HQ IMCOM centrally funded the initial research on a wooden crosstie replacement program report. This was necessitated by the large number of defective crossties encountered during inspections. It became apparent that installations needed support for creation of a crosstie replacement program as well as updated specification recommendations. The ADTIP/ERDC Railroad Track Evaluation Team inspects Army track every 5 years and communicates findings via reports to HQ IMCOM.

IMCOM sponsors a railroad resources management site available at

https://transportation.erdc.dren.mil/imcomadtip/rr_resources.aspx

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Current Specifications

Army specific standards for wooden crossties and switch crossties, used interchangeability in this document, can be found in UFC 4-860-01FA and UFC 4-860-03. UFGS-34 11 00 provides specifications that can be used when ordering crossties to ensure standards are met. Per AR 420-1, UFC 4-860-01FA and AREMA MRE are to be used for new construction or major rehabilitation and UFC 4-860-03 is to be used for routine maintenance and inspection. Current specifications are out of date and do not include new advances in the treatment industry. The following wood crossties recommendations will ensure that quality crossties in alignment with AR 420-1 are purchased.

Wooden Crosstie Recommendations

Species. Typically, orders are sold in groups, i.e., 60% Red Oak/White Oak 40% Mixed Hardwoods. Recommended species that are in line with UFCs are listed below:

Acceptable Species: Hardwoods: *Red Oak (Preferred), White Oak** (Preferred), Hickory**, Ash (Must comply with USDA Regulations) *-**, Beech*-**, and Gum***. Softwoods: *Southern Pine*-***, Douglas Fir***.

* Local experience reflects satisfactory results

** Recommended to use only if Properly Dual Treated (Borate & Creosote/Copper Naphthenate)

*** Not recommend on track with heavy usage or large wheel loadings. Require high density material.

Quality. Wooden crossties are referred to as grade or industrial grade (IG). Defects include Decay, Holes, Knots, Shakes, Splits, Checks, Slope of Grain, Cross or Spiral Grain, Bark Seams, and Manufacturing Defects. UFC requirements are unclear for quality requirements, as the referred AREMA requirements are either out of date or incorrectly referenced. Preferred recommendations, based on the intent of the UFCs, is to follow AREMA Chapter 30 Part 3 Section 3.1 and 3.2. IG crossties specifications can be found in AREMA Chapter 30 Part 3 Section 3.9. IG crossties are not recommended.

Dimensions. In order to meet UFC requirements, 7 in x 9 in grade crossties are required for turnouts. 7 in x 9 in grade crossties are preferred for use throughout the track system (especially in track with high volume or wheel loads and crossings). However, 6 in x 8 in grade crossties may be used. AREMA Grade 3 (6 in x 8 in), 4 (7 in x 8 in), and 5 (7 in x 9 in) crossties are previous designations from past versions of the AREMA MRE. Some producers still use these designations. When ordering crossties with these designations, be aware, check to ensure proper quality compliance with the latest quality standards described above. Length of crossties are required to be at least 8.5 ft. In turnouts length will vary, Table 6-9 in UFC 4-860-01FA outlines crosstie lengths for different sized turnouts. In crossings 9 ft or 10 ft crossties are recommended.

Treatment. At most Army Installations crossties will fail from decay. Therefore treatment is one of the most important factors affecting the life of a crosstie. The following recommendation is for borate full two step dual treatment (Recommended for all crossties). For creosote treatment only, the borate clauses can be removed. An acceptable alternative to replace creosote is Copper Naphthenate (may not be available in all regions). Crossties will be labeled with Year, Treatment, and Plant. Incision shall be done in accordance with AREMA MRE Chapter 30 Part 3 Section 3.6.

Crossties shall be treated in accordance with the latest edition of AWPA U1 (commodity specification C and use Category UC4) and all other AWPA standards incorporated by reference. Penetration and retention are the two most important treatment factors influencing crosstie performance in track.

- When dual treating crossties, inorganic boron (AWPA P25) shall be used before crossties are air seasoned (Industry Term: Air-dried Full Two-Step).
- Boultonizing and Steam Conditioning should never be used (Open deck bridge timbers can be an exception).
- After appropriate air seasoning, crossties can be treated in accordance with AWPA U1 using Creosote (AWPA P1/P13), Creosote Solutions (AWPA P2), Creosote-Petroleum Solutions (AWPA P3), or Copper Naphthenate (AWPA P36).
    - In Decay Hazard zones High and Severe Creosote AWPA P1/P13 or AWPA P2 are recommended. Diluting with a HARF/HARP compound is not recommended unless new a new AWPA "P" standard is developed.
- Treatment shall be done with an empty cell method.
- Inspections shall be conducted by a qualified independent inspection agency.
    - It is recommend that installations conduct core samples to test creosote penetration on delivery.

Anti-Splitting Device. Nail Plates are recommended to be on all crossties in accordance with AREMA Chapter 30 Part 3 Section 3.1. Nail Plates will at a minimum have a location identifier and year.

Kerf Marks. Kerf marks are recommend. Kerf marks indicate which side of a crosstie is to be installed facing up, i.e., bark should be facing up so rings are installed facing down-if the crosstie heart is not boxed. Width and depth of kerf marks should be no more than ¼ in. x ¼ in. Location and number of Kerf marks should be decided by the installation.

Additional Reference Material. The Railroad Tie Association (RTA) and the American Wood Protection Association (AWPA) https://awpa.com/info/ provide excellent resources. The RTA provides links to each Class 1 railroad crossties specifications (https://www.rta.org/links). If Class 1 railroad specifications are used, the most recent copy of Union Pacific's are recommended. The RTA Tie Guide can be found at https://www.rta.org/tieguide , which has penetration requirements per AWPA U1 in Appendixes.