

INCH-POUND

MIL-R- 87992

29 November 89

MILITARY SPECIFICATION

RAILWAY CAR, TANK, HYDRAZINE OR NITROGEN TETROXIDE: DOT 105J500W

This specification is approved for use within the Department of the Air Force, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE.

1.1 Scope. This specification covers a 10,000 gallon minimum domestic-service railway tank car for anhydrous hydrazine, unsymmetrical dimethylhydrazine (UDMH) or any mixture of anhydrous hydrazine and UDMH or a 10,000 gallon minimum nitrogen tetroxide (N₂O₄).

1.2 Classification. The tank car shall be of the following type as specified (see 6.2).

- a. Type I - Nitrogen tetroxide tank car.
- b. Type II - Anhydrous hydrazine, unsymmetrical dimethylhydrazine (UDMH) or any mixture of anhydrous hydrazine and UDMH tank car.

2. APPLICABLE DOCUMENTS.

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks 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 (see 6.2).

SPECIFICATIONS

Military

MIL-P-27401	Propellant, Nitrogen, Pressurizing.
MIL-P-53044	Painting and Marking: Freight and Maintenance Cars, Railway Motive Power and Work Equipment.
MIL-C-83286	Coating, Urethane Aliphatic Isocyanate, for Aerospace Applications.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: WR-ALC/MMVRS, Robins AFB, GA 31098-5609, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 2220

DISTRIBUTION STATEMENT A: Approved for public release; distribution is unlimited.

MIL-R- 87992**STANDARDS****Federal**

FED-STD-313 Material Safety Data, Transportation Data and Disposal Data for
Hazardous Materials Furnished to Government Activities.

FED-STD-595 Colors.

Military

MIL-STD-129 Marking for Shipment and Testing.

MIL-STD-130 Identification Marking of U.S. Military Property.

MIL-STD-808 Finishes, Materials and Processes for Corrosion Prevention and
Control in Support Equipment.

MIL-STD-810 Environmental Test Methods.

MIL-STD-831 Test Reports, Preparation of.

MIL-STD-889 Dissimilar Metals.

MIL-STD-965 Parts Control Program.

MIL-STD-1556 Government/Industry Data Exchange Program (GIDEP)
Contractor Participation Requirements.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, (ATTN: NPODS), 5801 Tabor Avenue, Philadelphia, PA 19120-5099.)

2.1.2 Other Government documents, drawings and publications. The following other Government documents, drawings, and publications form a part of this specification to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

AIR FORCE DRAWING

8838302 Fastener Quality Assurance Requirements

(Copies of drawings required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

DEPARTMENT OF TRANSPORTATION (DOT)

Materials Transportation Bureau, HM-144
Code of Federal Regulations, Title 49,
Part 179 and 231.

(The Code of Federal Regulations (CFR) and the Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for the issuance thereof.)

2.2 Non-Government publications. The following document(s) form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

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AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM E-11-58T Standard Specification for Wire-Cloth Sieves for Testing Purposes.

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

ASSOCIATION OF AMERICAN RAILROADS (AAR). Operations and Maintenance Department, Mechanical Division.

Interchange Rules.

Manual of Standards and Recommended Practices.

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

Section C, Part III, Specifications for Tank Cars, M 1002.

Section E Brakes and Brake Equipment.
S-400 Installation Specifications.
S-401 Basic Freight Car Brake Design.
S-475 Specifications for Geared Hand Brakes.

Section E, Part II Standards for Brake Shop Certification and Maintenance Requirements for Freight Car Air Brake Control Valves and Equipment.
S-486 Single Car Testing Device - Code of Tests for Freight Car Equipment.

(Application for copies should be addressed to the Association of American Railroads, Mechanical Division, 50 F Street N.W., Washington D.C. 20001.)

AMERICAN WELDING SOCIETY (AWS)

Railroad Welding Specifications D15.1

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

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents 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 (except for associated detail specifications, specification sheets or MS standards), 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.

3. REQUIREMENTS.

3.1 **Description.** The tank car shall be in accordance with CFR, Title 49, Specification DOT 105J500W and as specified in AAR Operations and Maintenance Department , Mechanical Division, Manual of Standards and Recommended Practices, and Interchange Rules, except where specified herein for transporting a minimum of 10,000 gallons of nitrogen tetroxide or the tank car shall be in accordance with

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CRT, Title 49, Specification DOT 105J500W and as specified in AAR Operations and Maintenance Department, Mechanical Division, Manual of Standards and Recommended Practices, and Interchange Rules, except downgraded as specified herein for transporting a minimum of 10,000 gallons of anhydrous hydrazine, unsymmetrical dimethylhydrazine or any mixture thereof. The tank car shall be capable of unrestricted interchange service.

3.2 **First Article.** When specified (see 6.2), a sample shall be subjected to first article inspection.

3.3 **Materials.** Materials shall be as specified herein. Materials not specifically covered by this specification or referenced specification shall be suitable in every respect for this type of equipment.

3.3.1 **Recycled, virgin and reclaimed materials.** All materials, equipment, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of rebuilt or used products is allowed under this purchase description.

3.3.2 **Material deterioration prevention and control.** When materials that are subject to deterioration when exposed to climatic and environmental conditions likely to occur during service usage are used, they shall be protected against such deterioration in a manner that shall in no way prevent compliance with the performance requirements of this specification. Protective coatings that will chip, crack or scale with extremes of climatic conditions shall not be used.

3.3.3 **Nonmetals.** Whenever possible, Teflon 100X, or equivalent, shall be used as gasketing. Teflon 1, or equivalent, may be used as an alternate. Other materials may be used as gasketing or packing provided that evidence of long-term compatibility with the tank contents is furnished in the test report specified in 4.4.2.

3.3.4 **Metals.** All metals that come in contact with the contents of the tank shall be ASTM 304L or 347 stainless steel. Wherever practical, lightweight metals shall be used in the construction of other parts of the tank car. All welded metallic parts in contact with the fuel or oxidizer liquid or vapor shall be ASTM 304L or 347 stainless steel.

3.3.5 **Dissimilar metals.** Unless protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

3.3.6 **Bonding.** All metal parts shall be specifically bonded together to prevent the possibility of sparking.

3.3.7 **Prohibited materials.** The following materials shall not be used in contact with either the fuel or the oxidizer:

- a. Stainless-steel containing more than 0.50 percent molybdenum.
- b. Hastelloys.
- c. Monel.
- d. Magnesium
- e. Zinc.
- f. Lead.
- g. Cadmium.
- h. Copper and its alloys.
- i. Iron.
- j. Plasticized Kel-F.

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4 **Design.** The tank car will be designed so that parts shall not work loose in service, and shall withstand the loads, shocks, vibrations, and other conditions incident to operation, shipping and stowage with minimum loss of time for maintenance, repair, and servicing. The design of the tank car shall ensure safe, efficient and economical operation. All assemblies, controls and installed equipment shall be located so that there will be no adverse interference with each other or with operations and shall be readily accessible for maintenance, operation, removal and replacement. The tank car shall meet all requirements of the AAR and DOT for this type of tank car. If the design is determined by the AAR to be of the new and untried type, all requirements to gain AAR interchange approval must be fully satisfied. A duplicate set of all correspondence, drawings and design calculations furnished to the AAR shall be submitted to the Contracting Officer.

3.4.1 **Functional design.** The tank car shall be a readily mobile 10,000 gallon minimum capacity self-contained storage and transport container designed for:

- a. Filling with the fuel or oxidizer at a supply site from an external pumping system.
- b. Transporting the fuel or oxidizer by rail to the using location.
- c. Unloading the tank car at a destination point from an external pumping system.

3.4.2 **Component design.**

3.4.2.1 **Pressure vessels and pressure relief devices.**

3.4.2.1.1 **Pressure vessels.** All tanks and appurtenances constructed shall comply with the applicable DOT specification and with the supplementary AAR requirements.

3.4.2.1.2 **Pressure relief devices.** A pressure relief device shall be provided in any line or component that can be isolated by closing valves or otherwise in which dangerous pressure could develop. All pressure relief devices shall be installed at readily accessible locations. All pressure relief devices shall conform to all requirements of the AAR and the DOT.

3.4.3 **Major components.** The vehicle shall consist of the following major components. Each component shall include all parts, controls, instruments and accessories necessary for its safe and effective operation.

<u>Item or System Name</u>	<u>See Requirement</u>
Fuel/Oxidizer tank	3.4.3.1
Loading/Unloading Piping system	3.4.3.2
Underframe, draft gear and couplers	3.4.3.3
Trucks and brake system	3.4.3.4

3.4.3.1 **Fuel/Oxidizer tank.**

3.4.3.1.1 **Tank design.** The tank shall be of the insulated, one compartment type having a liquid capacity of 10,000 gallons minimum and a vapor space of 3 percent of the total tank volume. The tank shall be constructed of sheet stainless steel in accordance with 3.1 and shall be sufficient to meet the strength requirement specified by the AAR and the DOT for the material being transported. The tank shall have a minimum life requirement of 40 years. The design of the tank insulation shall be based upon meeting the requirements specified in 3.4.3.1.2.

3.4.3.1.2 **Tank insulation.** The tank shall be insulated in such a manner as to prevent the temperature of the tank contents from rising from an initial temperature of 70°F to a final temperature of 100°F or above when the tank car is stored in an ambient temperature of 125°F for 48 hours. The insulation shall prevent the contents of the tank from falling below $\pm 40^\circ\text{F}$ when the tank car is operated under any temperature for

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48 hours within the range specified in 3.11. The insulating material shall be a type that will not settle, absorb moisture, burn or react with the oxidizer or the fuel liquid or vapor and shall be approved by the AAR and the DOT.

3.4.3.1.3 Jacketing. The insulating material shall be enclosed with stainless steel sheet covering that will constitute the external covering of the tank. The jacket shall conform to all AAR and DOT guidelines.

3.4.3.1.4 Manway nozzle, cover and protective housing. One circular manway nozzle shall be provided that shall conform to the DOT 105J500W tank car. The manway shall be so designed that water and dirt cannot collect and enter the tank when the cover is removed. The housing shall conform to all AAR and DOT regulations applicable to this type of tank car.

3.4.3.1.5 Ladder. A ladder of tubular steel or tubular aluminum construction shall be securely attached to either side of the tank to provide access to the manway nozzle from the ground and shall conform to all AAR and DOT regulations.

3.4.3.1.6 Tank bottom. The tank shall be equipped with a sloped bottom. The bottom shall provide a low point to permit complete drainage of the tank through the liquid line.

3.4.3.2 Loading and unloading piping system. All piping shall be AAR and DOT approved. The tank shall be equipped with the following piping and accessories:

3.4.3.2.1 Piping system design. All piping connections shall be welded wherever possible. Flanged joints shall be used where welding is impractical or will pose serious maintenance problems. Screwed joints shall be avoided.

3.4.3.2.1.1 Piping. All piping shall be schedule 10 seamless stainless-steel ASTM type 304L and shall be anchored securely in the tank to avoid breakage.

3.4.3.2.1.2 Shutoff valves. Shutoff valves shall be stainless-steel 150 pound ball valves. The ball valves shall be installed in the manway area to prevent loss of product in the event of pipeline damage. The ball valves shall be able to withstand the tank test pressure without leaking.

3.4.3.2.2 Liquid line. Two liquid lines shall be provided within the manway area. The liquid line shall be a 2-inch education line originating at the bottom of the tank, passing out through the top of the tank. AAR and DOT approved excess flow valves shall be provided which shall close automatically against the outward flow of the contents of the tank such as what may be encountered in case the external closure valve is broken off or removed during transit.

3.4.3.2.2.1 Liquid-line shutoff valve. The liquid line shutoff valve shall be a 2-inch valve conforming to 3.4.3.2.1.2.

3.4.3.2.2.2 Liquid line flange. The liquid line shall terminate in a 2-inch flange of the type specified in 3.4.3.2.7.1.

3.4.3.2.3 Vapor line. Two vapor lines shall be provided within the manway area. The vapor line shall connect the vapor space of the tank to a vapor line flange at the top of the tank car. The vapor line shall extend downward on the inside of the tank to the level at which the tank will be filled to rated capacity so as to prevent the tank being filled completely with liquid.

3.4.3.2.3.1 Vapor line shutoff valve. The vapor line shutoff valve shall be a 1-inch valve conforming to 3.4.3.2.1.2.

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3.4.3.2.3.2 Vapor line flange. The vapor line shall terminate in a 1-inch flange of the type specified in 3.4.3.2.7.1.

3.4.3.2.4 Sampling connection. The tank car shall have a coupling line originating at the bottom of the tank, passing out through the top of the tank in the manway area and terminating in a valve conforming to 3.4.3.2.1.2. This line shall include a 1/2-inch ball type shutoff valve. The quick-disconnect fitting shall be a 1/2-inch coupling, male half, Snaptite part number 2220-17 or equivalent item dimensionally and functionally. The sampling system shall meet all AAR and DOT requirements.

3.4.3.2.5 Tank pressure indicating equipment. The tank shall be equipped with instruments to indicate the internal pressure.

3.4.3.2.5.1 Pressure indicating equipment. The pressure sensing and indication equipment shall have a range from 0 to 500 psig in 10-psi increments and shall be located within the manway area.

3.4.3.2.6 Automatic pressure release valve. An automatic pressure relief valve shall be installed to vent the vapor space of the tank to the atmosphere when the internal pressure exceeds 375 ± 11.25 psig for a type I tank car or 225 ± 6.75 psig for a type II tank car. This valve shall close and reseal the tank after the tank pressure drops below the pressure range rating of the valve. The type I tank car shall also have a frangible disc in combination with the pressure relief valve. The valve arrangement and total valve discharge capacity shall meet all AAR and DOT requirements.

3.4.3.2.7 Flanges and flange gaskets.

3.4.3.2.7.1 Flanges. All flanges shall be 150-pound ASA raised face welding neck type with concentric serrations. Terminal flanges on any line shall have stainless steel bolts attached with the threads projecting outward.

3.4.3.2.7.2 Flange gaskets. All flange gaskets shall be virgin Teflon envelope type gaskets with asbestos filler.

3.4.3.2.8 Blind flange fittings. All flange openings must be equipped with a blind flange fitting. These plugs shall prevent entry of dust and dirt and escape of fumes and liquid from the valve. Where possible, the blind flange fittings shall be attached to the valve by a chain or other means to prevent their loss. The safety valve shall not have a plugging device.

3.4.3.2.9 Flange location and orientation. All flanges shall be located within the manway bonnet. All flanges shall be oriented such that the flange opening is parallel to the rail. The liquid/vapor flange arrangement shall conform to AAR and DOT requirements.

3.4.3.3 Underframe, draft gear and couplers.

3.4.3.3.1 Underframe. The underframe shall be stub sill-type of current design and meeting all AAR requirements.

3.4.3.3.2 Draft gear. The standard draft gear shall meet all AAR requirements.

3.4.3.3.3 Couplers. The couplers shall be of the top and bottom retention shelf type. Couplers shall comply with CFR part 179.14 as well as all applicable AAR requirements. A coupler restraint system that meets CFR part 179.105-6 shall be provided.

3.4.3.4 Trucks and brake system.

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3.4.3.4.1 Trucks. Trucks shall be AAR approved, stabilized, 100-ton capacity, 56-1/2-inch gage, with built in snubbing devices.

3.4.3.4.1.1 Wheels. Wheels shall be AAR approved, one-wear type, H-36 or CH-36.

3.4.3.4.1.2 Axles. Axles shall be AAR approved and be provided with journal roller bearings of the non-field lubricating (NFL) type.

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

3.4.3.4.2 Brake system. Brakes must comply with section E of the AAR Manual of Standards and Recommended Practices except where superseded by AAR Specification M-1001.

3.4.3.4.2.1 Airbrakes. Airbrakes shall consist of ABDW body-mounted freight equipment and be installed in accordance with AAR S-400, Installation Specifications. Brake beams shall be AAR No. 18 or higher capacity and marked "C" for AAR Manual of Standards and Recommended Practices composition brake shoes. Brake shoes shall be high friction composition type. Brake valves and breathers shall be protected from damaging effect of road splash.

3.4.3.4.2.2 Handbrake. The handbrake shall be a vertical wheel nonspin type with quick-release that meets AAR requirements for ratio and usage. Installation, construction and arrangement of the handbrake shall be as specified in AAR S-475, Specifications for Geared Hand Brakes and meet with FRA approval.

3.4.3.4.2.3 Braking force. Net airbrake and handbrake force, as determined by a static brake test, shall agree with AAR requirements as specified in AAR S-401, Basic Freight Car Design Data.

3.5 Construction

3.5.1 Tank construction. The tank shall be constructed to meet all the requirements of a DOT 105J500W tank car. The tank shall be of all welded construction. All weld joints shall be in accordance with the AAR. All weld beads shall be smooth and thoroughly cleaned. Spattering shall be removed from the tank.

3.5.2 Underframe construction. The underframe shall be constructed to meet all applicable AAR and DOT requirements. All weld joints shall be smooth and thoroughly cleaned. Spattering shall be removed from the tank.

3.6 Hardware

3.6.1 Component removal. To the maximum extent practical, it shall be possible to remove components and major assemblies without draining liquids or coolant or dismantling other assemblies. Major assemblies shall be equipped with lifting eyes or other suitable provisions for easy attachment of lifting devices.

3.6.2 Fastening devices. All screws, pins, bolts, nuts and other fastening devices shall be properly designed, manufactured and installed with adequate means of preventing loss of torque and adjustment. When subject to removal, replacement or adjustment, attaching hardware shall be easily removable and shall not be swagged, peened, staked or otherwise permanently deformed. All fasteners shall follow the quality assurance requirements in Air Force Drawing 8838302.

3.6.3 Lubrication. Roller bearings shall be grease lubricated in conformance to AAR requirements and applied in quantities approved by the bearing manufacturer. Truck center plates shall be lubricated in accordance with AAR recommended practices.

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3.4 Waterproofing. All components shall be designed and protected so their normal functioning shall not be impaired by rain, formation of condensation and leaks in the piping system.

3.6.5 Part numbering of interchangeable parts. All parts having the same manufacturer's part number shall be functionally and dimensionally interchangeable.

3.6.6 Parts control. The contractor shall participate in Government Industry Data Exchange Program (GIDEP) in accordance with MIL-STD-1556B. In the design of the vehicle, the contractor shall ensure the components selected have not been identified as a problem or unresolved deficiency by GIDEP. The contractor shall submit an Alert/Safe-Alert, on a DD Form 1939, whenever an actual or potential problem is evident with respect to a part, component, material, test equipment, process or safety condition. The contractor shall certify maximum use of off-the-shelf items in accordance with MIL-STD-965A.

3.7 Maintainability. The unit shall be designed and constructed to provide:

- a. A minimum number of parts consistent with the performance required herein.
- b. Parts and components that are located or positioned for ease of inspection and recognition of excessive wear or potential failure.
- c. Ease of adjusting, servicing, and replacing parts and components.
- d. Use of readily available standard tools and equipment for maintenance.
- e. Maintenance with a minimum number of tools.

3.8 Performance.

3.8.1 Storage and transport capacity. Under the conditions specified herein, the tank car shall be capable of:

- a. Receiving fuel/oxidizer at flow rates up to and including 60 gpm per line.
- b. Storing the fuel/oxidizer until needed.
- c. Transporting the fuel/oxidizer over rails to the using location.
- d. Discharging the fuel/oxidizer at rates up to and including 60 gpm per line.

3.9 Human factors.

3.9.1 Instruments, controls and accessories. All automatic and manual controls, instruments, fittings, safety devices and accessories needed for safe and efficient operation of the tank car shall be provided and shall be operable by personnel wearing chemical protective clothing and air breathing apparatus.

3.9.2 Position indicators. Manually operated controls that must be closely regulated for tank car operation shall be equipped with position indicators. The position indicators shall have graduations to permit accurately adjusting the controls to predetermined effective settings.

3.9.3 Installation. The pressure gauges and the other instruments shall be installed where they will not be contacted by fuel/oxidizer leaking from lines or connections.

3.9.4 Operating personnel. The tank car shall perform in accordance with requirements specified herein when attended by one operator.

3.10 Safety. All platforms, ladders and sill steps for the tank car shall be in accordance with all AAR and DOT requirements. Any safety features as required by the AAR and the DOT for this tank car shall be incorporated in the design and construction of the tank car. All space which is occupied or in which work is performed during operation, service and maintenance of the unit shall be free of hazardous protrusions, edges, cracks or other features that may cause injury to personnel.

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3.11 Environmental conditions. The tank car shall be capable of satisfactory performance under the following conditions:

- a. Temperatures ranging from -40 degrees to 125 degrees F.
- b. Exposure to relative humidities up to 100 percent.
- c. Exposure to salt fog atmosphere.
- d. Exposure to sand and dust particles as encountered in desert areas.

3.12 Dimensions.

3.12.1 Weight. The gross weight of the tank car and its accessories when filled to capacity with either the fuel or the oxidizer shall not exceed 263,000 pounds. The weight distribution of the loaded unit shall not be unbalanced, overloaded or improperly distributed.

3.12.2 Clearance. Clearance dimensions shall not exceed those shown on AAR Plates B and B1.

3.13 Curvature. The car shall negotiate a horizontal curve with a radius of 150 feet at light car condition and with 75 percent spring deflection, with no interference between brake equipment, trucks or underframe. Vertical curvature requirements shall be as set forth by AAR.

3.14 Cleaning, painting, plating, anodic films, and chemical treatments. Cleaning, painting, plating, anodic films, and chemical treatments shall be in accordance with MIL-STD-808 except that commercial components may be prepared in accordance with the manufacturer's standard practice, provided is it compatible with the exterior finish paint.

3.14.1 Finish. The exterior paint finish shall show no evidence of uneven application, curtains, runs, sags, orange peel, lack of adhesion, or other defect and shall be capable of passing the test described in paragraph 4.8.10 of MIL-C-83286.

3.14.2 Color. The jacketing of the tank car shall be painted with polyurethane paint, Gray, Color Number 16492 of FED-STD-595 and the underframe, trucks and other remaining surfaces shall be painted with polyurethane paint, Black, Color Number 17038 of FED-STD-595. The paint shall be in accordance with MIL-C-83286, or shall be a commercial polyurethane paint which meets the following requirements of MIL-C-83286:

- (1) Paragraph 3.7.3.4 Low temperature resistance.
- (2) Paragraph 3.7.3.6.1 Accelerated weathering.
- (3) Paragraph 3.7.3.7 Resistance to taping.

In addition, the paint shall have a minimum pencil hardness of 6H when tested in accordance with paragraph 4.8.12 of MIL-C-83286.

3.15 Marking.

3.15.1 Tank car marking. All markings shall be in accordance with MIL-P-53044 and all AAR and DOT requirements for this type of tank car.

3.15.1.1 The letters DODX and the registration numbers furnished by the procuring activity (see 6.2) shall be placed on the tank car in accordance with MIL-P-53044.

3.15.1.2 For a type I tank car and type II tank car, each end and each side of the tank car shall be marked as required by Code of Federal Regulations 49 CFR 172 and M1002, section L of the AAR.

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3.15.2 **Control marking.** All valves, gauges, controls and indicators used in operation of the tank car shall be identified by securely attached nameplates of such composition that exposure to oil, dirt, light, et cetera, will not fade or cause them to become eradicated. The use of tags will not be acceptable.

3.16 **Identification of product.** Equipment, assemblies and parts shall be marked for identification in accordance with MIL-STD-130.

3.17 **Welders and welding.**

3.17.1 **Welders.** All welders employed in the fabrication of the tank car shall be certified in accordance with applicable requirements specified in Section C, Part II and Part III of the Manual of Standards and Recommended Practices and as prescribed by the American Welding Society Railroad Welding Specification D15.1.

3.17.2 **Welding.** The surface of parts to be welded shall be free from rust, scale, paint, grease and other foreign matter. Welds shall transmit stress without permanent deformation or failure when the parts connected by the welds are subjected to test, proof and service loading.

3.17.3 **Cleaning.** Components of the tank car shall be thoroughly cleaned to remove dirt, excess soldering, brazing, welding flux, welding slag; loose, spattered, or excess solder; metal chips and other foreign materials before, during and after assembly.

3.17.3.1 **Interior cleanliness.** All surfaces in contact with the fuel/oxidizer shall be degreased, pickled (if applicable), rinsed and dried. The completed assembly shall be pressurized with dry nitrogen conforming to MIL-P-27401 to at least 10 psi and sealed after final inspection for contamination.

3.17.3.2 **Hydrocarbon and gross contaminants.** No corrosion products, metal chips, scale, weld slag, hydrocarbons, oil, grease, paints, preservatives, decals, or other foreign matter which constitutes a reactive or functional hazard to the equipment shall be present on significant surfaces when visually inspected using normal or ultraviolet light with or without magnification. Presence of any such contamination is cause for rejection.

3.17.3.3 **Total filterable solids.** The solids that will be retained on an HA or AA Millipore filter disc shall not exceed a maximum of 4 milligrams for each square foot of significant surface. During the last rinse and prior to drying, the effluent shall be passed through a 50-mesh sieve (ASTM Designation E11-58T, Fine series No. 50). For this purpose, the last rinse shall be performed with a minimum amount of fluid equivalent to 200 milliliters per square foot of surface. The sieve shall be examined with a 5 to 10 power magnifying glass. If no particles remain on the screen, the subsystem will be judged to be clean. Any particular matter retained on the sieve shall be cause for rejection or arbitration by means of a particulate count by the millipore method or equivalent to determine compliance with the following limits:

Particle Size (Microns)	Number per Square Foot
0 - 300	No Limit
300 - 500	20
500 - 1,000	4
1,000 - 1,500	1
over 1,500	0
Fiber Size (Microns)	Number per Square Foot
0 - 750 x 25	No Limit
750 - 2,000 x 25	40
2,000 - 6,000 x 40	4
6,000 - 9,000 x 40	1
over 9,000 x 40	0

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3.18 **Workmanship.** The tank car, including all parts and accessories, shall be fabricated and finished in a thoroughly workmanlike manner. Particular attention shall be given to freedom from blemishes, defects, burrs and sharp edges, accuracy of dimensions, radii of fillets, marking of parts and assemblies, thoroughness of soldering, welding, brazing, painting, wiring, riveting, alignment of parts and tightness of assembly screws and bolts.

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 (examinations and tests) 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 this specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 **Responsibility for compliance.** All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.2 **Classification of tests.** The inspection and testing of the tank car shall be classified as follows:

- a. First article..... See 4.4
- b. Acceptance tests..... See 4.5

4.3.1 **Apparatus.** Apparatus used in conjunction with the testing specified herein shall be of laboratory precision type and shall be calibrated at intervals properly spaced to ensure laboratory accuracy. Any fluid may be used prior to the final cleaning process so long as such fluid does not contaminate nor otherwise harm the tank car. When such fluids have a specific gravity less than that of a mixture of anhydrous hydrazine and UDMH or nitrogen tetroxide, additional weights shall be applied and distributed to simulate the rated load of the fuel or oxidizer. The test fluid shall be approved by the procuring activity.

4.3.2 **Data.** During all testing specified herein, at least the following data shall be recorded at intervals not greater than 30 minutes where applicable, except when shorter periods are a test requirement.

- a. Ambient temperature (°F).
- b. Fuel tank internal pressure (psig).
- c. Temperature of test liquid in fuel tank (°F).
- d. Fuel transfer pump flow rate (gpm).

4.4 **First article testing.**

4.4.1 **First article test sample tested by the contractor.** The contractor shall subject one tank car to the tests specified in 4.4.3.

4.4.2 **First article test report.** Upon completion of the first article tests, a first article test report shall be prepared in accordance with MIL-STD-831. An authorized Government representative shall countersign all data sheets and the report. The following shall be incorporated as a part of the test report:

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- a. All failures, maintenance and other events recorded shall be identified by accumulated operating time, miles, cycles, or position in the test procedure as appropriate. Test conditions during failures or irregular operations shall be recorded.
- b. Summary of the engineering reasoning and of any tests conducted to determine assignable causes for all failures and irregular operations identified.
- c. Summary of the engineering reasoning behind any corrections made to be made on production items, or proposed to be made, and the predicted effectiveness of those corrections.
- d. List of all cleaning and finishing procedures to be used in accordance with MIL-STD-808.
- e. List of special tools and diagnostic equipment necessary to perform field level maintenance.
- f. Estimates (± 5 percent of actual experienced) of manhours required for each maintenance and servicing action during the tests. A brief description of the qualifications and experience of the personnel involved shall be included and shall be adequate to permit comparison to the personnel anticipated in similar field work.

4.4.3 **First article tests.** The first article tests shall consist of all the tests described under 4.6.

4.5 **Acceptance tests.** The acceptance tests shall consist of the following:

- a. Individual tests..... See 4.5.1
- b. Periodic sampling plan and tests..... See 4.5.2.

4.5.1 **Individual tests.** Each tank car shall be subjected to the following tests as described under 4.6.

- a. Examination of product..... See 4.6.1
- b. Static pressure tests..... See 4.6.2.
- c. Mechanical Operation..... See 4.6.3.1
4.6.3.2

4.5.2 **Periodic sampling plan and tests.**

4.5.2.1 **Periodic sampling plan.** One tank car shall be selected at random from every fifth, or fraction thereof, produced and subjected to the following tests as described under 4.6.

- a. Mechanical Operation..... See 4.6.3.3
4.6.3.4
4.6.3.5
- b. Flow tests See 4.6.4

4.6 **Test methods.**

4.6.1 **Examination of product.** The tank car shall be inspected to determine compliance with respect to materials, workmanship, dimensions and markings specified herein.

4.6.1.1 **Pressure vessels and piping.** Certification required by the AAR shall be provided for all pressure vessels and piping. Copies of the certification shall be provided to the contracting officer.

4.6.1.2 **Cleanliness.** The interior of the tank, piping and hoses and shall be inspected to determine compliance with 3.16.2.1.

4.6.1.3 **Weight and capacity.** The tank car shall be filled with a fluid as defined in 4.3.1 and under a 10-psig pad pressure to rated capacity. The tank car shall then be weighed to determine compliance with 3.11.1 and the contents measured to determine compliance with 3.4.3.1.1.

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4.6.1.4 **Tank volume.** The tank shall be completely filled with water to determine compliance with 3.4.3.1.1. This determination may also be made by calculations to be submitted in a test report specified in 4.4.2.

4.6.1.5 **Coupler height.** The coupler height shall be measured to determine compliance with AAR requirements.

4.6.2 **Static pressure test.** The basic pressure vessel and all included connections thereto shall be subjected to an internal hydrostatic pressure of 500 psig for not less than 30 minutes.

4.6.2.1 **Leak test.** The assembled tank, piping and valves shall be subjected to the following leak test. The tank shall be filled to rated capacity with water and pressurized to 500 psig. All lines which will contain liquid or vapor shall be flooded or vented to the tank vapor space as applicable. Any leakage shall be cause for rejection.

4.6.2.2 **Repair and retest.** Any leaking component or joint shall be disassembled to determine the cause of the leakage and repaired. After repair, the item shall be tested and the reassembled system shall be retested as a system by the method described in the preceding paragraph. Leaking components shall be replaced rather than repaired when the cost of replacement is lower than the cost of repair.

4.6.3 **Mechanical operation.** A thorough check shall be made of the tank car to ensure the proper functioning of all mechanical parts, accessibility of all controls and levers, interchangeability of removable parts, installation of equipment without fittings and to effect every degree of safety and performance.

4.6.3.1 **Side bearing clearance.** Clearance shall be in accordance with AAR Manual of Standards and Recommended Practices. Nonconformance to AAR requirements or 3.4.3.4.3 shall constitute failure of this test.

4.6.3.2 **Airbrake.** The entire airbrake system shall be tested to ensure correct functioning of all component. The car shall be tested with a single car testing device in accordance with AAR S-486, Single Car Testing Device - Code of Tests for Freight Car Equipment. All pipe joints shall be tested for leaks at an air pressure of 90 psi. The brake cylinder piston travel shall be as specified by the manufacturer as shown on badge plate and shall be tested for interference and correct travel. Nonconformance to AAR requirements or 3.4.3.4.5.3 shall constitute failure of this test.

4.6.3.3 **Curvature.** The car shall be moved through a 150 foot radius horizontal curve. At maximum swing, the brake rigging shall be inspected to determine that clearances have been provided and that the brake systems function correctly. Nonconformance to 3.12 shall constitute failure of this test. Both the empty and full tank configuration shall be tested; blocks may be used to simulate the full load if necessary. Designated radius may be simulated on turntable or using cross-track method if necessary.

4.6.3.4 **Handbrake.** The braking force shall be determined and conform to AAR requirements for the type of system installed. The brake shoe pressure shall be determined at each wheel. Nonconformance to AAR requirements and 3.4.3.4.5.2 shall constitute failure of this test.

4.6.3.5 **Braking force.** With 50 psi brake cylinder pressure, the brake shoe pressure at each shoe shall be determined. Nonconformance to 3.4.3.4.5.5 shall constitute failure of this test.

4.6.4 **Flow test.** The following test shall be performed to determine compliance with the liquid line flow rate requirement of 3.6.2.2. The test liquid shall be pumped into the tank at the rate of 60 gpm per line.

4.6.5 **Automatic pressure release device operation test.** The automatic pressure release devices specified in 3.4.3.2.6 shall be installed in a test fixture and bench tested. Each automatic pressure release device shall demonstrate compliance with 3.4.3.2.6.

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4.6.7 Environmental tests. The tank car shall be subjected to the following environmental tests conducted in accordance with the specified procedures of MIL-STD-810. Failure criteria shall be defined as in section 4.5.7 of MIL-STD-810.

4.6.7.1 High temperature exposure and operation. The tank car shall be filled to rated capacity with the test liquid at 70°F. The high temperature shall be conducted in accordance with procedure I of MIL-STD-810, except the maximum temperature shall be 125°F. The temperature of the test liquid in the tank shall be recorded at intervals not greater than 30 minutes throughout the duration of the high temperature exposure and operation test. At the completion of the 48-hour period, the temperature of the test liquid in the tank shall be recorded to determine compliance with 3.4.3.1.2. With the temperature maintained at 125°F, the tests specified in 4.6.4 of this specification shall be satisfactorily performed.

4.6.7.2 Low temperature exposure and operation. The tank car shall be filled to rated capacity with the test liquid at 70°F. The low temperature tests shall be conducted in accordance with procedure I of MIL-STD-810, except change the -70°F soak to -40°F for 48 hours. The temperature of the test liquid in the tank shall be recorded at intervals not greater than 30 minutes throughout the duration of the low temperature exposure and operation test. At the completion of the 48-hour period, the temperature of the test liquid in the tank shall be recorded to determine compliance with 3.4.3.1.2. With the temperature maintained at -40°F, the tests specified in 4.6.4 of this specification shall be satisfactorily performed. All controls, levers and miscellaneous equipment shall be operated a sufficient number of times to ensure consistency of operation.

4.6.7.3 Humidity test. The humidity test shall be conducted in accordance with procedure I of MIL-STD-810. There shall be no excessive corrosion resulting from this test. An engineering evaluation concerning the ability of the equipment to resist exposure shall be considered as meeting this test.

4.6.7.4 Salt-fog test. The salt-fog test shall be conducted in accordance with procedure I of MIL-STD-810. After exposure, the assembly shall exhibit no effects of salt atmosphere of a deleterious nature. An engineering evaluation concerning the ability of the equipment to resist exposure shall be considered as meeting this test.

4.6.7.5 Sand and dust test. The sand and dust test shall be in accordance with procedure I of MIL-STD-810. No entrance of dust shall be permitted. An engineering evaluation concerning the ability of the equipment to resist exposure shall be considered as meeting this test.

4.7 Rejection and retest. When a tank car selected from a production run fails to meet the specification, tank cars still on hand or later produced shall not be accepted until the extent and cause of failure have been determined and appropriately corrected. The contractor shall explain to the Government representative the cause of failure and the action taken to preclude recurrence. After correction, all of the tests shall be repeated.

4.7.1 Individual tests may continue. For operation reasons, individual tests or other sampling plans may be continued pending the investigation of a sampling test failure. Final acceptance of tank cars on hand or produced later shall not be made until it is determined that all tank cars meet all the requirements of the specification.

4.7.2 Defects in tank cars already accepted. The investigation of a test failure could indicate that defects may exist in tank cars already accepted. If so, the contractor shall fully advise the procuring activity of all the defects likely to be found and the method of correcting them.

4.8 Inspection of preparation for delivery. The cleanliness, preservation, packaging and marking of these units shall be inspected to verify conformance to the requirements of the contract.

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5. **PACKAGING.**

5.1 **General.** Preparation for delivery shall be in accordance with the instructions of the procuring activity.

5.2 **Preservation, packing and marking.** Unless otherwise specified in the contract, each tank car shall be preserved and packed in accordance with AAR requirements for interchange service to a degree of protection to preclude damage to the tank car under normal shipping conditions to the DoD consignee within CONUS. Marking shall be in accordance with MIL-STD-129 and MIL-P-53044. The level of preparation for delivery marking shall be C/C. Labeling and placards shall be in accordance with CFR 49.

6. **NOTES.**

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 **Intended use.** The DOT 105J500W tank car is intended for use in rail transporting large quantities of either fuel or oxidizer from a supply site to using locations, and there either transferring the fuel or oxidizer into receiving containers or storing the fuel or oxidizer until needed, and at that time accomplishing the transfer.

6.2 **Ordering data.** Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Quantity and type of tank car required (see 1.2).
- c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- d. When first article tests may be waived if the contractor's item has previously passed the first article tests specified in the specification (see 3.2).
- e. Registration numbers required (see 3.15.1.1).
- f. The activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent Government mailing addresses for submission of data are listed in FED-STD-313.

6.3 **First article.** When first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item(s) should be a first article sample, a first production item, or a standard production item from the contractor's current inventory and the number of items to be tested as specified in 4.5. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examinations, approval for first article test results and disposition of first articles. Invitations for bids should provide that the Government reserves the right to waive the requirement for samples for first article inspection to those bidders offering a product which has been previously acquired or tested by the Government, and that bidders offering such products, who wish to rely on such production or test, must furnish evidence with the bid that prior Government approval is presently appropriate for the pending contract.

6.4 **Definitions.** For the purpose of this specification, the following definitions shall apply:

6.4.1 **Ambient conditions.** Ambient conditions are the dry-bulb temperature, wet-bulb temperature, and the relative humidity of the atmospheric air surrounding and in the vicinity of the tank car but unaffected by the temperature of any part of the tank car itself.

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6.4.2 Fuel. Anhydrous hydrazine, unsymmetrical dimethylhydrazine (UDMH) or any mixture of anhydrous hydrazine and UDMH.

6.4.3 Oxidizer. Nitrogen tetroxide.

6.4.4 Pressures. All pressures referred to herein, unless specified as absolute or denoted by the symbol psig, shall be interpreted as pounds per square inch (psi) gage.

6.5 Subject term (Key Word) listing.

Hydrazine
Nitrogen tetroxide
Stainless steel
Tank car

Custodian:
Air Force - 99

Preparing activity:
Air Force - 84

USER:
ARMY-ME

Project No: 2220-0002

(See Instructions – Reverse Side)

NN FORM 1120

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