DRYING PARKSIDE HARDWOOD

extract from drying schedules and copied from manual

Common Name	Botanical Name	Thickness mm	Mode of Sawing	Schedule Code	Species Kiln Drying time to 12% From Green Days	From 30% MC Days
Box, brush	Tristania conferta	25 50 50	M Q M	CVrb Curb BUrb	16-18 56	6-8 12
Box, grey	Eucalyptus microcarpa	25 50	B M	Cub BTb		7
Gum, red, forest	Eucalyptus tereticornis	25 50	M M	Curb BTrb	20	9
Gum, rose	Eucalyptus grandis	25 25	Q M	DVb BUb	10	5
Gum, spotted	Eucalyptus maculata	25 25 50	Q M M	DVb BUb BTb	16-18	6
Ironbark, red,	Eucalyptus sideroxylon	25 38	B B	CUb BU		7 10
Ironbark, red narrow-leaved	Eucalyptus creba	25	M	CUb		
Stringybark yellow	Eucalyptus muellerana	25 50	Q Q	Curb BUrb	16	7-8 12
Tallowwood	Eucalyptus microcorys	25	M	CVb	21-28	8-9
Turpentine	Syncarpia glomulifera	25 25 50	Q M M	CVrb BUrb BTrb	16	4

Introduction

Not all kiln drying can be accomplished under one universal schedule, as apart from species, the mode of sawing- quartersawing (Q), mixedsawn (M) or backsawn (B) – and thickness all affect drying rate and drying degrade. A large number of drying schedules, ranging from low temperature/high humidity schedules for refractory species to high temperature/low humidity schedules for easily dried species are required to cover the wide range of kiln drying tasks in the timber industry. These drying schedules have been formulated to give the fastest drying rate possible with minimum degrade. However, it may be necessary on some occasions for the kiln operator to modify the recommended schedule, i.e. to reduce the severity of the drying conditions where degrade is more intense than is normally acceptable or to increase the severity of the drying conditions where the end use is known and degrade is not such an important factor, e.g. the drying of pallet or case stock material.

Explanation of the tables

Table 1 gives kiln drying schedules in a two letter code form, each consisting of a series of moisture content change points together with the particular dry bulb temperature (DBT's) and wet bulb depressions (WBD's) appropriate to each of these change points.

Table 2 gives a basic High Temperature (HT) schedule, i.e. where the DBT exceeds 100øC).

Table 3 gives basic final drying conditions (FDC) suitable for some timbers below 22%, including most Ash group Eucalyts.

Table 4 gives basic reconditioning conditions and times.

Table 5 gives a key to the symbols found in Table 6

Table 6 gives an index of suggested kiln drying schedule codes for a list of species with common and botanical names, for varying thicknesses and modes of sawing. It also gives kiln drying times in days to dry from green to 12% mc and from approximately 30% mc to 12% mc. Drying times are not available for all species or thicknesses. It should be noted that these drying times are only an indication and do not relieve the kiln operator from the responsibility of determining when the timber is dried to the required specification.

Use of the index
To obtain the kiln drying schedule for a species with a certain thickness and mode of sawing, reference should be made to the index (Table 6) which will indicate the applicable two letter code. Reference to Table 1 indicates that the two letters signify a series of dry bulb temperatures and wet bulb depressions to suit the appropriate moisture content change points. Where 38 mm thickness has not been included for a species, the schedule for 50 mm is recommended rather than that for 25 mm. Kiln drying should commence at that stage in the schedule appropriate to the moisture content of the timber.

Table 1. Kiln Drying Schedules

Moisture Content	DRY BULB TEMPERATURES, øC								WET BULB DEPRESSIONS, øC							
Change Points, %	O	A	B	C	D	E	F	G	S	T	U	V	W	X	Y	Z
Green	25	40	45	50	55	60	70	80	1	3	3	4	5	8	10	20
60	25	40	45	50	55	60	70	80	1	3	4	5	8	10	15	20
40	30	45	50	55	60	65	70	80	2	4	5	8	10	15	20	25
35	35	45	50	55	60	65	70	80	3	4	5	8	15	20	20	25
30	40	50	55	60	65	70	80	90	4	5	8	10	20	25	25	25
25	45	50	60	65	65	70	80	90	5	8	10	15	20	25	25	25
20	50	55	70	70	70	80	80	90	6	10	15	20	20	25	25	25
15tofinal	55	60	70	70	70	80	80	90	10	15	20	20	20	25	25	25

Table 2 Basic High Temperature Schedule. Referred to in index as (HT)

Heating Up (green)	100øC plus DBT with minimum WBD
Drying	120øC to 150øC DBT with maximum WBD.
Final Steaming (stress relief treatment)	100øC DBT with minimum WBD (in a steaming chamber)

It is recommended that all stacks be restrained by concrete weights of full stack width and length and between 200 and 400mm thick throughout the kiln drying, steaming and final cooling stages.

Table 3 Basic High Temperature Final Drying Schedule. Referred to in index as (FDC)

Heating Up	100øC plus DBT with minimum WBD
Drying	100øC to 130øC DBT with 5 - 10øC WBD.
Final Steaming	100øC DBT with minimum WBD (in a steaming chamber)

It is recommended that all backsawn material have the stacks restrained by concrete weights of full stack width and length and between 200 and 400mm thick throughout the kiln drying, steaming and final cooling stages.

Table 4 Basic reconditioning conditions. Referred to in index as r

	Reconditioning Conditions	
Heating Up	minimum WBD, 1 to 2 hours,	
Reconditioning	95øC to 100øC DBT with wet or atmospheric steam,	
Times at 100øC DBT	25mm	3 to 4 hours,
	38mm	3.5 to 5 hours,
	50mm	4 to 6 hours.

It is recommended that all backsawn material have the stacks restrained by concrete weights of full stack width and length and between 200 and 400mm thick throughout the kiln drying, steaming and final cooling stages.

Table 5 Key to Index of kiln schedules (Table 6)

Symbol	Meaning
AS	(eg) Use column A in Table 1 for the DBT and column S for the WBD.
(E)	(Exotic) This species is either imported directly into Australia or is an introduced species now growing in plantations, e.g. radiata pine.
r	A reconditioning treatment is recommended; where reconditioning is not indicated, a high humidity treatment (70øC DBT with 5øC WBD) should be given at the end of kiln drying for the relief of drying stresses.
a	Preliminary shelter air drying recommended followed by a predrying treatment.
b	Preliminary air drying to 20% to 25% MC is the normal practice.

Recommended air flow rates for various kiln drying systems are as follows:

High temperature drying from green	5 to 10 m/s*
High temperature final drying	3 m/s
Conventional final drying (<100 øC)	2 m/s
Solar and dehumidifier drying	1 m/s
Predriers and progressive kilns	0.5 m/s
Curing Sheds	< 0.2 m/s

* It is possible to save money by reducing the air flow rate in H.T. drying during the later stages of drying. When drying radiata pine from green there is a large volume of water evaporating and a high air speed is required. As the moisture content of the pine drops then the required air speed also drops. The required air speed below FSP may be as low as 2 m/s.

It must be noted that the required air speed is dependent upon the number and width of stacks in the air path, the moisture content and the permeability of the wood being dried. The larger the volume of wood in the air path then the greater the volume of air required and the faster the air speed required. For wide stacks and high air speeds a large moisture gradient could be expected across the stacks.