Designation: A 759 – 85 (Reapproved 1992)

Standard Specification for Carbon Steel Crane Rails

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.

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 S5 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:

A 1 Specification for Carbon Steel Tee Rails

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:


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

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

2.3 Military Standards:

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

2.4 Federal Standards

Federal Standard No. 123 Marking for Shipment (Civil Agencies)

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 and S1),

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

3.1.6 Supplementary requirements that shall apply (see S1 through S5), 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: open-hearth, 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).

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
court 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 S2, certain section crane rails shall
be end hardened.
4.5 Heat Treatment—When specified in accordance with
Supplementary Requirement S3, all or a portion of the quantity
of rails ordered shall be heat treated.
4.6 Chamfering—When specified in accordance with
Supplementary Requirement S4, 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 S5.

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 require-
ments 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 speci-
fied in Table 2.

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 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 varia-
tion of 1/32 in. (2.4 mm) in the width of either flange will be
permitted but the variation in total width of base shall not exceed
1/32 in.

<table>
<thead>
<tr>
<th>Table 1 Chemical Requirements, %</th>
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<tbody>
<tr>
<td>Carbon</td>
</tr>
<tr>
<td>Manganese</td>
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<tr>
<td>Phosphorus, max</td>
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<td>Sulfur, max</td>
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<td>Silicon</td>
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</table>

6.2.1 The section of the rail shall be 39 ft (11.9 m)
when measured at a temperature of 60°F (15.5°C).
6.2.2 All standard 39-ft lengths may be specified; or
6.2.3 Standard 39-ft lengths with up to 11 % of the entire
order in lengths shorter than standard, varying by 1 ft (0.3 m)
from 38 to 20 ft (11.6 to 6.1 m), may be specified; or
6.2.4 Special cut lengths to complete an overall runway
length may be specified in conjunction with 39-ft lengths, or
39-ft lengths with shorts.
6.2.5 A variation of 1/16 in. (11.1 mm) 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 suit-
ability 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.
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 con-
cave 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
every 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.

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.

12. U.S. Government Procurement

12.1 When specified in the contract or purchase order, material shall be preserved, packaged and packed in accordance with the requirements of MIL-STD-163. The applicable levels shall be as specified in the contract or order. Marking for shipment of such material shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

SUPPLEMENTARY REQUIREMENTS

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

S1. Length Variation

S1.1 Special lengths other than 39 ft (11.9 m) may be specified, upon agreement with the manufacturer.

S2. End Hardening

S2.1 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.

S3. Heat Treatment

S3.1 Heat-treated rails may be specified in accordance with the manufacturer’s standard practice. Heat-treated rails shall conform to a Brinell hardness number range from 321 to 388 when the decarburized surface has been removed.

S4. Chamfering

S4.1 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.

S5. Ends Prepared for Electric Arc Welding

S5.1 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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