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SUPERSEDING

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MILITARY SPECIFICATION**CARRIAGE, HOWITZER, 105 MM, M2A2 (W/REPAIR
PARTS AND W/O EQUIPMENT OR ACCESSORIES)**

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 This specification covers the requirements for one type of pneumatic tired Howitzer Carriage, equipped with mechanical handbrakes, and designed for high speed travel. The carriage has pintle traverse and split trails.

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids, form a part of this specification:

SPECIFICATIONS**FEDERAL**

PPP-T-60 — Tape; Pressure Sensitive Adhesive, Waterproof — For Packaging and Sealing.

MILITARY

MIL-P-116 — Preservation, Methods of.

MIL-B-121 — Barrier - Material, Greaseproofed, Flexible (Waterproofed).

MIL-G-10924 — Grease, Automotive and Artillery.

MIL-P-12121 — Plastic, Coating Compound, Strippable (Sprayable).

MIL-W-14539 — Weapon Parts for Anti-Aircraft Artillery; Rocket Launchers and Small Arms, Packaging of.

STANDARDS**MILITARY**

MIL-STD-105 — Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 — Marking for Shipment and Storage.

FSC 1015

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MIL-STD-173 — Painting and Finishing Systems for Artillery Materiel.

DRAWINGS**ORDNANCE CORPS**

- F 7141820** — Carriage, Howitzer, 105 MM, M2A2.
- GL7101168** — Index to List of Inspection Gages and Parts Gaged on the Carriage, Howitzer, 105 MM, M2A2.

PUBLICATIONS**ORDNANCE CORPS**

- LSQAP7141820** — Index of Supplementary Quality Assurance Provisions.

(Copies of specifications, standards, drawings, and other publications required by contractors in connection with specific procurement functions should be obtained from the procuring agency or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification. Unless otherwise indicated, the issue in effect on date of invitation for bids shall apply.

NATIONAL MOTOR FREIGHT CLASSIFICATION NUMBERS A-4 AND 14.

(Application for copies should be addressed to the American Trucking Association, 1424 Sixteenth Street, N.W., Washington 6, D. C.)

ASSOCIATION OF AMERICAN RAILROADS

- Pamphlet Number MD-7, Rules Governing the Loading of Department of Defense Material on Open Top Cars.

(Application for copies should be addressed to the Association of American Railroads, Freight Loading and Container Section, 59 East Van Buren Street, Chicago 5, Ill.)

3. REQUIREMENTS**3.1 Dimensions. Dimensions of parts**

and assemblies shall conform to Drawing F7141820.

3.2 Performance and product characteristics.

3.2.1 Proof firing. Completed carriages shall be fully assembled and lubricated for proof firing. Proof firing shall be as specified in table I of 4.3.1. The carriage shall withstand the shocks incidental to proof firing without breakage or deformation of parts.

3.2.2 Assembled carriages. The first completed carriage under each contract and at least one out of each 50 thereafter shall be given a road test. The carriage shall withstand the shocks and stresses of the test without breakage or deformation of parts.

3.2.3 Handwheel loads. With a complete round of dummy ammunition, or the equivalent distributed weight, in the chamber of the howitzer and mounted with the recoil mechanism to the carriage, the force or torque required at the handwheel center (nut) to elevate or traverse the weapon shall not exceed the following in any position or direction or traverse. The elevating handwheel force or torque shall not exceed 65 inch pounds or the force required at the rim of the elevating handwheel shall not exceed 13 pounds. The traversing handwheel force or torque shall not exceed 52 inch pounds or the force required at the rim of the handwheel shall not exceed 13 pounds.

3.2.3.1 Backlash. With a complete round of dummy ammunition, or the equivalent distributed weight, in the chamber of the howitzer and mounted with the recoil mechanism to the carriage, the maximum backlash of either the elevating or traversing mechanism handwheel shall not exceed 15° of rotation at any position or in any direction of elevation or traverse when measured in accordance with 4.3.4.

3.2.4 Handbrakes. The two handbrakes of the carriage shall each be capable of locking their respective wheel and causing it to slide with a movement of the carriage.

3.3 Fire control equipment. Fire control equipment furnished by the Government shall be installed and aligned by the contractor prior to inspection of the completed carriage.

3.4 Lubrication. Lubrication shall be in accordance with the applicable lubrication order (see 6.2.2).

3.5 Painting. Unless otherwise specified, the carriage shall be painted in accordance with Standard MIL-STD-173.

4 QUALITY ASSURANCE PROVISIONS

4.1 General quality assurance provisions.

4.1.1 Contractor inspection. Unless otherwise specified herein, the inspections required by this specification shall be performed by the contractor.

4.1.2 Contractor quality assurance system. The contractor shall provide and maintain an effective quality assurance system acceptable to the Government covering the supplies under this specification. Results of all examinations and tests performed under the quality assurance system shall be made available to the Government. A current written description of the system shall be submitted to the contracting officer prior to initiation of production. The written description will be considered acceptable when as a minimum, it provides the quality assurance required by this specification and other documents referenced herein. The contractor will not be restricted to the inspection station or to the method of inspection listed provided that an equivalent control is included in the approved quality assurance procedure. In cases of dispute as to whether certain procedures of the system provide

equal assurance, the comparable procedure of this specification will be used. The contractor shall notify the Government of and obtain approval for any change to the written procedure that affects the degree of assurance required by this specification or other documents referenced herein.

4.1.3 Government verification. All quality assurance operations performed by the contractor shall be subject to Government verification at unscheduled intervals. Verification will consist of surveillance of the operations to determine whether the practices, methods, and procedures of the written inspection plan are being properly applied, and Government product inspection to measure quality of product offered for acceptance. Deviation from the prescribed or agreed upon procedures, or instances of poor practices which might have an effect upon the quality of the product will be immediately called to the attention of the contractor. Failure of the contractor to promptly correct deficiencies discovered shall be cause for suspension of acceptance until correction has been made or until conformance of product to prescribed criteria has been demonstrated. To avoid interference with operations, the contractor shall designate a responsible official or officials to whom the Government inspector will report such instances.

4.2 Inspection provisions.

4.2.1 Lot formation. Lots shall be as large as practical and shall consist of products made under essentially the same conditions and from the same batch of material.

4.2.2 Sampling.

4.2.2.1 Assembled carriages. Unless otherwise specified, each assembled carriage shall be inspected for compliance with this specification.

4.2.2.2 Parts and assemblies. Sampling of parts and assemblies for inspection shall be

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as specified in Standard MIL-STD-105.

4.2.2.3 Packaging. Sampling of packaging for inspection shall be as specified in Specification MIL-P-116.

4.2.3 Examination.

4.2.3.1 Material examination. The contractor shall provide the Government inspector with a certified statement that the material(s) used in the manufacture of all parts and assemblies of the carriage conform(s) to the material specification(s) referenced on the applicable drawing(s).

4.2.3.2 Assembled carriages. Each assembled carriage shall be examined visually for presence and continuity of protective coating and for the correctness and legibility of serial numbers.

4.2.3.3 Parts and assemblies. Examination of parts and assemblies shall be as specified in the applicable Supplementary Quality Assurance Provision (SQAP) forming a part of this specification.

4.2.3.4 Packaging. Examination of packaging shall be as specified in Specification MIL-P-116.

4.2.4 Inspection testing.

4.2.4.1 Proof firing. Proof firing shall consist of firing both standard rounds and specific pressure rounds of ammunition. Proof firing will be performed by the Government as specified in 4.3.1.

4.2.4.2 Assembled carriages. Completed carriages shall be given a road test (see 4.3.2) as specified in 3.2.2 and checked for compliance with requirements therein.

4.2.4.3 Handwheel loads. A suitable torque measuring device approved by the Government shall be used to determine that handwheel loads do not exceed the maximum

values specified in 3.2.3 under the conditions given therein.

4.2.4.4 Backlash. Measurements shall be made to determine that the backlash of the elevating mechanism and the traversing mechanism does not exceed 15 degrees (see 3.2.3.1).

4.2.4.5 Handbrakes. The handbrakes shall be tested as specified in 4.3.3.

4.2.4.6 Fire control equipment. The alignment and proper assembly of fire control equipment shall be verified.

4.2.5 Inspection equipment.

4.2.5.1 Contractor's inspection equipment. In inspecting the supplier's inspection equipment the Government inspector will determine that the supplier has available and utilizes correctly, gaging, measuring, and test equipment of required accuracy and precision and that the instruments are of proper type and range to make measurements of the required accuracy. The supplier will have available a set of master gages, standards, and appropriate instruments for regularly scheduled calibration of his inspection equipment. Records of such regularly scheduled calibration will be maintained by the supplier and made available for review by the Government. The calibration of gages, standards, and instruments will be periodically checked by authorized Government personnel.

4.2.5.2 Ordnance inspection equipment. Gages applicable to parts are referenced in the Index to List of Inspection Gages GL7101168.

4.2.5.3 Supplementary Quality Assurance Provisions. Unless otherwise specified, the Government shall furnish the contractor with the applicable SQAP(s) referenced in LSQAP 7141820.

4.3 Test methods and procedures.

4.3.1 Proof-firing test procedure. The completed carriage shall be proof fired in accordance with table I.

TABLE I

Number of rounds	Percent of maximum pressure	Elevation	Traverse
1	Standard	0°	Center
1	115%	Max	Note 1

Note 1. The 115 percent round at maximum elevation shall be fired in alternate carriages over the right and left trail.

4.3.2 Road test procedure. The carriage, with howitzer and recoil mechanism assembled thereto, shall be coupled to the prime mover and towed at least 50 miles at speeds listed below over roads simulating actual service conditions.

- (1) 30 miles per hour on straight, hard surface roads.
- (2) 15 miles per hour on dirt roads.
- (3) 10 miles per hour on unimproved roads or cross country.
- (4) 10 miles per hour on any turn.

4.3.3 Handbrake test procedure. With the wheels clear of the ground, rotate each wheel at a speed of at least 5 miles per hour. Application of the handbrake should cause the respective wheel to lock. With the brake released there shall be no evidence of brake drag.

4.3.4 Backlash test procedure. Using a dial indicator against the side of the carriage for traverse and against a suitable surface

of the tipping parts for elevation, and with the handwheel under load the dial indicator hand shall be set at zero, and the rim of the handwheel shall be scribed in this position. The handwheel shall then be rotated in a reverse direction until the dial indicator shows movement. The rim of the handwheel shall be scribed in this position also. The distance between scribe marks then indicates the amount of backlash present.

4.4 Rejection. A carriage which fails to pass any test of this specification shall be rejected.

4.5 Resubmission. Rejected carriages shall not be resubmitted until: The carriage has been screened and all defects removed or repaired by the contractor; the Government inspector is notified of precautionary measures instituted to prevent recurrence of failure causing rejection; and, the carriage has been marked plainly as a resubmitted carriage.

5. PREPARATION FOR DELIVERY

5.1 Materials and methods. All materials, methods, and procedures shall be in accordance with this specification and the applicable documents referenced within. The method of preservation shall be Method I of Specification MIL-P-116. Unless otherwise specified, the contractor shall provide the Government inspector with a certified statement that the materials used for packaging conform to the requirements of the applicable material specification. Packaging materials used in this specification are referred to as follows.

Reference	Identification
Medium preservative compound	Type P-5 of Specification MIL-P-116.
Grease	Specification MIL-G-10924.
Greaseproof barrier material	Grade A, Type 1 of Specification MIL-B-121.
Adhesive tape (pressure-sensitive)	Specification PPP-T-60.
Strippable coating, plastic	Type 1 of Specification MIL-P-12121.

MIL-C-2015B**5.2 Preparation for packaging.**

5.2.1 Cleaning. All foreign matter visible to the naked eye and contained on or about the carriage shall be removed by compressed air. All unpainted surfaces shall be cleaned by process C-3 of Specification MIL-P-116.

5.2.2 Drying. Areas and surfaces cleaned by process C-3 shall be dried by process D-1 (compressed air) or D-4 (wiping) in accordance with Specification MIL-P-116.

5.2.3 Preservation.**5.2.3.1 Level A.**

5.2.3.1.1 Carriage. Except as hereinafter provided for, exposed unpainted metal surfaces shall be coated with a medium preservative compound except those parts lubricated with grease. After the preservative has been applied, all preserved surfaces shall be wrapped or covered as applicable with one thickness of greaseproof barrier material. The barrier material shall be held in place by pressure-sensitive adhesive tape. All preserved and covered surfaces shall then be sprayed with a strippable coating (see 5.1). The coating shall extend over all seams or cracks to the adjacent surface for a distance of at least 1 inch wherever possible.

5.2.3.1.2 Gears (arcs) and pinions. Gears (arcs) and pinions shall be coated with grease and then covered with one thickness of greaseproof barrier material. Strippable coating shall then be applied in accordance with 5.2.3.1.1.

5.2.3.1.3 Carriage mounting. At the juncture between the top and bottom carriage an encirclement of pressure-sensitive tape shall be applied to give complete coverage. Strippable coating shall then be applied in accordance with 5.2.3.1.1.

5.2.3.1.4 Tires. Tire pressure shall be increased by 10 pounds over specified operat-

ing pressure. The valve caps shall be sealed with pressure-sensitive tape and then sprayed with strippable coating to a thickness of 0.025 to 0.035 inch and extending onto the adjacent surface, as applicable, 1 inch or more beyond the edges of the tape.

5.2.3.1.5 Elevating and traversing mechanisms. Elevating and traversing mechanisms shall be coated with grease and then covered and protected as specified in 5.2.3.1.2.

5.2.3.1.6 Parking brake assembly. Both parking brake assemblies shall be coated with grease and then covered and protected as specified in 5.2.3.1.1.

5.2.3.1.7 Gasketed joints. All gasketed joints shall be sprayed directly with a plastic strippable coating compound to a thickness of 0.025 to 0.035 inch and extending onto the surface adjacent to each side of the joint 1 inch or more as applicable.

5.2.3.1.8 Miscellaneous. Universal joints, shaft supporters, oil and grease seals, and lubricated parts exposed to moisture shall be sealed and protected in accordance with 5.2.3.1.1.

5.2.3.2 Levels B and C. Not applicable.

5.3 Marking. Marking shall be in accordance with Standard MIL-STD-129.

5.4 Carloading. Applicable carloading and blocking shall be in accordance with Pamphlets MD-7 and 14.

5.5 Repair parts. Repair parts shall be prepared for shipment as specified on the applicable packaging data sheet referenced in the supplement to Specification MIL-W-14539.

6. NOTES

6.1 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Title, number, and date of applicable drawing.
- (c) List of Government furnished equipment, if any.
- (d) Place of inspection.
- (e) Place of tests.
- (f) List of maintenance and repair parts required, with title, number, and date of applicable Supplementary Quality Assurance Provision (see 4.2.3.3).
- (g) Any exceptions to the applicable Supplementary Quality Assurance Provisions.
- (h) Responsibility for firing tests, if other than specified.
- (i) Levels of packaging and packing for repair parts.

6.2 Suggested contractual features.

6.2.1 Serial numbers. The contractor should be furnished a block of serial numbers to be used.

6.2.2 Lubrication order. The contractor should be furnished the lubrication order to be used.

6.3 Proof firing. Whenever possible, the carriages should be proof fired in combination with unproofed recoil mechanisms and

cannon. When this is done the following firing schedule should be used:

<i>Number of rounds</i>	<i>Type of rounds</i>	<i>Elevation</i>	<i>Traverse</i>
1	Standard	0°	Center
1	115%	65°	Center
1	Standard	65°	"
1	Standard	0°	"

* These standard rounds should be fired alternately over the right and left trails.

6.4 Provisions of this specification are the subject of international standardization agreements. When amendment, revision, or cancellation of this specification is proposed, the Departmental Custodians will inform their respective Departmental Standardization Office (DepSO) so that appropriate action may be taken regarding the international agreement concerned.

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Custodians:

Army—Ordnance Corps
Navy—Marine Corps

Other interest:

International (see 6.4)

Preparing activity:

Army—Ordnance Corps