



Outdoor Structures Australia

Practical solutions that enhance community design projects

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EXTERNAL TIMBER DESIGN NOTE No. 2 October 2001 – Joist Design



Careful attention must to be given to detailing the joist to ensure that after the decking has served its useful life, the substructure is still structurally sound and does not need to be replaced as well.

Decking should be fastened with at least 14# (6mm) screws. As the joist seasons it invariably splits along the top face. Over the years moisture accumulates in the split and the timber eventually decays along the screw line as the image shows. When random length decking is used it must, by

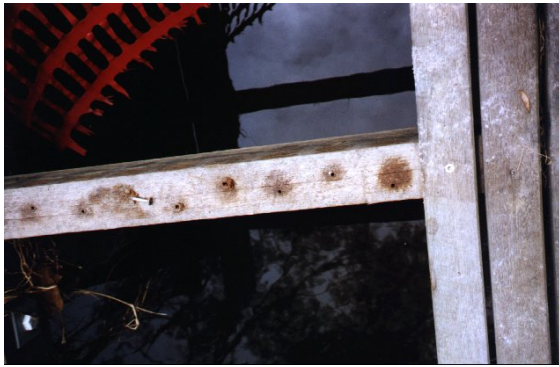
necessity, be joined on a joist. When this happens four screws are then forced into the top of the joist in close proximity causing severe damage to the joist and degrade is even more certain.

To maximise the life of the substructure we recommend:

- The use of a durable species such as OSA's Joistwood. Many Durability 2 hardwoods give a short life, perhaps as little as 10-12 years;
- Pre-oiling the joist with CN Oil;
- Applying a liberal coat CN Emulsion to where the joists touch the headstocks/bearer;
- Installing the screws in a staggered alignment (run to a stringline), about 15mm each side of the centreline;
- That all Joists are a minimum of 75mm wide,
 - As the screw should be four diameters i.e. 24mm from the edge. A 50mm joist does not allow for any staggering of the screws;
- You ensure the builder fully pre-drills to the full depth of the screw,
 - Batten screws were designed to be used under a roof without pre-drilling so the natural reaction will be to use them in external structures in the same way;
- Placing a layer of 110mm malthoid dampcourse on top of the 75mm joists and;
- Designing for the join,
 - use set length decking and,
 - Join on a double joist with the screws at least 75mm from the end.

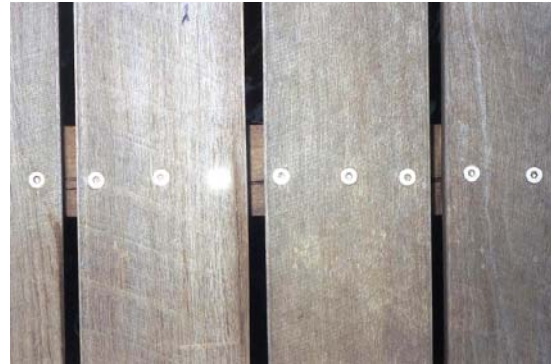
The above instructions have been described as a belt and braces approach, which is true. The cost and inconvenience of replacing more than just the decking is such that it demands that every step be taken to ensure there are no avoidable problems. The images on the second page show the effect on the joist of incorrect and correct screw fastening along with a joining on a double joist.

Our recommendations for detailing the joist for durability can be found on page 5 and 6 of our [Deckwood Selection Guide](#).



The decking was installed on this joist following the instructions in our Boardwalk Construction Guide at the time (prior to the addition of malthoid). After **two years** there is still no splitting of the joist associated with the screw fixings. The use of malthoid dampcourse reinforces the effects of good practice.

This image was taken about **two months** after the completion of the boardwalk which is built on 75mm joists as we recommend. Unfortunately the screws have not been staggered. As well, three screws are used when two were sufficient. The joist is badly split from one end to the other. Decay in the joist will be premature. We find that some do not like the aesthetics of the staggered alignment and in such case the joist should not be timber.



This image shows decking joined on a double joist, The screws are a good distance from the end so there is no splitting of the decking. There is no damage to the joist by having too many fasteners. Note that the boards do not touch that ensures moisture is not held against the end grain by capillary action.

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***PLEASE CONTACT TED IF YOU REQUIRE FURTHER TECHNICAL INFORMATION ON EXTERNAL
TIMBER STRUCTURES OR VISIT OUR WEBSITE - www.outdoorstructures.com.au***