

Stacking cocowood

Correct stacking is essential for cocowood because it influences all the successive stages of the drying process. The stack design must minimise the risk of twist, end distortion, and uneven drying.

The shape and arrangement of the stack controls:

- how well individual boards are restrained
- the quality and quantity of the airflow between the rows of cocowood boards
- how effectively boards dry
- the quality and efficiency of pre-driers and kilns.

Always build a sticker-stack; it is designed to allow air-flow through the stack, removing moisture, and support and restrain boards to avoid twist and end-distortion. It is the basic handling element for storing, transporting and drying cocowood boards.

Always incorporate sample boards in the stack; these will be used to gauge moisture content values that fall outside the range measured by electrical moisture meters. Resistance-type moisture meters are inaccurate above 25% MC. Below 25% MC, resistance-type moisture meters can be used with appropriate correction factors.

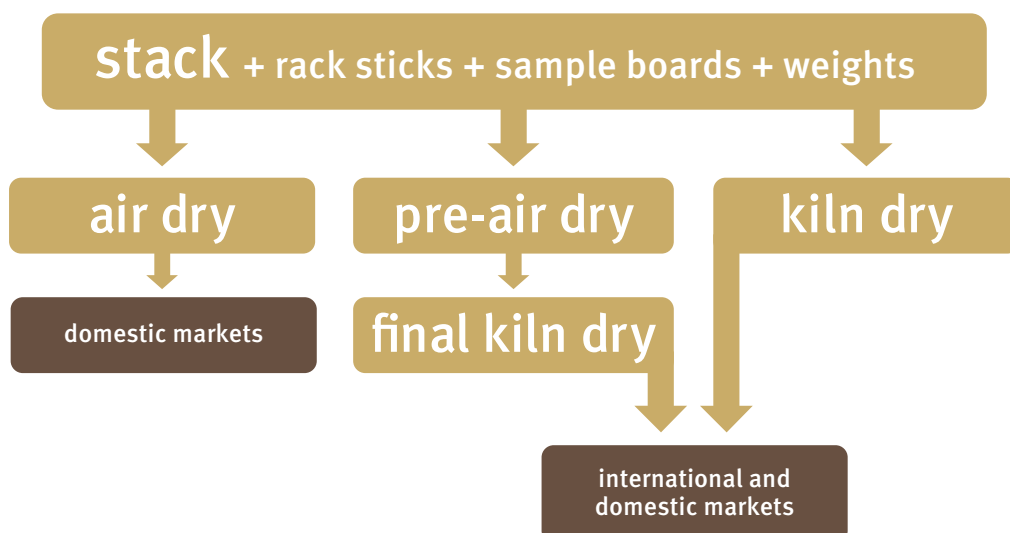
Storing and transporting boards before drying

Always dip and sticker stack for storing short-term and transporting green boards to a processing centre. Add weights to the stack if the delay in transport will be more than 2 weeks.

Correct stacking is essential for successful drying

For international flooring markets, the stack must incorporate rack sticks and sample boards to monitor MC accurately. This also applies to cocowood boards bound for any domestic or local situations that will be airconditioned.

The only exceptions are for local, non-airconditioned markets and where a kiln is unavailable or the oven-dry method is not available for monitoring MC.



Steps

1. **Position** the stack where conditions are suitable or can be moderated.
2. **Build the stack** using dried rack strips (stripping) to space and aerate the boards.
3. **Cut, process and position sample boards** in the stack.
4. **Weight** the stack to minimise distortion during drying.
5. **Protect** the stack or moderate conditions as necessary.

1. Position the stack to moderate conditions affecting the stacks

Natural conditions experienced by the stacks can be moderated by changing their position and orientation in the open, or their position in buildings or shelters. Protect stacks from adverse drying conditions by:

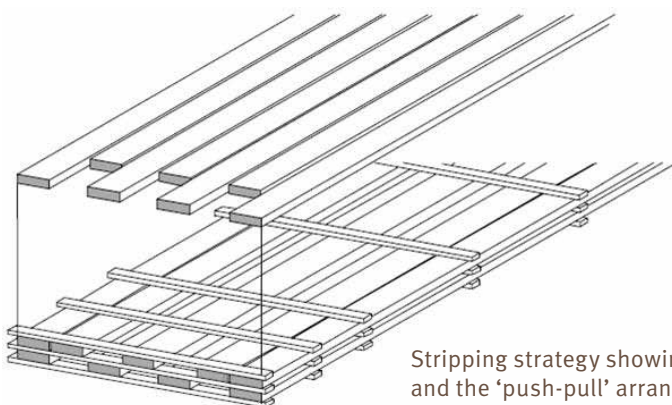
- positioning them in the yard or drying buildings, using the site drying schedule as a guide
- using fabric or other shades and screens on the drying building to reduce air flow
- placing stack ‘tops’ (pallet material or iron sheeting) on the top to minimise weathering in the top layers of stacks that are air-drying outdoors; this is unnecessary if the stack is weighted because the weight serves as a natural stack ‘top’.

2. Build the stack using rack sticks

Build the cocowood stack so that each layer of boards is separated and spaced for drying with rack sticks, a process called stripping.

Quick reference

- Stacks should be 400 mm clear off the ground on bearers.
- Use dried rack sticks 20 mm (thick) x 30 mm (wide) to separate the boards.
- Rack sticks are spaced 450 mm apart between rows of cocowood at right angles to the length of the boards
- Full-length boards are positioned on outside rows, and bottom and top layers.
- Shorter boards should be arranged in the centre of rows and aligned at each end of the rack
- Board ends are supported.
- Boards should not overhang the last, outside rack stick by more than 50 mm.



Stripping strategy showing the rack sticks and the ‘push-pull’ arrangement

Reasons to stack properly

Spacing the boards allows air to flow, removing moisture, and ensures the boards dry evenly to a suitable moisture content with minimal degrade.

Assembling the rack is one of the most important stages of drying cocowood because the stack is the unit handled through all the remaining stages of drying. Any mistake made in the way cocowood is stripped results in problems with that material throughout the remaining stages.

The ideal, finished cocowood stack has boards:

- of similar thickness, density and drying characteristics
- restrained and supported evenly along their full length and at both ends
- spaced at regular intervals from boards in adjacent rows
- assembled with very even sides and ends so that the airflow into the rack from any direction is as regular as possible
- arranged so that the rack is sturdy and its size complements other, fixed equipment.

Position the rack sticks

Rack sticks are strips of seasoned wood placed between rows of cocowood at right angles to the length of the boards. They allow air circulation between the layers. Rack sticks are approximately 20 mm thick and 30-40 mm wide. Narrower sticks tend to create indentations in the boards above and below, and wider sticks can delay drying and cause staining in the contact area.

Spacing rack sticks depends on the thickness and length of the boards.

Maximum spacing for rack sticks (units in mm)

Board thickness	25 mm or more	less than 25 mm
Inner rack spacing	450	350
End spacing	300	250

Arrange the boards

Arrange the boards close together in the row. As each layer of cocowood is placed, keep alternate boards in alternate rows flush with alternate ends. This gives a checkerboard arrangement at the ends of the rack and is called 'push-pull' racking.

Boards should not overhang the last, outside rack stick by more than 50 mm. Overhanging ends dry rapidly and may split. Board ends shouldn't overhang internal rack sticks too much for the same reason.

Arrange short boards to match the regular position of rack end lengths. Their inside ends should either be butted together to share a single stick, or moved apart entirely, so that they are firmly supported on separate sticks.

The full length boards on the base and at the sides provide a consistent airflow path and structural support for the rack. The alternating ends of the boards provide a relatively regular end to the rack.

The full length of the board and the ends need to be restrained evenly so that they dry flat and straight. As the boards dry, they tend to distort, especially the ends. In the stack, boards are restrained by the weight of boards above them, supported by rack sticks. A thicker board is more rigid between points of restraint than thinner boards.

3. Sample boards

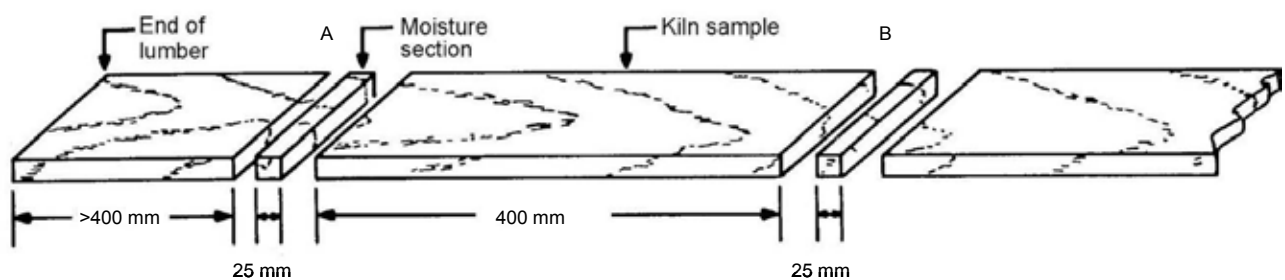
Sample boards are needed to monitor MC changes in the stack, by weighing. Small **moisture or MC sections** are cut from the sample boards to be a reference for the starting MC levels.

- Cut and label sample boards.
- Cut and label small MC sample sections.
- Weigh sample boards using a top-pan balance.
- End-coat sample boards
- Place sample boards in the stack. They will be weighed during the drying process.

Cut and label sample boards. For each stripped stack, at least two sample boards should be used; one each side of the stack. Sample boards should be chosen from high density boards (free of bark) before stripping. Sample boards should be cut as shown and about 400 mm long or shorter so that they can be weighed easily with the available top-pan balance. Label sample boards with a unique number and ending with 'S'.

Cut and label small MC sample sections. At the end of each sample board remove two small MC sample sections as soon as possible. These will be oven-dried to calculate the original moisture content of the boards. Label the moisture content sections with the same sample board number followed by 'A' for one section and 'B' for the other.

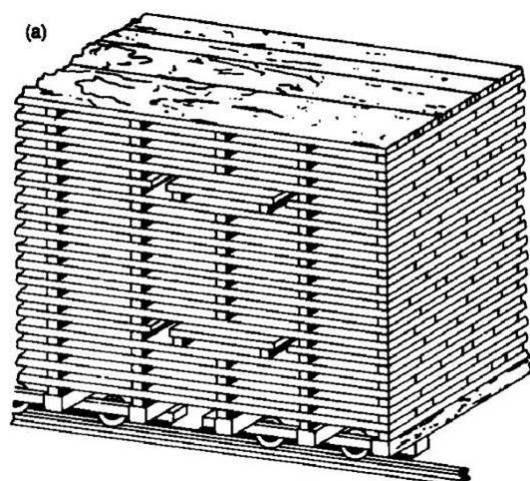
Weigh sample boards. Weigh the sample boards immediately, and then wrap each board fully with 3-4 layers of plastic film and store, ready to place in the stack.



How to cut sample boards.

End-coat sample boards. Because cocowood dries most quickly through the end grain, the end grain in the sample boards must be sealed, so that they represent how a long board would dry more accurately. An impermeable coating such as a wax emulsion product or silicon sealant is recommended.

Place sample boards in the stack. Place the sample boards in 'sample pockets' in the stack.



A cocowood stack showing rack strips and the position of the shorter sample boards.

4. Weight the stack

Cocowood is particularly prone to twist distortion during drying, so placing concrete weights on the top of kiln stacks is recommended. A minimum mass of 1000 kg weight per 1 m² surface area is suggested.

Stacks must be weighted during full air-drying and when there is a two week delay in moving green boards to a processing centre.

5. Protect the stack

Stacks stored in the green or drying mill, or during transport, should be protected to minimise end drying and checking. Store the stacks in a protected location, ideally in an enclosed building.

- Support stacks on evenly-spaced bearers placed immediately under a line of rack sticks.
- Use fabric or other shades and screens on the drying building to reduce air flow.
- Place stack 'tops' (pallet material or iron sheeting) on the top to minimise weathering in the top layers of stacks that are air-drying outdoors.



Cocowood stack showing sample boards



Twisted boards in an un-weighted stack