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FOREST PRODUCTS UTILIZATION TECHNICAL REPORT

No. 2

KILN SCHEDULES FOR FOREIGN WOODS¹

Kiln schedules given in British Forest Products Research Laboratory Leaflet No. 42, "Kiln-Drying Schedules," revised in 1959, are used extensively for foreign woods. These schedules differ somewhat from those in Chapter 8, Dry Kiln Operator's Manual, Agriculture Handbook 188 (1961). Table 1 lists the British schedule recommendations for 4/4 to 6/4 lumber plus the nearest U.S. Dry Kiln Operator's Manual schedule for these sizes, and a suggested U.S. schedule for 8/4 stock.

According to the leaflet, the British schedules listed represent conditions believed to be suitable for average-quality lumber, but experience may suggest modifications, either in temperature, wet-bulb depression, or both, to suit the particular kiln or end use of the lumber. When drying green lumber by these schedules, the appropriate schedule step can be entered on the basis of the highest moisture content discovered. For partly air-dried stock, however, the British Laboratory advises entering the schedule at a moisture content two steps higher than the highest average figure determined. After 1/2 to 4 days, depending on species and thickness, the basic schedule should be approached by stages. When drying lumber between 1-1/2 and 3 inches thick, relative humidity at each step of the schedule should be 5 percent higher. For stock over 3 inches, relative humidities should be 10 percent higher.

Leaflet No. 42 gives the 12 British kiln schedules in full. It also lists factors calling for variations in the schedules, suggestions for modifications, and details of application. The British suggestions for equalizing and stress relief are given in their "Kiln Operations Handbook." General information about the woods listed, their drying rates, and shrinkage, swelling, and working properties are given in "A Handbook of Hardwoods" and "A Handbook of Softwoods."

These publications are obtainable from the Pendragon House, Inc., 220 University Ave., Palo Alto, Calif. 94301. If you wish to obtain any of them, give full citation of each publication desired and remit the amount shown by money order.

¹Originally issued as FPRS Wood Drying Div. News-Digest, March 1961.

"Kiln-Drying Schedules," British Forest Products Research Laboratory Leaflet No. 42, Revised Jan. 1959. Approx. \$3.00

"A Handbook of Hardwoods," by Gr. Brit. Forest Products Research Laboratory, 1956. \$6.00

"Kiln Operations Handbook," by W.C. Stevens and G.H. Pratt, 1961. \$5.50

"A Handbook of Softwoods," by Gr. Brit. Forest Products Research Laboratory, 1957. \$2.60

In table 1, the species most commonly imported into the United States are listed alphabetically by botanical names. Common names differ in different countries and there is much confusion in this field. The names given in column 2 are generally those most commonly used in the United States or the country of origin. Names used in commerce outside the United States are shown in parentheses. Besides the species listed in the FPU Technical Report, schedules for about 150 other foreign woods are given in British Leaflet No. 42. These woods are not frequently used for lumber in the United States.

Table 1.--British² and suggested U.S. kiln schedules³ for foreign woods

Botanical name	Common name	:British : :schedule:	Suggested U.S. schedules
		: 4/4-6/4 :	4/4-6/4 : 8/4
<u>Acacia melanoxylon</u>	: blackwood, Australian	: E	: T6-D2 : T3-D1
<u>Acer pseudoplatanus</u>	: maple, sycamore	: E	: T6-D2 : T3-D1
	: (for lightest color)	: A	: T2-D4 : T2-D3
<u>A. platanoides</u>	: maple, Norway	: E	: T6-D2 : T3-D1
<u>Aesculus hippocastanum</u>	: horse-chestnut, European	: H	: T10-D4S : T8-D3S
<u>Agathis</u> spp.	: kauri, Queensland	: J	: T10-D5S : T8-D4S
<u>Albizia lebbek</u>	: kokko	: E	: T6-D2 : T3-D1
<u>A. grandibracteata</u>	: nongo,	: F	: T6-D4 : T3-D3
<u>Anacardium excelsum</u>	: espavé; caracoli	: E	: T6-D2 : T3-D1
<u>Anisoptera</u> spp.	: palosapis (krabak, mersawa)	: E	: T6-D2 : T3-D1
<u>Araucaria araucana</u>	: "Chilean pine"	: J	: T10-D5S : T8-D4S
<u>A. augustifolia</u>	: "Parana pine"	: D	: T3-D2 : T3-D1
<u>A. cunninghamii</u>	: hoop pine	: J	: T10-D5S : T8-D4S
<u>Aucoumea klaineana</u>	: okumé (gaboon)	: E	: T6-D2 : T3-D1
<u>Balfourodendron reidelianum</u>	: guatambu; paumarfim	:	: T6-C3 : T5-C2
<u>Brosimum utile</u>	: sande	:	: T5-C3 :
<u>Calophyllum brasiliense</u>	: jacareuba	: A	: T2-D4 : T2-D3
<u>C. brasiliense v. rekoi</u>	: maria; santa maria	: A	: T2-D4 : T2-D3
<u>Calycophyllum candidissimum</u>	: degame; lemonwood	: B	: T2-C2 : T2-C1
<u>Camposperma panamensis</u>	: sajo	:	: T5-C3 :
<u>Carapa guianensis</u>	: crabwood; andiroba	: C	: T3-C2 : T3-C1
<u>Cariniana</u> sp.	: jequitiba, red	: D	: T3-D2 : T3-D1

Table 1.--British² and suggested U.S. kiln schedules³ for foreign woods

Botanical name	Common name	British schedule	Suggested U.S. schedules
		4/4-6/4	4/4-6/4 : 8/4
<u>Castanospermum australe</u>	: black bean	: C	: T3-C2 : T3-C1
<u>Cedrela fissilis</u>	: Spanish cedar	: H	: T10-D4S : T8-D3S
<u>Cedrela toona</u>	: toon	: H	: T10-D4S : T8-D3S
<u>Ceiba pentandra</u>	: ceiba	: J	: T10-D5S : T8-D4S
<u>Centrolobium ochroxylon</u>	: amarillo	: E	: T6-D2 : T3-D1
<u>Chlorophora excelsa</u>	: iroko	: E	: T6-D2 : T3-D1
<u>Chrysophyllum longui</u>	: longui	: E	: T6-D2 : T3-D1
<u>Cordia alliodora</u>	: laurel	: E	: T6-D2 : T3-D1
<u>C. goeldiana</u>	: freiyo	: E	: T6-D2 : T3-D1
<u>Dacrydium cupressinum</u>	: rimu	: K	: T13-C4S : T11-D3S
<u>D. elatum</u>	: sempilor	: K	: T13-C4S : T11-C3S
<u>Dalbergia latifolia</u>	: rosewood, Indian	: E	: T6-D2 : T3-D1
<u>D. melanoxylon</u>	: blackwood, African	: B	: T2-C2 : T2-C1
<u>D. stevensonii</u>	: rosewood, Honduras	: C	: T3-C2 : T3-C1
<u>Dialyanthera</u> spp.	: cuangare, "virola"	:	: T5-C3 :
<u>Diospyros ebenum</u>	: ebony, Ceylon	: C	: T3-C2 : T3-C1
<u>D. spp.</u>	: ebony, African	: E	: T6-D2 : T3-D1
<u>Dipterocarpus</u> spp.	: apitong; keruing; "bagac"	: D	: T3-D2 : T3-D1
<u>Distemonanthus benthamianus</u>	: ayan	: F	: T6-D4 : T3-D3
<u>Endiandra palmerstonii</u>	: orientalwood	: E	: T6-D2 : T3-D1
<u>Entandrophragma angolense</u>	: gedu nohor (mukusu)	: A	: T2-D4 : T2-D3
<u>E. candollei</u>	: omu	: A	: T2-D4 : T2-D3
<u>E. cylindricum</u>	: sapele	: A	: T2-D4 : T2-D3
<u>E. utile</u>	: sipo; utile	: A	: T2-D4 : T2-D3
<u>Eucalyptus diversicolor</u>	: karri	: C	: T3-C2 : T3-C1
<u>E. marginata</u>	: jarrah	: C	: T3-C2 : T3-C1
<u>E. spp.</u>	: eucalyptus	: C	: T3-C2 : T3-C1
<u>Gossypiospermum praecox</u>	: Maracaibo-boxwood	: 6	: T3-A1 :
<u>Gonystylus</u> spp.	: ramín	: C	: T3-C2 : T2-C1
<u>Gossweilerodendron</u>	:	:	:
<u> balsamiferum</u>	: agba	: J	: T10-D5S : T8-D4S
<u>Grevillea robusta</u>	: silk-oak	: C	: T3-C2 : T3-C1
<u>Guaiacum</u> spp.	: lignum vitae	: B	: T2-C2 : T2-C1
<u>Guarea cedrata</u> ,	:	:	:
<u> G. thompsonii</u>	: guarea	: E	: T6-D2 : T3-D1
<u>G. excelsa</u>	: cramantee	: E	: T6-D2 : T3-D1
<u>Hura crepitans</u>	: hura	: E	: T6-D2 : T3-D1
<u>Hymenaea courbaril</u>	: courbaril	: C	: T3-C2 : T3-C1
<u>Juglans regia</u>	: walnut, European	: E	: T6-D2 : T3-D1
<u>Khaya</u> spp.	: mahogany, African	: F	: T6-D4 : T3-D3
<u>Lophira alata</u>	: ekki, azobe	: B	: T2-C2 : T2-C1
<u>Lovoa klaineana</u>	: tiger wood	: E	: T6-D2 : T3-D1

Table 1.--British² and suggested U.S. kiln schedules³ for foreign woods

Botanical	Common name	:British :schedule:	: Suggested : U.S. schedules
		: <u>4/4-6/4</u>	: <u>4/4-6/4</u> : <u>8/4</u>
<u>Mansonia altissima</u>	: mansonia	: H	: T10-D4S : T8-D3S
<u>Microberlinia brazzavillensis</u>	: zebrano	: B	: T2-C2 : T2-C1
<u>Mora excelsa</u>	: mora	: B	: T2-C2 : T2-C1
<u>M. gonggrijpii</u>	: morabukea	: B	: T2-C2 : T2-C1
<u>Nesogordonia papaverifera</u>	: danta	: E	: T6-D2 : T3-D1
<u>Nothofagus dombeyi</u>	: coigüe	: B	: T2-C2 : T2-C1
<u>N. procera</u>	: rauli	: E	: T6-D2 : T3-D1
<u>Ochroma lagopus</u>	: balsa	: H	: T10-D4S : T8-D3S
<u>Ocotea rodiaei</u>	: greenheart	: B	: T2-C2 : T2-C1
<u>O. rubra</u>	: determa	: E	: T6-D2 : T3-D1
<u>O. spp.</u>	: jigua	: H	: T10-D4S : T8-D3S
<u>Parashorea malaanonan</u>	: seraya, white	: J	: T10-D5S : T8-D4S
<u>P. spp.</u>	: bagtikan	: E	: T6-D2 : T3-D1
<u>Paratecoma peroba</u>	: peroba, white	: D	: T3-D2 : T3-D1
<u>Peltogyne spp.</u>	: purpleheart	: E	: T6-D2 : T3-D1
<u>Pentacme spp.</u>	: lauau, white	: E	: T6-D2 : T3-D1
<u>Pericopsis elata</u>	: kokrodua, afrormosia	: J	: T10-D5S : T8-D4S
<u>Phoebe porosa</u>	: imbuya	: E	: T6-D2 : T3-D1
<u>Pinus caribaea</u>	: pine, caribbean	: H	: T10-D4S : T8-D3S
<u>P. nigra</u>	: pine, Austrian	: M	: T14-D6S : T12-D5S
<u>P. occarpa</u>	: pine, ocote	: H	: T10-D4S : T8-D3S
<u>P. sylvestris</u>	: pine, Scots	: M	: T14-D6S : T12-D5S
<u>Podocarpus guatemalensis</u>	: yellowwood, Br. Honduras	: H	: T10-D4S : T8-D3S
<u>P. spp.</u>	: podo	: A	: T2-D4 : T2-D3
<u>Populus alba</u>	: poplar, white	: E	: T6-D2 : T3-D1
<u>P. spp.</u>	: poplar, black	: E	: T6-D2 : T3-D1
<u>Prioria copaifera</u>	: cativo	: C	: T3-C2 : T3-C1
<u>Pterocarpus angolensis</u>	: muniga	: J	: T10-D5S : T8-D4S
<u>P. dalbergioides</u>	: padauk, Andaman	: F	: T6-D4 : T3-D3
<u>P. macrocarpus</u>	: padauk, Burma	: F	: T6-D4 : T3-D3
<u>P. soyauxii</u>	: padauk, African	: J	: T10-D5S : T8-D4S
<u>Pycnanthus angolensis</u>	: ilomba	: C	: T3-C2 : T3-C1
<u>Quercus robur</u>	: oak, European	: C	: T3-C2 : T3-C1
<u>Q. spp.</u>	: oak, Japanese	: C	: T3-C2 : T3-C1
<u>Shorea spp.</u>	: lauau, red	: E	: T6-D2 : T3-D1
<u>S. spp.</u>	: seraya, red	: F	: T6-D4 : T3-D3
<u>Swietenia macrophylla</u>	: mahogany, Central American	: F	: T6-D4 : T3-D3
<u>S. mahagoni</u>	: mahogany, West Indies	: F	: T6-D4 : T3-D3
<u>Symphonia globulifera</u>	: waika chewstick	: C	: T3-C2 : T3-C1

Table 1.--British² and suggested U.S. kiln schedules³ for foreign woods

Botanical name	Common name	British schedule	Suggested U.S. schedules
		4/4-6/4	4/4-6/4 : 8/4
<u>Tabebuia rosea</u>	: mayflower	: E	: T6-D2 : T3-D1
<u>T. spp.</u>	: guayacan; lapacho; ipé	:	: T3-C1 :
<u>Tarrietia utilis</u>	: wishmore (nyankom)	: E	: T6-D2 : T3-D1
<u>Tectona grandis</u>	: teak	: H	: T10-D4S : T8-D3S
<u>Terminalia amazonia</u>	: nargusta; sura	: C	: T3-C2 : T3-C1
<u>T. ivorensis</u>	: idigbo; afara, black	: J	: T10-D5S : T8-D4S
<u>T. superba</u>	: limba; afara	: J	: T10-D5S : T8-D4S
<u>Tieghemella heckelii</u>	: makoré	: H	: T10-D4S : T8-D3S
<u>Triplochiton scleroxylon</u>	: obeche (wawa)	: L	: T14-C6S : T12-C5S
<u>Turraeanthus africanus</u>	: avodiré	: E	: T6-D2 : T3-D1
<u>Virola spp.</u>	: banak	: C	: T3-C2 : T3-C1
<u>Vochysia spp.</u>	: quaruba; yemeri	: A	: T2-D4 : T2-D3

²British Forest Products Research Laboratory Leaflet No. 42 (1959).

³Dry Kiln Operator's Manual No. 188, Chapter 8. Copies available from Superintendent of Documents, Government Printing Office, Washington, D.C. 20402, for \$1.

⁴Where "S" appears as the final character of the U.S. schedule designation, the softwood wet-bulb depression schedule from table 20 of Chapter 8 of the Dry Kiln Operator's Manual should be used.

⁵For 2-1/2- and 3-inch squares, T3-B2.

⁶If thickness is greater than 1-1/2 inches, use schedule B.

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For further information on this subject and other areas of forest products utilization, contact your State Forester who cooperates with the U.S. Forest Service in providing direct assistance to forest landowners, loggers, and wood processing firms.

These technical reports are issued by State and Private Forestry. Suggestions for topics for this report can be forwarded to Forest Products Laboratory, P.O. Box 5130, Madison, WI 53705.