



Designation: A759 – 21

Standard Specification for Carbon Steel Crane Rails¹

This standard is issued under the fixed designation A759; 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 U.S. 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 A1.

1.3 Supplementary Requirements S1 through S3 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 standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*²

A1 Specification for Carbon Steel Tee Rails

A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

E10 Test Method for Brinell Hardness of Metallic Materials

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 Section 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 S3), 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 and Reduction*—A sufficient discard and reduction (minimum reduction of 8:1) shall be made to secure freedom from injurious segregation, and piping, and cast structure.

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 – 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).

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

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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.

TABLE 1 Chemical Requirements, %

Carbon	0.67 to 0.86
Manganese	0.70 to 1.10
Phosphorus, max	0.03
Sulfur, max	0.03
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
Chromium, max		0.30
Nickel, max		0.25
Molybdenum, max		0.10

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

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 *High Strength Rails*—When specified in accordance with Supplementary Requirement S1, all or a portion of the quantity of rails ordered shall be high strength.

4.5 *Chamfering*—When specified in accordance with Supplementary Requirement S2, the ends of rails shall be chamfered.

4.6 *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 S3.

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.

5.3 Alternate chemistries may be allowed when agreed to by purchaser and supplier.

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

6.1 Section:

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

6.1.2 A variation of $\frac{1}{32}$ in. (0.8 mm) less or $\frac{1}{32}$ in. greater than the specified height will be permitted.

6.1.3 A variation of $\frac{1}{16}$ 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 $\frac{1}{16}$ in. (1.6 mm). For 175-lb/yd (86.8-kg/m) sections a variation of $\frac{3}{32}$ in. (2.4 mm) in the width of either flange will be permitted but the variation in total width of base shall not exceed $\frac{3}{32}$ 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), 60 ft (18.3 m), 40 ft (12.2 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, 40, 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 $\frac{7}{16}$ in. (11.1 mm) for 39 ft rails or $\frac{7}{8}$ 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 $\frac{1}{32}$ 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 $\frac{1}{16}$ in. (1.6 mm) over and nothing under in the size of the bolt holes shall be permitted.

6.5.3 A variation of $\frac{1}{32}$ in. (0.8 mm) in the location of the holes will be permitted.

6.6 Physical Properties:

6.6.1 Standard strength rails shall conform to a Brinell hardness number minimum of 285.

6.6.2 The Brinell hardness test shall be performed. The single test is to be made on either the top or side of the rail head after oxide and decarburized material has been removed. The test may also be made on the appropriately prepared transverse rail sample $\frac{3}{8}$ in. from the top rail surface.

6.6.3 The test shall be conducted in accordance with Test Method E10.

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.