SPECIFICATIONS FOR TIMBER CROSSTIES

(Latest Revision as of January 2014)

These specifications were arrived at by a joint committee of the Railway Tie Association and the American Railway Engineering and Maintenance-of-Way Association, and are identical to Chapter 30 of the AREMA Manual for Railway Engineering. This publication does not include numerous other requirements of AREMA specifications.

AREMA Manual Chapter 30 is a multi-page work covering many additional practices regarding crossties and switch ties, including adzing, boring, trimming, branding, application of anti-splitting devices, log storage, air seasoning, treatment, and care after preservative treatment. It is available from AREMA Publications Department, 4501 Forbes Blvd., Suite 130, Lanham, MD 20706, for $200 (non-member price is $275) for the individual Chapter 30 or $745 (non-member price is $1245) for the complete Manual. Prices are subject to change without notice.

3.1.1 SPECIFICATIONS FOR TIMBER CROSSTIES

NOTE: It is recommended for West Coast species that West Coast Lumber Inspection Bureau (W.C.L.B.) Grading Rules apply.

3.1.1.1 MATERIAL

3.1.1.1.1 Kinds of Wood*

Before manufacturing ties, producers shall ascertain which of the following kinds of wood suitable for crossties will be accepted:

Ashes	Gums	Oaks
Beech	Hackberries	Pines
Birches	Hemlocks	Poplars
Catalpas	Hickories	Redwoods
Cherries	Larches	Sassafras
Douglas Fir	Locusts	Spruces
Elms	Maples	Sycamores
Firs (true)	Mulberries	Walnuts

*Each railway will specify only the kind of wood it desires to use. Others will not be accepted unless specially ordered.

3.1.1.1.2 Timber Ties of Non-Indigenous Species

a. Non-indigenous tie species must possess similar design characteristics to domestic species with regard to adequate rail bearing area, sufficient bearing surface on the ballast, maximum strength to prevent failure of the tie or the tie fastenings while providing

against undue deflection in the rail. Tie size, along with the inclusion of all other indigenous wood tie specifications, mechanical properties, and quality must apply.

b. Regardless of the materials used and the quality of the construction, track will not remain permanently to gage, surface, and line under the loads imposed upon it in typical revenue service applications. Restorative and maintenance operations will, therefore, always be necessary. Some alternative tie species may provide additional resistance to any change in gage or line as may be caused by wheel loads and may allow for easy adjustment to correct any changes in track geometry that do occur. Density of the alternative species is the primary driver for this and thus evaluation of this property as well as specie workability is necessary.

c. All ties produced from non-indigenous species shall be manufactured in accordance with AREMA Chapter 30, Part 3, Solid Sawn Timber Ties, and shall be free of any defects that may impair their strength or durability for use as crossties, such as: decay, large splits, large shakes, slanting grain, or large or numerous holes or knots.

d. The decay resistance properties of heartwood and sapwood of non-indigenous wood species vary greatly. Both, the heartwood and sapwood, shall be tested in accordance with AWPA standards to determine the degree of natural decay resistance, which, in turn, determines if preservative treatment is necessary.

e. All alternative tie species must be tested to determine classification for resistance to termite infestation and fungal decay. Certain species may exhibit high resistance to decay and insect attack and determination of these properties by AWPA standard methodologies is recommended. “Highly Resistant” indicates the maximum resistance in this classification. If the species meets this classification, then preservative treatment is not necessary. Otherwise, treatment in accordance to AWPA Standards is recommended.

f. All alternative tie species must conform dimensionally in length, width, and thickness in a green and seasoned state, holding to the same standards for indigenous wood ties as outlined in Article 3.1.1.3.1.

g. Insulation – Ties produced from non-indigenous species must be tested to insure that they perform satisfactorily in regard to track circuitry, signaling and communication requirements.

h. Alternative tie species shall be tested to determine the suitability and application requirements of all plate and rail fastening hardware.

3.1.1.2 PHYSICAL REQUIREMENTS

3.1.1.2.1 General Quality

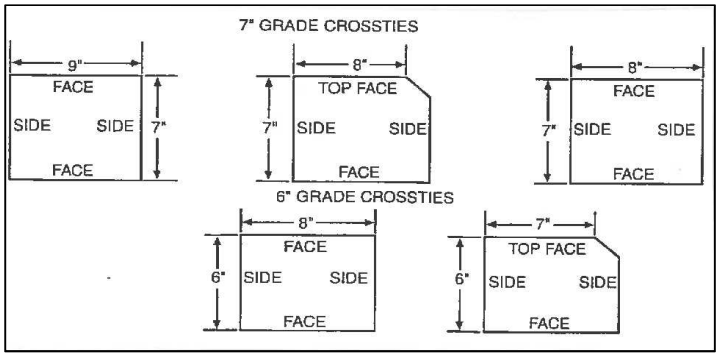
Except as hereinafter provided, all ties shall be free from any defects that may impair their strength or durability as crossties, such as decay, large splits, large shakes, slanting grain, or large or numerous holes or knots.

3.1.1.2.2 Resistance to Wear

When so ordered, ties from needle -leaved trees shall be of compact wood throughout the top fourth of the tie, where any inch of any radius from the pith shall have six or more rings of annual growth.

3.1.1.3 DESIGN

Size Categories for 7" & 6" Crossties 1" of Wane Allowed ---- 20% Square 7" x 8" Allowed



3.1.1.3.1 Dimensions

Ties shall be 8'-0", 8'-6", or 9'-0" long as specified by the customer. Thickness, width, and length specified are minimum dimensions for green ties. Dry or treated ties may be 1/4" thinner or narrower than the specified sizes. Ties exceeding these dimensions by more than 1" shall be rejected. The grade of each tie shall be determined at the point of most wane on the top face of the tie within the rail-bearing areas. The rail-bearing areas are those sections between 20" and 40" from the center of the tie. The top of the tie shall be the narrowest face and/or the horizontal face farthest from the heart or pith center.

All rail-bearing areas shall measure as follows: 7" grade crossties shall be 7"x9" in cross section with a maximum of 1" of wane in the top rail-bearing areas. A maximum of 20% of the ties in any given quantity may be square-sawn 7" x 8" in cross section with no wane in the rail-bearing areas. A 6" grade tie shall be 6" x 8" in cross section with a maximum of 1" of wane permitted in the top rail-bearing areas. For both 6" and 7" grade ties, wane shall be permitted on the bottom face so long as it does not exceed 1" at any given point.

3.1.1.4 INSPECTION

3.1.1.4.1 Place

Ties will be inspected at suitable points as specified in the purchase agreement of the railway.

3.1.1.4.2 Manner

Inspectors will make a reasonably close examination of the top, bottom, sides and ends of each tie. Each tie will be judged independently, without regard to the decisions on others in the same lot. Rafted or boomed ties too muddied for ready examination will be rejected. Ties handled by hoists will be turned over as inspected, at the expense of the producer.

3.1.1.4.3 Decay

Ties must be presented for inspection in an organized manner with all surfaces clean for ready inspection. Inspectors will make a reasonably close examination of the top, bottom, sides and ends of each tie. Each tie will be judged independently, without regard to the decisions on others in the same lot. Decay is the disintegration of the wood substance due to the action of wood destroying fungi. "Blue stain" is not decay and is permissible in any wood.

3.1.1.4.4 Holes

A large hole is one more than 1/2" in diameter and 3" deep within, or more than 1/4 the width of the surface on which it appears and 3" deep outside, the sections of the tie between 20" and 40" from its middle. Numerous holes are any number equaling a large hole in damaging effect. Such holes may be caused in manufacture or otherwise.

3.1.1.4.5 Knots

Within the rail-bearing areas, a large knot is one having an average diameter more than 1/3 the width of the surface on which it appears, but such a knot will be allowed if it is located outside the rail-bearing areas. Numerous knots are any number equaling a large knot in damaging effect.

3.1.1.4.6 Shake

A shake is a separation along the grain, most of which occurs between the rings of annual growth.

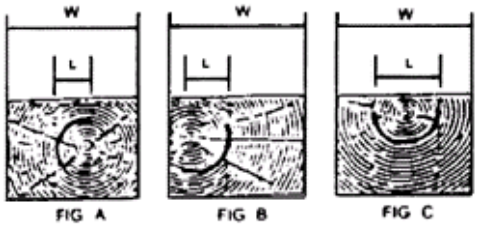


FIG A FIG B FIG C

The procedure illustrated in the above diagrams shall be used in determining the length of a shake. One which is not more than 1/3 the width of the tie will be allowed, provided it does not extend nearer than 1" to any surface.

3.1.1.4.7 Split

A split is a separation of the wood extending from one surface to an opposite or adjacent surface. Do not count the end as a surface when measuring the length of a split. In unseasoned crossties, a split no more than 1/8" wide and/or 4" long is acceptable. In a seasoned crosstie, a split no more than 1/4" wide and/or longer than the width of the face across which it occurs is acceptable. In seasoned crossties, a split exceeding the limit is acceptable, provided split limitations and anti-splitting devices are approved by the buyer and properly applied.

3.1.1.4.8 Checks

A check is a separation of the wood due to seasoning which appears on one surface only. Do not count the end as a surface. Ties with continuous checks whose depth in a fully seasoned and/or treated tie is greater than 1/4 the thickness and longer than 1/2 the length of the tie will be rejected.

3.1.1.4.9 Slope of Grain

Except in woods with interlocking grain, a slant in grain in excess of 1 in 15 will not be permitted.

3.1.1.4.10 Bark Seams

A bark seam or pocket is a patch of bark partially or wholly enclosed in the wood. Bark seams will be allowed provided they are not more than 2" below the surface and/or 10" long.

3.1.1.4.11 Manufacturing Defects

All ties must be straight, square-sawn, cut squarely at the ends, have top and bottom parallel, and have bark entirely removed. Any ties which do not meet the following characteristics of good manufacture will be rejected:

a. A tie will be considered straight when a straight line from a point on one end to a corresponding point on the other end is no more than 1-1/2" from the surface at all points.

b. A tie is not well-sawn when its surfaces are cut into with score marks more than 1/2" deep, or when its surfaces are not even.

c. The top and bottom of a tie will be considered parallel if any difference at the sides or ends does not exceed 1/2 ".

d. For proper seating of nail plates, tie ends must be flat, and will be considered square with a sloped end of up to 1/2", which equals a 1 in 20 cant.

3.1.1.5 DELIVERY

3.1.1.5.1 On Railway Premises

Ties shall be delivered and stacked as specified in the purchase agreement of the railway. If ties are to be inspected, they must be placed so that all ties are accessible to the inspector.

3.1.1.5.2 Risk, Rejection

All ties are at the owner’s risk until accepted. All rejected ties shall be removed within one month after inspection.

3.1.1.6 SHIPMENT

Ties forwarded in cars or vessels shall be separated therein according to the above groups, and also according to the above sizes if inspected before loading, or as may be stipulated in the contract or order for them.

SPECIFICATIONS FOR TIMBER SWITCH TIES

(Latest Revision as of January 2014)

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3.2.1 SPECIFICATIONS FOR TIMBER SWITCH TIES

NOTE: It is recommended for West Coast species that West Coast Lumber Inspection Bureau (W.C.L.B.) Grading Rules apply.

3.2.1.1 MATERIAL

3.2.1.1.1 Kinds of Wood

Before manufacturing ties, producers shall ascertain which of the following kinds of wood suitable for switch ties will be accepted:

Ashes	Firs (true)	Maples
Beech	Gums	Oaks
Birches	Hemlocks	Pines
Cherries	Hickories	Redwood
Douglas fir	Larches	Spruces
Elms	Locusts	Walnuts

Others will not be accepted unless specially ordered.

3.2.1.2 PHYSICAL REQUIREMENTS

3.2.1.2.1 General Quality

Except as hereinafter provided, all ties shall be free from any defects that may impair their strength or durability as switch ties, such as decay, large splits, large shakes, slanting grain, or large or numerous holes or knots.

3.2.1.2.2 Resistance to Wear

When so ordered, ties from needle-leaved trees shall be of compact wood throughout the top fourth of the tie, where any inch of any radius from the pith shall have 6 or more rings of annual growth.

3.2.1.3 DESIGN

3.2.1.3.1 Dimensions

All unseasoned or green switch ties shall measure in cross section a minimum of 7" in side thickness and 9" in face width. A maximum of 1" of wane is allowed on the top or bottom faces within the rail-bearing area, which is defined as the section between 12" from each end of the tie. Seasoned or treated switch ties may be 1/4" under the specified dimensions for thickness and width, or not more than 1" over the specified dimensions. Lengths and length tolerances shall be specified by the customer.

All thickness and face width dimensions apply to the rail-bearing area. All determinations of face width shall be made on the top of the switch tie, which is the narrowest horizontal face. If both horizontal faces are of equal width, the top shall be that face with the narrowest or no heartwood.

3.2.1.4 INSPECTION

3.2.1.4.1 Place

Ties shall be inspected at suitable points as specified in the purchase agreement of the railway.

3.2.1.4.2 Manner

Inspectors will make a reasonably close examination of the top, bottom, sides and ends of each tie. Each tie will be judged independently, without regard for the decisions on others in the same lot. Ties too muddied for ready examination will be rejected. Ties handled by hoists will be turned over as inspected, at the expense of the producer.

3.2.1.4.3 Decay

Decay is the disintegration of the wood substance due to the action of wood destroying fungi.

"Blue stain" is not decay and is permissible in any wood.

3.2.1.4.4 Holes

A large hole is one more than 1/2" in diameter and 3" deep within, or more than 1/4 the width of the surface on which it appears and 3" deep outside, the section of the tie between 12" from each end of the tie. Numerous holes are any number equaling a large hole in damaging effect. Such holes may be caused in manufacture or otherwise.

3.2.1.4.5 Knots

A large knot is one whose average diameter exceeds 1/4 the width of the surface on which it appears; but such a knot may be allowed if it occurs outside the section between 12" from each end of the tie. Numerous knots are any number equaling a large knot in damaging effect.

3.2.1.4.6 Shake

One which is not more than 1/3 the width of the tie will be allowed. The procedure and diagrams shown in 3.1.1.4.6 for crossties shall also apply to switch ties for measuring the length of a shake.

3.2.1.4.7 Split

A split is a separation of the wood extending from one surface to an opposite or adjacent surface. Do not count the end as a surface when measuring the length of a split.

In unseasoned or green switch ties, a split no more than 1/8" wide and/or 5" long is acceptable. In a seasoned or treated switch tie, a split no more than 1/4" wide and/or longer than the width of the face across which it occurs is acceptable. A split exceeding the limit is acceptable, provided split limitations and anti-splitting devices are approved by the buyer and properly applied.

3.2.1.4.8 Checks

A check is a separation of the wood due to seasoning which appears on one surface only. Do not count the end as a surface when measuring the length of a check. Ties with continuous checks whose depth in a fully seasoned and/or treated tie is greater than 1/4 the thickness and longer than 1/2 the length of the tie will be rejected.

3.2.1.4.9 Slope of Grain

Except in woods with interlocking grain, a slope of grain in excess of 1 in 15 will not be permitted.

3.2.1.4.10 Bark Seams

A bark seam or pocket is a patch of bark partially or wholly enclosed in the wood. Bark seams will be allowed provided they are not more than 2" below the surface and/or 10" long.

3.2.1.4.11 Manufacturing Defects

All ties must be straight, square-sawn, cut squarely at the ends, have top and bottom parallel, and have bark entirely removed. Any ties which do not meet the following characteristics of good manufacture will be rejected:

a. A tie will be considered straight when a straight line from a point on one end to a corresponding point on the other end is no more than 2" from the surface at all points.

b. A tie is not well-sawn when its surfaces are cut into with score marks more than 1/2" deep, or when its surfaces are not even.

c. The top and bottom of a tie will be considered parallel if any difference at the sides or ends does not exceed 1/4".

d. For proper seating of nail plates tie ends must be flat, and will be considered square with a sloped end of up to 1/2", which equals a 1 in 20 cant.

3.2.1.5 DELIVERY

3.2.1.5.1 On Railway Premises

Ties shall be delivered and stacked as specified in the purchase agreement of the railway. If ties are to be inspected, they must be placed so that all ties are accessible to the inspector.

3.2.1.5.2 Risk, Rejection

All ties are at the owners risk until accepted. All rejected ties shall be removed within one month after inspection.

3.2.1.6 SHIPMENT

Ties forwarded in cars or vessels shall be separated therein according to the above groups, and also according to the above sets or lengths if inspected before loading, or as may be stipulated in the contract or order for them.

SPECIFICATIONS FOR TIMBER INDUSTRIAL GRADE CROSSTIES

(Latest Revision as of January 2014)

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3.9.1 SPECIFICATIONS FOR TIMBER INDUSTRIAL GRADE CROSSTIES

3.9.1.1 MATERIAL

3.9.1.1.1 Kinds of Wood

Before manufacturing ties, producers shall ascertain which of the following kinds of wood suitable for crossties will be accepted:

Ashes	Gums	Oaks
Beech	Hackberries	Pines
Birches	Hemlocks	Poplars
Catalpas	Hickories	Redwoods
Cherries	Larches	Sassafras
Douglas Fir	Locusts	Spruces
Elms	Maples	Sycamores
Firs (true)	Mulberries	Walnuts

3.9.1.2 GENERAL

All procedures regarding quality, manufacture, inspection, shipment, and delivery will comply fully with those specified for grade crossties in Part 1, General Considerations unless excepted by information contained in this part.

3.9.1.3 CLASSIFICATION AND DESIGN

The following sizes, lengths, minimum faces and tolerances are allowed:

Grade	Dimensions	Minimum Faces Allowed
6" IG	6"x 8"x 8'0"/8'6"	6" face on top or bottom
7" IG	7"x 8"x 8'0"/8'6"	6" face on top or bottom
7" IG	7"x 9" x 8'0"/8'6"	6" face on top or bottom

The above minimum face requirements apply to the rail-bearing areas, which are the areas between 20" and 40" from the middle of the industrial grade crossties. Outside the rail-bearing areas, wane will be limited to half the face width on the top or bottom of the tie. The grade of each tie shall be determined at the point of most wane, on the top or bottom, within the rail- bearing areas. (The top is defined as the horizontal face farthest from the heartwood or pith center).

Dry or treated ties may be 1" narrower or 1/2" thinner than the specified sizes. Thickness and width may not vary more than 1" from end to end. The tie body may be out of square by no more than 1" throughout the length. Tie length may vary from +1" to -3" for the length specified.

3.9.1.4 DEFINITION OF DEFECTS

3.9.1.4.1 Wane

Wane is defined as bark or the lack of wood (see 3.9.1.3 for allowance).

3.9.1.4.2 Decay

Ties with decay greater than 1-1/2 inches in diameter within the rail bearing areas will be rejected. Slight incipient decay will be allowed if the tie as a whole is of good quality. Decay is allowed outside of the rail bearing areas if the decayed area does not exceed 3 inches in diameter. Ties with decay greater than 2 inches in diameter appearing in both ends of the tie will be rejected.

3.9.1.4.3 Holes

Ties having holes on any surface within the rail-bearing areas that are greater than 1-1/2 " in diameter or greater than 3" deep will be rejected. Holes on any surface outside the rail-bearing areas greater than 3" in diameter or deeper than 4" will be rejected. Numerous holes are any number equaling a large hole in damaging effect and will be cause for the tie to be rejected.

3.9.1.4.4 Knots

A knot greater than 3" in diameter within the rail-bearing area will not be permitted.

3.9.1.4.5 Shakes

Shake that is not more than 5 inches in length will be allowed. Shake may appear on one face or both ends as long as it does not run the entire length of the tie. Length measurements shall be made using Figure 30-3-10 as a guide. If end plates are used they must be mechanically applied to insure they are fully seated for maximum performance.

3.9.1.4.6 Splits

A split is a separation of wood extending from one surface to an opposite or adjacent surface – not counting the ends as a surface. A seasoned or treated tie with a split greater than 1/2" wide or 11" long will be rejected with or without a nail plate.

3.9.1.4.7 Checks

A check is a separation of wood due to seasoning which appears on the surface only – not counting the end as a surface. Season checks greater than 2" deep or 3/4" wide shall be rejected as industrial grade ties.

3.9.1.4.8 Cross or Spiral Grain

Except in species with interlocking grain, ties having cross, slant, or spiral grain greater than 2" in 15" of length will be rejected.

3.9.1.4.9 Bark Seams

Bark seams won't be acceptable if more than 2" deep or more than 10" long anywhere in the tie.

3.9.1.4.10 Manufacturing Defects

All ties must be straight and have top and bottom parallel. Any ties which do not meet the following characteristics of good manufacture will be rejected:

a. A tie will be considered straight when a straight line from a point on one end to a corresponding point on the other end is no more than 2" from the surface at all points.

b. The top and bottom of a tie will be considered parallel if any difference at the sides or ends does not exceed 1".

c. A tie is not well-sawn when its surfaces are cut with score marks more than 1" deep.

d. For proper seating of nail plates, tie ends must be flat, and will be considered square with a sloped end of up to 1/2", which equals a 1 in 20 cant. When nail plates are applied, they must be fully seated and flush with the end surface. If corners of nail plates are exposed, they must be pounded flat over the corner of the tie to reduce the danger of injury to personnel handling the ties.

3.9.1.5 DELIVERY

3.9.1.5.1 On Railway Premises

Ties shall be delivered and stacked as specified in the purchase agreement of the railway. If ties are to be inspected, they must be placed so that all ties are accessible to the inspector.

3.9.1.5.2 Risk, Rejection

All ties are at the owners risk until accepted. All rejected ties shall be removed within one month after inspection.

3.9.1.6 SHIPMENT

Ties forwarded in cars or vessels shall be separated therein according to the above groups, and also according to the above sets or lengths if inspected before loading, or as may be stipulated in the contract or order for them.