

MIL-R-53059(ME)  
21 August 1985

# MILITARY SPECIFICATION

FOR

RAILWAY CAR, HOPPER, 56-1/2-INCH GAGE, 100 TON,

8 WHEEL, DOMESTIC SERVICE

This specification is approved for use within the USA Belvoir Research and Development Center, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers a railway steel hopper car with four bottom hoppers to transport coal in shaker service.

## 2. APPLICABLE DOCUMENTS

### 2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

## SPECIFICATIONS

### MILITARY

MIL-P-3558

- Plates, Identification: Locomotives, Railway Cars and Work Equipment.

MIL-P-53044

- Painting and Marking: Freight and Maintenance Cars Railway Motive Power and Work Equipment.

## STANDARDS

### FEDERAL

FED-STD-H28

- Screw-Threads Standards.

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Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: USA Belvoir Research and Development Center, ATTN: STRBE-DS, Fort Belvoir, VA 22060-5606 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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FSC 2220

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MILITARY

MIL-STD-129

- Marking for Shipment and Storage.

MIL-STD-889

- Dissimilar Metals.

2.1.2 Other Government document. The following other Government document forms a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DEPARTMENT OF TRANSPORTATION (DOT)

Federal Railroad Administration, Office of Safety.

Railroad Safety Appliance Standards, Part 231 (Title 49 of Code of Federal Regulations).

(Application for copies should be addressed to Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

(Copies of specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted shall be those listed in the issue of the DoDISS specified in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS shall be the issue of the nongovernment documents which is current on the date of the solicitation.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

Welding Qualifications of the ASME

(Application for copies should be addressed to the American Society of Mechanical Engineers, 345 East 47th Street, New York, NY 10017.)

AMERICAN SOCIETY OF TESTING AND MATERIALS (ASTM)

A 53 - Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

A 325 - High Strength Steel Bolts for Structural Steel Joints.

A 502 - Steel Structural Rivets.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

AMERICAN WELDING SOCIETY (AWS)

D1.1 Structural Welding Code, Section 5, Qualification.

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(Application for copies should be addressed to the American Welding Society, 2501 NW 7th Street, Miami, FL 33125.)

ASSOCIATION OF AMERICAN RAILROADS (AAR)

Manual of Standards and Recommended Practices, Mechanical Division

Section B - Couplers and Freight Car Draft Components.

M-921 Special Cushioning Devices for Freight Cars.

Section C - Car Construction Fundamentals and Details.

Equipment Diagram, AAR Plates B and B-1 for Unrestricted Interchange Service.

Section C, Part II, Volume I - Specification for Design, Fabrication and Construction of Freight Cars, M-1001.

Section D - Trucks and Truck Details.

M-114 Helical Springs, Heat Treated Steel.

Section E - Brakes and Brake Equipment.

S-400 Specification No. 2518, Freight Car Brake Equipment, Installation Specification.

S-401 Basic Freight Car Design Data.

S-473 Application Form for AAR Approval of New and Untried Freight Cars.

M-601 Hose, Air-Brake and Train Air-Signal.

Section E, Part II - Maintenance Requirements for Freight Car Air Brake Control.

Valves and Equipment - Shop Certification.

S-486 Single Car Testing Device - Code of Test for Freight Car Equipment.

Instruction Pamphlet No. 5039-4, Sup. 1.

Section G - Wheels and Axles.

M-101 Axles, Carbon Steel, Non-Heat-Treated and Heat-Treated.

Section G, Part II - Wheel and Axle (Shop) Manual.

Section H - Journal Bearings and Lubrication.

M-934 Freight Car Journal Roller Bearings.

S-701 Locking Plate, Journal Roller Bearings.

Section I - Specially Equipped Freight Car and Intermodal Equipment.

M-952 Intermodal Support and Securement System for Freight Cars.

Section L - Lettering and Marking of Cars.

Interchange Rules.

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

(Nongovernment standards and other publications are normally available from the organizations which prepare or which distribute the documents. These documents also may be available in or through libraries or other informational services.)

**2.3 Order of precedence.** In the event of a conflict between the text of this specification and the references cited herein, the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

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## 3. REQUIREMENTS

3.1 Description. The hopper car shall be 3800 to 3900 cubic foot level capacity, 100-ton truck capacity, open top, four pocket hopper with minimum 45-degree slope sheets and doors arranged to operate in pairs for discharging the lading. The car shall be all steel and mounted on two 4-wheel, 56-1/2-inch gage, freight car trucks. Underframe shall be welded construction and superstructure shall be riveted construction. The car shall comply with the safety requirements established by the Department of Transportation, Federal Railroad Administration, Office of Safety, and shall conform to the Association of American Railroads (AAR) Manual of Standard and Recommended Practices, including the recommended practices for open top hopper cars in shaker service.

3.1.1 Drawings. When specified, the contractor is responsible for preparing his own engineering drawings. No deviation from the prescribed dimensions is permissible without prior approval of the contracting officer.

3.2 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 4.3 and 6.3). Any changes or deviations of cars from the approved first article during production will be subject to the approval of the contracting officer. Approval of the first article will not relieve the contractor of his obligation to furnish cars conforming to this specification.

3.3 Materials. Material shall conform to applicable AAR and commercial specifications currently used by the railroad industry for this type of equipment unless otherwise specified herein. All structural steel shapes, plates, and bars in contact with lading shall be copper-bearing steel having a minimum of 0.20 percent copper content. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components of the overall assembly.

3.3.1 Pipe and pipe fittings. Pipes shall be black steel conforming to ASTM A 53.

3.3.2 Bolts, nuts, studs, and rivets. Material shall conform to ASTM A 325 or A 502.

3.3.3 Threaded parts. Threaded parts shall conform to FED-STD-H28. The American National Fine Thread Series shall be used for threaded parts less than 1/4-inch in diameter. The Unified or American National Coarse Thread Series shall be used for threaded parts 1/4-inch in diameter and larger; however, the American National Fine Thread Series may be employed for these sizes where applicable. All air brake pipe threads shall conform to American National Pipe Thread Series.

3.3.4 Substitution of materials. Materials not conforming to the specifications referenced herein shall not be substituted, unless such substitutions are specifically approved by the contracting officer and, (1) it is clearly demonstrated that an improvement in operating characteristics, a saving in

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weight, conservation of critical or strategic materials, or a reduction in cost without sacrifice of reliability can be accomplished thereby; (2) that such substitutions will not preclude the subsequent use of specified materials in effecting repairs or replacements. Requests for approval of such substitutions shall be accompanied by completely detailed supporting data which clearly illustrate the use of the proposed substitute material.

3.3.5 Material deterioration and control. The hopper car shall be fabricated from compatible materials, inherently corrosion resistant or treated to provide protection against the various forms of corrosion and deterioration that may be encountered in any of the applicable operation and storage environment to which the item may be exposed.

3.3.6 Dissimilar metals. Dissimilar metals shall not be used in intimate contact with each other unless protected against galvanic corrosion. Dissimilar metals and method of protection are defined and detailed in MIL-STD-889.

3.3.7 Identification of materials and finishes. The contractor shall identify the specific material, material finish or treatment for use with component and subcomponent, and shall make information available upon request to the contracting officer or designated representative.

3.3.8 Recovered materials. For the purpose of this requirement, recovered materials are those materials which have been collected from solid waste and reprocessed to become a source of raw materials, as distinguished from virgin raw materials. The components, pieces and parts incorporated in the car may be newly fabricated from recovered materials to the maximum extent practicable, provided the car produced meets all other requirements of this specification. Used, rebuilt or remanufactured components, pieces and parts shall not be incorporated in the car.

3.4 Interchangeability. Jigs, templates, gages, and fixtures shall be used to insure interchangeability of like components and subassemblies with respect to assembly, performance, and quality. All parts having the same part number shall be functionally and dimensionally interchangeable.

3.5 Adjustments. All parts and components subject to adjustment or replacement by operating or maintenance personnel shall be accessible. Adjusting facilities where provided shall operate without interference and shall maintain such adjustments under all conditions of service.

3.6 Tolerances and fits. Tolerances and fits shall conform to all appropriate AAR manuals applicable to railway cars unless otherwise specified herein.

3.7 Dimensions and weight. The cubic capacity, level, shall be 3800 cubic feet nominal.

3.8 Clearances. Car shall not exceed clearance limitation of AAR Plate B for unrestricted interchange service.

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3.8.1 Curvature. The car shall be capable of negotiating a 38-degree horizontal curve (150-foot radius) when uncoupled. The car shall be capable of negotiating a 150-foot radius horizontal curve when coupled by an auxiliary type coupler similar to National 31629 (see 4.5.2.6). Car shall be designed to negotiate specified horizontal and AAR required vertical curves without interference between trucks and carbody, attached parts or brake riggings. The design shall include allowance for truck springs deflected to 75 percent of their total travel plus body deflection.

3.9 Design and construction. Except as specified herein, design and construction of the hopper cars shall be in accordance with the AAR Manual of Standards and Recommended Practices, Section C, Part II, Volume I - Specifications for Design, Fabrication and Construction of Freight Cars, M-1001 including Recommended Design Features of Open Top Hopper Cars in Shaker Service. Structural members shall be free of notch sensitive areas and discontinuities that could result in highly localized stress concentrations. Sufficient documentation shall be submitted to the AAR, for approval of car design. A full set of drawings and design calculations with complete structural analysis shall be submitted to the contracting officer. The contractor shall provide to the Government a letter of approval from the AAR.

3.10 Underframe. The underframe shall be welded construction.

3.10.1 Jacking pads and lifting lugs. The body bolsters shall be equipped with combination jacking pads and lifting lugs at the side sill connections and shall be reinforced at the side sill.

3.11 Trucks. The truck shall be a 100-ton minimum capacity and shall be an AAR-approved design. Truck shall be the gage specified and shall have built-in snubbing devices in accordance with Section D - Trucks and Truck Details, AAR Specification and Manual of Standards and Recommended Practices.

3.11.1 Wheels. Wheels shall be 36-inch diameter, multiple-wear, cast or wrought carbon steel, conforming to Section G - Wheels and Axles of the Manual of Standards and Recommended Practices. Wheels shall be inspected and mounted in accordance with AAR Section G, Part II - Wheel and Axle Manual.

3.11.2 Axles. Axles shall be forged carbon steel and in accordance with AAR requirements. Axles shall be drilled and tapped each end for roller bearing retaining caps.

3.11.3 Side bearings. Each car shall be equipped with AAR approved roller-type side bearings adjusted to AAR specifications.

3.11.4 Springs. Springs shall conform to AAR M-114. The solid spring group capacity shall conform to AAR requirements.

3.11.5 Journal roller bearings. Nonfield lubricating journal roller bearings in conformance with AAR M-934 of Section H - Journal Bearings and Lubrication, shall be provided.

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3.12 Superstructure. The car superstructure shall be lined steel sheathed type conforming to AAR specifications except as specified herein, and shall be comprised of the following components: Side and end construction, floor, and hopper with the doors. The side and end construction shall be copper bearing steel sheathing of 0.20 percent minimum copper content and shall be riveted to side framing. Side framing shall be outside stake design.

3.12.1 Floor and hoppers. Floor bottom sheets shall be set at 45-degrees to the rail. The hoppers gates shall be of a transverse arrangement and shall be manually operated. The doors shall be equipped with dual lock and operating mechanism operable from either side of the car.

3.13 Couplers. Couplers shall be AAR approved bottom-shelf E type, rotary, bottom-operated with coupler operating levers and rods at diagonal corners of the car.

3.14 Brake system. Design and installation shall be in accordance with AAR Manual of Standards and Recommended Practices, Section E - Brakes and Brake Equipment; S-400 Specification No. 2518, Freight Car Brake Equipment, Installation Specifications; S-401, Basic Freight Car Design Data; and other AAR requirements as applicable.

3.14.1 Airbrakes. Airbrakes, single capacity, providing constant braking force, shall be furnished body-mounted and shall consist of ABDW freight equipment.

3.14.2 Braking force. Net airbrake and handbrake force, as determined by a static brake test shall conform to AAR requirements.

3.14.3 Automatic slack adjuster. The airbrake system shall be provided with an automatic slack adjuster (pneumatic) of AAR-approved design.

3.14.4 Handbrake. Handbrake shall be AAR-approved geared type, mounted on one end of the car, to operate brakes on both trucks.

3.15 Identification plate. Identification plate conforming to type II of MIL-P-3558 shall be permanently attached to the underframe in a readily visible location.

3.16 Safety appliances. Safety appliances shall comply with the current issue of DOT Railway Safety Appliance Standards (Code of Federal Regulations, Title 49, Part 231).

3.17 Painting and marking. Painting and marking shall conform to MIL-P-53044. Color of paint shall be aluminum or gray over zinc chromate primer. Reporting marks shall be USAX as specified in MIL-P-53044. Additional markings shall be in accordance with AAR specifications. Car numbers conforming to MIL-P-53044 shall be applied and shall be provided by the contracting officer. Stenciling on ends of car will include but not be limited to identification of couplers, wheels, end-of-car cushioning, springs and snubbers. Additional markings shall

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be in accordance with AAR's Section L - Lettering and Marking of Cars, as applicable.

3.18 Workmanship. Workmanship for fabrication and construction shall be in accordance with AAR Section C, Part II, Volume I - Specifications for Design, Fabrication, and Construction of Freight Cars, M-1001.

3.18.1 Welding. Welding shall be in accordance with the American Welding Society Code and AAR Section C, Part II or other applicable requirements. The surface of parts to be welded shall be free from rust, scale, paint, grease, mill scale that can be removed by chipping and wire brushing or other foreign matter. Spot, tack, or intermittent welds for strength will not be permitted. Weld penetration shall be such as to provide transference of maximum design stress through the base metal juncture. Fillet welds shall be provided, when necessary, to reduce stress concentration.

3.18.2 Welders. Before assigning any welder to manual welding work covered by this specification, the contractor shall provide the Government with certification that the welder has passed qualification tests as prescribed by either of the following listed codes for the type of welding operations to be performed and that such qualification is effective as defined by:

AWS, Structural Welding Code, Section 5, Qualification, D1.1.

Contractors who only make horizontal welds need not qualify welders for "all position welding". Subject to approval by the Government, contractor's standard welder qualification may be substituted in lieu of the above codes provided that the contractor's procedure is equivalent to the above codes. The contractor shall be responsible for determining that automatic welder equipment operators are capable of producing quality welds. The certification shall be made available for review by the contracting officer or the contracting officer's representative.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order, the contractor 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.

4.1.1 Acceptability criteria. Cars which conform to all requirements in sections 3 and 5 of this specification and pass all applicable examinations and tests in section 4 of this specification and meet requirements of the AAR Rules of Interchange will be considered acceptable by the Government. The contractor shall furnish a certification of design approved from AAR to the contracting

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officer. The certification shall be made available for review by the contracting officer or the contracting officer's representative.

4.1.2 Component and material inspection. The contractor is responsible for insuring that components and materials used are manufactured, examined, and tested in accordance with applicable AAR specifications, or that the components have been previously approved by AAR.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).
- c. Inspection of packaging (see 4.6).

4.3 First article inspection. The first article car(s) which shall have been produced from production tooling shall be examined and tested to determine conformance to the requirements of this specification.

4.3.1 Examination. The first article car(s) shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.3.1.2 Tests. The first article car(s) shall be tested as specified in 4.5.2. Failure of any test or lack of AAR required approval shall be cause for rejection.

4.4 Quality conformance inspection.

4.4.1 Examination. Each car shall be examined as specified in 4.5.1. Presence of one or more defects shall be cause for rejection.

4.4.2 Tests. Each car shall be tested as specified in 4.5.2.1 through 4.5.2.5. Failure of any test shall be cause for rejection.

4.5 Inspection procedures.

4.5.1 Examination. All cars shall be examined for compliance with the specification. This examination shall include the following defects:

- 101. Material not as specified herein.
- 102. Design and construction not as specified herein.
- 103. Design and construction not in accordance with AAR Recommended Design Features of Open Top Hoppers in Shaker Service.
- 104. Dimensions, tolerances, and fits not as specified herein.
- 105. Parts and components missing, misaligned, or not as specified.
- 106. Brake systems and components not as specified.
- 107. Pipe fittings misaligned, missing, or not tight.
- 108. Adjustments not as specified.
- 109. Threaded parts not as specified.
- 110. Safety appliances not as specified herein.

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- 111. Painting and marking not as specified.
- 112. Technical publications specified not furnished.
- 113. Workmanship not as specified.
- 114. Bolts, nuts, studs, and rivets not as specified.
- 115. Used, rebuilt, or remanufactured components, pieces or parts incorporated in the car.
- 116. Interchangeability not as specified.
- 117. Underframe not as specified.
- 118. Jacking pads and lifting lugs not as specified.
- 119. Trucks not as specified.
- 120. Wheels not as specified.
- 121. Axles not as specified.
- 122. Side bearings not as specified.
- 123. Springs not as specified.
- 124. Journal roller bearings not as specified.
- 125. Superstructure not as specified.
- 126. Floor and hoppers not as specified.
- 127. Couplers not as specified.
- 128. Identification plate not as specified.
- 129. Materials are not resistant to corrosion or deterioration or treated to be made resistant to corrosion or deterioration for the applicable storage and operating environment.
- 130. Dissimilar metals as defined in MIL-STD-889 are not effectively insulated from each other.
- 131. Contractor does not have documentation available for identification of material, material finishes or treatments.
- 132. Welding not as specified.
- 133. Welders certificate not as specified.

#### 4.5.2 Tests.

4.5.2.1 Test conditions. Prior to being tested, each car shall be lubricated with oil and grease as specified herein and put in a completely operational condition. Methods of performing tests shall be submitted to the contracting officer for approval.

4.5.2.2 Airbrake. The entire airbrake system shall be tested to insure correct functioning of all components. The car shall be tested with a single car testing device in accordance with Instruction Pamphlet No. 5039-4, Sup. 1, of section E, S-486 adopted by AAR. The brake cylinder piston travel shall be as specified in Air Brake Specification No. 2518 and shall be tested for interference and correct travel. Nonconformance to 3.14 or AAR requirements shall constitute failure of this test.

4.5.2.3 Handbrake. The handbrake shall be tested by applying and releasing the brakes to determine that brake shoes are applied to all wheels and that the operation conforms to 3.14.4. Nonconformance to 3.14.2 shall constitute failure of this test.

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4.5.2.4 Side bearing clearance. With the car on level tangent track and the car body level, side bearing clearance shall be measured at each bearing. Nonconformance to AAR standard limits shall constitute failure of this test.

4.5.2.5 Slack adjuster. The slack adjuster shall be tested for range of travel. Nonconformance to 3.14.2 shall constitute failure of this test.

4.5.2.6 Curvature. The car, uncoupled, shall be moved through a simulated 150-foot radius horizontal curve. At maximum swing, the brake rigging and the car body rigging shall be inspected to determine that when springs are at 75 percent deflection, clearances have been provided and the brake systems function as specified. Calculations are to be furnished to prove that the car coupled to a locomotive by means of an auxiliary coupler similar to National 31629 will move through a 150-foot-radius curve. Nonconformance to this test or 3.8.1 shall constitute failure.

4.6 Inspection of packaging. The packaging and marking shall be inspected to determine conformance to section 5 of this specification.

## 5. PACKAGING

5.1 Hopper car. Each hopper car shall be prepared for delivery in accordance with AAR Requirements for Interchange Service.

5.2 Marking. Marking for shipment shall be in accordance with MIL-STD-129. Additional marking shall be as required by applicable AAR Rules and Regulations.

## 6. NOTES

6.1 Intended use. The hopper car is intended to transport coal within the continental limits of the United States.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number, and date of this specification.
- b. Time frame required for submission of first article car (see 3.2).
- c. When AAR structural analysis is required (see 3.1.1).
- d. Car numbers and other special marking required (see 3.17).

6.3 First article. When a first article inspection is required, the items should be an initial production. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, tests, and approval of the first article test results and disposition of the document's first article.

6.4 Data requirements. The contracting officer should include requirements for such data as technical publications, drawings, instructional materials, illustrated parts lists, and contractor's maintenance and operation manual to be furnished as considered necessary with each car.

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6.5 Drawings. Drawings shall be made available to the contracting officer prior to submission of first article car.

6.6 Car numbers. The contracting officer should arrange to furnish car numbers to the contractor to be applied to each car.

6.7 Packaging. Levels of packaging have not been included as the cars are for domestic service and will be delivered over the rails. Storage periods exceeding normal domestic limitations are not anticipated.

6.8 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the specification.

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**NOTE:** This form may not be used to request copies of documents, nor to request waivers, deviations, or clarification of specification requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

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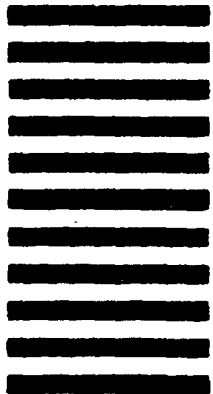
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**STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL***(See Instructions - Reverse Side)***1. DOCUMENT NUMBER**  
MIL-R-53059 (ME)**2. DOCUMENT TITLE** Railway Car, Hopper, 56-1/2-Inch Gage,  
100 Ton, 8 Wheel, Domestic Service**3a. NAME OF SUBMITTING ORGANIZATION****4. TYPE OF ORGANIZATION (Mark one)**☐ **VENDOR**☐ **USER**☐ **MANUFACTURER**☐ **OTHER (Specify):** \_\_\_\_\_**3b. ADDRESS (Street, City, State, ZIP Code)****5. PROBLEM AREAS****a. Paragraph Number and Wording:****b. Recommended Wording:****c. Reason/Rationale for Recommendation:****6. REMARKS****7a. NAME OF SUBMITTER (Last, First, MI) - Optional****7b. WORK TELEPHONE NUMBER (Include Area Code) - Optional****8a. MAILING ADDRESS (Street, City, State, ZIP Code) - Optional****8. DATE OF SUBMISSION (YYMMDD)**

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