

RTA TieReport #8B

Categorizing Wood Species for Railway Use

The matching of wood species to specific railroad operating and environmental conditions resulted in the development of a set of Tie Usage Indices to identify wood species that can perform in different levels of railway crosstie applications [1]. As part of this activity, the timber species categories (and thus the individual species) were related to level of service, as defined by the Tie Usage Indices. The result is a preliminary Wood Species Usage Guide which relates wood species categories, as defined in Table A, to railway use [2,3] as a function of the two main deterioration categories: environmental decay and mechanical damage.

However, there are over 100 species and subspecies of wood that have potential application as crossties under the full range of railway conditions, from high-density heavy axle load operations in high-decay climatic areas to low-density, light axle load operations in low-decay climatic areas. Using available data on North American wood species [4], these 100+ species were consolidated into the 22 categories as presented in Table B.

This expanded list of tie suitable wood species allows for better use of different wood species and expanded availability of timber sources for use as wood crossties.

Red Oak
White Oak (E)
NMH-H
NMH – I
SMH-H
SMH – I
NMH – II
NMH – II (E)
Douglas Fir – Coastal
Douglas Fir – Intermountain (E)
SMH – II
SMH – II (E)
SYP – Dense
NMH – III
SMH – III
NMH – III (E)
ES – I
WS I
ES II
WS II
SYP – Standard
WS III (E)

Table A:
General Tie Categories

E = Treatment issues or where environment-of-use (locale as it applies to climate) is a consideration

Best

Table B: Index of Wood Species - Expanded Categories

Species not included in the following are considered unsuitable for use as crossties.

RED OAKS

Black Oak
Blackjack Oak
California Black Oak
Northern Pin Oak
Northern Red Oak
Pin Oak
Scarlet Oak
Shingle Oak
Shumard Oak
Southern Red Oak
Willow Oak

WHITE OAKS

Burr Oak
Chestnut Oak
Chinquapin Oak
Live Oak*
Oregon Oak
Overcup Oak
White Oak
Post Oak

SOUTHERN MIXED HARDWOODS

SMH-H

Shagbark
Pignut
Mockernut
Bitternut
Pecan
Nutmeg

SMH - I

Osage Orange
Black Cherry
Black Walnut
Butternut
Black Gum

SMH - II

Coffeetree

SMH - II (E)

Red or Sweet Gum

SMH - III

Persimmon
River Birch
Red Maple
Silver Maple
Boxelder

NORTHERN MIXED HARDWOODS

NMH-H (Best)

Shagbark
Shellbark
Pignut
Mockernut
Bitternut
Pecan

NMH-I

Black Cherry
Black Walnut
Butternut
Black Gum
Black Maple
Sugar Maple
Honey Locust

NMH - II

White Elm
Slippery Elm
White Ash
Sassafras
Persimmon
Sycamore

NMH - II (E)

Red or Sweet Gum
Beech
Black Locust

NMH - III

Hackberry
Basswood
Yellow Birches
Sweet Birch
River Birch
Red Maple
Silver Maple
Cottonwood
Boxelder

NMH - III (E) (Env)

Red Mulberry
Hardy Catalpa
Yellow Poplar

Table B: Index of Wood Species - Expanded Categories (continued)

SOUTHERN YELLOW PINES

Shortleaf Pine
Loblolly Pine
Longleaf Pine
Slash Pine
Virginia Pine
SYP – Dense (as defined by SPIB standards.
Timber and heavy decking, section 400)

EASTERN SOFTWOODS

ES – I

Eastern Spruces
Balsam Fir
Northern White Cedar
Atlantic White Cedar

ES – II

Tamarack
Eastern Hemlock

WESTERN SOFTWOODS

DOUGLAS FIR

Douglas Fir Coastal
Douglas Fir Intermountain (E)

WS – I

Western Larch
White Fir (Hem-fir family)
Grand Fir (Hem-fir family)
Balsam Fir (Hem-fir family)
Redwood*
Western Hemlock

WS – II

Ponderosa Pine
Lodgepole Pine
Port Orford Cedar*
Western Redcedar

WS – III (E)

Western White Pine*
Limber Pine*
Jeffrey Pine*
Engelmann Spruce

*Not commercially available

REFERENCES

1. Railway Tie Association, Tie Report 8A, Tie Usage Index for Matching Wood Performance and Operating Conditions.
2. Zarembski, A.M., Gauntt, J.C., "Development of a Tie Usage Index for Matching Wood Performance and Operating Conditions," American Railway Engineering Maintenance Association Annual Technical Conference, September 2002.
3. Zarembski, A. M., "Development of a Preliminary Tie Usage Index," Report Submitted to the Railway Tie Association, July 2001.
4. Webb, G. V. and Webb, D. A., "Tie Guide: Handbook for Commercial Timbers Used by the Cross-Tie Industry," Railway Tie Association, Fayetteville, GA.