Designation: A 759 – 00 (Reapproved 2005)

Standard Specification for Carbon Steel Crane Rails[1]

This standard is issued under the fixed designation A 759; 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.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This specification covers carbon steel crane rails of special designs only, and nominal weights of 104 lb/yd (51.6 kg/m) through 175 lb/yd (86.8 kg/m) for crane runway use.

1.2 When standard tee rail sections are desired, they shall be ordered in accordance with Specification A 1.

1.3 Supplementary Requirements S1 through S4 of an optional nature are provided. They shall apply only when specified by the purchaser in the order.

1.4 The values stated in inch-pound units are to be regarded as the standard.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

A 1 Specification for Carbon Steel Tee Rails

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

2.2 Design details for the special crane rails are indicated in the crane rail catalogs of individual manufacturers, and referred to in the following documents:

American Institute of Steel Construction, Inc. (AISC), Manual of Steel Construction, Seventh Edition, pp. 1–136 and 1–137[3]

Association of Iron and Steel Engineers (AISE), Standard No. 6, May 1, 1969, pp. MD-22 through MD-25[4]

Crane Manufacturers Association, Inc. (CMAA), Specification No. 70, 1971, pp. 20 and 34[5]

3. Ordering Information

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

3.1.1 Quantity (tons or pieces),

3.1.2 ASTM designation and year of issue,

3.1.3 Complete identification of section with dimensional drawing if required (see 2.1 and 2.2),

3.1.4 Length of rails or length of runway as required, (see 6.3),

3.1.5 Arrangement of drilled bolt holes with dimensional drawing if required,

3.1.6 Supplementary requirements that shall apply (see S1 through S4), and

3.1.7 Certification and Test Report Requirements (see Section 10).

4. Manufacture

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

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

4.2 *Discard*—A sufficient discard shall be made to secure freedom from injurious segregation and piping.

4.3 *Control Cooling*:

4.3.1 Rails shall be control cooled in accordance with the following procedure, except when produced from vacuum-degassed steel or control cooled blooms, in which case the rails may be air cooled and 4.3.2 through 4.3.6 are not applicable.

4.3.2 All rails shall be cooled on hot beds or runways until full transformation is accomplished, and then charge immediately into the containers. In no case should the rail be charged below 725°F (386°C).

[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 the American Institute of Steel Construction, Inc., 1 East Wacker Dr., Ste. 3100, Chicago, IL 60601.

[4] Available from the Association of Iron and Steel Engineers, 3 Gateway Center, Pittsburgh, PA 15222.

[5] Available from the Crane Manufacturers Association of America, Inc., 8720 Red Oak Blvd., Ste. 201, Charlotte, NC 28217.

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4.3.3 The temperature of the rails before charging shall be determined with reliable equipment at the head of the rail at least 12 in. (305 mm) from the end.

4.3.4 The cover shall be placed on the container immediately after completion of the charge and shall remain in place for at least 10 h. After the removal or raising of the lid of the container, no rails shall be removed until the temperature of the top layer of rails has fallen to 300°F (149°C) or lower.

4.3.5 The temperature between an outside rail and the adjacent rail in the bottom tier of the container at a point not less than 12 in. (305 mm), nor more than 36 in. (914 mm), from the rail end shall be recorded. This temperature shall be the control for judging rate of cooling.

4.3.6 The container shall be so protected and insulated that the control temperature shall not drop below 300°F (149°C) in 7 h from the time that the bottom tier is placed in the container. If this cooling requirement is not met, the rails shall be considered control cooled provided the temperature at a location not less than 12 in. (305 mm) from the end of a rail at approximately the center of the middle tier does not drop below 300°F (149°C) in less than 15 h.

4.4 *End Hardening*—When specified in accordance with Supplementary Requirement S1, certain section crane rails shall be end hardened.

4.5 *High Strength Rails*—When specified in accordance with Supplementary Requirement S2, all or a portion of the quantity of rails ordered shall be high strength.

4.6 *Chamfering*—When specified in accordance with Supplementary Requirement S3, the ends of rails shall be chamfered.

4.7 *Ends Prepared for Electric Arc Welding*—When rails are to be joined by electric arc welding, special end preparation may be available from individual manufacturers as may be developed in accordance with Supplementary Requirement S4.

5. Chemical Requirements

5.1 *Heat or Cast Analysis*—An analysis for each heat or cast of steel shall be made by the manufacturer 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 and shall conform to the requirements in Table 1.

5.2 When ladle tests are not available, finished material representing the heat may be product tested. The product analysis allowance beyond the limits of the specified ladle analysis shall be within the limits for product analyses specified in Table 2.

6. Permissible Variations of Dimension, Weight, and Other Physical Attributes

6.1 *Section*:

TABLE 1 Chemical Requirements, %

Carbon	0.67 to 0.84
Manganese	0.70 to 1.10
Phosphorus, max	0.04
Sulfur, max	0.05
Silicon	0.10 to 0.50

TABLE 2 Product Analysis Allowance Beyond Limits of Specified Chemical Analysis

	Under Minimum Limit, %	Over Maximum Limit, %
Carbon	0.04	0.04
Manganese	0.06	0.06
Phosphorus	. . .	0.008
Sulfur	. . .	0.008
Silicon	0.02	0.02[A]

[A] Continuously cast allowances shall be 0.05 % over maximum limit for silicon.

6.1.1 The section of the rail shall conform to the design specified by the purchaser.

6.1.2 A variation of 1/32 in. (0.8 mm) less or 1/32 in. greater than the specified height will be permitted.

6.1.3 A variation of 1/16 in. (1.6 mm) in the width of either flange will be permitted for sections other than 175 lb/yd (86.8 kg/m), but the variation in total width of base shall not exceed 1/16 in. (1.6 mm). For 175-lb/yd (86.8-kg/m) sections a variation of 3/32 in (2.4 mm) in the width of either flange will be permitted but the variation in total width of base shall not exceed 3/32 in.

6.2 *Weight*—A variation of 1 % from the calculated weight of section as applied to the entire order will be permitted.

6.3 *Length*:

6.3.1 The standard length of rail shall be 80 ft (24.4 m) or 39 ft (11.9 m) when measured at a temperature of 60°F (15.5°C).

6.3.2 Up to 9% for 39 ft rail or 15% for 80 ft rail of the entire order will be accepted in lengths shorter than standard varying by 1 ft (0.3 M) as follows: 79, 78, 77, 75, 70, 65, 60, 39, 38, 37, 36, 33, 30, 27, and 25 ft.

6.3.3 Special cut lengths to complete an overall runway length may be specified.

6.3.4 A variation of 7/16 in. (11.1 mm) for 39 ft rails or 7/8 in. (22 mm) for 80 ft rails from the specified length of individual rails will be permitted.

6.4 *End Finish*:

6.4.1 Rails shall be milled, abrasive wheel cut, or ground to length, with a variation in end squareness of not more than 1/32 in. (0.8 mm) allowed.

6.4.2 Harmful burrs on the ends shall be removed.

6.5 *Drilling*:

6.5.1 Circular holes for joint bolts, when specified, shall be drilled to conform to the specified drawings and dimensions.

6.5.2 A variation of 1/16 in (1.6 mm) over and nothing under in the size of the bolt holes shall be permitted.

6.5.3 A variation of 1/32 in (0.8 mm) in the location of the holes will be permitted.

7. Workmanship, Finish, and Appearance

7.1 All rails shall have a workmanlike finish and be free of various imperfections that may detrimentally affect their suitability for the service for which they are intended.

7.2 Rails shall be straightened cold in a press or roller machine to be commercially straight, as determined by visual inspection.

7.3 Deviations in the vertical and horizontal alignment throughout the length of the rail shall be uniform. Sharp deviations in either direction shall not be acceptable.

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7.4 Deviations of the lateral (horizontal) line in either direction at the rail ends shall not exceed a maximum ordinate of 0.040 in. (1 mm) in 3 ft (0.9 m).

7.5 All ordinate determinations shall be made on the concave side, between the rail surface and the straightedge.

7.6 Rails presented for inspection that do not conform to the requirements of 7.1 through 7.4 may be reconditioned by the manufacturer.

8. Inspection

8.1 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.

9. Rejection and Rehearing

9.1 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.

10. Certification

10.1 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.

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

10.3 A material Test Report, Certificate of Inspection or similar document printed from or used in electronic 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.

10.4 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.

11. Product Marking

11.1 The name or brand of the manufacturer, the year and month of manufacture, and the weight and section designation of the rail shall be legibly rolled in raised letters and figures on the web.

11.2 The heat number, the rail letter, and the ingot number or a designation for the strand and bloom for continuously cast rail shall be hot stamped into the web of each rail where it will not be covered by the joint bars.

11.3 The requirements of 11.1 and 11.2 shall not apply when sections shorter than 25 ft (7.6 m) are specified, since branding or stamping, or both, may be incomplete or missing entirely.

11.4 *Bar Coding*:

11.4.1 The automotive Industry Action Group (AIAG) Bar Code Standard for Primary Metals for Steel Products may be considered as an auxilary method of identification. Use of this method shall be by agreement between purchaser and supplier.

12. U.S. Government Procurement

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

13. Keywords

13.1 rails; railway application; steel rails; steel crane rails

SUPPLEMENTARY REQUIREMENTS

The following supplementary requirements shall apply only when specified by the purchaser in the inquiry, order, or contract.

S1. End Hardening

S1.1 When purchased in suitable quantities certain crane rail sections may be ordered end hardened, in accordance with mill practice. Before specifying this requirement the purchaser shall develop which sections can be end hardened.

S2. High Strength Rails

S2.1 Heat-treated, head hardened, or alloy rails may be specified in accordance with the manufacturer's standard practice. High strength rails shall conform to a Brinell hardness number range from 321 to 388 when the decarburized surface has been removed.

S3. Chamfering

S3.1 Chamfered ends may be specified. Chamfering will consist of grinding a bevel approximately 1/16 in. (1.6 mm) back and 1/8 in. (3.2 mm) from the top and sides of the end face of the rail head, when specified.

S4. Ends Prepared for Electric Arc Welding

S4.1 The purchaser shall consult with the manufacturer as to special end preparation if crane rails are to be supplied for welding.

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