

SPECIFICATIONS FOR HARDWOOD AND SOFTWOOD BRIDGE TIES TREATED WITH COPPER NAPHTHENATE AND THE SUPPLEMENTAL BTX® BORATE DUAL TREATMENT PROCESS

NOTE: This specification relates to preservative treatment only and should be inserted into existing railroad specifications covering inspection for acceptable wood species, strength properties and defects, framing tolerances, post-treatment handling, etc.

This procurement specification establishes the minimum detailed technical requirements for wood bridge ties, guard timbers and lumber for use by _____ (hereafter referred to as “the Company”).

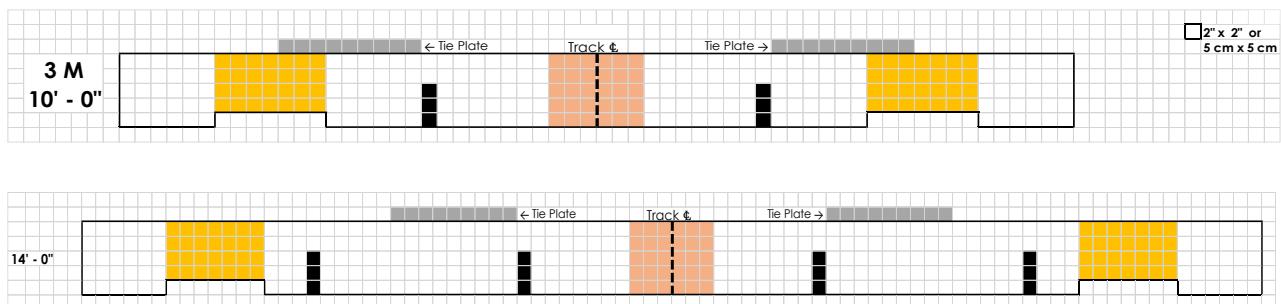
Where current specifications or recommended practices of technical associations such as AREMA and the American Wood Protection Association (AWPA) are appropriate, they are made part of this specification by reference. Guidelines for dual treatment of wood ties treated with disodium octaborate tetrahydrate (DOT), in conjunction with other preservatives, are covered in AREMA Manual for Railway Engineering, Chapter 30 - Ties, Section 3.6.4.5.

Dual-Treatment with DOT Borate and Copper Naphthenate – The specifications and procedures used for dual-treated crossties are considered plant specific, depending on their treatment and seasoning processes in use, and are results oriented. The individual plants will submit their specification to the Company for approval. The specification must cover the processing and dual treatment of ties with disodium octaborate tetrahydrate (DOT) followed by overtreatment with copper naphthenate solution.

A. BTX Treatment – The BTX process is a dual treatment of bridge ties with liquid borate followed by overtreatment with copper naphthenate, resulting in improved

preservative treatment throughout the tie rather than just near the surface. The BTX process involves drilling holes into green unseasoned ties, filling the cavities with a liquid 50% solution of DOT borate, capping the filled holes with a BTX plug, followed by a final Boulton seasoning or steam conditioning at elevated temperature to diffuse the DOT borate throughout the tie, in particular the heartwood.

1. The borate solution shall be an EPA-registered 50% liquid DOT borate preservative with a product label specifying its accepted use in railroad ties. DOT borate concentration in the liquid solution is determined using AWPA Standard A40. Always read, understand and follow label directions.
2. The normal number of holes per tie is two (2) per bridge tie, with a 3rd hole for 16' timbers having a walkway. Four (4) holes may be drilled per tie, with an additional hole for any 16' ties, depending on the target DOT borate retention or tie length.
3. Example diagrams showing recommended positioning of BTX holes (shown as black rectangles) in a 10' bridge tie are shown below, with either 2 holes or 4 holes per tie. All ties shall have 2 holes located inside the tie plates, with any additional holes located between the tie plate and girder. The exact location of the holes may be supplied on the drawings for each individual bridge.



Specific instructions for drilling BTX holes in bridge timbers include:

1. BTX holes are 2" in diameter, drilled manually or by automated drill press.
2. BTX holes will be drilled to half the depth of the bridge timber plus 1/2". Example: For a 10" x 10" timber, the BTX holes are drilled to a depth of 5-1/2".
3. BTX holes should be drilled into the bottom (heart) face of the bridge timbers at the approximate center of the face.
4. BTX holes shall not be drilled beneath the tie plate area or within daps.
5. BTX hole locations and specific face to be drilled will be provided on the drawing with the following general guidelines:
 - a. BTX holes shall not be drilled into the dapped area or under the tie plates. BTX hole locations are generally 2" inside of the tie plate area.
 - b. For 16' timbers with a walkway, an additional hole should be drilled midway between the tie plate and the longer, overhang end.

6. 50% liquid DOT borate solution will be inserted into the BTX holes in such a manner as to apply consistent and exact volumes of solution to achieve target retentions.
7. The volume of 50% liquid DOT borate solution added to each hole should fill no more than 1/2" from the top of the hole. Holes shall not be overfilled, and spillage of DOT borate solution outside the hole should be avoided.
8. BTX plugs will be inserted and pressed flush with the tie surface.
9. Records of DOT borate application volumes or retentions shall be maintained and available for review by the Company representatives.

B. Seasoning – Heating the BTX-treated green ties is required to provide adequate diffusion of the DOT borate throughout the tie heartwood, either by Boulton seasoning or steam conditioning. Consult AREMA Manual Chapter 30, Section 3.6.3 and AWPAs Standard T1 for seasoning guidance and limitations. Time limits for steaming and heating in the preservative may vary between commodities and species.

As a conditioning process used prior to treatment, steam conditioning is limited to southern pine to be treated with copper naphthenate, or for thawing ice-coated or frozen material prior to treatment.

BTX plugs may be used in kiln dried southern pine or Douglas fir, and shall be inserted prior to copper naphthenate treatment. Diffusion of DOT borate in dry wood will be much slower than in unseasoned green wood.

C. Copper Naphthenate Treatment – Wood bridge timbers, guard timbers and lumber will be treated with Copper Naphthenate in accordance with the latest version of the AREMA Manual Chapter 30 – Ties, Sections 3.6.4.3 and 3.7.2.3, which reference the current version of AWPAs Standards U1, T1, P36 and HSA. The following specific requirements will also be followed:

1. Treatment shall be by the empty cell method with a copper naphthenate solution in accordance with AWPAs Standard P36. Copper naphthenate treating solutions shall contain between 0.5% - 1.5% as copper metal, preferably 0.8-1.0% copper, with the exact concentration used that provides adequate retention and penetration in the wood. The minimum solution concentration for treatment to refusal is 0.8% as copper metal.
2. The copper naphthenate concentrate shall be an EPA-registered product and shall be diluted in petroleum-based oils that conform to AWPAs Standard HSA (formerly P9-A). Always read, understand and follow label directions.
3. The preservative solution shall be tested prior to each charge in accordance with AWPAs Standard A9, A21 or A88 for copper concentration, with a copy retained for inspection by the Company representatives.

4. Treatment shall comprise a minimum 130 psi (psig) pressure but not to exceed 150 psi for Douglas-fir and most western softwoods, 200 psi for Southern Pine, and 250 psi for hardwoods. Refer to AWPA Standard T1 Section C: Crossties and Switch ties.
5. Copper naphthenate treatment should be conducted at 140° - 185°F (60° - 85°C). Preservative temperature during the entire pressure period shall not exceed 212°F (100°C).
6. A final vacuum of not less than 22" Hg shall be applied and maintained until the wood is free of dripping preservative when removed from the cylinder.
7. Dual-treated borings may be sprayed with the 2-part curcumin solution of AWPA Standard A78 to visually check for borate penetration from BTX plugs. At least a 3" core will be needed since the DOT borate will be mostly in the center of the tie. These should be the same borings used for the visual determination of copper naphthenate penetration.
8. Penetration in material treated with copper naphthenate can usually be determined visually due to the dark coloration. When depth of penetration is indistinct or questionable, penetration shall be determined using indicators in accordance with AWPA Standard A69 (Chrome Azurol S) or Standard A72 (Rubeanic Acid).
9. The Company minimum retention for copper naphthenate treatment of bridge ties is 0.055 pcf (as copper) for oak and hickory, and 0.06 pcf (as copper) for mixed hardwoods and softwood species per AWPA Standard U1, unless higher retentions are expressly specified.
10. Retention of copper naphthenate (pcf as copper metal) may be determined by gauge or assay. Copper assay shall follow AWPA Standard A9, A21 or A88.
11. Records of assay and gauge copper retentions shall be maintained and available for review by the Company representatives.

D. Care and Handling After Treatment – All post-treatment cuts, daps, drilled holes and injuries such as abrasions, nail and spike holes which may penetrate the treated zone shall be field treated with copper naphthenate containing 2% copper in accordance with AWPA Standard M4.