

# **TIMBERS OF FIJI**

Properties and Potential Uses

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## SEASONING

Seasoning refers to the drying of timber down to a moisture content suitable for the conditions and purposes for which it is to be used.

Seasoning is required to avoid splitting and twisting in manufactured items which may arise from the shrinkage of timber as it dries.

Other reasons for seasoning relate to requirements for sound gluing, painting and varnishing, to improved durability (in relation to fungal attack), improved strength properties and to the lower handling and transport costs arising from reduction in weight. In addition, some forms of preservative treatment require the prior drying of the timber.

Air seasoning refers to the drying of timber in the open or under cover, relying simply on natural atmospheric conditions.

Kiln seasoning refers to the drying of timber in a closed chamber where conditions can be artificially controlled by the provision of facilities for heating, air circulation and humidity control.

Whilst air seasoning plays a part locally, in commercial practice significant reliance has to be placed on kiln drying.

### Kiln Seasoning Guidelines

Guidelines for the conventional kiln drying of the main indigenous and exotic timbers are detailed in Table 20. Apart from the schedules for coconut (*Cocos nucifera*) and Fiji pine (*Pinus caribaea*), the information is derived from experimental work undertaken by CSIRO, Australia.

The schedules for coconut and Fiji pine have been established by the Forest Research Institute, New Zealand (16, 17). For the latter species, high temperature drying is also included.

In the general remarks in Table 20, references are made to presteaming, conditioning, reconditioning, steaming and high humidity treatment. These are defined below, the various times given being 'at temperature', not including heating-up times, etc.

*Presteam*ing refers to a steaming treatment of 2-4 hours duration, preferably in a steaming chamber, at 100°C, undertaken before kiln drying. Subsequent rates of drying of some timbers are significantly increased and the treatment also has a beneficial effect on moisture gradients in slower drying material.

*Conditioning* is the final stage in a kiln drying schedule which is designed to reduce moisture variations in individual boards or to bring the moisture content of the charge to a particular level. It involves maintaining the final dry bulb temperature and adjusting kiln humidity such that conditions in the kiln equate with the desired moisture content. Conditioning time tentatively is 24 hours, but is dependent on moisture gradients and on whether the timber had been over-dried or not.

Reconditioning refers to the exposure of timber to saturated steam at 100 °C in a steaming chamber, typically for 4-8 hour periods. Reduction of collapse is the main objective. Collapse is the abnormal flattening or buckling of the wood cells which may occur in some species, e.g. *rosarosa* (*Heritiera ornithocephala*), during the early stages of drying. It is often characterised by excessive or uneven shrinkage, or corrugated surfaces.

All steaming treatments involving a target of 100°C saturated conditions (0°C wet bulb depression) should be done in a separate steaming chamber to reduce kiln deterioration and because kilns are usually not sealed well enough to maintain 0°C wet bulb depression.

Steaming treatments at 100°C differ from reconditioning in their duration, 2-6 hours, and their objective, which is the reduction of twist and warp rather than collapse. Unless checking is unduly aggravated, it is a steaming treatment under weights which would be the normal remedy for twist.

High humidity treatment, undertaken at the conclusion of the drying operation in the kiln, is designed to relieve drying stresses in the timber. Standard procedure calls for a dry bulb temperature 5°C above final dry bulb temperature, with a wet bulb depression of 5°C or lower depending on required moisture content, for periods of 12-48 hours.

The restricted output of many of the timbers and the limited kilning facilities available have not permitted the schedules to be reliably refined through local commercial practice. Additional information available from overseas processing, however, has not suggested any significant amendments in the schedules for the main light and medium density timbers exported.

Nevertheless, the schedules remain guidelines only, to be modified as necessary in the light of further experience. In this connection, some importers of Fijian timbers may prefer milder schedules, particularly in the latter stages of drying, to keep degrade to an absolute minimum in what finally is an expensive commodity.

Table 20

**Kiln Seasoning Guidelines**

mss = mixed sawn stock    qss = quartersawn stock  
 MC Change Pts. = Moisture content change points  
 DBT = Dry bulb temperature    WBD = Wet bulb depression

Species	Dimension (mm)	MC Change Pts(%)	DBT(°C)	WBD(°C)	Remarks
<b>AMUNU</b> <i>(Dacrydium imbricatum)</i>	25 mss	Green 30 to final	60 70	10 20	Kiln drying time is 3 days from green to 12% m.c., or 1 day after preliminary air drying to 20% m.c. A final 2-3 hour steaming treatment under weights is recommended to reduce twist.
	50 mss	Green 30 20 to final	55 60 70	8 10 20	
Preliminary air drying to 25% m.c. reduces the effect of tree differences in drying rates, limiting final kiln drying time to 2-3 days. Kiln drying time from green to 12% m.c. is 14 days. A 4-5 hour steaming treatment after kiln drying may be given.					

Table 20 (contd.)  
Kiln Seasoning Guidelines

Species	Dimension (mm)	MC Change Pgs(%)	DBT(°C)	WBD(°C)	Remarks
<b>BAUVUDI</b> ( <i>Palaequium fejiense</i> ) ( <i>Palaequium vitievuense</i> )	25 mss	Green 40 20 to final	55 60 70	8 10 20	Kiln drying time from green to 12% m.c. is about 5 days. A 24 hour high humidity treatment is recommended at the end of drying.
	50 mss	Green 30 20 to final	55 60 65	8 10 15	Kiln drying time from green to 12% m.c. is about 15 days for quartersawn stock and about 9 days for backsawn material. A 24 hour high humidity treatment is recommended at the end of drying.
<b>BUABUA</b> ( <i>Fagraea gracilipes</i> )	25 mss	Green 25 20 15 to final	Air dry to 25% m.c. 50 50 60	8 8 10	Presteamming and air drying to 25% m.c. are recommended. About 25 days are required for final kiln drying to 12% m.c. or 14 days if presteaming when green is undertaken.
	50 qss	Green 20-25 20 15 to final	Air dry to 20-25% m.c. 55 60 60	5 5 8 10	Quartersawing, presteaming and preliminary air drying are recommended. A conditioning treatment of 24-36 hours after final kiln drying is suggested to reduce moisture content variations.
<b>COCONU</b> ( <i>Cocos nucifera</i> )	25 mss	Green 100 60 to final	60 60 70	5 8 10	A 4 hour final conditioning treatment (77°C DBT, 1°C WBD) is recommended. Estimated kiln drying time is 6-7 days.
	50 mss	Green 30 25 20 to final	Air dry to 30% m.c. 60 65 65	5 5 8 10	Preliminary air drying is recommended. Kiln drying time after initial air drying to 30% m.c. is 5-6 days. An 8 hour final conditioning treatment (71°C DBT, 1°C WBD) is recommended.
<b>DAKUA MAKADRE</b> ( <i>Agathis vilens</i> )	25 mss	Green 40 20 to final	55 60 70	8 10 20	Weighting of stacks prior to drying is recommended to offset twist. Kiln drying time from green to 12% m.c. is 3 days. A high humidity treatment of up to 24 hours should be given at the end of the drying schedule.
	50 mss	Green 30 20 to final	55 60 65	8 10 15	Kiln drying time from green to 12% m.c. is about 7 days. Stock initially air dried to 20% m.c. takes 3 days. A high humidity treatment of up to 24 hours is recommended after drying.
	75 mss 100 mss	Green 40 30 25 20 15 to final	45 45 50 50 50 60	3 4 5 8 10 10	Tentative guideline only—schedules for these dimensions have not been formally developed.

Species	Dimension (mm)	MC Change Pst(%)	DBT(°C)	WBD(°C)	Remarks
<b>AKUA SALUSALU</b> <i>ecussocarpius vitensis</i>	25 mss	Green	55	8	Weighting of stacks during drying is recommended to minimise twist. Kiln drying time is 3 days from green to 12% m.c. A 24 hour high humidity treatment is recommended after drying.
	40	20 to final	60	10	
	20 to final	70	20		
	50 mss	Green	55	8	Kiln drying time from green to 12% m.c. is about 7 days, or 3 days if preliminary air drying to 20% m.c. is undertaken. A 24 hour high humidity treatment is recommended after drying.
	30	20 to final	60	10	
	20 to final	65	15		
<b>DAMANU</b> <i>Calophyllum vitense</i>	25 mss	Green	55	5	Weighting of stacks during drying is recommended. Kiln drying time from green to 12% m.c. is about 6 days. A final reconditioning treatment of about 4 hours should be given.
	40	20 to final	55	8	
	30	20 to final	60	10	
	20 to final	70	20		
	50 mss	Green	50	3	Weighting of stacks during drying and a final high humidity treatment of up to 24 hours are recommended.
	50	20 to final	50	5	
	35	20 to final	52	8	
	20	15 to final	55	10	
	15 to final	60	20		
<b>DEGLUPTA</b> <i>Eucahyptus deglupta</i>	25 mss	Green	45	8	Preliminary air drying to 25% m.c. reduces a tendency to collapse. Kiln drying time from green to 12% m.c. is about 7 days. Partial air drying to 25% m.c. reduces this to 1-1½ days. Collapse is further relieved by a final reconditioning treatment, tentatively 4-6 hours.
	40	20 to final	50	10	
	30	20 to final	60	15	
	20 to final	70	20		
	50 mss	—	—	—	
<b>DOI</b> <i>Alphitonia zizyphoides</i>	25 mss	Green	60	10	Kiln drying time from green to 12% m.c. is about 4-5 days, reduced to 2 days if preliminary air drying to 30% m.c. is undertaken. A short steaming treatment of 2-3 hours under weights is recommended at the end of drying to relieve drying stresses and remove twist.
	30 to final	70	20		
	50 mss	Green	50	8	Kiln drying time from green to 12% m.c. is about 9 days, reduced to 3-4 days if preliminary air drying to 30% m.c. is undertaken.
40	20 to final	55	10		
	30	20 to final	60	15	
	20 to final	70	20		

Table 20 (contd.)

**Kiln Seasoning Guidelines**

Species	Dimension (mm)	MC Change Pst(%)	DBT(°C)	W
<b>FUJI PINE</b> ( <i>Pinus carbaea</i> )	25, 50 mss	Green to final 71		
		(Conventional kiln drying)		
<hr/>				
	50 mss	Green to final 115		
		(High temperature kiln dry)		
<hr/>				
<b>KAUCEUTI</b> ( <i>Bleasdalea vitensis</i> )	25 mss	Green	45	
		40	50	
		30	55	
		25	60	
		20 to final	70	
<hr/>				
	50 mss	Green	Air dry to 25	
		25	55	
		20 to final	60	
<hr/>				
<b>KAUDAMU</b> ( <i>Myristica chartracea</i> ) ( <i>Myristica gillespieana</i> ) ( <i>Myristica castaneifolia</i> )	25 mss	Green	55	
		40	55	
		30	60	
		20 to final	70	
<hr/>				
	50 mss	Green	55	
		40	55	
		30	60	
		20 to final	70	
<hr/>				
	75 mss	Green	45	
		40	45	
		30	50	
		25	50	
		20	50	
		15 to final	60	
	100 mss			

(°C)	WBD(°C)	Remarks
2	5	Kiln drying time from green to 12% m.c. is about 4 days, reduced to 2 days if preliminary air drying to 20% m.c. is undertaken. A high humidity stress relief treatment of up to 24 hours should follow drying.
5	8	
3	10	
-	-	-
5	8	Kiln drying time from green to 12% m.c. is 3-3½ days. A 12 hour high humidity stress relief treatment is recommended after drying.
0	10	
0	20	
5	8	Kiln drying time from green to 12% m.c. is about 8 days for backsawn stock. A 12 hour high humidity stress relief treatment is recommended after drying.
0	10	
0	20	
5	3	Tentative guideline only—schedules for these dimensions have not been formally developed.
5	4	
0	5	
0	8	
0	10	
0	10	Stack weighting is recommended to offset twist. Kiln drying time from green to 12% m.c. is about 8 days. A high humidity treatment, tentatively 24 hours, should follow drying.
15	5	
15	8	
30	10	
70	20	
30	5	Kiln drying time from green to 12% m.c. is about 16-18 days, reduced to about 5-6 days if preliminary air drying to 25% m.c. is undertaken. A 6 hour steaming treatment is recommended after drying.
35	8	
30	10	
70	20	
35	10	
15	3	Kiln drying time from green to 12% m.c. is about 9½ days. A high humidity stress relief treatment, tentatively 24 hours, is recommended after drying.
15	4	
50	5	
55	8	
55	10	
45	3	Preliminary air drying is suggested. A 24 hour high humidity stress relief treatment should follow final kiln drying.
45	4	
50	5	
55	8	
55	10	



Table 20 (contd.)  
**Kiln Seasoning Guidelines**

Species	Dimension (mm)	MC Change Pts(%)	DBT(°C)	WBD(°C)	Remarks
<b>LAUBU (contd.)</b> ( <i>Garcinia myrtilloia</i> )	25 qss	Green	50	5	Kiln drying time from green to 12% m.c. is about 6½ days. A 24 hour high humidity stress relief treatment should follow final kiln drying.
		30	55	8	
		20 to final	60	10	
			60	20	
	50 qss	Green	50	5	Preliminary air drying is suggested. A 24 hour high humidity stress relief treatment should follow final kiln drying.
		30	55	8	
		25	60	10	
		20 to final	60	20	
<b>LEMON SCENTED GUM</b> ( <i>Eucalyptus citriodora</i> )	25 mss	Green	50	5	Local plantation grown material has not been assessed; schedule refers to mature <i>E. citriodora</i> in Australia. Preliminary air drying to 30% m.c. is preferable, final kiln drying to 15% m.c. taking about 6 days.
		30	55	8	
		25	60	10	
		20 to final	70	20	
	50 mss	—	—	—	
<b>MAHOGANY</b> ( <i>Swietenia macrophylla</i> )	25 mss	Green	60	10	About 2½ days are required to kiln dry from green to 12% m.c. A 24 hour high humidity stress relief treatment should follow kiln drying.
		20	70	20	
	50 mss	Green	55	8	About 10 days are required to kiln dry from the green condition to 12% m.c. A high humidity stress relief treatment of at least 24 hours should follow kiln drying.
		30	60	10	
		20	70	20	
<b>MAKO</b> ( <i>Trichospermum richii</i> )	25 mss	Green	60	10	Weighting of stacks offsets slight tendency to cup and twist. 3 days are required to kiln dry from the green to 12% m.c.; reduced to 18 hours if preliminary air drying to 20% m.c. is undertaken. A short 2-3 hours steaming treatment should follow kiln drying.
		60 to final	70	20	
	50 mss	—	—	—	No schedule has been identified, but it is reported to dry easily.
<b>MASIRATU</b> ( <i>Degeneria vitensis</i> )	25 mss	Green	50	10	Preliminary air drying is suggested to offset tendency to collapse on kiln drying. Kiln drying time from green to 12% m.c. is about 6-7 days; reduced to 1½ days if preliminary air drying to 25-30% m.c. is undertaken. If kiln
		30	60	20	
		20 to final	70	20	

Table 20 (contd.)  
**Kiln Seasoning Guidelines**

Species	Dimension (mm)	MC Change Pts(%)	DBT(°C)	WBD(°C)	Remarks
<b>LAUBU (contd.)</b> ( <i>Garcinia myrtifolia</i> )	25 qss	Green	50	5	Kiln drying time from green to 12% m.c. is about 6½ days. A 24 hour humidity stress relief treatment should follow final kiln drying.
		30	55	8	
		25	60	10	
		20 to final	60	20	
50qss		Green	50	5	Preliminary air drying is suggested. 24 hour high humidity stress relief treatment should follow final kiln drying.
		30	55	8	
		25	60	10	
		20 to final	60	20	
<b>LEMON SCENTED GUM</b> ( <i>Eucalyptus citrodora</i> )	25 mss	Green	50	5	Local plantation grown material has not been assessed; schedule refers to mature <i>E. citrodora</i> in Australia. Preliminary air drying to 30% m.c. preferable, final kiln drying to 15% m.c. taking about 6 days.
		30	55	8	
		25	60	10	
		20 to final	70	20	
	50 mss	—	—	—	
<b>MAHOGANY</b> ( <i>Swietenia macrophylla</i> )	25 mss	Green	60	10	About 2½ days are required to kiln dry from green to 12% m.c. A 24 hour high humidity stress relief treatment should follow kiln drying.
		20	70	20	
		Green	55	8	
		30	60	10	
	50 mss	Green	55	8	About 10 days are required to kiln dry from the green condition to 12% m.c. A high humidity stress relief treatment of at least 24 hours should follow drying.
	30	60	10		
		20	70	20	
<b>MAKO</b> ( <i>Trichospermum richii</i> )	25 mss	Green	60	10	Weighting of stacks offsets slight tendency to cup and twist. 3 days required to kiln dry from the green to 12% m.c., reduced to 18 hours if preliminary air drying to 20% m.c. undertaken. A short 2-3 hours steaming treatment should follow drying.
		60 to final	70	20	
	50 mss	—	—	—	No schedule has been identified, but is reported to dry easily.
<b>MASIRATU</b> ( <i>Degeneria vitensis</i> )	25 mss	Green	50	10	Preliminary air drying is suggested. Preliminary air drying is suggested offset tendency to collapse on kiln drying. Kiln drying time from green to 12% m.c. is about 6-7 days, reduced to 1½ days if preliminary air drying to 25-30% m.c. is undertaken. If kiln
		30	60	20	
		20 to final	70	20	

Table 20 (contd.)  
**Kiln Seasoning Guidelines**

Species	Dimension (mm)	MC Change Pst(%)	DBT(°C)	WBD(°C)	Remarks	
<b>MASIRATU</b> (contd.) ( <i>Degeneria vitensis</i> )	50 mss	Green	50	10	Preliminary air drying is suggested to offset tendency to collapse on kiln drying. Kiln drying time from green to 12% m.c. is about 12 days, reduced to 2½ days if preliminary air drying to 25-30% m.c. is undertaken. If kiln dried from the green, a 4-8 hour reconditioning treatment will probably be necessary.	
		30 to final	60	20		
<b>MAVOTA</b> ( <i>Gonystylus punctatus</i> )	25 mss	Green	50	5	Kiln drying time from green to 12% m.c. is about 4½ days. A 6 hour high humidity stress relief treatment should follow drying.	
		40	55	8		
		30 to final	60	10		
		20 to final	70	20		
	50 mss	Green	50	3		Kiln drying time from green to 12% m.c. is about 10½ days. A high humidity stress relief treatment of 12-24 hours should follow drying.
		40	50	5		
	30	55	8			
	20 to final	60	10			
75 mss	Green	45	3	Tentative guideline only—schedules for these dimensions have not been formally developed.		
	40	45	4			
	30	50	5			
	25	50	8			
	20	50	10			
	15 to final	60	10			
<b>MOVI</b> ( <i>Cynometra insularis</i> ) ( <i>Manittoa grandiflora</i> ) ( <i>Manittoa minor</i> )	25 mss	Green	50	5	Kiln drying time from green to 12% m.c. is about 8-9 days. Air drying to 25% m.c. reduces this to about 3 days. When twist is a problem, stacks should be weighted and given a 3 hour final steaming treatment, otherwise a high humidity treatment should follow drying.	
		40	50	8		
		30	55	10		
		25	60	15		
		20 to final	70	20		
		50 mss	—	—		—
<b>OUUMU</b> ( <i>Acacia richii</i> )	25 mss	Green	45	4	Kiln drying time from green to 12% m.c. is about 5 days, reduced to 2 days if preliminary air drying to 25% m.c. is undertaken. If twist arises, stacks should be weighted and given a 3 hour final steaming treatment, otherwise a high humidity treatment, tentatively 24 hours, should be substituted.	
		40	50	5		
		30	55	8		
		25	60	10		
		20 to final	70	20		
		50 mss	—	—		—

Table 20 (contd.)  
**Kiln Seasoning Guidelines**

Species	Dimension (mm)	MC Change Pst(%)	DBT(°C)	WBD(°C)	Remarks
<b>RAINTREE</b> ( <i>Samanea saman</i> )	25 mss	Green	45	10	Stack weighting during drying is suggested. Kiln drying time from green to 12% m.c. is about 10 days for quartersawn material and 5 days for backsawn stock. If preliminary air drying to 25% m.c. is undertaken, times are reduced to 4 days and 2 days respectively.
		40	50	10	
		30	60	20	
		20 to final	70	20	
<b>ROSAROSA</b> ( <i>Heritiera ornithocephala</i> )	50 mss	Green	45	10	Kiln drying time from green to 12% m.c. is about 18 days for quartersawn material and 13 days for backsawn stock.
		40	50	10	
		30	60	20	
		20 to final	70	20	
<b>ROSAROSA</b> ( <i>Heritiera ornithocephala</i> )	25 mss	Green	40	5	Kiln drying time from green to 12% m.c. is about 16 days for quartersawn stock and 13 days for backsawn material. Preliminary air drying to 20% m.c. reduces this to 3-4 days and 2-3 days respectively. A final reconditioning treatment, tentatively 6-8 hours, is required to recover collapse.
		30	50	8	
		25	55	10	
		20 to final	60	20	
50 mss	—	—	—	—	Limited testing has not permitted a schedule to be fully detailed. Kiln drying from green to 12% m.c. requires about 40 days, with a mild schedule starting at 40°C DBT, 3°C WBD. If preliminary air drying to 20% is undertaken, this is reduced to 9 days. A final reconditioning treatment, tentatively 8 hours, is required to recover collapse.
<b>ROSAWA</b> ( <i>Gmelina vitensis</i> )	25 mss	Green	55	8	Kiln drying time from green to 12% m.c. is about 7 days, reduced to 5 days if preliminary air drying to 30% m.c. is undertaken. Presteamming could save 2-3 days initial drying time.
		40	60	10	
		30	70	20	
		20 to final	80	25	
50 qss	—	—	—	—	Limited testing indicated some 15 days are required to dry quartersawn stock from green to 12% m.c. but a specific schedule has not been identified.
<b>SA</b> ( <i>Painari insularum</i> )	25 mss	Green	45	3	Preliminary air drying to 25% m.c. is preferable. If kiln dried from the green to 12% m.c. about 9 days are required. A 24 hour high humidity stress relief treatment should follow drying.
		40	45	4	
		30	50	5	
		25	55	8	
		20 to final	60	10	
50 mss	Green	Green	Air drv. to 25% m.c.	Preliminary air drying to 25% m.c. is	

Species	Dimension (mm)	MC Change Pst(%)	DBT(°C)	WBD(°C)	Remarks		
<i>Ujum bornei</i>	25 mss	Green	40	5	Preliminary air drying is recommended. If kiln dried from the green to 12% m.c. about 16 days are required, reduced to 4 days if preliminary air drying to 20% m.c. is undertaken. Stock should be held for a few weeks after kiln drying to reduce wet cores, prior to reconditioning, tentatively for 8 hours.		
		30	50	8			
		25	55	10			
	20 to final	60	20				
		50mss		Green		45	Preliminary air drying is recommended.
		40	45	3			
	30	50	4				
	25	55	5				
	20 to final	60	8				
	20 to final	60	10				
<i>OSARO thonella vilensis</i>	25 mss	Green	50	3	About 6 days are required to kiln dry from green to 12% m.c., reduced to 3½ days if preliminary air drying to 25% m.c. is undertaken. A 24 hour high humidity treatment should follow kiln drying.		
		30	55	5			
		25	60	8			
	20 to final	60	10				
		50mss		Green		55	Preliminary air drying to 20% m.c. is recommended. Final kiln drying to 12% takes about 8 days.
		20	55	8			
	15 to final	60	10				
	25 mss	Green	60	10		Kiln drying from the green to 12% m.c. requires approximately 6 days, reduced to 2 days if preliminary air seasoning to 30% m.c. is undertaken. These times can be reduced slightly for backsawn stock. A 24 hour high humidity stress relief treatment should follow drying.	
		30 to final	70	20			
		50mss		Green			
20 to final	40	55	5				
	30	60	8				
	20 to final	70	10				
	50mss		Green	55			
	40	60	10				
	20 to final	70	20				
<i>AUIRA oxylum quercifolium</i> <i>oxylum richii</i>	25 mss	Green	55	8	Preliminary air drying to 25% m.c. is suggested. Drying quartersawn stock from 25% to 12% m.c. requires about 2 days. If kiln drying from the green is undertaken, 15-20 days are required depending on prevalence of wet cores.		
		40	60	10			
		20 to final	70	20			
	25 mss	Green	55	8		About 4 days are required to kiln dry from green to 12% m.c. A 24 hour high humidity treatment should follow kiln drying.	
		40	60	10			
		20 to final	70	20			
	50mss	Green	50	5			
		40	55	8			
		30	60	10			
		20 to final	70	20			
50mss		Green	50				
40		55	8				
30	60	10					
20 to final	70	20					
<i>minialia pterocarpa</i>	25 mss	Green	55	8	Kiln drying from green to 12% m.c. requires 10-12 days.		
		40	60	10			
		20 to final	70	20			
	50mss	Green	50	5			
		40	55	8			
		30	60	10			
		20 to final	70	20			
		50mss		Green		50	
		40	55	8			
	30	60	10				
20 to final	70	20					

Table 20 (contd.)

**Kiln Seasoning Guidelines**

Species	Dimension (mm)	MC Change Pts(%)	DBT(°C)	WBD(°C)	Remarks
<b>VAIVAI-NI-VEKAU</b> ( <i>Serianthes melanesica</i> )	25 mss	Green 20 to final	60 70	10 20	Kiln drying from green to 12% m.c. requires about 7 days. A 24 hour high humidity treatment should follow drying.
	50 mss	Green 40 30 20 to final	55 60 65 70	8 10 15 20	
<b>VELAU</b> ( <i>Casuarina nodiflora</i> )	25 mss	Green 25 20 15 to final	40 45 50 55	4 5 8 10	Weighting of stacks is recommended. Kiln drying time from green to 12% m.c. is about 12 days for quartersawn stock and 8-9 days for backsawn material. If preliminary air drying to 20% m.c. is undertaken, about 4 days are required for mixed stock. A final 24 hour high humidity stress relief treatment should be given.
	50 mss	Green 25 20 15 to final	40 45 50 55	4 5 8 10	
<b>VESI</b> ( <i>Intsia bijuga</i> )	25 mss	Green 30 20 to final	55 60 70	8 10 20	Kiln drying from green to 12% m.c. requires 8 days for quartersawn stock and 6 days for backsawn material. Air drying to 25-30% m.c. reduces this to about 4 days. Stacks should be weighted and a short 4 hour steaming treatment given after drying.
	50 mss	Green 30 20 to final	45 55 70	3 5 15	
<b>VUGA</b> ( <i>Metrosideros collina</i> )	25 mss	Green 40 30 20 to final	40 45 50 60	3 5 8 10	Quartersawing is preferable. Kiln drying time from green to 12% m.c. is 10-11 days, reduced to 3 days if preliminary air drying to 25% m.c. is undertaken. A final steaming treatment under weights should be given.
	50 mss	Green 40 30	40 45 50	3 5 8	

Kiln drying time from green to 12% m.c. is about 31 days, reduced to about 10 days if preliminary air drying is undertaken.

## Kiln Seasoning Guidelines

Species	Dimension (mm)	MC Change Pts(%)	DBT(°C)	WBD(°C)	Remarks
<b>VUTU</b> ( <i>Barringtonia edulis</i> )	25 mss	Green	55	5	Kiln drying from green to 12% m.c. requires 4-5 days, reduced to 1½ days after preliminary air drying to 25% m.c. A high humidity stress relief treatment, tentatively 24 hours, should follow drying.
		40 30 20 to final	55 60 70	8 10 20	
<b>WACIWACI</b> ( <i>Sterculia vitensis</i> )	25 mss	Green	60	10	Kiln drying time from green to 12% m.c. is about 8 days, reduced to 3 days if preliminary air drying to 35% m.c. is undertaken. A high humidity stress relief treatment, tentatively 24 hours, should follow drying.
		30 to final	70	20	
<b>YAKA</b> ( <i>Dacrydium nidulum</i> ) ( <i>Dacrydium nausoriensis</i> )	25 mss	Green	50	5	Stacks should be weighted to offset twist. Kiln drying time from green to 12% m.c. is about 5 days, reduced to 1½-2 days if preliminary air drying to 20% m.c. is undertaken. If appreciable twist develops, after drying a short steaming treatment under weights is advised. Otherwise a 24 hour high humidity stress relief treatment should be given.
		40 30 20 to final	55 60 70	8 10 20	
<b>YASIVASI I, II</b> ( <i>Syzygium</i> and <i>Cleistanthus</i> spp.)	50 mss	—	—	—	Testing has been inadequate for a full schedule to be established. Kiln drying from green to 12% m.c. requires about 14 days, starting at 40°C DBT, 3°C WBD.
	25 qss	Green	45	3	
	50 qss	Green	45	3	Preliminary air drying to 25% m.c. is recommended. Final kiln drying to 12% m.c. takes 6-8 days. A final 24 hour high humidity stress relief treatment should be given.
		40 30 25 20 to final	50 55 55 60	5 8 10 20	
	50 qss	Green	45	3	Preliminary air drying to 25% m.c. is recommended. Final kiln drying to 12% m.c. takes about 18 days. A 24 hour high humidity stress relief treatment should be given after drying.
		40 30 25 20 to final	50 55 55 60	5 8 10 20	

### Moisture Meter Correction Factors

In the course of determining appropriate kiln seasoning guidelines, corrected moisture contents for electrical resistance moisture meters calibrated for Douglas fir were established (18, 19). These are detailed in Table 21.

Table 21  
Corrected Moisture Contents for Electrical Resistance  
Moisture Meters Calibrated for Douglas Fir

Meter reading	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
AMUNU	7	8	9	9	10	11	11	12	13	14	14	15	16	16	17	18	18	19	20
BAUVUDI	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	18
BUABUA	5	6	7	8	9	9	10	11	12	12	13	14	15	15	16	17	18	19	21
COCONUT	—	—	—	8	8	9	9	10	11	11	12	12	13	13	14	14	15		
DAKUA MAKADRE	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
DAKUA SALUSALU	8	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
DAMANU	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
DAMANU	6	7	8	8	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
DEGLUPTA	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17	17	18	19	20
DOI	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17	17	18	19	20
*FUJI PINE	5	7	8	10	11	12	14	15	17	18	20	21	22	24	25	—	—	—	—
*KAUCEUTI	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	—	—	—
KAUDAMU	7	7	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21
KAUNICINA	6	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19	20	20	21
KAUVULA	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18
KOKA	6	7	8	8	9	10	11	12	12	13	14	15	16	16	17	18	19	19	19
KUASI	8	9	9	10	11	12	13	14	14	15	16	17	18	19	20	20	21	22	23
LAUBU	7	7	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18	19	20
LEMON SCENTED GUM	6	6	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20
MAHOGANY	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
MAKO	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18
MASIRATU	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19
MAVOTA	7	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18	19	20	20
*MOIVI	7	7	8	9	9	10	10	11	12	12	13	13	14	15	15	16	16	17	18
OUMU	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19	19
*RAINTREE	6	6	7	7	8	8	9	9	10	10	11	11	12	—	—	—	—	—	—
ROGAROSA	8	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	—	—



Rating	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	6	7	8	9	9	10	11	12	13	14	14	15	16	17	18	19	20	20	21
	7	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	17	—	—
ARO	7	7	8	9	9	10	11	11	12	13	13	14	14	15	16	16	17	18	18
IIRA	6	7	7	8	9	10	10	11	12	13	13	14	15	—	—	—	—	—	—
	7	7	8	8	9	10	10	11	12	12	13	14	14	15	15	16	17	—	—
NI-VEIKAU	6	7	7	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18
	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18	19	20	21
	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	21
	7	8	8	9	9	10	10	11	12	12	13	13	14	14	15	16	16	—	—
	5	6	7	7	8	8	9	9	10	11	11	12	12	13	—	—	—	—	—
VACI	6	7	7	8	9	9	10	10	11	12	12	13	14	14	15	15	16	17	—
	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19	19	20	20
SI I	6	6	7	8	9	10	11	11	12	13	14	15	15	16	17	17	18	19	19
II	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	21	22

Values for these timbers are provisional.

### Equilibrium Moisture Content

Equilibrium moisture content is the moisture content at which timber neither gains nor loses moisture under any constant conditions of humidity and temperature. It represents the ideal moisture content to which timber should be dried to minimise shrinkage in subsequently manufactured items, with the proviso that gluing and finishing requirements limit maximum moisture content to 14 per cent or perhaps 16 per cent at the most.

Target values for equilibrium moisture content in indoor non-air-conditioned buildings are:

Wet zone	(Suva, Nausori, Lamiti)	— 17 per cent
Intermediate zone	(Sigatoka, Labasa)	— 15 per cent
Dry zone	(Nadi, Lautoka, Ba)	— 14 per cent

Target values for sheltered outdoor locations are approximately 2 per cent higher