

MM-T-371E  
July 31, 1975  
SUPERSEDING  
Fed. Spec. MM-T-371d  
November 7, 1967

FEDERAL SPECIFICATION

TIES, RAILROAD, WOOD, (CROSS AND SWITCH)

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers standard and narrow-gage railroad crossties and switchties.

1.2 Classification.

1.2.1 Type, size, and length. The ties shall be of the following types, sizes, and lengths as specified (see 6.2 and 6.3):

Type I - Crossties, narrow gage.  
Type II - Crossties, standard gage.  
Type III - Switchties.  
Size - As specified in Table I.  
Length - As specified in Table I.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issues in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

Federal Specification:

TT-W-571 - Wood Preservation: Treating Practices.

Federal Standard:

FED. STD. No. 123 - Marking for Domestic Shipment (Civil Agencies).

FSC 5510

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(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-L-14362 - Lumber: Unitizing and Loading of.

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.  
MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military Specifications and Standards required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN RAILWAY ENGINEERING ASSOCIATION (AREA)

AREA Manual, Chapter 3, "Ties".

(Application for copies should be addressed to American Railway Engineering Association, 59 East Van Buren Street, Chicago, IL 60605.)

## RAILWAY TIE ASSOCIATION

Specifications for Crossties and Switchties.

(Application for copies should be addressed to the Railway Tie Association, 418 Olive Street, St. Louis, MO 63102.)

## WEST COAST LUMBER INSPECTION BUREAU

Standard Grading Rules for West Coast Lumber.

(Application for copies should be addressed to West Coast Lumber Inspection Bureau, 6980 S.W. Varns Road, Tigard Br. Portland, OR 97223.)

## AMERICAN WOOD PRESERVERS' ASSOCIATION (AWPA)

C6 - Crossties and Switchties - Preservative Treatment by Pressure Processes.

M1 - Standard for the Purchase of Treated Wood Products.

M2 - Standard for Inspection of Treated Timber Products.

(Application for copies should be addressed to the American Wood Preservers' Association, Suite 628, 1625 Eye Street NW, Washington, DC 20006.)

## 3. REQUIREMENTS

3.1 Material. Unless otherwise specified (see 6.2), the ties shall be made from the following species of wood:

Ash	Hemlock, western	Oak
Beech	Hickory	Pine
Birch	Larch, western	Jack
Douglas-fir	Locust	Lodgepole
Gum	Black	Ponderosa
Black	Honey	Red
Red	Maple	Southern
		Walnut

3.2 Dimensions. Ties shall conform to the dimensions specified in Table I. The thickness and width shall be measured in the rail-bearing area of the tie. Determination of width shall be made on the top of the ties; the top of the tie frequently being the narrower of the horizontal surfaces. When both horizontal surfaces are equal, the top shall be the surface either without heartwood or with the narrower heartwood or the furthest from the heart center.

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3.2.1 Tolerances. The fully air-seasoned and treated ties shall have the following tolerances based on the minimum dimensions shown in Table I:

Length:	Plus 1-inch, minus 1-inch
Thickness:	Plus 1-inch, minus 1/4-inch
Width:	Plus 1-inch, minus 1/4-inch

3.3 Spike boring. When specified (see 6.2), crossties shall be bored for spikes. Drawings or diagrams for spike boring shall be furnished by the supplier, along with tolerances allowable.

3.4 Preservative treatment. All ties shall be treated in accordance with TT-W-571.

3.5 Pretreatment preparation. Incising of all hardwood species shall be accomplished before seasoning; softwood species may be incised after seasoning. Any adzing, boring for spikes, branding, grooving, or trimming shall be accomplished after seasoning and before preservative treatment. The application of dowels may be accomplished before or after preservative treatment. (Seasoning refers to fully air-seasoned ties.)

### 3.6 Defects.

3.6.1 Checks. Ties are acceptable with checks on all faces provided the depth of the checks in the fully seasoned and treated tie is less than one-fourth the thickness and the check is shorter than one-half the length of the tie.

3.6.2 Decay. Ties shall contain no decay. Although blue stain is not considered decay and is not a defect, ties shall be inspected with extra care for the presence of decay in heavily stained areas.

3.6.3 Holes. One large hole, not more than 1/2 inch in diameter and 3 inches deep, inside the rail-bearing area; or one large hole, not greater in diameter than one-fourth the width of the surface on which it appears and 3 inches deep, outside the rail-bearing area, shall be allowed. Any number of holes of lesser size caused by manufacturing, or other causes not greater than the aggregate of maximum single hole permitted, in either bearing or nonbearing area, shall be allowed.

3.6.4 Knots. A single knot within the rail-bearing area shall be allowed, provided the knot is not larger in average diameter than one-fourth the width of the surface on which it appears. A single knot outside the rail-bearing area shall be allowed, provided the knot is not larger in average diameter than one-third the width of the surface on which it appears. Any number of knots of lesser size shall total no greater in area than the maximum size single knot specified for either the bearing or nonbearing area.

Table I. Tie Dimensions

Type	Nominal Thickness	Nominal Top Width	Minimum Face	Location of Rail Bearing Area	Nominal Lengths	Size (Grade) (a)	Use Classification	
	(Inches)	(Inches)	(Inches)		(Feet)			
I	5	5		Throughout the two portions between 15 and 25 inches from the middle of the tie.	5, 5-1/2, 6			
I	6	6			5, 5-1/2, 6, 6-1/2, 7			
II	6	8	5-1/2	Throughout the two portions between 20 and 40 inches from the middle of the tie.		1 (b)	Siding (e)	
II	6	8	6-1/2			2 (b)	Siding (e)	
II	6	8	7			3 (c,d)	Branch Line(e)	
II	7	7	6			3A(c,d)	Branch Line(e)	
II	7	8	7			4 (c,d)	Main Line (e)	
II	7	9	8			5 (c,d)	Main Line (e)	
III	6	8	7	Throughout the entire length between points 12 inches from each end of the tie.	As specified (see 6.2)			
III	7	8	7					
III	7	9	8					

All minimum thicknesses, widths, and face dimensions shown above apply to the rail bearing areas. The grade of each tie shall be determined on the narrow face at the narrowest point, or the point of most wane on the top or bottom within the rail bearing areas. Wane outside the rail bearing area may exceed minimum face requirements.

- (a) Conforms to Railway Tie Association Specifications for Crossties and Switchties and American Railway Engineering Association specifications (with modifications).
- (b) Meets or exceeds requirements of the West Coast Lumber Inspection Bureau for No. 2 ties.
- (c) Meets or exceeds requirements of the West Coast Lumber Inspection Bureau for No. 1 ties, except 1/4-inch under size and 1-inch oversize width and thickness is allowed after seasoning and preservative treatment.
- (d) Meets or exceeds requirements of the West Coast Lumber Inspection Bureau for Select ties, except 1/4-inch under size and 1-inch oversize width and thickness is allowed after seasoning and preservative treatment and a medium grain of 4 annual rings per inch is allowed (see 3.6.5).
- (e) Use classification is not mandatory, but is included for information, and as an aid in tie selection.

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3.6.5 Medium grain. Ties from needle-leaved trees shall be medium grain; for example, the number of annual rings measured on any radius from the pith over the top one-fourth of the tie shall average not less than 4 annual rings per inch, except that ties averaging less than 4 annual rings per inch shall be accepted if averaging one-third summerwood.

3.6.6 Shakes. Shakes shall be limited to one, which shall be not longer than one-third the tie width when measured at the tie end between lines parallel to the two faces that give the least dimension, provided the shake does not extend nearer than 1 inch to any surface (see Figure 1).

3.6.7 Splits. A split is a separation of the wood extending from one surface to an opposite or adjacent surface. Prior to treatment, a seasoned tie which develops a single split not exceeding 10 inches in length with a maximum width of 1/2 inch will be acceptable if doweled as specified in 3.6.7.1. A single split developed during the preservative treatment not exceeding the above limits will also be acceptable if doweled as specified in 3.6.7.1. However, a split tie which has been doweled but which re-opens in excess of 1/2 is not acceptable. A single split less than 1/2 inch in width and 10 inches in length will not require dowels. Also, after treatment, a split in each end of the tie, not to exceed 1/8 inch in width and 4 inches in length, is acceptable without doweling (maximum total, two splits, one each end).

3.6.7.1 Doweling of split ties. Two dowels (see Figure 2), shall be inserted in each end of a split tie in prebored holes 1/8 inch less in diameter than the diameter of the dowels and perpendicular to the split. (Splits may be parallel or perpendicular to the top surface.) There shall be not less than 3 inches nor more than 5 inches from the end of the tie to midpoint of the dowel nor less than 2 inches or more than 2-1/2 inches from the top or bottom or side. Dowels shall be inserted by a device capable of holding the tie in a rigid position, under pressure, while the holes are drilled and dowels inserted.

3.6.7.1.1 Dowel requirements. Dowels shall be made of materials conforming to the requirements listed in the American Railway Engineering Association (AREA) Manual for Railway Engineering, Chapter 3, "Ties".

3.6.8 Slope of grain. The slope of grain, except in ties having interlocking grain, shall be not greater than 1 in 15 inches when measured in the entire tie length. Local variations shall not be considered when measuring grain slope.

3.6.9 Wane. Wane shall be permitted providing it does not reduce the face width of the rail-bearing area more than that shown in Table I (minimum face).

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3.7 Workmanship. Ties shall be straight, well hewed or sawed, and cut square at the ends, shall have bottom and top parallel, and bark entirely removed. Applicable portion of AWWA Standard M1 shall apply.

3.7.1 Straightness. A tie shall be considered straight when: (a) A straight line along the top from the middle of one end to the middle of the other end is entirely within the tie; and (b) a straight line along a side from the middle of one end to the middle of the other end is everywhere more than 2 inches from the top or bottom of the tie at all points along the length.

3.7.2 Parallel top and bottom. The top and bottom of a cross- or switchtie shall be considered parallel provided any differences in the thickness at the sides or ends is less than 1/2 inch.

3.7.3 Hewed or sawed. A tie shall be considered well hewed or sawed when its surfaces are not scored more than 1/2 inch deep or when its surfaces are even.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Classification of inspections. Inspections shall be classified as follows:

- (a) Quality conformance inspection (see 4.3).
- (b) Inspection of preparation for delivery (see 4.5).

#### 4.3 Quality conformance inspection.

4.3.1 Sampling. Sampling for examination and testing shall be in accordance with MIL-STD-105.

4.3.1 Examination. Samples selected in accordance with 4.3.1 shall be examined in accordance with 4.4.1. AQL shall be 4.0 percent defective.

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4.3.3 Tests. Samples selected in accordance with 4.3.1 shall be tested as specified in 4.4.2. AWL shall be 2.5 percent defective.

4.4 Inspection procedure.

4.4.1 Examination. The ties shall be examined prior to preservative treatment for the following defects:

101. Species not as specified.
102. Dimensions not as specified.
103. Boring not as specified.
104. Dowels missing from ties containing acceptable splits.
105. Pretreatment preparation not as specified.
106. Checks, decay, holes, knots, shakes, splits, or wane in excess of amounts specified.
107. Medium grain not as specified (needle-leaved species only).
108. Slope of grain greater than specified.
109. Workmanship not as specified.
110. Straightness not as specified.
111. Tie is scored more than 1/2 inch deep.
112. To and bottom of tie exceed limits for parallelism.

4.4.2 Tests. Ties shall be tested as specified in AWWA Standard M2. A retention lower than the minimum in AWWA Standard C6, for the applicable species shall constitute failure of the test.

4.5 Inspection of preparation for delivery. The unitizing and marking of ties for shipment shall be examined to comply with the applicable requirements of MIL-L-14362.

5. PREPARATION FOR DELIVERY

5.1 Packing. Unless otherwise specified (see 6.2), ties shall be unitized for shipment in accordance with MIL-L-14362, Level C, Method 1 or 3, as specified (see 6.2).

5.2 Marking.

5.2.1 Civil agencies. Marking of individual ties will not be required. Shipments shall be accompanied by a shipment document with a piece tally entered on the document. Strapped units shall be marked in accordance with FED. STD. No. 123.

5.2.2 Military agencies. In addition to any special marking required, units shall be marked in accordance with MIL-STD-129.



## 6. NOTES

6.1 Intended use. Crossties and switchties are intended for use in the construction of railroad trackage.

6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type, size, and length of ties required (see 1.2.1).
- (c) Species of wood required if other than as specified (see 3.1).
- (d) When boring of ties for spikes is required (see 3.3).
- (e) Level of pack required, when other than as specified (see 5.1).
- (f) Method of pack required (5.1).

6.3 The user should understand that in buying crossties it is the practice of the industry to furnish ties on the following basis:

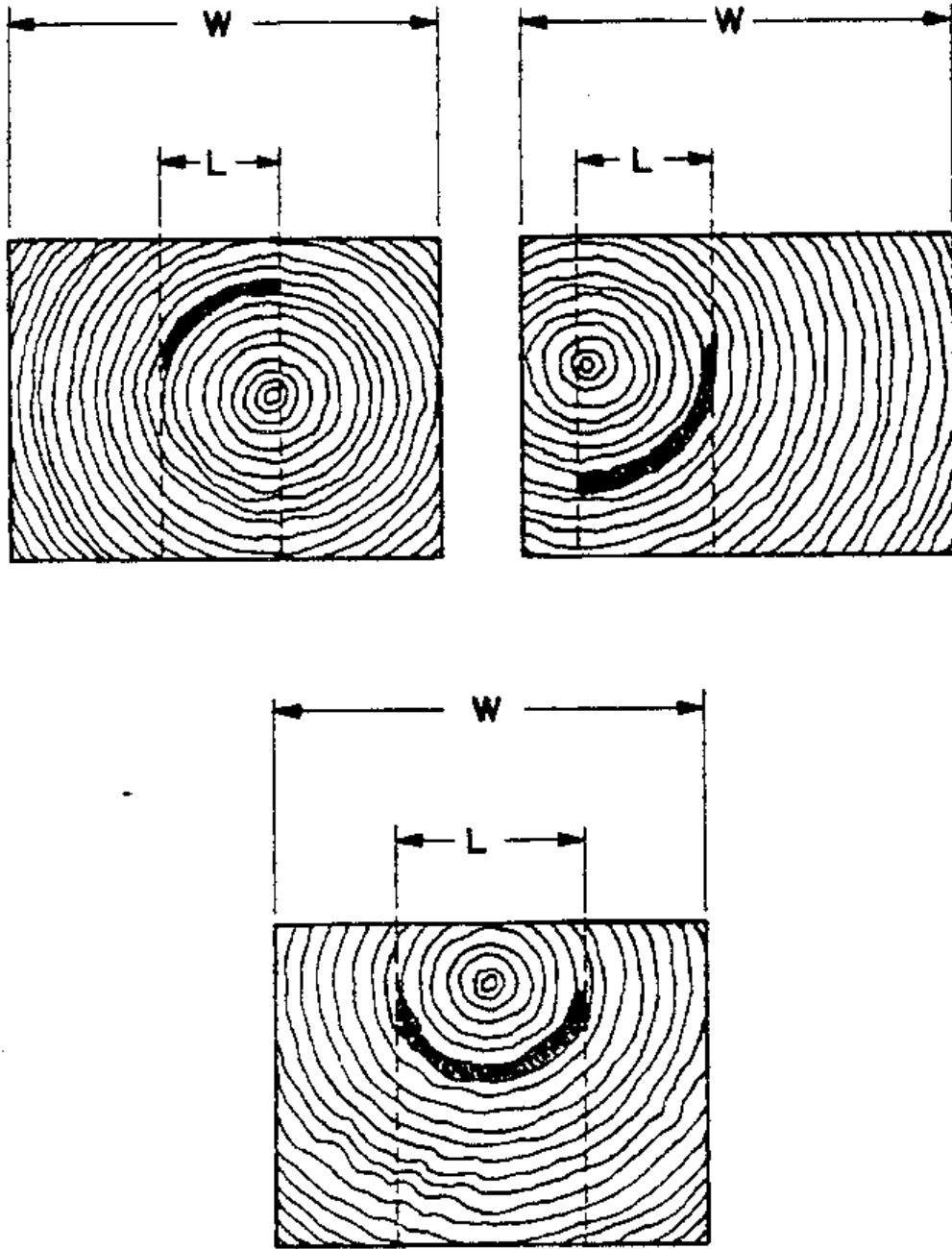
Main line ties: 65 percent Size (grade) 5 and 35 percent Size (grade) 4.

Branch line ties: Size (grade) 3 and 3A mixed. (This group contains the poorest of the 7-inch thickness and the best of the 6-inch thickness.)

Side track ties: 70 percent Size (grade) 3, 20 percent Size (grade) 2, and 10 percent Size (grade) 1.

This is the manner in which all rail lines purchase their ties, the sizes are mixed, to a limited degree, but the prices paid are for the exact percentage of ties furnished in each specific size. When a single specific size is demanded, the price will be increased by the additional work required for sorting and rehandling. This practice is based on the nature of tie production. Ties are cut to be 6 inches or 7 inches in depth (cut to utilize the maximum amount of wood available). The width is then dependent on the wane or lack thereof for all 8-inch widths (the 9-inch width is specified when the full minimum 8-inch face is required).

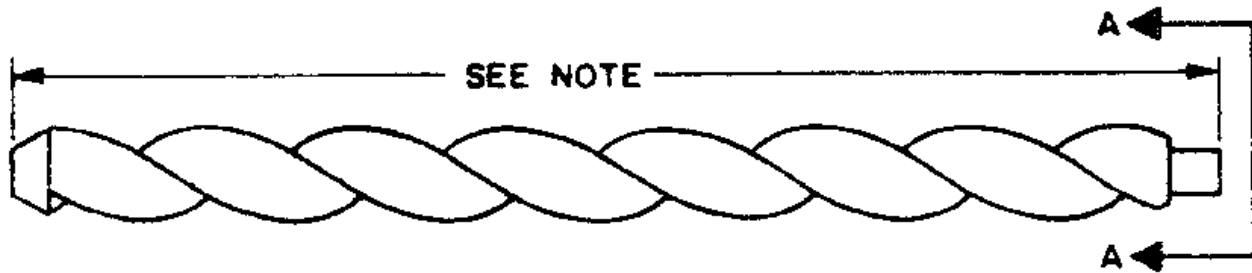
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W = NOMINAL WIDTH OF TIE  
L = LENGTH OF SHAKE

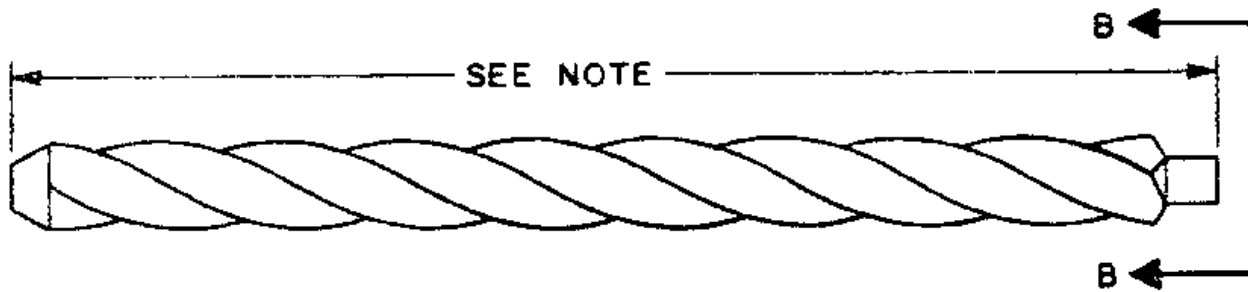
FIGURE 1 TYPICAL SHAKE

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ENLARGED VIEW A-A

3 FLUTE DOWEL



ENLARGED VIEW B-B

4 FLUTE DOWEL

**NOTE:**

LENGTH TO BE DETERMINED BY SIZE OF TIE  
TO BE DOWELED.

**FIGURE 2. TYPICAL 3 AND 4 FLUTE DOWELS**

**X-2847**

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MILITARY INTERESTS:

Civil Agency Coordinating Activities:

Custodian:

GSA - FSS

USDA - AFS

Army - ME

Preparing activity:

Review activity:

Army - ME

Army - CE

DOD Project No. 5510-0124

User activity:

Navy - YD

Defense Supply Agency Interest:

DSA - CS

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