinery frame the head packer should be fixed to the bottom of the lintel board, remembering to fit the head flashing at the same time. The head packer should be nailed at 300 centres using 75 mm galvanised FH nails. Head packers are cut to the correct length and head flashings should extend equally on each side of the head packer, to avoid head flashing creep fix the head flashing to the tongue of the lintel board (pre-drill hole for 30mm screws). Refer to detail 10-105 / 110-107.

For H3 pine and cedar walls, before placing the final board - on either side of the joinery frame- trim 3mm x 100mm long off the top of the tongue of the board directly under the head flashing as shown in detail 10-05-107. This is to enable the head flashing to sit correctly at each end.



JOINERY EXPOSURE KITS

(Lockwood detail manual reference 10-10-107)

Fit wind seal to the underside of the head flashing, allow 50mm from each end (figure 3) prior to fitting the head flashing, this should sit above the aluminium frame as per Lockwood detail manual "head details".

It is crucial that all frames are installed to the highest level of accuracy. Ensuring the frames are installed square is **critical**

Remember there is no room to adjust later with the Lockwood system.

A level sub-floor ensuring there is no deflection across the opening is critical as is the secure fixing of sills for full height frames (Doors / Ranch- sliders / Bi-folds etc.) *Lockwood detail manual reference 1-50-107.*

The frames should be checked during the building process to ensure they are square and plumb as a standard building practice, and this should be adhered to and not compromised.



FIGURE 3



Protect the sills to doors during the build this avoids scratches and blocking of drainage holes. Avoid weight directly on the head of full height frames



WIDE LINTELS

(Lockwood detail manual reference 10-230-107)

To avoid deflection at lintels when installing stacker and sliding doors (clear openings greater than 2m) fit 100 x 12g lintel screw, find in cardboard tube within hardware box.

SLIDING DOORS ON SITE ADJUSTMENT





Rollers in sliding door panels;

In the factory;

To reduce the weight of joinery frames the *joinery factory* remove the sliding door panels from the frames, to achieve this the wheels in the sliding panel are lowered.

On site;

Once the main frame is in place the builder will install the sliding panels on site, the lowered wheels allow for an easy install.

The builder must adjust the wheels to their correct position this will reduce the gap at the sliding panel head to prevent water ingress on Z3 and Z12 sliders and allow for smooth operation of sliding panel and locking device.

The adjustment process is simple, refer to this link and scroll down to: Sliding Door Wheel Adjustment.

ONSITE GLAZING

Joinery will arrive on site with certain items unglazed, the building contractor will contact the glazing company to organise the glazing of the unglazed units.

Work safe complaint platforms and scaffolding should be provided for the glaziers.

Gable Walls & Roof Beams

(reference Lockwood detail manual section 3 Beams)

Gable boards can now be fitted to exterior walls and any interior walls parallel to these. Extra boards will also have to be placed on interior walls running in a longitudinal direction. Many of these boards will require to be joined, using short lengths of X-profile, once again ensuring that all tie-rod and power holes line up.

Nail all gable boards, approximately 60 mm from the bevelled end, into the lower board with 90 mm galvanised FH nails.

Beam to posts; Refer to floor plan for floor to underside of beam dimension, this must be the finished height, provide temporary packer under posts if required. Remove the packer -once wall boards have settled to correct position- and fix to floor



Beam to gable walls; Line up the top of beam with the gable wall line or refer to floor plan for floor to underside of beam dimension (2730) subtract the number of wall boards ($15 \times 172 = 2580$ add 10mm for tongue = 2590) the difference (140mm) is the accurate position from the bottom of the beam to the V of the wall board directly under the beam and allows for accurate beam position after wall board settlement.



Mark beam check outs on the boards and double check their positions and size prior to cutting the checkout. Check the ground plan for accurate floor to underside of beam dimensions – site check prior to cutting beam support posts - and any mild steel beam brackets to be fitted to posts, stiffeners or walls. When positioning brackets, ensure that the beams will be level when fitted. Any discrepancy between plan beam heights and site heights should be questioned with building contractor and Lockwood factory.

When beams are supported by a post, check out the bottom of the beam -remove bull nose-to accept post and to avoid unsightly join created by the bull nose on the lower side of the beam.

If the posts-beam connection is a mortise and tenon, the post height should be adjusted by cutting the bottom of the post and driving it down to the correct height. When a stiffener has no tenon it is a simple task to trim the top to the correct height. If the stiffener or post is load bearing and extends through the subfloor check engineers details.

When all check outs and brackets have been prepared in the correct manner, the beam should be lifted into position. Remember to use string lines to line your beams up level throughout the length of the building.

Each beam is marked with an identification number, which can be checked against the floor plan. Start by placing the main ridge beam ensuring that the gable walls are plumb. Once the main ridge is fixed in position and the walls are plumb, the balance of the beams can be fitted.

The end grain of any external beams must be protected using similar metal end caps reference Lockwood detail manual 3-150-107.

The 'E' beams can now be fitted to the interior walls. Again, refer to the ground plan and load sheets. The 'E' beams will all be numbered on the plans and the lengths are shown on the load sheet. The 'E' beams are supplied approximately 50 mm longer than necessary and will need to be trimmed to suit. 'E' beams should be nailed at as Nailing schedule 'Beams".

All stand-alone wall stiffeners on exterior walls must extend 150 mm into the roof space.

To retain the envelope treatment, apply Enseal spray to all Lockwood external product where timber cuts, checkouts, rebates, etc occur and carried out onsite.



Multi-Storey Structures

Assembly of walls, etc., should follow the same procedure as described in the single storey structures. However, once the top board is in place, the builder must check with the floor plans to ascertain where the first-floor support beams are placed. In many cases these beams are fitted to posts and brackets.

The floor-to-floor height is as shown on the floor plan. From these dimensions the height of the support post can be calculated by deducting the dimensions of flooring, joists and beams (Lockwood detail manual reference1-220-107), always work to these heights not to the wall board V heights as there may be board growth that will dry and shrink.

Remember that any high or low spots on a concrete floor must also be taken into consideration if the support beams are to be kept absolutely level.

After positioning the brackets, the beams can be bolted into position and the construction of the exterior walls can proceed. Before erecting the interior walls, check the subfloor plan to determine the position of the tierods. All interior tie-rods need to be fixed to the upper floor with tie-rod anchors.

Note: It is essential to keep walls on these structures straight and plumb as at these heights it becomes very difficult to adjust the wall once it is in place.

Noise Reduction Tape

Before laying the sarking, all surfaces that meet the sarking i.e. beams and the top of walls should be covered with noise reducing tape.

Sarking

(Lockwood detail manual Section 4 Roofing)

IMPORTANT:

Cover Up

Be prepared to cover up, it is critical at the end of each working day, or before it starts raining, to cover any sarking already on the building and to secure the cover with plenty of temporary battens. Fixing wet sarking or exposing dry sarking to rain can have disastrous effects to the structure. It is most important to keep the end grain well protected as water run-off from the sarking can be soaked up by the end grain.

Pre-Sarking Fixing Process

Before fixing the sarking, the exterior and interior walls and the ridge beams should be straight and parallel. The walls should be straightened against a string line and securely braced from both sides. The beams can be kept parallel by temporary sarking boards at two metre centres extending from the ridge line to the exterior walls and fixed to each beam or wall.

The sarking boards should first be sorted into various lengths and stacked along the side of the building in the correct order of length, with the clean face out, and all the tongues facing the same direction. Stacking in this manner, the carpenters on the roof can slide the boards up without damaging the clean face, turn them over and fix them into position.

Installing Sarking Boards

If possible, it is common practice to start laying sarking over the most open end of the design and work towards the less open areas.

For clipped gables, start at the open end and nail the first sarking board to the gable end wall allowing for the gable packer (43 mm).



For gable overhangs - as there are no beams generally supporting the overhang -the first board to be fixed is the board over the gable wall. The positioning of this board must be worked back from the overhang size allowing for full boards. The overhang boards are supported by the outriggers or by the tongue and groove of the sarking and later with the fascia and roof framing.

When a beam checks through an internal wall, nail the sarking board with 2/100 x 3.75 mm FH galv nails into the wall each side of the beam. Two nails must be used on all other support beams or walls. Pull the next board up and carry it to the ridge. The top end should be pushed into the first board and skew-nailed on the outside edge first.

Carry on nailing the board to each beam as you work down the roof, always skew nailing the outside first and then the inside nail. Always ensure the boards are well hammered together.

Fix each board to main structural support (beam or wall) with 2 / 100mm x 3.5mm galv flat head nails or 3 x 90mm x 3.5mm FH gun nails.

Once the bottom is nailed to the top of the wall, pick up the next board. Carry it back to the top and before fitting, nail a second nail into the previous board at the top. This system has the effect of tightening the sarking as you go. Check regularly to see that you are keeping the sarking parallel to the walls.

As the boards are being fitted transfer measurements from the sarking edge to the tie-rod and power cable hole positions of the walls directly below, transfer these dimensions onto the next sarking board being placed. Holes can be drilled at this time, place a small nail adjacent to the hole so the sarking overlay paper can be pushed down over the nail, indicating the hole position for tie rods and electrical wiring later.

If the building is a 'T' or 'L' shape plan, the intersections between the ridges, at right angles to each other, will in most cases need to be false framed on site to fill the gap created by the interior effect of the sarking. Full details on this part of the structure are covered in the Lockwood detail manual <u>(Lockwood detail manual</u> <u>Section 4 roofing)</u>

Sarking Strap

(Lockwood detail manual reference 4-190-107)

Sarking strap is required for all sarking spans greater than 2.5m

Before fixing the sarking strap, refer to the sarking plan for the positions of the straps. It is most important to follow the layout carefully as additional bracing of the entire structure relies upon the positions indicated.

Fix the strap at one end to several boards and run the strap down the length of the roof. The strap should be tensioned using the tensioner supplied with the kit. Care must be taken not to over tighten, as it is possible to finish with a bow in the roof. The strap should be fixed to every board with two 30 mm galvanised FH nails.

Check engineers documentation for any reference to strap bracing, fit as per engineers instructions.

Installation of Sarking Overlay

The sarking overlay (thermakraft 101)

As pointed out earlier, it is most important that the sarking is protected from the weather. This effectively means that the building programme should be such that the building is completely sarked and covered before any long breaks, such as a weekend. Sarking overlay must cover the total sarked area. All joins in the overlay should lap by 150 mm. The joins should be stapled to the sarking and then sealed with tape. Ensure that the overlay covers the sarking end grain.

Sarking overlay for composite T sarking, start from the bottom and cover sarking and over rafter, staple for tight finish.

<u>Standard sarking</u> -start overlay from the bottom- overlay protects the sarking platform from light rain. Further protection is required to protect the sarking and walls from heavy rain. Cover with tarpaulins- well tied downensure that tarpaulins have ropes long enough to reach the foundation.





DUMMY RAFTERS

(Reference Lockwood Detail Manual Section 4 and Structural Handbook Section B)

To avoid possible deflection during the dummy rafter fixing process provide continuous temporary rows of support mid span under the sarking platform for all spans greater than 2.5m and maintain temporary support until roof fixings is complete, remove as soon the roof is complete.

The Lockwood standard allows for the Dummy rafters to be spaced on edge at the centres specified on the consent plans, the first and last rafters fixed flush with the gable ends.

It is easier to plumb cut the rafter and attach the CPC40 brackets with 4 nails (30x 3.15mm FH galv) at 900crswithin 200mm from each end- to the side of the rafter on the ground before lifting onto the sarking platform.

Position the rafters on the sarking to suit the centres indicated on the consent plans fix the CPC40 bracket to the sarking with 2 / 10 x 25mm wood screws.

To keep the sarking straight at eaves fit ex 75 x 50 member along the full length of the over-hang with 65mm exterior screws every 2nd board <u>(Lockwood detail manual reference 4-10-107)</u>, ensure the distance of sarking overhanging from the walls is as per plan; otherwise you may have trouble with your fascia details.

COMPOSITE T SARKING

(reference Structural Handbook Composite Sarking span charts)

The Composite Sarking is a factory fabricated all in-one Sarking / Dummy Rafter member designed to achieve greater spans (average 17% increase) reduce on-site labour and eliminate the need for steel brackets and fixings.

Fix to wall and beams as standard 35mm sarking, the rafter finishes away from the bottom eave and top ridge, this allows the builder to attach a short plumb cut 90 x 45 outrigger to the side of the rafter to help with fixing providing a straight fascia line. The ex 75 x 50m sarking straightening member can run under the outrigger for the full length of this line (screw fixed every 2^{nd} board).



Trusses

(Lockwood Detail Manual reference 4-200-240-107)

Fit top plate to top Lockwood exterior and interior wall planks as detail 4-200-107 mark and drill for electrical wiring and tie rods prior to fixing trusses.

Fix bottom chord of truss to top plate as specified by truss provider, follow 'Buildable truss layout'

Fitting of Tie-Rods

Refer to detail manual (9-101/102/105-107) and tierod and electrical plans

Check wall plans to determine which are tie-rod holes and electrical holes. These plans also show the length of each tie-rod. The lengths are based on well protected walls and sarking (no allowance for wet weather growth). The tie-rods are inserted from the top with the smaller thread end at the bottom. Fit 40 x 40 washer and nut at the base, the nut should be screwed on only slightly past the bottom of the thread. The tie-rod should be pulled up tight.

For low roof pitches; and after placing the 70 x 60 washer, spring, galvanised sleeve, small 25mm round washer and nut, tension as required or to assist with board growth, do not over tighten. (50 x50 washer provided for truss / flat ceilings).

For roof pitches above 7 degrees use tie rod tension bracket kit, tension as required or to assist with board growth, do not over tighten.

For timber subfloors in Sea spray zones a tie rod pack will be supplied with a stainless-steel nut, washer, extension and coupling. These extensions should be attached to the bottom of each rod and follow the bottom nut installation procedure as above. *(Lockwood detail manual reference 9-105-107)*

Electrical Wiring

The Electrician can now install the wiring. Every wiring hole should be patched with squares of overlay extending a minimum of 100 mm from the holes. The lap should be completely sealed with tape, paying attention to the higher side.





Barges and Fascias

(Lockwood detail manual reference Section 4 Roofing and Nailing schedule)

Barge boards should extend 250 mm beyond the lower end of the sarking and are best plumb cut after scribing with a spirit level. The 1st dummy rafter should be fixed to the sarking with CPC 40 cleats and the barge board with 90 mm galvanised FH nails at 300 mm centres.

Treat end cuts with Enseal, prime and apply 2 final coats of paint.

Roof Battens

Refer to NZS 3604; 2011 Section 10 – Roof framing Table 10.10 / 10.11 – Purlins – VG 8

Exterior Roof Support Posts

(Lockwood detail manual reference roofing section 4-160-107)

These posts ideally should be pre-fitted to the fascia beam prior to fixing the facia to the sarking, note that in sea spray zones that all steel fixings will need to be stainless steel.

Check consent plans for post foundation footing sizes.

Exterior Finishing

The following should be carried out before proceeding with the interior finishing work.

- Fit building paper to any 44 mm walls requiring lining (*reference Lockwood Detail Manual section14*).
- Fit sealant to gable walls scallops on both sides for the exterior gable walls (*refer detail manual, section 4*)
- Fit gable scotia where required.
- Fit aluminium L profile down any internal corners and W repair profiles around the meter box. Use R.T.V to seal around the meter box prior to fixing the W profiles. Screw profiles in place with one 50mm stainless steel screw every second board. Refer detail 2-3900-107.
- Fit corner outer profiles (2-120/130/150/-107) fix supports to hold the aluminium outer in place, trim outer to correct height, insert PVC wedges in correct position then fix outer profile in place tight against exterior scotia -with 50mm stainless steel screws, every 2nd board.









With aluminium clad houses it is imperative that any down pipe brackets or such like are fixed with stainless steel nails or screws. **DO NOT** use galvanised or cadmium plated fixings.

Any copper pipes exiting through an aluminium-clad wall must have a PVC sleeve fitted, extending from the inside of the wall to the outlet. If possible, do not use copper pipe in this situation.

Copper, zinc and aluminium, being similar metals, only need water to act as an electrolyte and electrolysis sets in. The aluminium cladding will quickly be corroded, allowing likely water ingress.

Interior Finishing

Take care not to damage the walls as you carry finishing materials and doors within the interior of the building.

Interior door and wardrobe frames are supplied in knock down form. Before fitting door frames, remove the bottom tongue (10 mm) from the bottom of the 13th-lintel- board x the length of the wall opening. This is necessary to allow the walls to settle without bearing down on the head. To enable the jambs and or cappings to be fitted easily, it is a good idea to arris both edges of the openings.



Start with tacking the heads of the frames into position then drive the jambs hard under them to prevent gaps in between the head and jambs. Where the hinges are to be fitted the jambs are rebated.

Closely follow the ground plan to ensure the frames with the door hinging are hanging the correct way. All frames and doors are numbered. Frame numbers are on top of the doors and inside the rebate of door heads. Ensure each door goes into its respective frame. Note the number of the frame on the floor as the number on the head becomes invisible by positioning the frame. Nail the head to the wall first with 75 mm jolt head nails at 300 centres, tack the jambs to the walls with finishing nails. Do not drive the nails home before the doors are positioned and hung. Use finishing nails to fix the jamb to the wall boards. Sometimes the fit of the doors can be improved by the way the jamb nails in the frames are hammered home. Rebates for hinges and locks are pre-drilled. Use the ex 100 x 50 capping to cover the remaining end grain of walls in the house. Cut them exactly to the required length and nail them with 75 mm jolt head nails.

SKIRTOCIA AND BEADING

(Reference Lockwood detail manual section 13 interior doors and Lockwood Nailing schedule)

All interior floor and ceiling perimeters are to be skirted with the ex 50 x 25 skirtocia. Skirtocias are to be butted to door frames and cappings, and on interior corners to each other as well. Exterior corners (if any) are to be mitred. Use 40 mm galv. jolt head nails. You must shave a small amount of timber off the back of the skirtocia where the seating profiles are positioned, so the skirtocia fits flush to the wall.

All interior timbers should be fully sanded to remove marks prior to applying any blond or varnish procedures





Nailing Schedule for Lockwood Specific Construction

(Refer to Nzs3604 For General Fixings)

	Hand-dri	iven nails	Power-driven nails	
LOCATION	Length x diameter and type	Number	Length x diameter and type	Number
SUBFLOOR				
Boundary joists	100 x 3.75 FH	2, end nailed as NZS3604 table 7.5	90 x 3.15	2, end nailed
Tie rod nog nailing	90 x 3.15 FH	3 pairs through boundary joist plus 2 through joist into tie rod nog end grain	90 x 3.15	As hand driven
Exterior tie rod	30 x 3.15	Fill all holes (24		
Multigrips x 4	product nails	nails per multigrip)		
Internal tie Rod	30 x 3.15	12 per MG		
Multigrips x 4	product nail			
Sill nogs	100 x 3.75 FH	2 skew nailed & 2 thru end grain	90 x 3.15	As hand driven
Tie rod anchors to exterior walls concrete slab (Chemset)	M10 Ramset Chemset anchor studs and spin caps	2 per anchor		
PVC base flashing	40 x 2.8 galv clouts	900 crs		
PVC WeatherClad clip	40 x 2.8 galv clouts	2 Per clip		
Flashing base board to timber foundation	75mm FH galv	600 crs max		
Flashing base board to concrete slab foundation	Conc nails	600 crs		
S (seating) profiles timber floor	40 x 2.8 galv clouts	6 per profile (4 to floor, 2 to wall)		
S (seating) profiles conc floor	Ramset 5mm x 22mm Suredrive	2 to floor		
Full height joinery sill	50 x 3 screws	500 crs		
INTERNAL				
Stiffener post multigrips to timber floor	30 x 3.15 product nail	12 per MG		
Stiffener post multigrips to concrete floor	Ramset 5mm x 22mm Suredrive	4 to floor		
S (seating) profile timber	40 x 2.8 galv clouts	4 per profile		
S (seating) profile conc	Ramset 5mm x 22mm Suredrive	2 to floor		
Z profiles (fixing to timber)	30 x 2.8 galv clouts	2 @ 350 crs		
Skirtocia	40 x 2.8 jolt head	600 crs max		



Cappings	75mm jolt head	450 crs		
Door head	75mm jolt head	300 crs		
Door jamb	Finishing nails	450 crs		
Nailing beams to wall	75 x 3.15 JH	double @ 300		
non- lintel	galv	crs		
EXTERNAL WALLS				
Aluminium corner	50mm SS	Every 2 nd board		
"outer profile"	screws			
	(LW supply)			
PVC corner support	30 x 3.15	Bottom/middle		
	product nail	/top		
Aluminium extended cladding @	30mm exterior	Every 2 nd board		
corner	grade screw			
Aluminium L profile @ external	50mm SS	Every 2 nd board		
internal corner	screws			
	(LW supply)			
Aluminium weatherboard 1st	30 x 3.15 FH	2 per clip @ 450		
board base clips	nail	crs		
Aluminium weather boards	40 x 3.15 FH	450 crs		
	galv			
Pine/Cedar weather board clips	30 x 3.15 FH	450 crs		
	galv			
Boxed corner profiles	50 x 3.2 RH	2 @ 450 crs		
	annular			
Gable scotia	60 x 2.8 JH galv	450 crs max		
Frieze board	60 x 2.8 JH galv	450 crs max		
Lintel screw (for greater than 2m	100 x 12g	1 per opening		
openings)	screw (LW			
	supply)			
Head flashing to wall board	30 mm screw	400 crs		
Head packer to wall board	75mm FH galv	400 crs		
Gable boards to board under	100 x 3.15 FH	60mm from low		
	galv	end of board		
ROOF CEILING				
Sarking	100 x 3.75 FH	2 per board	90 x 3.15	3 per board
	nails			
CPC 40 to sarking	14 g x 25mm	2 per cleat		
	wood screws			
CPC 40 to Dummy rafter	30 x 3.15 FH	4 per cleat		
	galv			
Tie rod tension bracket	12g type 17	4 per cleat for		
	screws LW	roof pitch		
	supply	greater than 15		
Sarking fascia 75 x 50 nogs	65mm exterior	370 crs (every		
	screws	2 nd board)		
Fascia board	75mm FH galv	600 crs max	75 x 3.06	600 crs
Barger board	75mm FH galv	600 crs max	75 x 3.06	600 crs
Top plate to top board	100 x 3.75 galv	300 crs	90 x 3.15	2 @ 300crs
Top plate to top board	M10 x 100 galv	Adjacent to		
	CS	each truss		
BEAMS				
Nailing beams @ change of roof	75 x 3.15 JH	300 crs	75 x 3.06	300 crs
pitch	galv			



Nailing bean supporting verandah roof	75 x 3.15 JH galv	2 @ 300 crs	75 x 3.06	
Fascia packer @ fascia beam	75 x 3.15 JH galv	300 crs		
Fascia board to post @ fascia beam	130 x 10 coach bolts	2 per post		
Tie Rod tension bracket	Fix as detail manual 9-101- 107	4 screws for roof pitch greater than 15		
Aluminium L profile @ external internal corner	50mm SS screws <i>(LW supply)</i>	Every 2 nd board		
Aluminium weatherboard 1 st	30 x 3.15 FH	2 per clip @ 450		
board base clips	nail	Crs		
Aluminium weather boards	40 x 3.15 FH galv	450 crs		
Pine/Cedar weather board clips	30 x 3.15 FH galv	450 crs		
Boxed corner profiles	50 x 3.2 RH annular	2 @ 450 crs		
Gable scotia	60 x 2.8 JH galv	450 crs max		
Frieze board	60 x 2.8 JH galv	450 crs max		
Lintel screw (for greater than 2m openings)	100 x 12g screw (LW supply)	1 per opening		
Head flashing to wall board	30 mm screw	400 crs		
Head packer to wall board	75mm FH galv	400 crs		
Gable boards to board under	100 x 3.15 FH galv	60mm from low end of board		



Lockwood crucial installation checks

Version 3. July. 2018

Contractor	
Client	
Job Number	
Builder	

Builder Contact Details ____

The following are essential Lockwood activities that must be confirmed as having been completed during the build of a Lockwood Home.

Activity performed	Yes	No
First board installation process		
Seating Profiles		
• Fix as Lockwood detail manual (900 maximum centres) unless otherwise		
 Timber floors; 4x 40x 2.8 galv clouts unless otherwise specified 		
 Concrete floor; 2 x Concrete nail / screws and 2 x 40 x 2.8 galv clouts to 		
 Nail to bottom board prior to fixing skirtocia 		
PVC base flashing		
Refer to Lockwood Detail manual		
 Fix to timber substrate or concrete slab with 40 x 2.8 galv clouts or concrete nails @ 600 crs 		
 Trim under full height frames (refer to standard Lockwood detail manual) 		
 At full height frames, apply sealant to top of flashing baseboard and underside of sill 		
Wall boards		
Protect wall boards from damage and weather (refer page 15 of assembly		
Use wooden blocks to protect-top of tongues of Lockwood wall boards- from		
• Keep wall boards off the ground, subject to site conditions, minimum of 45mm,		
increase gap to provide good protection from rough ground conditions		
Tie rods		
 Installing tie rods to <i>Concrete</i> floors; fit tie rod anchor with 2 dyna bolts or chemsets as the Lockwood detail manual or as specified by a structural engineer, 25mm washer and nut. 		
 Timber subfloor structure; tie rod nogs installed in positions indicated on subfloor plan, refer to Lockwood details 1-135-107 / 1-140-107 and nailing 		
 Timber floor; drill 20mm hole through tie rod floor nog in position indicated on the factory drawings, rod should protrude maximum of 50mm, fit washer (40mm x 		
 Roof structure; Determine position at sarking or truss plate, drill 20mm hole through this structure, insert rod through sarking / truss plate, wall panel through to floor, 7 deg +roof designs; fit sarking tensioner, fit 40 x 40 washer, fit spring, fit sleeve, fit 25mm washer, fit nut, wind down and apply tension. 7 deg – roof designs; no tensioner, <i>fit 75 x 50 x 6mm</i> washer, fit spring, fit 25mm washer, fit nut, wind down and apply tension. 		
 Tighten; 2-person operation, hold bottom nut while tightening top nut. Apply tension (no further adjustment) 		



 Sea spray extension; attach to bottom of tie rod, fit washers as timber floor. 	
Sarking fixing to main structural supports	
• Fit noise reducing tape to the top of beams and walls that run parallel to the	
• Sarking secured with 2x 100mm x 3.5 flat galv hand driven or 3x 90mm x 3.15	
• Fix 25 x 0.8mm sarking strap centrally across all sarking lengths greater than	
• Fit sark paper (Thermakraft 101) prior to fitting dummy rafters (seal holes)	
Flashing Baseboards	
 Flashing base board fixed as per Lockwood detail manual and consent plans 	
Mitre corners apply primer and sealant	
Lockwood windows and doors	
 For wide openings, stackers and bifold doors fix 100 x 12g screw to head / lintel 	
All frames have been installed plumb and square as Lockwood detail and	
assembly manuals	
PVC water proofing wedge fitted at all wall board scallops	
Head flashings installed as Lockwood detail and assembly manuals	
Sill liner screw fixed to substrate	
Fit support angle under stacker doors	
Check operation of B of F hung doors during wall installation process	
Adjust rollers to sliding door panels	
Aluminium Profiles	
 PVC water proofing wedge fitted at each wall board scallop 	
Stainless steel screws fitted as Lockwood detail manual (where applicable)	
X or V profiles installed as Lockwood detail manual	
• Outer Profile finishes level with bottom of aluminium, H3 pine and cedar flashing	
base boards or 20mm below floor level for A / B type timber flashing base	
 Exposure kit (for site conditions above very high wind, or unless otherwise 	
 requested) 	
Joinery	
Fit Wind seal behind head flashings	
 Apply sealant between head packer and joinery head 	
Walls	
Apply sealant at boxed corner joins	
Apply sealant at external corners prior to fixing L profiles	
Apply sealant to high soffit of mono sarking / top board roof designs	
Stiffener posts to Exterior walls	
Stiffener Post through timber floor; bolted to substrate as Lockwood detail	
 Stiffener Post connection to timber / concrete floor; Multi grips + halls to hall pattern as Lockwood detail manual 	
 Stiffener Post through sarking; as Lockwood detail manual 	
 X profiles installed full length of Stiffener Post to wall connection unless specified otherwise 	
 Lockwood H5 exterior posts beams minimum surface treatment for onsite fabrication 	
Any cuts rebates for fixings, bolt holes etc., have been liberally coated with	
"Enseal clear" or equivalent preservative	



Lockwood crucial installation checks sign off

Date _____

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