Designation: A 65 – 07

Standard Specification for Steel Track Spikes[1]

This standard is issued under the fixed designation A 65; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope*

1.1 This specification covers steel track spikes used as fastenings between railroad rails, tie plates, and ties.

1.2 Three grades of spikes are described, Grades 1, a lower carbon steel; Grade 2, a higher carbon steel; and Grade 3, a carbon structural steel, conforming to Specification A 36

1.3 Supplementary Requirement (S1) are provided for use and shall only apply when specified in the purchase order.

1.4 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 6/A 6M Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

A 29/A 29M Specification for Steel Bars, Carbon and Alloy, Hot-Wrought, General Requirements for

A 370 Test Methods and Definitions for Mechanical Testing of Steel Products

A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Shipment

2.2 *American Railway Engineering and Maintenance of Way Association Manual for Railway Engineering*[3]

Design of Cut Track Spike (1963), Chapter 5, Part 2

3. Ordering Information

3.1 Orders for spikes under this specification shall include the following information as appropriate:

3.1.1 *Quantity* (weight),

3.1.2 *Grade* in accordance with 1.2 and Table 1, Table 2, Table 3, Table 4, Table 5, and Table 6,

3.1.3 *Design*—AREMA design (see 2.2), or other, including drawings if required,

3.1.4 *Dimensions*—cross section and length,

3.1.5 *Supplementary Requirement* if to apply (see S 1) and Table 1, and

3.1.6 *Certification and Test Report Requirements* (see 12.1).

4. Manufacture

4.1 The steel shall be made by any of the following processes: electric-furnace or basic-oxygen.

4.2 The steel may be cast by a continuous process, or in ingots.

5. *Chemical or Alternative Tension Test Requirements* Chemical or Alternative Tension Test Requirements

5.1 The manufacturer has the option to furnish spikes from steel conforming to the heat or cast analysis described in 5.2, the alternative analysis described in 5.3, or the alternative tension test described in 5.4.

5.2 *Heat or Cast Analysis*—An analysis of each heat or cast shall be made by the manufacturer of the steel to determine the percentage of the elements specified in Table 1. The analysis shall be made from a test sample taken preferably during the pouring of the heat or cast. The chemical composition thus determined shall conform to the requirements of Table 1. All elements listed in Table 1 shall be reported in the test analysis to the purchaser when requested.

5.3 *Alternative Analysis*—When the heat or cast analysis of the steel cannot be furnished and the spike manufacturer elects to offer the material on the basis of chemical composition, an analysis of three finished spikes selected at random from each 10-ton (9-Mg) lot shall be made by the manufacturer and the separate chemical compositions shall conform to the requirements of Table 1. The product analysis for specified elements shall conform to the permitted variations in Table B of Specification A 6/A 6M

5.4 *Alternative Tension Test*—The manufacturer of the spikes may, at his option, elect to substitute a tension test for the chemical analysis specified in 5.2 or 5.3. The tension test

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.01 on Steel Rails and Accessories.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American Railway Engineering and Maintenance of Way Assn (AREM), 8201 Corporate Drive, Suite 1125, Landover, MD 20785.

***A Summary of Changes section appears at the end of this standard.**

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TABLE 1 Chemical Requirements

Element	Grade 1	Grade 2	Grade 3
Carbon	0.12 min	0.30 min	0.26 max
Manganese	...[A]	...	.090 max
Phosphorous	0.04 max	0.04 max	0.04 max
Sulfur	0.05 max	0.05 max	0.05 max
Silicon	...	...	0.40 max
Copper	[B]	[B]	[B]
Chromium	...	...	...
Nickel	...	...	...
Molybdenum	...	...	...
Vanadium	...	...	...

[A]Where an ellipses is shown, there is no requirement, but the element shall be reported in the test analysis.
[B]The purchaser can specify a minimum copper content of 0.20 %.

TABLE 2 Product Analysis

Element[A]	Allowance Beyond Limits of Specified Chemical Analysis	
	% under min limit	% over max limit
Carbon	0.03	0.04
Managanese	0.06	0.08
Phosphorous	...	0.010
Sulfur	...	0.010
Silicon	...	0.05

[A]For other elements not listed in this table, the permitted variations of Table B in Specification A 6/A 6M shall apply.

TABLE 3 Tension Test Requirements

Property	Grade 1	Grade 2	Grade 3
Yield point , min, psi MPa	27 500	35 000	36 000
Tensile strength, min, psi MPa	(190) 55 000	(240) 70 000	(240) 58 000
Elongation in 2 in. or 50 mm, min %	(380) 25	(485) 25	(400) 23

TABLE 4 Bend Test Requirements

	Grade 1	Grades 2 and 3
Body bend, cold	180°—flat on itself	120°—around pin of diameter not greater than spike thickness
Head bend, cold	backward to the line of the face	backward to an angle of 55° with face

results determined on one full size spike selected at random from each 10-ton (9-tonne) lot of finished spikes or fraction thereof, and tested in accordance with Test Methods A 370, shall conform to the properties listed in Table 3.

5.5 *Product Analysis*—An analysis may be made by the purchaser from a sample taken from a finished spike representing each heat or cast, or 10-ton (9-tonne) lot if spikes are furnished in accordance with 5.3. The chemical composition thus determined shall conform to the requirements in Table 1 and Table 2.

6. Bend Requirements

6.1 *Body Bend*—The body of a full-size finished spike shall withstand the bend test described in Table 4 without cracking on the outside of the bent portion.

6.2 *Head Bend*—The head of a full-size finished spike shall withstand the bend test described in Table 4 without showing evidence of forging laps.

6.3 *Number of Tests*—One bend test of each type specified in 6.1 and 6.2 shall be made from each 5-ton (4.5-tonne) lot of finished spikes or fraction thereof.

7. Dimensions and Permissible Variations

7.1 The finished spikes shall conform to the dimensions specified by the purchaser, subject to the permissible variations prescribed in Table 5.

8. Workmanship, Finish, and Appearance

8.1 The finished spikes shall be straight, with well-formed heads and sharp points and shall be free of injurious and other imperfections not consistent with good commercial practice.

9. Retests

9.1 If, during the tension or bend tests, a previously undiscovered material or manufacturing flaw should be disclosed that interferes with the test or the interpretation of results, the substitution of another sample spike shall be permitted after it is demonstrated to the satisfaction of the purchaser or his representative, that the condition is not typical of the remainder of the lot.

9.2 Spikes represented by tests that fail to meet the requirements prescribed in 5.4, 6.1, and 6.2 may be treated and resubmitted for test.

9.3 If any test specimen fails because of mechanical reasons such as failure of testing equipment or improper specimen preparation, it may be discarded and another specimen taken.

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TABLE 5 Permissible Variations in DImensions

	Over		Under	
	in.	mm	in.	mm
Cross section	1/32	0.8	1/64	0.4
Head	3/32	2.4	1/32	0.8
Length, under head to point	1/8	3.2	1/8	3.2
Angle, under side of head	1°	1°	1°	1°

TABLE 6 Markings

	Grade 1	Grade 2	Grade 3
Steel, copper not specified	manufacturer's symbol	manufacturer's symbol and HC	manufacturer's symbol and A
Steel, copper specified	manufacturer's symbol and CU	manufacturer's symbol and HC and CU	manufacturer's symbol and A and CU

10. Inspection

10.1 The manufacturer shall afford the purchaser's inspector all reasonable facilities necessary to satisfy that the material is being produced and furnished in accordance with this specification. Mill inspection by the purchaser shall not interfere unnecessarily with the manufacturer's operations. All tests and inspections shall be made at the place of manufacture, unless otherwise agreed upon.

11. Rejection and Rehearing

11.1 Material that fails to conform to the requirements of this specification may be rejected. Rejections shall be reported to the manufacturer or supplier promptly and in writing. In case of dissatisfaction with the test results, the manufacturer or supplier may make claim for a rehearing.

12. Certification and Test Report

12.1 When specified in the purchase order or contract, a manufacturer's certification shall be furnished to the purchaser that the material was produced and tested in accordance with this specification and has been found to meet the requirements.

12.2 When specified in the purchase order or contract, a report of the chemical and mechanical test results shall be furnished.

12.3 A Material Test Report, Certificate of Inspection, or similar document printed from or used in electronic form from an electronic data interchange (EDI) transmission shall be regarded as having the same validity as a counterpart printed in the certifier's facility. The content of the EDI transmitted document must meet the requirements of the invoked ASTM standard(s) and conform to any existing EDI agreement between the purchaser and the supplier.

12.4 Notwithstanding the absence of a signature, the organization submitting either a printed document (Material Test Report, Certificate of Inspection or similar document) or an EDI transmission is responsible for the content of the report.

13. Product Markings

13.1 Each spike shall be marked on the top of the head while it is being formed with appropriate symbols as described in Table 6.

13.2 *Bar Coding*:

13.2.1 The Automotive Industry Action Group (AIAG) Bar Code Standard for Primary Metals for Steel Products may be considered as a possible auxiliary method of identification on the containers. Use of this method shall be by agreement between purchaser and supplier.

14. U. S. Government Procurement

14.1 When specified in the contract or purchase order, material shall be prepared for shipment and storage in accordance with the requirements of Practices A 700.

15. Keywords

15.1 rails; railway applications; steel track spikes; track spikes

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SUPPLEMENTARY REQUIREMENTS

The following supplementary requirement shall apply only when specified by the purchaser in the order:

S1

Copper may be specified to a 0.20 % min for Grade 1, Grade 2, or Grade 3. The maximum copper content shall be determined upon mutual agreement between the purchaser and the manufacturer.

S2

Since spikes are hammer-struck, a minimum Charpy V-notch impact requirement is desirable, particularly in cold weather. A new supplement for impact toughness is therefore provided.

S3

The Charpy V-notch average toughness of three individual test values, where each bar specimen is taken from three separate spikes in the same lot, shall be a minimum of 15 ft-lbs. Testing shall be in accordance with Specification A 370. The test temperature shall be determined either by the lowest average temperature of the location where the spikes shall be used, or other temperature specified in the purcahse order.

SUMMARY OF CHANGES

Committee A01 has identified the location of selected changes to this standard since the last issue (A 65 – 01) that may impact the use of this standard. (Approved May 2007).

(1) Added a third grade.
(2) Added standards to the Referenced Document section
(3) Changed chemistry reporting requirements in 5.2.
(4) Changed Table 1 to include grade chemistry and added P and S maximums.
(5) Revised Table 2.
(6) Tables 3 and 6 now include Grade 3.
(7) Revised Supplmentary section.

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