

INCH- POUND

MIL-T-40632B  
7 August 1994  
SUPERSEDING  
MIL-T-40632A  
9 JUNE 1967

MILITARY SPECIFICATION  
FOR TRUCK, FORKLIFT, DIESEL ENGINE DRIVEN,  
120 INCH (3050 MM) LIFT HEIGHT,  
DS SAFETY RATED, PNEUMATIC RUBBER TIRES, ROUGH TERRAIN,  
FOR SHIPBOARD USE

This specification is approved for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 This specification covers the requirements for pneumatic-tired, diesel engine driven, "DS" safety rated, rough terrain forklift truck for use on board marine (shipboard) vessels.

1.2 Classification: The forklift truck shall have the lifting capacity and salient features as specified herein (see 6.2).

1.2.1 Lifting capacity.

1.2.1.1 Size A: 6,000 pound (2720 Kg) at 24 inches (610 mm) load center.

1.2.1.2 Size B: 10,000 pound (4540 Kg) at 24 inches (610 mm) load center.

Beneficial comments (recommendations, additions, deletions) and any other pertinent data which may be of use in improving this document should be addressed to: Department of the Navy, Navy Ships Parts Control Center, Code 0341, 5450 Carlisle Pike, P.O. Box 2020, Mechanicsburg, PA 17055-0788 by using the self addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N7031

FSC 3930

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

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## 2. APPLICABLE DOCUMENTS

2.1 Government Documents.

2.1.1 Specifications and standards 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, (see 6.2).

## SPECIFICATIONS

## FEDERAL

- |          |   |
|----------|---|
| QQ-P-416 | - Plating, Cadmium (Electrodeposited)   |
| TT-E-489 | - Enamel, Alkyd, Gloss, Low Voc Content |

## MILITARY

- |             |   |
|-------------|---|
| MIL-P-116   | - Preservation, Methods of  |
| MIL-V-173   | - Varnish, Moisture and Fungus Resistant  |
| MIL-P-514   | - Plate, Identification, Instruction and Marking, Blank   |
| MIL-S-901   | - Shock Tests, H.I. (High Impact) Shipboard, Machinery, Equipment and Systems; Requirements For |
| MIL-L-2104  | - Lubricating Oil, Internal-Combustion Engine, Combat/Tactical Service                          |
| MIL-L-2105  | - Lubricating Oil, Gear, Multi-Purpose  |
| MIL-G-3859  | - Grease Gun, Hand Operated, Lever, Push and Screw Type   |
| MIL-W-5044  | - Walkway Compound, Non-slip and Walkway Matting, Non-slip                                      |
| MIL-T-5624  | - Turbine Fuel, Aviation Grades JP-4, JP-5, and JP-5/JP-8ST                                     |
| MIL-F-16884 | - Fuel, Naval Distillate  |

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- MIL-H-17672 - Hydraulic Fluid, Petroleum, Inhibited
- DOD-G-24508 - Grease, High Performance Multi-purpose (metric)
- MIL-A-46153 - Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty Single Package
- MIL-E-52649 - Engine Cold Starting Aids, Ether Fuel Primers
- MIL-T-83133 - Turbine Fuels, Aviation, Kerosene Types, NATO F-34 (JP-8) and NATO F-35.

## STANDARDS

### FEDERAL

- FED-STD-H28 - Screw Threads Standards for Federal Services
- FED-STD-595 - Colors

### MILITARY

- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-130 - Identification Marking of U. S. Military Property
- MIL-STD-162 - Materials Handling Equipment: Preparation for Shipment, Storage, Cyclic Maintenance, Routine Testing and Processing
- MIL-STD-209 - Slings and Tiedown Provisions For Lifting and Tying Down Military Equipment
- MIL-STD-461 - Electromagnetic Emission and Susceptibility Requirements for the Control of Electromagnetic

### Interference

- MIL-STD-462 - Measurement of Electromagnetic Interference Characteristics
- MIL-STD-810 - Environmental Test Methods and Engineering Guidelines

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- MIL-STD-889 - Dissimilar Metals
- MIL-STD-1474 - Noise Limits For Military Material
- MIL-STD-1791 - Designing for Internal Aerial Delivery in Fixed Wing Aircraft
- MS-24207 - Coupling, Grease Gun, Hydraulic Type Nozzle
- MS-35000-3 - Battery, Storage, Lead-Acid, Waterproof
- MS-51113 - Switch, Vehicular Lights: 24 Volt (Waterproof)
- MS-51318 - Headlight: Blackout, 24 Volt, Waterproof
- MS-51330 - Stop Light-Taillight, Vehicular-24 Volt, Blackout Tail, Blackout Stop
- MS-51335 - Pintle Assembly, Towing, 18,000 lbs. Capacity, Manual Release
- MS-75058 - Connector, Receptacle, Electrical Slave, 2 Contact, 24 Volt, Waterproof

## MILITARY HANDBOOKS

- MIL-HDBK-267(SH) - Guide For Selection of Lubricants and Hydraulic Fluids For Use in Shipboard Equipment

(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 document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)  
29 CFR, Chapter XVII, Part 1910  
Occupational Safety and Health Standards  
(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

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2.2 Non-Government 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 are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of the documents not listed in the DODISS are the issue of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS STANDARDS (ASTM STANDARDS)

ASTM B633 -Electrodeposited Coating of Zinc on -Iron or Steel

(Application for copies shall be addressed to the American Society of Mechanical Engineers, United Engineering Center, 345 East 47th Street, New York, N.Y. 10017)

SOCIETY OF AUTOMOTIVE ENGINEERS HANDBOOK (SAE Handbook)

SAE J20 - Coolant System Hoses

SAE J154 - Operator Space Envelope Dimensions for Off-Road Machines

SAE J180 - Electrical Charging Systems For Construction and Industrial Machinery

SAE J185 - Access Systems For Off-Road Machines

SAE J198 - Windshield Wiper Systems - Trucks, Buses, and Multipurpose Vehicles

SAE J209 - Instrument Face Design and Location for Construction and Industrial Equipment

SAE J231 - Minimum Performance Criteria For Falling Object Protective Structure

SAE J383 - Motor Vehicle Seat Belt Anchorages-Design Recommendations

SAE J386 - Operator Restraint System For Off-Road Work Machines

SAE J429 - Mechanical and Material Requirements For Externally Threaded Fasteners

SAE J492 - Rivets and Riveting

SAE J514 - Hydraulic Tube Fittings

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- SAE J516 - Hydraulic Hose Fittings
- SAE J517 - Hydraulic Hose
- SAE J518 - Hydraulic Flanged Tube, Pipe and Hose Connections,  
Four Bolt Split Flange Type
- SAE J524 - Seamless Low Carbon Steel Tubing Annealed For  
Bending, Flaring
- SAE J525 - Welded and Cold Drawn Low Carbon Steel Tubing  
Annealed For Bending and Flaring
- SAE J534 - Lubrication Fittings
- SAE J536 - Hose Clamps
- SAE J541 - Voltage Drop For Starting Motor Circuits
- SAE J551 - Performance Levels and Methods of Measurement of  
Electromagnetic Radiation from Vehicles and Devices  
(20-1000 MHz)
- SAE J553 - Circuit Breakers
- SAE J585 - Tail Lamps
- SAE J586 - Stop Lamps For Use On Motor Vehicles
- SAE J598 - Sealed Lighting Units For Construction, Industrial  
and Forest Machinery
- SAE J636 - V-Belts and Pulleys
- SAE J637 - Automotive V-Belt Drives
- SAE J695 - Turning Ability and Off Road Tracking - Motor  
Vehicles
- SAE J833 - Human Physical Dimensions
- SAE J844 - Nonmetallic Air Brake System Tubing
- SAE J847 - Trailer Tow Bar Eye and Pintle Hook/Coupler  
Performance
- SAE J849 - Connection and Accessory Locations For Towing  
Multiple Trailers
- SAE J898 - Control Locations for Off-Road Work Machines

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- SAE J899 - Operator's Seat Dimensions for Off-Road Self-Propelled Work Machines
- SAE J917 - Marine Push-Pull Control Cables
- SAE J925 - Minimum Service Access Dimensions for Off-Road Machines
- SAE J1040 - Performance Criteria for Rollover Protective Structures (ROPS) for Construction, Earthmoving, Forest and Mining Machines
- SAE J1127 - Battery Cable
- SAE J1362 - Graphical Symbols for Operator Controls and Displays on Off-Road Self-Propelled Work Machines
- SAE J1378 - Electric Hourmeter Specification
- SAE J1398 - Stop Lamps for Use on Motor Vehicles 2032 mm or More in Overall Width
- SAE J1944 - Truck & Bus Multipurpose Vehicle Windshield Washer system
- SAE J2040 - Tail Lamps (Rear Position) for Use on Vehicles 2032 mm or More in Overall Width

(Application for copies should be addressed to the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001)

THE TIRE AND RIM ASSOCIATION, INC.

YEARBOOK

(Application for copies should be addressed to the Tire and Rim Association, Inc., 175 Montrose West Avenue, Suite 150, Copley, Ohio 44321).

UNDERWRITERS LABORATORIES, INC. (UL)

UL558 - Internal Combustion Engine - Powered Industrial Trucks

(Application for copies should be addressed to the Underwriters Laboratories, Inc., 333 Pfingsten Road, Northbrook, Illinois 60062)

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AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ASME/ANSI MH11.3 - Load Handling Symbols for Powered  
Industrial Trucks.

(Copies of ASME Codes may be obtained upon application to the American Society of Mechanical Engineers, 345 E. 47th St., N.Y., NY 10017.)

Association of American Railroads (AAR)

General Rules Governing the Loading of Commodities on Open Top Cars.

Section 1, Part 3 - Recommended Procedures for Conducting Field Impact Tests of Loaded Open Top Cars.

(Applications 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 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 documents and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS

3.1 First Article. When specified in the contract or purchase order (see 6.2), one preproduction sample truck shall be subjected to the first article inspection and tests as specified herein. At the manufacturers option, a second sample truck may be used for the electromagnetic interference (EMI), high shock, fording, air transportability and saline atmosphere tests specified herein.

3.2. Design. The forklift truck (hereinafter called the truck) shall be pneumatic tired, diesel engine driven, DS safety rated, 4-wheel drive, rigid frame with 4-wheel steering or articulated frame. The truck shall be capable of traversing rough terrains, fording water and shall be transportable by highway, marine, rail and air modes as specified herein. When specified for shipboard

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use (see 6.2), the truck shall also be designed to traverse shipboard ramps and for moving cargo on weather and hangar decks onboard marine vessels. These trucks shall be designed for the lifting capacity at the specified load center and to the specified full lift height without the use of outriggers or stabilizers. The lifting capacity for articulated frame steer shall be determined at full articulation of the frame. No adjustments or deration to the lifting capacity will be permitted for lift height, side shifters or any other factor specified herein. The use of stabilizers or outriggers is not permitted. Design of trucks covered by the specification and all components therein shall insure safe operation under marine service conditions. Truck shall be designed to permit selection and operation of travel, lift, steering, tilt, and side shift separately, simultaneously or combinations thereof.

3.3 Safety. Trucks shall conform to the applicable requirements of UL558 (Type DS) and OSHA Standards. The truck shall bear the UL label indicating their stamp of approval for the DS rating. All exposed parts subject to high operation temperatures or energized electrically shall be located, insulated, enclosed, or guarded so as to prevent hazards to personnel. All moving parts which are of such nature or so located as to be a hazard shall be enclosed or guarded. There shall be no exposed bolts, clamps, gages, fittings, lifting attachments, or appendages that can be caught or hooked while the truck is in operation. Protective devices shall not impair operating functions.

### 3.4 Environmental Requirements.

3.4.1 Operating Temperatures. The engine shall start within 5 minutes and the truck shall operate as specified herein within 15 minutes after engine start in any ambient temperature in the range of 0° F (-18° C) to +120° F (49° C). When specified (see 6.2), truck operating temperature range shall be minus 25° F (-32° C) to +120° F (49° C).

3.4.2 Storage Temperature. The truck shall not be damaged by storage under the following conditions:

Air Temperature	Time Period
+155°F. (+68° C)	4 hours daily
-65°F. (-54° C)	12 hours (no solar radiation)

3.4.3 Rain. When tested in accordance with 4.3.2.31 and Test Method No.11, the truck shall start within 5 minutes and operate as follows when exposed to a minimum 4 inch (100 cm) per hour rainfall:

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- (a). Without malfunction of any electrical component, gage or instrument.
- (b). Without leakage of water in the air-intake filter in excess of 8 percent of the fluid capacity of the sediment chamber.
- (c). Without leakage of water into the torque converter oil chamber, engine crankcase sump, transmission, transfer case, instruments, gages or fuel tank.

3.4.4 Fording Conditions. All components, assemblies and systems of the truck which would be damaged and could cause malfunction of the truck when exposed to fresh or salt water or submersed in fresh or salt water to a depth as specified herein shall be inclosed in a water resistant housing or jacket. Equipment inclosed in a water resistant housing or jacket which must be air vented shall have a vent tube or pipe extending above the fording depth to preclude the entry of water. The truck engine shall be capable of being started at full fording depth. All exposed components subject to contamination or corrosion from fresh or salt water shall be protected by use of corrosion-resisting plating or corrosion resisting treatment, except the wearing surfaces of functional chains, rollers and slides which shall be lubricated. The application of corrosion-resisting plating or treatment shall give protection to any part for its functional life. There shall be no evidence of water damage to, or water leaking into water resistant housings, water resistant jackets and closed tanks of the engine, transmission, torque converter, fuel system, brakes and hydraulic system or any evidence of water damage or corrosion of any truck part which affects operation of the truck and its ability to meet all the performance requirements specified herein.

3.4.5 Fungus and moisture resistance. The truck electric circuitry, controls and instrumentation including all components and connections, shall be protected from the effects of saline moisture and fungus growth by an overall treatment with a varnish conforming to MIL-V-173 with the following exceptions that:

- (a) Components or circuit elements that are inherently fungus and moisture resistant or which are hermetically sealed need not be treated.
- (b) Components or circuit elements whose functions will be adversely affected by the varnish coating shall not be treated. When used, the varnish shall be applied by spray, brush, or a combination of both to give a minimum dry-film thickness of .001 inch (.0254 mm) to component or element surfaces previously cleaned and prepared so that the surfaces are free from all foreign matter which would interfere with the adherence or function of the varnish.

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3.5 Human Factors Engineering. The characteristics of the truck shall provide for operation by personnel ranging from the small man (5%), clothed, through the large man (95%), clothed, in accordance with SAE J833.

3.6 Lubrication. All surfaces requiring lubrication shall be provided with a means for replenishing or replacing the lubricant. The truck shall operate as specified herein when lubricated with lubricants conforming to MIL-L-2104, MIL-L-2105, and DOD-G-24508 and military lubricants listed in MIL-HDBK-267 (SH). No other lubricants are permitted. The truck shall operate with lubricants suitable for the operating temperatures specified herein.

3.6.1 Pressure-Release Device. An automatic pressure-release device shall be provided where the use of pressure-lubricating equipment will damage grease seals or other parts furnished on the truck.

3.6.2 Lubrication Tag. The truck shall be equipped with a lubrication list tagged (installed) on the steering column to indicate which lubricant has been used in each lubricated component or system.

3.6.3 Lubrication Fittings. Lubrication fittings shall conform to SAE J534. Fittings shall be located in a protected position. Fittings shall be accessible to a grease gun conforming to MIL-G-3859, equipped with a hydraulic coupler conforming to MS 24207 and a 10 inch (254 mm) flexible extension. Accessibility to fittings shall be provided without the removal or adjustment of accessories or parts. Panels and plates equipped with hand-operated fasteners may be removed to provide accessibility.

3.7 Maintainability. Provisions shall be made for lubrication, adjustment, servicing, or replacement of all truck components subject to wear or maintenance. The truck shall not require scheduled maintenance at intervals of less than 100 hours operation. Reservoir level checks by the operator on a daily basis will not be considered scheduled maintenance. Equipment including, water pump, alternator, starter, thermostats,

batteries, battery cables, lights, filters, hoses, and drive belts shall be capable of being replaced with hand tools.

3.7.1 Enclosures with Integral Reservoir of Lubricant. Enclosures, such as gearcases, transmission housing, differentials and engine crankcase, which contain a integral reservoir of lubricant, shall be equipped with a magnetic drainplug having either tapered pipe threads or shoulder and gasket. The drainplug shall be located so that removal of the

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plug will result in complete drainage of the lubricant from the enclosure.

3.7.2 Access openings. When hand-access openings are used on the exterior of the truck, the edge of the opening shall be smooth and shall be provided with a removable or hinged cover, whenever it is required. Dimensions of access openings shall be in accordance with SAE J925 for a bare or normal clothed hand.

3.7.3 Drainage. Drains shall be provided to completely drain the engine fuel and cooling system, lubricants from the diesel engine and transmission, hydraulic system reservoir, and service brake system. Drains shall be capable of being drained into a container located on the ground without spillage on any part of the truck. When drains are located over other parts of the truck, integral tubes, pipes, troughs, or other means shall be used to convey the coolant or lubricant from the drain to the container. Drains shall be accessible without the requirement for removal or adjustment of accessories or parts other than opening covers. Drainholes with removable drainplugs or covers shall provide for complete drainage of all reservoirs without disconnecting any hoses. Drain plugs shall be removable with the use of handtools.

3.7.4 Replenishment. The diesel engine and transmission shall be capable of being replenished with lubricants without the requirement to remove any truck component. The hydraulic system reservoir and service brake system shall be equipped with not less than a 3/4 inch (19 mm) diameter fill port and with dipsticks or visible level indicators to determine fluid level. At a minimum, all truck dipsticks shall be graduated with a minimum of two marks indicating full and add levels. Dipsticks shall be accessible without the use of handtools.

3.7.5 Filters. Filters shall be accessible for removal without dismantling or removing other truck components and shall be located to permit replacement of filter element(s) or spin-on type filters.

3.8 Screw Threads. Screw threads shall be in accordance with FED-STD-H28. Except where otherwise specified herein, all hexhead cap screws shall be SAE grade 5 or 8 and marked. Bolts used for fabrication or assembly of major subassemblies which are not normally SAE 5 or 8 in production need not be SAE 5 or 8.

3.9 Plating. All threaded fasteners, hydraulic hose fittings, washers and cotter pins required to fabricate the truck, except those in contact with oils in reservoirs and those inside corrosion resistant components shall be zinc plated, cadmium plated or made of corrosion resisting material. When specified

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for shipboard use (see 6.2), zinc plating shall be in accordance with ASTM B633, type II, SC 3 and cadmium plating shall be in accordance with QQ-P-416, type II, class 2. For all other applications, zinc plating shall be in accordance with ASTM B633, type I, SC 1 and cadmium plating shall be in accordance with QQ-P-416, type I, class 3.

3.10 Oil Sampling Valves. Oil sampling valves shall be provided on the engine and transmission and shall have the capability of closing automatically when released. Valves shall be made of material resistant to corrosion such that it will not contaminate the sample. The valves shall be located in such a way as to insure operator safety when taking oil samples with the engine running.

3.11 Engine. The engine shall be diesel, water cooled, industrial type. The engine shall be capable of operating on the following fuels: Navy Distillate (F-76) conforming to MIL-F-16884, JP-5 (F-44) conforming to MIL-T-5624, and JP-8 (F-34) conforming to MIL-T-83133. Lubricating oil shall conform to MIL-L-2104. The power and speed rating of the engine shall be such that operation of the truck, under any of the operational requirements and conditions specified herein, will not require horsepower in excess of the intermittent horsepower rating of the engine for the applicable governed speed as established by the engine manufacturer. All other requirements including electromagnetic interference suppression, cooling system, fuel system, starting system and accessories shall be as specified herein.

3.11.1 Crankcase Ventilation System. The engine crankcase ventilation system shall prevent water from entering the engine during fording operations specified herein. When the crankcase vapors are directed into the induction system, means shall be provided on turbocharged engines to prevent choking of turbocharger blades. No vapors or condensation shall be deposited on, or come in contact with, the air cleaner element.

3.11.2 Oil Filters. Engine shall be equipped with full flow filter(s) with emergency bypass with either replacement element(s) or spin-on type filter(s). Filter capacity shall be in accordance with the engine manufacturer's recommendations. Oil lines, when applicable, to and from the filters shall be installed to minimize vibration and shall be of flexible hose with reusable fittings.

3.12 Governor. A governor shall be provided to limit the engine speed to not more than the intermittent duty speed recommended by the engine manufacturer with the truck operated under any condition specified herein.

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3.13 Starting system. The engine starting system shall be 24 volt and include battery or batteries, starting motor solenoid, starting motor, necessary wiring and cable, and starting motor switch. Cranking torque of the starting motor shall be sufficient to start the engine with battery specified for the truck when both engine and battery are exposed to the operating temperatures specified herein. Starting system circuit voltage drop shall not exceed the drops indicated in SAE J541. The starter motor shall be waterproof.

3.13.1 Alternator. An alternator in accordance with SAE J180 shall be provided to maintain a positive battery charge. It shall have output capacity sufficient to meet the electrical load required by the engine and to support the complete truck electrical system and accessories furnished with the vehicle plus a 25 percent reserve capacity. The alternator shall not utilize externally mounted selenium rectifiers. The alternator shall be driven by single or multiple V-belts in accordance with SAE J636 and SAE J637 to provide full alternator output at all engine speeds without belt slippage. A protective device shall be provided and matched electrically to the alternator so that the vehicle's electrical system including alternator is protected from damage when incorrect polarity is applied or arc welding maintenance repairs are performed anywhere on the equipment. Fuses are not acceptable. In lieu of a protective device to protect truck electrical system from arc welding repairs, a master manual electrical system switch may be provided.

3.13.2 Alternator regulator. An alternator regulator shall be furnished when required by the alternator and electrical system design. Provision shall be made within the electrical system for alternator voltage regulation, current limiting to protect alternator enclosed diodes or the alternator, disconnection of circuit to the alternator rotor when the starting switch is off, actuation of ammeter or charge indicator lamps and field current relay switch to prevent rotor current from passing through the ignition switch where applicable.

3.13.3 Battery. The truck shall be furnished with two (2) 12 volt waterproof batteries conforming to MS-35000-3, size 6TN, and arranged for 24 volt operation.

3.13.4 Battery Mounting. Battery mounting shall be in a weathertight compartment accessible for battery removal without chafing or other damage to the batteries. Batteries shall be located so they can be cleaned, serviced and removed without removing any component except the quick-release battery box cover when a separate battery box is provided. Battery supports, hold downs, and areas around the installation which can come into contact with dripping or seeping battery acid shall be protected

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with a acid resisting coating. The battery shall be mounted in such a manner as not to interfere with access to engine components or accessories. Battery mounting shall provide for complete support over the entire base of the battery and shall be in such a position that the level of the electrolyte is directly visible without removing the battery from its mounting bracket or requiring the use of tools. Battery restraining clamps shall be designed to hold the battery in a fixed position and prevent damage from any shocks and vibrations encountered during operations as specified herein. The battery compartment shall have provision for drainage and provision for gas venting at or near the top of the compartment. Cover and positioning shall be protected against short circuiting. The ungrounded cable shall be protected by rubber grommets or insulated passages at entry to the battery box.

3.13.5 Battery cables and terminals. Battery cables shall be in accordance with SAE J1127. Positive and negative cable terminals shall be identified. Terminals, secured with a plated, corrosion-resistant bolt and nut shall be provided on the ends of cables connected to the battery to facilitate disconnection and battery removal.

3.14 Fuel System. The capacity of the fuel tank shall provide a minimum of 8 hours continuous operation when tested as specified herein. If the fluid level of the tank is above the engine, the tank shall be provided with a hand operated fuel shutoff valve attached directly to the tank. The fuel tank cap shall be an approved DS safety rating cap. The fuel tank cap shall be marked "Diesel Fuel" with cast or embossed letters with a minimum of 1-inch (25.4 mm) lettering, or on a data plate near the fill pipe. A removable strainer shall be provided to fit inside the fill pipe under the fuel tank cap. The tank shall accept fuel from a nozzle of 1 3/4" (44.5 mm) diameter with air release clearances, and shall be located so that a person standing on the ground or a truck step can fill the tank using a 5-gallon (18.9 l) can. Fuel lines shall provide continuous operation at full throttle, at maximum loads, and during slope ascension specified herein. The fuel system shall include fuel transfer pump, a fuel strainer, air filter(s), fuel filter(s), water separator and a fuel injection pump with provisions for priming.

3.14.1 Air Cleaner. The engine intake manifold shall be provided with a dry-type air cleaner with replaceable element(s) and equipped with a dust scavenger. Air cleaner shall have sufficient capacity to allow the engine to operate under all conditions specified herein. The air cleaner shall be located or designed to prevent water from entering the cleaner when the vehicle is operated as specified herein.

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3.14.2 Air filter restriction indicator. A dirty filter restriction indicator shall be furnished and shall be mounted for unobstructed visibility.

3.14.3 Fuel strainer, filter and water separator. A fuel filter with replaceable element(s) and a water separator shall be provided in the fuel system. A fuel strainer shall be located between the fuel tank and the fuel pump.

3.15 Cooling System. The cooling system shall be of the closed-pressure type, incorporating a radiator, radiator pressure cap, hoses, thermostat, fan, and circulating pump. The cooling system shall maintain an air-to-boil temperature of greater than 110° F (43° C) when operated as specified herein. The truck shall function normally without overheating when operated under conditions as specified herein. The cooling system fluid shall be a solution of water and ethylene glycol conforming to MIL-A-46153 sufficient to protect the cooling system at the operating temperature specified herein.

3.15.1 Fan. The cooling system fan shall be a pusher type fan discharging away from the operator. The fan shall be belt driven rotating on anti-friction bearings, or electric motor driven controlled thermostatically. For a belt driven fan, belt take-up shall be at least 3 percent of the belt circumferential length, plus an allowance for replacement of new belts without forcing. The belts shall be clear of all other components within the adjustment range. Provisions shall be made for disengaging the fan when required for fording operations without affecting coolant circulation within the engine. When fan disengagement is required for fording it shall be manually controlled within reach of the seated operator. A warning light shall be furnished which shall indicate when the fan is disengaged. In lieu of fan disengagement, a welded wire or expanded metal guard to protect the fan and radiator from floating debris whenever fan blades are located below the fording depth is permitted. When an electric motor driven fan is provided, a wire guard shall be furnished to protect the fan blades.

3.15.2 Water Pump. The water pump shall be of the centrifugal type and driven by a single or matched multiple V-belts in accordance with SAE J636 and equipped with seals which prevent coolant leakage. The pump shall be corrosion resistant when exposed to water and ethylene glycol antifreeze mixture. A permanent (sealed) lubrication system or a pressure lubrication system with lubrication fittings shall be furnished.

3.15.3 Thermostat. The engine cooling system shall be equipped with a thermostat to automatically maintain cooling system temperature and pressure. The thermostat's temperature range and

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pressure rating shall be in accordance with the engine manufacturer's recommendations.

3.15.4 Radiator. The radiator assembly shall consist of a fin and tube-type core with an expansion tank and sediment tank. Where the top of the radiator is lower than the top outlet of the engine, a surge tank may be used. The radiator shall be mounted to prevent it from being damaged due to shock and racking during operation of the truck as specified herein. The radiator shall be protected by a shield, grilled guard or by the counterweight to protect the radiator during fording and from mud and gravel thrown by the tires. Hoses shall clear the forklift structure and other components under all operating conditions specified herein. The radiator shall include baffles and shroud when required to prevent recirculation of cooling air.

3.15.5 Gaskets, Seals, and Packing. Gaskets, seals, and packing used in the cooling system shall be made of materials which resist deterioration from mixtures of water and ethylene-glycol base antifreeze.

3.15.6 Engine Coolant Hose. All engine coolant hoses shall be SAE J20, Type SAE 20R1 or 20R2. All hose clamps shall be of the double wrap stainless steel type in accordance with SAE J536, type F, style 1, 2, or 4.

3.16 Exhaust System. The engine exhaust system shall be designed to prevent entry of rain into the exhaust system and to prevent accumulation of water and condensed vapors. The back pressure of the exhaust system, including muffler, shall not exceed the maximum recommended by the engine manufacturer when measured approximately 2 inches (51 mm) beyond the engine exhaust header outlet at any load up to rated net continuous load. The exhaust system shall connect to the engine exhaust header with a flanged connection. The muffler shall be independently supported around the body or muffler outlet. If the tailpipe is independent of the muffler or extends more than 12 inches (305 mm) from the muffler, it shall be supported. Exhaust gases shall be discharged vertically above the personnel cab roof when furnished (see 6.2) or at the rear or side rear of the truck within the plan outline of the truck. The exhaust system shall be arranged by either component location or guards shall be provided to prevent burns to the operator and maintenance personnel while working or operating the truck. Exhaust system shall conform to UL 558, Type "DS".

3.17 Cold weather system aids. The truck shall be equipped with cold weather system aids to meet the environmental requirements specified herein. Aids shall include battery blankets, glow plugs or fluid priming engine starting aids, engine oil heater,

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hydraulic system heater, engine coolant heater, and transmission heater. However, only the aids necessary to meet the temperature requirements specified herein (see 6.2) will be required. Heaters shall be electric and shall operate on 110 volt alternating, 60 cycle electrical current. When a fluid priming starting system is provided it shall conform to MIL-E-52649, Type III. The size of the primer shall be in accordance with the engine manufacturers recommendations. The primer shall be mechanically or electromechanically operated. When the primer is mechanically actuated, it shall be furnished with a total cable length not exceeding 6 feet (1.83 m) and a "tee" handle and when electromechanically actuated, it shall be furnished with a temperature control.

3.18 Drive assembly. The drive assembly shall consist of all components necessary to transmit engine torque to the four drive wheels. Drive assembly shall include four wheel drive, torque convertor, transmission, axle assemblies and drive shafts all of which are designed to accept full horsepower rating of the engine. Each gear, shaft, and axle shall be of hardened steel, mounted on anti-friction bearings and shall operate in lubricants conforming to MIL-L-2105 and DOD-G-24508. The entire power train shall be waterproofed to preclude the entry of water when operated as specified herein. All components of the power train when mounted on the truck shall be aligned true one to the other with no binding of any of the components within the power train. Driveshaft angles shall not exceed the component manufacturers recommendations. Axles shall be of sufficient strength to absorb shock under all conditions specified herein.

3.18.1 Transmission. The transmission shall provide minimum three forward and three reverse speed ranges. All transmission gears shall be constant mesh. Transmission shall be capable of attaining the speed specified herein in the highest forward gear with the engine operating at governed speed. The transmission shall allow for shifting under full engine power through all successive forward and reverse transmission gear ratios. The transmission shall provide controlled application of the clutches to provide smooth shifting and shall limit slippage which could damage the clutches. The transmission shall be protected from damage when the operator moves or attempts to move the directional control lever to the opposite direction while the forklift is in motion. Oil pressure for actuation of the transmission clutches, for torque converter supply, and for transmission lubrication shall be supplied by a mechanically driven pump. The transmission shall be provided with a clutch disconnect control. The disconnect control shall disengage the transmission and apply the service brakes while allowing the engine to be operated throughout the entire speed range. The disconnect control shall permit full lifting, lowering and

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tilting specified herein with rated load without truck movement while the disconnect control is engaged and the transmission control lever is positioned in either the forward or reverse positions. A water cooled heat exchanger shall be provided to limit transmission case pressure in accordance with the manufacturer's recommendation when required to meet the operating conditions specified herein. When a transmission breather is required, it shall be located above the fording water level specified herein.

3.18.2 Oil filter. Transmission and torque convertor fluid shall be filtered by a full-flow filter with a replaceable element(s) or spin-on filter having a minimum 25-micron nominal filter rating.

3.18.3 Towing front and rear axle disconnect. The truck shall be equipped with a front and rear axle disconnect suitable for constant use when the truck is being towed.

3.18.4 Universal Joints and Drive Shafts. Universal joints and drive shafts between the engine and transmission assembly and the outputs from the transmission to the front and the rear axles shall be of identical make and type. The universal joint operating angles shall comply with the recommendations of the drive line component manufacturer as well as the universal joint manufacturer. The universal joints and drive shafts shall not be used in any configuration that does not coincide with the manufacturers recommendations.

3.18.5 Front and Rear Axles. The axle manufacturer's recommended ratings for torque input, gearing, and beam loading shall be in excess of the actual maximum loads. The axle ratio shall be matched to the other drive-train components to meet or exceed the minimum performance specified herein. Both axles shall be of either the multiple reduction type having the final reduction in the hub ends, or a single reduction type. Front and rear axle components shall be interchangeable including the differentials, hub assemblies, bearings, seals, and tie rods. The tie-rod ends shall permit fine toe-in adjustment. The steering geometry of caster, camber, and toe-in shall be for optimum handling characteristics and tire longevity. Axles shall be sealed to prevent entry of water when operated as specified herein. Use of external boots to prevent water entry is not acceptable. Rigid frame axles shall be designed to permit cramping operations. Sway cylinders may be provided on front axle for truck oscillation when operating on a side incline.

3.18.6 Wheels. The truck shall be mounted on four hubs with demountable rim or disc type wheels. The wheels shall be

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fastened to the hubs in accordance with the axle manufacturer's standards for off-road applications. Wheels shall be in accordance with the Tire and Rim Association Yearbook and shall be of uniform size.

3.18.7 Tires. All tires shall be new, unused, and of uniform size with the same rated size and construction and shall be listed in the Tire and Rim Association Yearbook. Tires shall be pneumatic and tubeless with nondirectional tread. Valve caps shall be metal with elastomer innerseal. Hydroinflated tires are not acceptable. Tires shall include commercial anti-ozonant compounds in the rubber mixture. The front tire pressure shall be determined at gross vehicle weight (GVW) and the rear axle tire pressure at curb weight. When specified for shipboard use (see 6.2), the tire compound(s) shall be suitable for operation on non-slip compounds painted on the ship's decks.

3.19 Steering System. The truck shall be equipped with a hydraulic powered steering system which permits operation of truck at all speeds as specified herein. The system shall provide four wheel cramp or articulated frame steering. As viewed from the operator's normal seated position, when the steering wheel is turned clockwise, the truck shall steer to the right and when the steering wheel is turned counterclockwise the truck shall turn to the left. The steering system for both rigid and articulated frames must be operable with a dead engine and when the vehicle is being towed. The power steering actuation device shall be located such as to absorb all road shock without transmitting the shock effect to the steering wheel. The steering cylinders shall absorb all mechanical shock loads and steering force encountered during tests as specified herein.

3.19.1 Rigid Frame Steering. Rigid frame steering shall provide cramp steering (rear wheels turning in the opposite direction of the front wheels). Rigid frame steering linkage shall be of the modified Ackermann type with performance priority given to the front wheels. The steering system shall be provided with a hydraulic, follow-up mechanism to maintain a positive ratio between the amount the steering wheel is turned and the amount the front wheels turn. The control of the rear wheels shall be either hydro-mechanical or hydraulic.

3.19.2 Articulated Frame Steering. Articulated truck shall be center steer. The point of articulation shall be pinned for towing and shipping. Warning signs shall be placed at the point of articulation to prevent accidents. The steering system shall control the articulation.

3.20 Brakes. The truck shall be equipped with a four wheel service brakes, parking brake and deadman control.

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3.20.1 Service Brakes. The service brake system shall be either an air, hydraulic, or air over hydraulic. Brake system shall be independent of the hydraulic system and power train. Brakes shall be either the expanding drum or disc wheel type. Self-adjusting or manual brake adjustment shall be provided which permits a minimum of 90 percent contact of brake lining with the drum throughout the service life of the brake lining. When specified for shipboard use (see 6.2), a wet disc type brake system is not permitted. A dual (split) redundant hydraulic or air system shall be provided to independently activate the front and rear brakes to prevent complete brake failure in the event of failure in either circuit. The brake system shall be equipped with a flashing red or amber warning indicator light which shall be energized in the event of a loss of hydraulic or air pressure in either brake circuit. The service brakes shall function with either a dead engine or when the engine stalls. A flashing low air pressure red or amber warning light shall be located on the dash board to indicate inadequate air pressure for brake operation. When the truck is equipped with air actuated brakes the air compression system shall contain either an alcohol injection or an automatic drain system to insure cold weather operation as specified herein. When the truck is equipped with hydraulic actuated brakes a dual master cylinder or two separate master cylinders shall be furnished. Locking nuts and flat washers shall be used on all bolts and studs to prevent loosening due to vibration or any other cause. Brake system materials shall be corrosion resistant to prevent contamination and corrosion resulting from fording operations in both salt and fresh water. The corrosion resistant finish shall protect all parts for their functional service life.

3.20.2 Service brake holding device. The service brake system shall be equipped with a control which permits the wheel brakes to remain activated after the operator force has been removed from the foot brake pedal. Control shall be located within reach of the seated operator.

3.20.3 Parking Brake. A mechanical activation system shall be provided which shall actuate the service brake system. The parking brake shall be connected to the service brakes by a cable and conduit assembly actuated by a hand lever or foot operated pedal equipped with a locking device. The hand lever or foot lever shall be located within reach of a seated operator. Adjustment of parking brake activation system shall be provided.

3.20.4 Deadman control. When specified for shipboard use (see 6.2), a deadman control shall be provided such that upon removal of the operator's weight from the operator's seat the deadman control shall automatically apply the service brakes and return the transmission to neutral when the engine is running. On

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mechanically activated transmissions, the directional control lever shall be automatically returned to the neutral setting when the control lever is positioned at any setting other than neutral. Visual examination shall confirm the transmission control lever has been reset to neutral. On electrically activated transmissions, the control lever need not be returned to neutral but a flashing red or amber indicator light located on the instrument panel shall alert the operator the transmission is in neutral regardless of the position of the transmission control lever. A nameplate located adjacent to the flashing light shall instruct the operator he must first reset the transmission control lever to neutral prior to selecting a directional mode. In no case shall either the mechanical or electrically activated transmission automatically return the transmission to any directional mode with the return of the operator's weight to the seat. A manual release or override of the deadman control shall be furnished.

**3.21 Hydraulic System.** The hydraulic system shall consist of all hydraulic components necessary for operation of the forklift and steering system but shall not include the brake system and power train components. The truck shall be equipped with a fail-safe hydraulic system. In the event of engine or hydraulic system failure or hydraulic fluid loss, a raised load of rated capacity shall not be lowered until the system is manually overridden by the operator. Hydraulic system fluid shall conform to MIL-L-2104 or MIL-L-17672. The system shall have a maximum working pressure (relief valve setting) which is not in excess of 3,000 psi (20.7 MPa). The temperature of the hydraulic fluid shall not exceed 220°F (104°C) above ambient. All system hoses and fittings which are subject to full system pressure shall withstand a proof pressure which is equal to or greater than 2 times the maximum working pressure without external leakage, damage, or permanent deformation. Tubing or pipe and fittings shall have a minimum burst pressure which is equal to or greater than 3.5 times the system maximum working pressure. The hydraulic system shall be free of foreign matter, including weld slag and spatter.

**3.21.1 Hydraulic Lines.** Hydraulic lines shall consist of tubing, hose and field attachable (reusable) fittings. Hose or a combination of hose and tubing shall be used between components which are not mounted to a nonflexing, rigidly connected structural member or rigidly connected subassembly. All lines shall be routed to provide the minimum number of bends, ease of maintenance, and maximum protection. Provisions shall be made to prevent damage of lines due to chafing. The hose installation, such as angle of fittings and location, shall cause no stress concentration on the hose at the fitting, and the hose shall be

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supported to eliminate sagging at the fitting. All lines, other than suction lines, return lines and cylinder bleeder lines, shall be considered pressure lines.

3.21.2 Pressure Hose Assemblies. Pressure hose shall be as specified in SAE J517, except 100R7 type hose is not acceptable. Hose inside diameter shall be limited to 1/4, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-1/2, and 2 inches. The hose installation shall not cause the hose to be bent beyond the minimum bend radius specified in SAE J517.

3.21.3 Pressure Hose Fittings. All pressure hose assemblies shall be equipped with field attachable (reusable) fittings. Permanently attached type hose fittings will be acceptable when furnished as specified herein. All fittings shall be 37-degree flare, female swivel or 4-bolt split flange as specified in SAE J516.

3.21.4 Pressure Tubing. Pressure tubing shall be in accordance with SAE J524 or SAE J525 for hydraulic pipe and shall meet the requirements specified herein. Pressure tube sizes shall be limited to 1/4, 5/16, 3/8, 1/2, 5/8, 3/4, 7/8, 1, 1-1/8, 1-1/4, 1-1/2, and 2 inches. Tubing or pipe shall be clamped by cushioned, threaded fasteners. All bends shall be smooth without flattening, kinking or wrinkling of the tube.

3.21.5 Pressure Tube Fittings. Pressure tube fittings shall be 37-degree flare or 0-ring boss conforming to SAE J514, or 4-bolt split-flange conforming to SAE J518. Jump size tees may be used. 4-bolt split-flange connections may terminate in either a flange head which incorporates a SAE J518 mating face or a flange head which integrally incorporates four bolt holes and an 0-ring groove for mating to a SAE J518 port face. Pressure tube fittings which incorporate the SAE J518 connection shall contain a boss into which the tube shall be brazed or welded.

3.21.6 Suction Lines. The pump suction line (pump inlet line) shall include provision for flexibility when there is vibration or movement between the reservoir and the pump. The suction line shall be sized so that the minimum pump inlet pressure does not fall below atmosphere by more than 7 in.Hg (178 mmHg) of mercury vacuum at 150°F (66°C) + 10°F (5°C) oil temperature and at governed engine speed. The suction line installation shall include no stress concentrations at the end fittings with no kinks. Suction hose shall conform to SAE J517, 100R4. The suction line assembly shall withstand a minimum of 25 in.Hg (635 mmHg) of mercury vacuum without evidence of leakage or collapse.

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3.21.7 Suction Hose Clamps. Suction hose clamps shall be of the double wrap stainless steel type in accordance with SAE J536, type F, style 1, 2, or 4.

3.21.8 Low Pressure Pilot Lines. Low pressure pilot lines shall conform to SAE J844, type 3. Low pressure pilot lines are defined as air lines (other than brake system lines) or hydraulic lines other than suction lines, return lines or cylinder bleeder lines whose maximum working pressure does not exceed 250 psi (1724 kPa). Tubing in accordance with SAE J844 shall have a working pressure equal to or less than one quarter of the minimum burst pressure specified in SAE J844. The tubing installation shall not cause the tube to bend beyond the minimum bend radius specified in SAE J844. The tubing installation shall be such that the tubing is supported to prevent abrasion against any metal part and to prevent kinking and stress concentration at a fitting. The tube fitting shall have an internal tube support.

3.21.9 Return Lines. Return lines shall be in accordance with SAE J517, except 100R7 type hose is not acceptable.

3.21.10 Hydraulic Pump(s). Hydraulic flow and pressure used for hydraulic functions shall be furnished by hydraulic pump(s) gear driven by the engine or transmission. The hydraulic pump(s) shall withstand a minimum proof pressure of 2 times the maximum system working pressure without permanent deformation, damage, or external leakage.

3.21.11 Filters. The hydraulic system shall be equipped with a minimum of one hydraulic filter type as specified herein. Filter(s) shall be either the replaceable element(s) type or spin-on type filter.

3.21.11.1 Return Line Filters. The filter shall maintain full flow condition during normal operation. The filter bypass shall open for system oil at a temperature less than 70°F (21°C). The filter element shall function properly at a flow rate equal to or greater than the truck(s) maximum system oil flow at; (1) maximum governed engine speed or, (2) lowering rated load at engine low idle speed, whichever is greater. All return oil shall pass through the filter except relief oil which may return directly to the reservoir. At the maximum system oil flow through the filter, including lowering rated load at maximum governed engine speed and oil temperature of 150°F (66°C) + 5°F (3° C), the pressure drop across a new filter assembly shall not exceed 20 psi (138 kPa). An automatic bypass shall be provided in the filter and shall open a minimum of 10 psi (69 kPa) greater than pressure drop measured across new filter assembly. The filter shall permit full flow at a pressure less than or equal to 35 psi (241 kPa). The filter housing shall have a minimum proof

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pressure of 100 psi (690 kPa) without permanent deformation, damage, or leakage. The filter shall be equipped with a contamination indicator which may be remotely mounted.

3.21.11.2 Suction Line Filter/Strainer. The suction line between the reservoir and the pump shall be equipped with a removable 50 mesh or finer strainer, or a suction filter conforming to 3.21.11.1 with the following exceptions:

(a). Pressure drop across a new filter assembly shall not exceed 0.75 psi (5.2 kPa).

(b). The automatic bypass shall open at a pressure over 2.0 psi (13.8 kPa) and shall permit full flow at pressures less than 3.5 psi (24.1 kPa).

(c). The filter housing shall have proof pressure greater than 30 psi (207 kPa).

(d). The filter elements shall have a terminal pressure drop of 2.5 psi (17 kPa), an average filtration ratio equal to or greater than 2.2, and flow fatigue capable of withstanding 7500 cycles without deformation or defective medium.

3.21.11.3 Pressure Filter. The pressure filter shall conform to 3.21.11.1 except that proof pressure test shall be 150 percent of system maximum working pressure.

3.21.12 Hydraulic system contamination indicator. The hydraulic system shall include a signal mechanism or contamination indicator to indicate when filter maintenance or replacement is required.

3.21.13 Reservoir. A reservoir shall be furnished to contain the hydraulic system oil. The reservoir shall include a filler opening, screen, cap, and other items required to function as specified herein. The reservoir shall be rigidly mounted to prevent vibrations which could result in loosening of fasteners, brinelling of material, leaks, or cracks. The location shall not impair operational visibility to either side of the operator's compartment. The reservoir shall have sufficient capacity to prevent air entering the system with all hydraulic pistons fully extended, and sufficient free air capacity to prevent oil being discharged through the reservoir air vent when maximum return flow of oil is surged into the reservoir from the system. The filler cap and tube shall be located to provide for filling from a standard 5 gallon (19 l) container, and to prevent entrance of contaminants throughout filling and checking operations. The reservoir fill neck shall contain a removable 30 mesh, or finer, strainer retained in

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place. The filler tube shall be not less than a 1 inch inside diameter. The reservoir pump suction openings shall be located a minimum of .375 inches (9.5 mm) above the bottom of the reservoir. Except for sealed reservoirs, a breather with a pleated paper element with a minimum filtering surface area of 200 square inches (129,000 square millimeters) shall filter incoming air. The breather shall preclude the entrance of water induced by rain. The reservoir shall provide an indirect flow path from the reservoir inlet to outlet ports. All return line flow except the vent line shall discharge into the reservoir at a level which is below the oil level in the reservoir, when the lift cylinder is at maximum extension. A removable 50 mesh, or finer, strainer, shall be installed in the suction line between the reservoir and the pump unless a suction line filter in accordance with 3.21.11.2 is furnished. The reservoir shall have a minimum of one access for manual cleaning of the reservoir interior.

**3.21.14 Relief Valve.** A hydraulic-system relief valve shall be provided to protect the hydraulic system from excessive pressure. The valve shall have a reseal pressure greater than 85 percent of rated flow pressure settings at an oil temperature of 150°F (66°C) + 10°F (5°C). The response of the valve shall be such that no pressure peaks shall exceed 150 percent of the relief pressure.

**3.21.15 Hydraulic Accumulator.** If hydraulic check valves are not furnished in the hydraulic system, a hydraulic accumulator shall be provided to eliminate lift mechanism shock. When a hydraulic accumulator is required to retain pressure in the hydraulic system after the engine dies, a means shall be provided to relieve the pressure to permit maintenance operations and to prevent loss of fluid during servicing.

**3.21.16 Hydraulic Control Valves.** Mounting of the valves shall be rigid and shall permit no vibration which may cause instability of the controls. All control-valve spools shall be spring centered with sufficient force to return the levers to the center position and retain them there throughout all operations. Spools shall not bind under the operating conditions as specified herein.

**3.21.17 Cylinders.** All hydraulic system and steering cylinders shall be fabricated from either seamless steel tubing, or welded and redrawn tubing. All welding and brazing to the cylinder within the zone of piston operation shall be located to provide for ease of maintenance and replacement. All internal cylinder ports shall be located beyond the area of piston travel. Each cylinder shall have a wiper to prevent foreign material and fluids from entering around the piston rod damaging the seal and

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other cylinder components. All hydraulic system and steering cylinders shall be capable of meeting all performance requirements as specified herein without buckling or bending. Each piston shall have a bearing surface concentric with the piston to carry the piston side loads against the cylinder walls. The bearing surface shall be of a material which will not scar, score, or gall the inside surface of the cylinder. All cylinder rods shall be hard chrome plated. Plating shall be electro-deposited hard chromium finish, having a uniform thickness of not less than 0.0005 inch (0.013 mm). All cylinders shall withstand a pressure that is equal to 150 percent of the system relief valve setting without evidence of rupture, permanent deformation, damage, or external leakage. Lift cylinders, if single-acting type, shall provide a bleeder line to the reservoir, or an internal valve to return oil which bypasses the piston, unless a bleeder is provided as an integral part of the cylinder.

3.21.18 Hose Reels. When hydraulic hose reels are required on the mast to maintain hose tension during mast extension, sheave wheels, guide rollers, guide blocks, or other means shall be provided to prevent the hose from becoming entangled around and riding over the reels or reel flanges. Hose reels shall be mounted such that they are within the plan outline of the truck for all positions of the forks. All hydraulic lines shall be secured and protected to prevent damage due to chafing.

3.22 Forklift mechanism and carriage assembly. The forklift mechanism shall be hydraulically operated and shall be either a telescoping lever arm and carriage assembly or a lifter arm linkage and carriage assembly. Either type forklift mechanism shall not permit the truck or the operator to extend the mechanism past the point of the specified fork reach such that the truck rated lifting capacity would be reduced.

3.22.1 Tilt mechanism. The lift mechanism shall include a means for tilting the forks upward and downward of the horizontal to the degree specified herein. The forks shall remain tilted without movement during engine or hydraulic system failure. The forks shall tilt fully upward and downward at all lift heights above 24 inches (610 mm) from the ground. The fork tilt angle shall be automatically maintained to be the same throughout the entire lift range.

3.22.2 Carriage. The lift mechanism carriage shall provide a vertical support for the load to rest against when tilted to the rear. When the carriage is sideshifted to the maximum travel in both directions, the carriage shall not extend beyond the outside edge of either front tire. The carriage shall be positioned on the lift mechanism so that a centered load wider than the truck

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and the carriage will not interfere with the front tires or any other portion of the truck when operated as specified herein.

3.22.3 Load backrest. A removable load backrest fastened to the top of the carriage shall be provided. The load backrest shall be the same width as the carriage and shall extend from the top of the carriage to a height of 48 inches plus or minus 1/4 inch (1220 mm plus or minus 6 mm) above the load carrying surface of the forks.

3.22.4 Sideshift mechanism. A hydraulically powered sideshift mechanism shall be provided which will permit lateral displacement of the rated load from the centered position to the right and left to the distance specified herein. The carriage shall not extend beyond the outside of either drive tire when the sideshift is positioned to the maximum right or left sideshift position.

3.22.5 Fork Positioner. A hydraulically powered fork positioner shall be provided which will permit the forks to be laterally spaced to the distance as specified herein.

3.22.6 Forks. Forks shall be attached to the carriage in a manner which prevents lateral movements of the forks, except when fork positioner is activated by the operator. The lift mechanism shall provide an automatic means for keeping the forks level throughout the entire lift unless remotely adjusted by the operator. The taper shall be on the underside of the forks and shall be not less than 14 inches (360 mm) long measured from the tip of the fork. The fork tips shall be chamfered or rounded to break corners and provide smooth edges. The fork tip when measured from the top of the forks, shall be not more than 5/8 inches (16 mm) inch thick. Fork dimensions shall be as specified herein.

3.23 Frame and Body Assembly. The frame and body assembly shall be designed and fabricated to meet all requirements specified herein.

3.23.1 Frame oscillation. The truck shall be provided with truck frame oscillation to permit operation on a side slope as specified herein. The frame and body assembly shall be free to pivot on the center suspension pins through the action of hydraulic powered sway cylinders connected between the front axle and the frame. Rotational motion of the frame and body assembly about the pivot point shall be not less than specified herein.

3.23.2 Fork oscillation. Fork oscillation to permit operation on a side slope as specified herein may be used in lieu of frame oscillation. The fork oscillation hydraulic cylinder(s), hose

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lines and hydraulic controls shall be connected into the truck hydraulic system as specified herein. There shall be no evidence of permanent deformation or structural failure of the frame and body assembly due to fork oscillation when operated as specified herein.

3.23.3 Engine Cover. The engine shall be protected by a metal hood cover and metal sideplates. The hood cover and sideplates shall be quick opening. The hood and side plates shall be held in the open position by counter-weight(s), spring and linkage mechanism(s), gas cylinder(s), latch(es), or by brace(es) all of which cannot be inadvertently released while servicing the truck. The hood cover and sideplate shall be easily opened and removed by one man. Handtools shall not be required for release of quick-opening hood and sideplates. If single finger-ring lift latches are provided, the force required to release or fasten the latches shall not exceed 15 pounds (67 N). When hood cover and sideplates are open, all engine accessories shall be accessible in accordance with SAE J925 without requiring the removal of any additional truck structure. The hood cover and sideplates shall be secured in a manner to prevent vibrations.

3.23.4 Wheel Guards. Metal wheel guards shall be provided to prevent foreign objects and road splash from being discharged in the direction of the operator. The wheel guards shall be constructed to prevent vibration under operating conditions as specified herein.

3.23.5 Operator Access. Operator-access systems to the truck shall be in accordance with minimum requirements of SAE J185. A grab handle shall be provided on the exterior of the truck to assist the operator in entering the drivers area. Also a step(s) shall be provided which will not interfere with any other truck component nor be part of any other truck component.

3.23.6 Seat. A cushion seat and backrest shall be furnished in accordance with the requirements specified in SAE J898 and SAE J899 except armrests are not required. The seat shall have a fore and aft adjustment of 4 inches (100 mm) minimum and shall be adjustable by the operator without the use of tools.

3.23.7 Seatbelt. An adjustable, weather-resistant seatbelt with a corrosion-resistant, metal-to-metal, quick-release buckle conforming to SAE J386, Type I shall be anchored to the truck floor in accordance with SAE 383, Figure 1.

3.23.8 Pintle Hook. A rear mounted pintle hook conforming to MS51335 shall be provided. The pintle hook shall be located on the vertical center-line of the forklift between 31 inches (790 mm) minimum 37 inches (940 mm) maximum above ground level.

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3.23.9 Towbar. When specified (see 6.2), the truck shall be equipped with a towbar for towing at the speed as specified herein. Towbar shall be of an A-frame or V-frame design, hinged at two points on the forklift, and with a solid towbar eye in accordance with SAE J847. The towbar shall provide for towing by trucks with pintle locations in accordance with SAE J849, and shall provide for a turning clearance area. A lockup latch shall be provided to secure the towbar in a vertical position when not in use. Two safety chains equipped with safety type grabhooks, shall be furnished; and each chain shall be of an ultimate strength equal to or greater than the weight of the forklift. When the forklift is being towed it shall track the towing vehicle within the width of the forklift tire.

3.23.10 Slings and tiedown Attachments. Slings and tiedown provisions shall be provided which permit the truck to be lifted in its normal travel position and to be fastened to the floor or deck of a transportation medium. Provisions shall conform to MIL-STD-209, class 1, 2, or class 3 for type II or III equipment, including air transport requirements. When required due to truck size and weights, slinging and tiedown sizes may be increased above the sizes indicated in MIL-STD-209. However, increased slinging and tiedowns must still meet the strength requirements of MIL-STD-209 and MIL-STD-1791. When the truck must be sectionalized to meet transportability requirements, truck components in excess of 2500 pounds (1130 kg) must also be provided with slinging and tiedown provisions. When specified for shipboard use (see 6.2), the truck tiedowns shall also meet the requirements of a Grade A item in Type A HI (high-impact) shock specified in MIL-S-901.

3.23.11 Roll Over Protective Structure and falling objects protective structure (ROPS and FOPS). The truck shall be equipped with a complete ROPS and FOPS conforming to the requirements for loaders indicated in SAE J154, SAE J231 and SAE J1040. Installation and removal of the ROPS/FOPS shall be accomplished without requiring cutting or welding. The ROPS/FOPS shall be free from sharp edges at any point where a sling can come in contact during lifting operations.

3.23.12 Handtool box. A hand tool box with provisions for drainage with a hinged cover and a hook fastener shall be provided. The tool box shall be bolted or welded to the truck in a protected location.

3.24 Weighing device. When specified for shipboard use (see 6.2), Type A truck shall be equipped with a weighing device to measure the amount of weight on the forks. The weighing device shall be connected to and operate from the system for raising and lowering the forks. Either a digital readout or a bourdon tube

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dial indicator shall be provided as specified herein. The entire instrument and connections shall be moisture and weather resistant. The readout shall be readable by the operator when in the seated position.

3.24.1 Dial indicator. The dial shall be not less than 12 inches (305 mm) in diameter and the increments shall be marked in 50-pound (23 kg) increments maximum. The dial shall be capable of being rotated 360 degrees by means of an external tare adjusting knob. Bearing points or locking devices shall prevent dial rotation due to shock vibration. The indicating pointer shall be capable of 360 degrees rotation for full scale reading. The entire indicator case shall be filled with a liquid to provide movement lubrication and dampening of vibration-caused tube and pointer oscillation. There shall be sufficient air space left to allow for oil expansion owing to temperature changes. The indicator case shall be appropriately sealed to prevent leakage. The indicator shall be fitted with a fully adjustable pulsation damper located in an accessible position on the case.

3.24.2 Digital indicator. The digital indicator minimum increments shall be 50 pounds (23 kg). The digits shall have a minimum height of .75 inches (19 mm) visible to direct sunlight and subdued night lighting. The indicator shall have an internal zero and span adjustment for initial calibration and taring out the weight of the forks. The indicator shall have an external push-button auto zero device to tare out extraneous weights on the fork. Indicator must maintain auto zero reference when power is turned on or off or and indicate loss of auto zero reference. Indicator must indicate a truck overload condition of tare load and live load on the forks. The zero button must have a locking device to prevent actuation caused by vibrations.

3.25 Personnel Cab. When specified (see 6.2), the truck shall be equipped with an insulated, weathertight personnel cab. The cab clearances shall be in accordance with SAE J154. The cab shall inherently resist torsional strain and withstand all operational shock and vibration under the conditions specified herein. The cab shall be constructed of metal. The cab shall be equipped with a minimum of two fully opening or removable doors. Each door shall have a safety latch, opening stop and hold-open catch. All hardware shall be of the heavy-duty or industrial type, resistant to corrosion.

3.25.1 Glazing. The cab shall provide the operator with all around visibility. The cab total glazed area shall be not less than 27.8 square feet (2.6 square meters) of tinted windows consisting of windshield, sliding or roll-down door windows, rear window, roof window, and other windows required by cab design.

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All glazing shall conform to ANSI Z26.1, type AS1 in the windshield and roof window and type AS1 or AS2 in other windows. Fixed glazing shall be sealed in waterproof stress-absorbent molding, and moveable windows shall be sealed on extra heavy type, piled lined channels. Plastic glazing is not permitted.

3.25.2 Interior. The interior of the cab shall be fitted with insulation, retarding both heat loss and noise intrusion. The insulation and cab framing shall be covered with an interior skin and headliner, providing a smooth, washable protective cover.

3.25.3. Window Wipers and Washer. The cab shall be equipped with powered wiper assemblies to clear the windshield, roof window, and the rear window. Windshield wiper shall be in accordance with the requirements of SAE J198. Self-parking features shall be provided. The wiper arms shall provide pressure on the glazed surface of at least 1-ounce (.28 N) for each inch (25 mm) of wiper arm length. Air motors shall be plumbed to exhaust air outside of the cab. The operator controls shall be located for convenient operation by the operator from the normal operating position. The windshield shall be provided with a washing system in accordance with SAE J1944.

3.25.4 Ventilation fans. The cab shall be equipped with not less than two ventilation fans not less than 6 inches (150 mm) in diameter. Fans shall be directionally adjustable to direct air flow toward all glazing.

3.25.5 Heater and Defroster. A hot water, air type heater and windshield defroster that operates on engine coolant shall be furnished. Heater shall be of sufficient capacity to maintain a temperature of 60° F (16°C) at cab floor level in the ambient temperature specified herein (see 6.2). Use of thermal insulation in the cab area to insure adequate capacity is acceptable. Heater shall be equipped with a removable safety guard.

3.26 Electrical system. The truck shall have a 24 volt electrical system. The electrical system shall be constructed to be moisture and weather resistant to prevent entry of moisture when operated as specified herein. Multiple conductor routing shall be protected by flexible tubing or electrical insulation tape. Grommets shall be provided whenever wiring passes through bulkheads, partitions, structural members and the wiring shall be fastened to prevent chafing or abrasion. All wiring shall be color coded. The electrical system shall conform to UL 558, Type DS.

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3.26.1 Circuit breakers. Each electrical circuit shall be protected from electrical overload with circuit breakers in accordance with SAE J553. Fuses are not permitted.

3.26.2 Lights. The truck shall be provided with not less than two headlights and two floodlamps for forward illumination and two floodlamps for rearward illumination. The lights shall be shock mounted in elastomer ring housings and shall conform to SAE J598. Floodlamps shall be adjustable a minimum of 45 degrees above and below the horizontal plane. Horizontal adjustment shall be a minimum of 300 degrees rotation. Floodlamps shall be protected from damage by either position or guards. When specified for shipboard use (see 6.2), each floodlamp shall be furnished with three sets of lenses. Color of lenses shall be clear, red and yellow. Red and yellow lenses shall be stored in a pocket located on the back of the operator's seat. The truck shall be provided with two rear mounted combination stop light and tail light. Stop lights and tail lights shall be located at the rear of the truck and on the right and left sides. Lights shall conform to SAE J2040 and SAE J1398.

3.26.3 Blackout lighting. The truck shall be provided with two blackout headlights which conform to MS 51318 and two blackout combination stoplight and taillights which conform to MS 51330.

3.26.4 Horn. The truck shall be equipped with an electric horn.

3.26.5 Slave receptacle. Truck shall be furnished with one 24 volt slave receptacle conforming to MS-75058 which will permit charging of the truck battery(ies) and slave starting the engine from an external power source. The slave receptacle shall be located on the truck exterior near the battery mounting and shall be accessible to personnel when standing on the ground.

3.27 Locations of controls and instrumentation. All controls and instruments shall be located in conformance with SAE J209 and SAE J898. All controls and instruments identification symbols shall be in conformance with SAE J1362 and ASME/ANSI MH11.3. All controls to operate the truck shall be accessible to the operator when in the seated position. All instruments shall be visible to the operator when in the seated position. Controls and instrumentation shall be moisture and weather resistant.

3.28 Controls. The truck shall be provided with the minimum type of controls as specified herein. Light control switches and window wipers controls shall be located on the instrument panel. Each control shall be located such that it is free to operate as specified herein without interference from an adjacent control and the truck frame. Unless otherwise specified herein, the distance from the near edge of one control to the near edge of an

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adjacent control or other surface shall be a minimum of 1 1/2 (38 mm) inches. The travel of the controls shall not exceed 6 inches (152 mm) from the center position when measured at the end of the grip. The force necessary to actuate directional and hydraulic controls shall be 10 pounds (44 N) maximum. All hand-control levers and linkages shall withstand a minimum force of 50 pounds (222 N) applied at the handgrip in the normal directions of operation. The levers shall have sufficient strength to withstand, without permanent deformation or damage, all operations as specified herein. Mechanical push-pull remote type controls shall be of the waterproof antifriction type which shall conform to requirements for marine cables specified in SAE J917. All exposed parts of the control cables shall be fabricated of corrosion-resistant steel. The cables shall be covered with a polyethylene or vinyl jacket. Cable ends shall be tailored to actuate all levers through their respective arcs without binding. Bend radii shall be as recommended by the cable manufacturer. The manufacturer's published ratings for continuous operation shall not be exceeded for any required operation of the control specified herein. Foot pedal controls shall be equipped with replaceable rubber caps.

3.28.1 Floodlamp controls. One "on-off" switch shall be provided to control the forward floodlamps and one "on-off" switch shall control the rear floodlamps.

3.28.2 Blackout lighting control. One switch conforming to MS 51113 shall be provided to control the front headlights, blackout headlights, stop light, tail light, blackout stoplight and taillights, and instrument panel lights.

3.28.3 Engine-run control. An engine run-control shall be furnished which shall have not less than two positions, "on" and "off". The switch shall control operation of all electrical system components, except the horn. Control shall be the keyed type and two keys shall be furnished with each truck. All trucks under a contract shall be keyed identically. The diesel engine operation shall be terminated when the engine control is positioned to "off".

3.28.4 Starting system control. The starting system solenoid shall be operated by a pushbutton or a spring-loaded starter switch. The starter shall be inoperable when the engine-run control is in the "off" position and whenever the transmission control lever is in any position other than neutral. Starter button or switch may be located on the steering column or the instrument panel.

3.28.5 Braking and declutch controls. The brake control shall be foot operated and shall provide for braking and declutch

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control. A separate declutch (two pedals) or a combination braking and declutch pedal (one pedal) may be used. When a combination braking and declutch pedal (one pedal) is utilized, a switch shall be provided to permit selection between braking only or a combination of braking and declutch. When a separate declutch control (two pedals - one pedal for declutch and braking and one pedal for braking only) is furnished the declutch pedal shall be located to the left of the braking only pedal. Each pedal shall be a minimum of 2-1/2 inches (64 mm) wide and shall be separated from other pedals by a minimum of 2 inches (50 mm).

3.28.6 Service brake control. The wheel brake control shall be located for left hand operation within reach of the seated operator.

3.28.7 Accelerator control. The accelerator control shall be installed for right-foot operation and shall be located to the right of the brake pedal(s) by a distance of not less than 2 inches (50 mm)

3.28.8 Transmission controls. The shift pattern shall be arranged to minimize the possibility of accidental shifting into a reverse gear when shifting between successive forward gears. The shifting lever shall pass through the neutral position when shifting from forward to reverse gear. The transmission control levers shall be mounted within easy reach of the seated operator.

3.28.9 Parking brake control. The parking brake control shall be either hand or foot operated. The hand control shall be located so as to permit movement on and off the vehicle from either side of truck or to allow unobstructed egress. The foot operated control shall be installed for left foot operation.

3.28.10 Lift, sideshift, reach, fork positioners, frame or fork oscillation cylinders, and tilt controls. Lift, sideshift, reach, fork positioners, frame or fork oscillation cylinders, and tilt controls shall be self-centering levers, located for right hand operation located within reach of the seated operator. Rearward or upward motion of lift and tilt control levers shall raise and tilt the load rearward. Rearward or upward motion of sideshift lever shall position the fork carriage to the right. Rearward or upward motion of fork positioner lever shall position the forks together. Rearward or upward motion of sway cylinders lever shall position the frame clockwise. The arrangement of control levers shall provide a spacing of 1.5 inch (38 mm) minimum clearance between levers at all times. The control levers shall operate when the truck is in forward and rearward motion.

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3.28.11 Rigid frame steering control. The rigid frame steering control shall position the truck steering system to cramp type steering or to two-wheel rear steering. Control shall be located for hand operation in the seated position.

3.28.12 Horn control. The horn button shall be mounted on the steering wheel or located for left foot operation.

3.28.13 Window wipers and washer control. Each window wiper shall be controlled by one on-off switch. The windshield washer control shall be located adjacent to the windshield wiper switch.

3.28.14 Heater and defroster control. The heater and defroster controls shall provide for temperature control and variable selection of blower speeds. Controls shall be located within reach of the seated operator.

3.28.15 Ventilation fan control. Each ventilation fan shall have one "on-off" switch located within reach of the seated operator.

3.28.16 Instrument gauges control. Instrument internal lighting shall be provided with one "on-off" switch.

3.28.17 Engine starting aid control. The glow plug or fluid priming starting control shall be located within reach of the seated operator.

3.28.18 Cooling system fan disconnect control. When required, the engine cooling system fan disconnect switch shall be located within reach of the seated operator.

3.28.19 Electrical system disconnect control. The electrical system manual disconnect switch for the charging system required in UL 558 shall be positioned for right hand operation within reach of the seated operator.

3.29 Instrument panel. An instrument panel shall be provided which is visible to the seated operator. The instrument panel shall be installed on an inclined or vertical plane to facilitate drainage of water. On this panel shall be mounted gauges as specified herein. All gauges shall be flush mounted and shall be internally lighted for other than daylight visibility.

3.29.1 Electrical system gauge. An ammeter, voltmeter or alternator gauge shall be furnished. Either type gauge shall be of sufficient capacity to indicate variations in current supply or demand experienced by the truck, exclusive of starter requirements. The gauge shall indicate when the alternator is not charging while the engine-run control is "on".

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3.29.2 Engine oil pressure gauge. A engine oil-pressure gauge shall be furnished.

3.29.3 Engine coolant temperature gauge. A engine-coolant temperature gauge shall be furnished.

3.29.4 Transmission temperature gauge. A torque converter and transmission fluid temperature gage shall be furnished.

3.29.5 Hourmeter. An hourmeter which registers the number of engine operating hours in accordance with SAE J1378 shall be furnished. The hour meter shall be capable of totaling 9,999 engine hours.

3.29.6 Fuel level gauge. An electric, thermally stabilized fuel gauge shall be provided.

3.29.7 Air pressure gauge and warning light. When a air or air-over-hydraulic brake system is furnished an air pressure gauge shall be provided. A warning light shall also be furnished which shall indicate when air pressure is inadequate to permit actuation of the brake systems.

3.29.8 Deadman control light. When specified for shipboard use (see 6.2) and an electrically activated transmission is furnished, a flashing red or amber indicator shall alert the operator whenever the transmission is in neutral regardless of the position of the transmission shifting lever.

3.29.9 Fan disconnect warning light. When required, a warning light shall indicate when the engine cooling system fan disconnect control has been activated.

3.29.10 Service brake system warning lights. A flashing red or amber indicator warning light shall be furnished in each brake circuit which shall alert the operator of loss of pressure whenever the service brake pedal is applied.

3.30 Identification plates. The, truck including each component which must be removed for transportation purposes, shall be equipped with identification plates conforming to MIL-P-514 as specified herein. All plates shall be securely attached to the truck with screws, bolts, or rivets, and shall be furnished and mounted by the contractor. Decals and stencils are not permitted.

3.30.1 Identification marking plate. The truck shall be identified with an identification plate conforming to MIL-P-514, type I, style 1, Composition C, Grade A, Class I, which shall be mounted in a visible and safe location on the instrument panel or

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fire wall of the truck. The identifying data to be applied to the identification plates shall be as indicated herein and as defined in MIL-STD-130. Identification data shall include the truck lifting capacity, lift height, name of manufacturer, model number, serial number, contract number, gross vehicle weight, USN registration number, delivery date, technical manual national stock number, shipping weight, cube dimension, name or stamp of government inspector, and HI-Shock test date.

3.30.2 Instructions, warnings, controls, gauges and caution plates. Each truck shall be equipped with instruction, warning, control, gauges and caution plates conforming to MIL-P-514, type III, composition C, grade A, class I, prominently located and describing any special or important procedure to be followed in operating, lifting, and servicing of the truck or its components. Plates for control lever markings which indicate truck operations shall conform to ANSI B56.11.3. The plates for controls and instruments shall be visible to the operator from the seated position.

3.30.3 Shipping data plate. Shipping data plate shall conform to MIL-P-514, Type III, Composition C, of Type I, Grade A, Class 1 material and shall indicate the silhouette of the forklift in transport position showing the center of gravity and the location and capacity of the lifting and tiedown attachments. Wheel loading information in 3.30.4 may be included on shipping data plate.

3.30.4 Wheel loading plate. Each truck shall be equipped with a wheel loading plate conforming to MIL-P-514, Type III, Composition C, of Type 1, Grade A, Class 1 material. As a minimum the plate shall have the following information:

Wheel loading (no load on forks)	
Front wheels (each wheel)	pounds (    kg)
Rear wheels (each wheel)	pounds (    kg)
Wheel load (rated load on forks)	
Front wheels (each wheel at maximum sideshift)	pounds (    kg)
Rear wheels (each wheel at maximum sideshift)	pounds (    kg)

3.30.5 Safety rating plate. Each truck shall be equipped with a safety designation plate conforming to MIL-P-514, Type III. As a minimum, the plate shall indicate the truck manufacturer's name, truck model number, safety designation (Type DS), independent testing laboratory's name, independent testing laboratory's registration or index number assigned to the inspected truck and date of independent laboratory inspection.

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3.30.6 Oil sampling valve plate. Each oil sampling valve shall be identified as to the type of oil being sampled. Plates shall conform to MIL-P-514, type III, composition C, grade A, class I.

3.30.7 Slave receptacle plate. The voltage potential of the slave receptacle shall be identified on a plate furnished adjacent to the receptacle. Plates shall conform to MIL-P-514, type III, composition C, grade A, class I.

3.31 Vehicle marking. Each truck shall be marked as specified herein. All markings shall be painted in black enamel block letters and numbers. Color number shall be 17038 in accordance with FED-STD-595.

3.31.1 Safe Working Load. Safe working load (capacity) of the truck shall be three inches (76 mm) high located on each side and rear of truck. Example: SWL 6000 lbs (2720 kg).

3.31.2 Registration number. Assigned USN registration number for each truck shall be 3 inches (76 mm) high located on each side and on rear of truck.

3.31.3 Tire pressure. For pneumatic tired trucks, the tire pressures for each tire shall be 1 inch high (25 mm) located on each side of the truck above the applicable tire.

3.31.4 Safety rating. Markers indicating the DS safety designation of truck shall be applied on each side and on the rear of the truck of the vehicle. These markers shall be in accordance with UL 558.

3.31.5 Supplementary markings. Supplementary marking and load handling symbols as specified in ASME/ANSI MH11.3 are required.

3.31.6 Slinging and tiedowns. Slinging and tiedown markings shall be in accordance with MIL-STD-209.

3.31.7 Safety warning. Safety warning information shall be two inches (51 mm) high located as follows:

3.31.7.1 Title: WARNING, NO CLEARANCE FOR A PERSON STANDING IN THIS AREA. Near the articulated frame steering hinge on both sides of truck.

3.31.7.2 Title: No smoking. Inside personnel cab visible to operator when seated. When cab is not furnished (see 6.2), on the forklift mechanism.

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3.31.7.3 Title: No riders. Inside personnel cab visible to operator when seated. When cab is not furnished (see 6.2), on the forklift mechanism.

3.31.8 Fuel type marking. Fuel type shall be 1 inch (25 mm) high located near fuel tank filler.

3.31.9 Shipboard marking. When specified for shipboard use (see 6.2), the truck shall be identified with the words "SHIPBOARD USE APPROVED", 1-1/2 inch (38 mm) high located on each side of truck.

3.31.10 Structural testing marking. When specified for shipboard use (see 6.2), truck(s) which successfully pass the weight test specified herein shall be identified with the words Structurally Tested, date and By Manufacturer, 1 1/2 inch (38 mm) located on each side of truck. Example:

STRUCTURALLY TESTED

date

BY (manufacturer)

3.31.11 Paint marking. When specified for shipboard use (see 6.2), the words "Painted with lead/chromate free paint by manufacturer (name), month, and year" 1 inch (25 mm) located on each side of truck.

### 3.32 Construction.

3.32.1 Castings and Forgings. All parts, components and assemblies of the truck which include castings and forgings shall be clean of harmful extraneous material such as sand, dirt, sprues, scale and flux. Rework shall be limited to procedures which do not reduce mechanical properties or affect function.

3.32.2 Metal Fabrication. Metal used in fabrication shall be free from kinks and sharp bends. The straightening of material shall be done by methods which will not cause injury to the material. Corners shall be square and true. Flamecutting, using tips suitable for the thickness of the steel, may be employed instead of shearing and sawing. All bends shall be made with controlled means to insure uniformity of size and shape. Precaution shall be taken to avoid overheating. Heated steel shall be allowed to cool slowly, except in the performance of designed heat treatment. External surfaces shall be free from burrs, sharp edges and corners, except when sharp edges or corners are required, or where they are not detrimental to safety. Dissimilar metals shall not be used in intimate contact with each other unless protected against electrolytic corrosion. Dissimilar metals and methods of protecting them are defined and described in MIL-STD-889.

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3.32.3 Welding. The surfaces of parts to be welded shall be free from rust, scale, paint, grease, mill scale that can be removed by chipping and wire brushing, and other foreign matter. Welds shall transmit stress without permanent deformation or failure when the parts connected by the welds are subjected to proof and service loading. Parent materials, weld filler metals, and fabrication techniques shall be as required to enable the truck to conform to the examination and test requirements specified in Section 4. Parts to be joined by fillet welds shall be brought into as close contact as possible and in no event shall be separated by more than 3/16 inch (4.8 mm) unless appropriate bridging techniques are used. The welding process used in fabrication of the truck shall be at the option of the contractor.

3.32.4 Bolted Connections. Boltholes shall be accurately formed and shall have the burrs removed. Washers, lockwashers or other positive locking shall be provided where necessary. Matching thread areas securing bolts conforming to SAE J429 or capscrews shall be of sufficient strength to withstand the tensile strength of the bolt. All fasteners shall be correctly torqued and shall have full thread engagement.

3.32.5 Riveted Connections. Rivets shall fill the holes completely. The upset rivet heads shall be full, neatly made, concentric with the rivet holes and in full contact with the surface of the member. The rivets shall be in accordance with SAE J492.

3.33 Treatment and painting. All truck surfaces shall be treated or painted to prevent rusting or equipment component failure due the environmental requirements specified herein. All exterior surfaces of the truck shall be thoroughly cleaned and shall be dry and free from mill scale, oil, grease, dirt and rust and shall be painted as soon as practicable after cleaning with not less than one coat of base primer and two finish coats of enamel. Neither lead or chromate primer or finish coats is permitted. Unless otherwise specified (see 6.2) the final enamel finish coat shall be Type 13538 gloss yellow of FED-STD-595 conforming to TT-E-489. When a first produced truck is required for test and evaluation it shall be painted with one primer coat only. The finish coat, when dry, shall be a smooth even surface, free from runs, sags, peels, chips, blisters, areas of thin film or no film. Surfaces of components and assemblies of the truck, not normally painted with a finish coat, shall be cleaned and protected in accordance with good commercial practice. Lift chains, sprockets, rollers, plastics, fabric hoses (except hydraulic hoses) and drive belts shall not be painted except that slight overspray will be accepted provided there is no interference with the proper functioning of the component. Paint

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must be kept off working surfaces where interference with working parts would result. Engine accessories, such as radiator, drive belts, instruments, chrome plating and lift chains shall not be painted by the contractor and shall be adequately protected or masked from overspray.

3.33.1 Walkway coating. Floor plates and step surfaces shall be coated or matted coating conforming to MIL-W-5044, type II or III, color black (color number 17038 of FED-STD-595).

3.34 Performance. The truck shall conform to the requirements specified herein under all conditions specified herein without malfunction, damage or permanent deformation. There shall be no evidence of accelerated wear or failures when operated under conditions specified herein.

3.34.1 Fording Conditions. The truck fording depth shall be 36 inches (914 mm) minimum when tested in accordance with 4.3.2.1 and Test Method No. 1. When specified for shipboard use (see 6.2), the fording depth shall be 60 inches (1520 mm) minimum when tested in accordance with 4.3.2.1 and Test Method No.1.

3.34.2 Truck stability. The completely assembled truck longitudinal and lateral stability shall be as specified herein when tested in accordance with 4.3.2.2:

(a) Axle weight distribution. The truck rear axle weight without rated load and with the heel of the forks positioned 24 inches (610 mm) above the ground shall be a minimum of 52% of the curb weight. The truck rear axle weight with rated load and with the heel of the forks positioned 24 inches (610 mm) above the ground shall be a minimum of 20% of the curb weight. Curb weight is defined as the weight of the truck including the operator and the maximum capacity of engine fluids and lubricants, transmission lubricants, and diesel fuel.

(b) Dynamic stability. The truck with rated load shall be capable of decelerating from the maximum speed in the forward direction to a full stop without any truck tire leaving the ground and the load slipping on the forks.

(c) Lift system stability. The truck shall be capable of lowering the rated load at maximum lowering speed and abruptly terminating the descent 24 inches (610 mm) above the ground without any tire leaving the ground.

3.34.3 Slope operation. The truck shall negotiate slopes as specified when tested in accordance with 4.3.2.3:

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(a). Slope ascension. The truck with rated load shall be capable of ascending and descending a 100 foot (31 m) 45% (24 degrees) minimum slope in low gear when the lateral axis of the truck is parallel to the slope for a total of 20 consecutive passes. One pass is defined as one ascent and one descent.

(b). Lateral slope (static). The truck with rated load shall maintain 4-wheel ground contact on a 30% (17 degrees) minimum side slope when the lateral axis of the truck is parallel to the truck axles without any tire leaving the ground.

(c). Lateral slope (dynamic). The truck without rated load shall operate and maintain 4-wheel ground contact on a 30% (17 degrees) minimum lateral slope in low gear when the lateral axis of the truck is parallel to the truck axles without any tire leaving the ground.

3.34.4 Speed. The truck without rated load shall be capable of attaining a speed of 20 mph (32 km/hr) minimum in the forward direction in high gear. The truck with the rated load shall be capable of attaining a speed of 15 mph (24 km/hr) minimum in the forward direction and 7.5 mph (12 km/hr) minimum in the reverse direction in high gear. When specified for shipboard use (see 6.2), the truck speed shall be 10 mph (16 km/hr) maximum in both the forward and reverse directions in high gear. The truck shall be tested in accordance with 4.3.2.4.

3.34.5 Acceleration. The truck without rated load shall traverse a 100-foot (31 M) course in 19.5 seconds in first gear and 7.5 seconds in high gear in both forward and reverse direction. The truck shall be tested in accordance with 4.3.2.5. When specified for shipboard use (see 6.2), an acceleration performance requirement is not required.

3.34.6 Transportability. When specified (see 6.2), the forklift shall be capable of being transported, without damage, by highway, air, marine, and rail transport as specified herein and tested in accordance with 4.3.2.6 and Test Method No. 2.

(a). Highway transportability. The forklift shall be towable with a dead engine on improved roads at a speed 35 mph (56 km/hr) minimum for 50 miles (80 km) minimum without damage or loss of operating capability. Preparation of truck for towing shall be

performed by one man in not more than 30 minutes. Truck shall be tested in accordance with 4.3.2.6 and Test Method No. 15.

(b). Air transportability. The forklift shall be transportable in USAF C-130 and C-5A aircraft. Transportability requirements shall be in accordance with MIL-STD-1791. The forklift trucks

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shall be capable of being driven on and off the aircraft in the transportable configuration. The truck shall be provided with a minimum of 1/2 to a maximum of 3/4 tank of fuel. Components such as the counterweights, tophandler, cab, exhaust stack, mast, overhead guard, etc., may be removed from the forklift if such action is necessary to meet dimensional or weight requirements for aircraft drive-on loading. Components weighing 2500 pounds or more shall be equipped with lifting and tiedown provisions. Using only a mechanic with common hand tools, neither the removal nor the replacement of such parts shall require longer than 4 hours for either operation. Because of limited capacities of the tools in the field mechanic's tool box, all socket drives greater than 3/4 inch (20 mm), and sockets and wrenches greater than 2-inch required for removal or replacement of the parts shall be furnished with each forklift by the manufacturer. No accessories or attachments which would prevent the forklift from being driven on/off the aircraft via its own power shall be removed. The vehicle, after preparation for air transport, shall not exceed the allowable height and width dimensions listed in MIL-STD-1791.

(c). Rail transportability. The forklift truck shall be transportable in accordance with the requirements of the Association of American railroads (AAR) General Rules Governing the Loading of Commodities on Open Top Cars.

(d). Marine Transportability. The truck shall be approximately sized to allow it to be loaded and unloaded from a LST (1179 Class) hull without disassembly.

3.34.7 Noise Limits. The noise level of the truck (excluding horns) shall not exceed the following when tested in accordance with 4.3.2.7:

(a). Operator's station. 85 decibels (dB) (A) maximum at the operator's station during normal operating procedures of the truck.

(b). Exterior of truck. 85 dB(A) maximum at 24.5 feet (7.5 M) from the side of the truck during normal operation of the truck.

3.34.7.1 Noise hazard. The precautions of MIL-STD-1474 shall be provided when the noise level exceeds 85 db(A). However, in no case shall the noise limit be exceeded at the operator's station when a personnel cab is required (see 6.2).

3.34.8 Electromagnetic Interference. The electromagnetic interference emission characteristics of the truck shall meet the limits specified in SAE J551. When specified for shipboard use (see 6.2), the truck shall meet the limits specified in

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MIL-STD-461, Part 8, Class C1, Group II. The truck shall be tested in accordance with 4.3.2.8.

3.34.9 High Impact (HI) Shock Requirements. When specified for shipboard use (see 6.2), the truck shall be designed to withstand Type A HI shock as a Grade A Item in accordance with MIL-S-901 and shall be tested in accordance with 4.3.2.9.

3.34.10 Endurance.

3.34.10.1 Durability. The first article test truck shall complete 2600 circuits of the durability course without any failures when tested in accordance with 4.3.2.10.1 and Test Method No.3.

3.34.10.2 Load placement. The first article test truck shall be capable of moving and placing a minimum of 36 palletized rated loads in one hour on the load placement course specified herein when tested in accordance with 4.3.2.10.2 and Test Method No.4.

3.34.11 Truck configuration. Truck configuration dimensions shall be as specified herein when tested in accordance with 4.3.2.11:

- (a). Height: 96 inches (2440 mm) maximum without ROPS and FOPS without rated load.
- (b). Length: 268 inches (6810 mm) maximum with forks in retract position.
- (c). Width: 90 inches (2290 mm) maximum.
- (d). Ground clearance: 14 inches (360 mm) minimum with rated load.
- (e). Fork size: 48 inches (1220 mm) length maximum x 6 inches (150 mm) width maximum x 2 inches (50 mm) thickness maximum.
- (f). Fork tilt: 30 degrees rearward tilt (plus or minus 1/2 degree) when forks are positioned 24 inches (610 mm) above the ground and full reach and 25 degrees forward tilt (plus or minus 1/2 degree).
- (g). Fork spacing: 15 inches (380 mm) maximum closed and 84 inches (2140 mm) minimum opened.
- (h). Fork reach: 36 inches (920 mm) maximum measured from the front edge of front tires with forks level and positioned 24 inches (610 mm) above ground level to the heel of forks.

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(i). Fork reach: Retracted, 15 inches (380 mm) maximum measured from front edge of front tires with forks level and positioned at ground level to the vertical face of the forks.

(j). Fork heel: heel of forks capable of 6 inches (150 mm) minimum reach below ground level measured from ground level to the horizontal face of the forks, with and without rated load and normal operating tire pressure.

(k). Fork sideshift: Sideshift function shall provide for at least 50 inches (1300 mm) of sideshift travel with rated load measured across the full width of the carriage when the forks are spread 34 inches (860 mm) outside to outside

3.34.12 Lift height. The truck lifting height with rated load shall be 120 inches (3050 mm) minimum when tested in accordance with 4.3.2.12 and Test Method No.5.

3.34.13 Lifting speed. The speed of lifting the rated load from ground level to the maximum fork height shall be 40 feet per minute (.20 m/s) minimum when tested in accordance with 4.3.2.13 and Test Method No.5.

3.34.14 Lowering speed. Speed of lowering of forks without rated load shall be not less than 60 feet per minute (.30 m/s) and not more than 80 feet per minute (.41 m/s) with rated load over the entire distance from maximum fork height to ground level. The truck shall be tested in accordance with 4.3.2.14 and Test Method No.5.

3.34.15 Truck weight. Size "A" and "B" truck weight shall be as specified herein when tested in accordance with 4.3.2.15 (see 6.2):

(a). Size A: 26,000 pounds (11,800 kg) maximum without rated load.

(b). Size B: 30,000 pounds (13,000 kg) maximum without rated load.

3.34.16 Hydraulic drift. The truck lift assembly shall be capable of holding the rated load at the maximum lift height for not less than ten minutes with not more than one inch (25 mm) of vertical drift and not more than one degree of rotational drift from the vertical when tested in accordance with 4.3.2.16 and Test Method No. 6.

3.34.17 Overload. The truck shall be capable of sustaining 300 percent overload (18,000 pounds (8180 Kg) for size A and 30,000

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pound (13,600 Kg) for size B) for a minimum of ten minutes when tested in accordance with 4.3.2.17 and Test Method No.7.

3.34.18 Service brakes. A brake pedal force of not more than 100 pounds (450 N) and not less than 50 pounds (230 N) shall stop the truck with and without the rated load as specified herein. Also, the brake system shall be capable of withstanding a brake pedal force of 300 pounds (1300 N) for five minutes without failure of any component and without loosening of any part designed to be rigid.

(a) Service brakes shall stop the truck within a distance of 5 feet (1.5 m) maximum when the truck is travelling at a speed of 5 mph (8 km/hr) minimum in the forward direction.

(b) Service brakes shall stop the truck within a distance of 10 feet (3.0 m) maximum when the truck is travelling down a 45% (24 degrees) at a speed of 5 mph (8 km/hr) minimum in the reverse direction.

(c) Service brakes shall restrain the truck on a 45% (24 degrees) minimum slope immediately after the service wheel brakes have been immersed in water for a period of ten minutes minimum.

(d) Service brakes shall stop the truck within a distance of 5 feet (1.5 m) maximum when the truck is travelling at a speed of 5 mph (8km/hr) minimum and with a dead engine.

The truck shall be tested in accordance with 4.3.2.18 and Test Method No.8.

3.34.19 Parking brake and deadman control. The parking brake, and when specified herein for shipboard use, (see 6.2), a deadman control shall be capable of retaining the truck on a 45% (24 degrees) longitudinal slope with rated load positioned in the carry position for 2 minutes minimum without permitting any tire movement. The carry position is defined as: Forks at maximum rearward tilt position and 24 inches (610 mm) above ground level measured from the intersection of the vertical and horizontal tines or 21 inches (540 mm) from the face of the vertical tine to the front edge of the drive tires. The maximum force required to activate the parking brake shall be 100 pounds (450 N) maximum. Truck shall be tested in accordance with 4.3.2.19.

3.34.20 Resistance to saline atmosphere. The truck shall be designed to withstand the corrosive effects of saline atmosphere without any formation of rust, loss or deterioration of performance, evidence of harmful corrosion, loss of mobility of parts and a inability to disassemble parts for service or repair when tested as specified herein. Also, operation of all

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components within the electrical system shall remain operative. The truck shall be tested in accordance with 4.3.2.20.

3.34.21 Slings and tiedown attachments. Each lifting and tiedown provision shall be capable of withstanding the loads indicated in MIL-STD-209. When specified for shipboard use (see 6.2), tiedowns shall withstand Type A Hi-shock as specified herein in addition to MIL-STD-209 requirements. When truck is specified to be air transportable (see 6.2), tiedowns shall withstand the loads indicated as specified herein in addition to MIL-STD-209 requirements. The truck shall be tested in accordance with 4.3.2.21.

3.34.22 Maintainability. The following maintenance operations shall be accomplished by one man, except as noted, in not more than the time specified using common tools and special tools (if any) furnished with the truck, when tested in accordance with 4.3.2.22:

- (a) Remove, replace, and adjust all engine driven belts - 3/4 hour. Exclude engine timing belt(s).
- (b) Remove and replace alternator - 1/2 hour.
- (c) Remove and replace regulator - 1/2 hour.
- (d) Remove and replace all filters, screens, and strainers in all hydraulic systems - 1/2 hour.
- (e) Drain engine coolant, remove and replace engine coolant system hoses and thermostat and refill system. - 1 hour.
- (f) Drain engine lubricating oil, remove and replace oil filter elements, and refill crankcase - 1/2 hour.
- (g) Remove and replace fuel filter elements and drain water separator - 1/4 hour.
- (h) Disconnect battery cables, remove and replace battery(ies), and reconnect battery cables - 1/2 hour.
- (i) Drain torque converter oil and transmission oil, remove and replace all filter elements and strainers, and refill converter and transmission - 1/2 hour.
- (j) Remove and replace starter - 1 hour.
- (k) Bleed and adjust brakes and refill master cylinder (two men) - 3/4 hour.

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(1) Remove, read, and replace fluid level dipstick or conduct a visual inspection - 2 minutes each.

3.34.23 Tires and tire loading. The front and rear tires, when inflated to 20 psig (13.8 KPa) maximum, shall show no evidence of failure, deterioration or separations from the wheels when truck is operated with rated load over soft terrain or in sea water at a minimum speed of 2 mph for a period of 30 minutes when tested as specified herein. Soft terrain is defined as noncompacted sand, snow or mud. Truck tire loadings with rated load shall not exceed the tire load limits indicated in the Year Book of the Tire and Rim Association at rated tire ply rating, inflation pressure and the truck's maximum speed as specified herein. The truck shall be tested in accordance with 4.3.2.23 and Test Method No.9.

3.34.24 Deck loading. When specified for shipboard use (see 6.2), the truck individual wheel loading with rated load and forks at maximum sideshift position and fully extended shall not exceed 250 psi (1720 kPa). The minimum dimension measured across the bearing area of each individual tire shall be 6 inches (150 mm) minimum under the wheel loading specified herein. The truck shall be tested in accordance with 4.3.2.23 and Test Method No.9.

3.34.25 Exhaust emission requirements. When specified for shipboard use (see 6.2), the truck diesel engine exhaust emission constituents shall not exceed the limits specified herein when tested in accordance with 4.3.2.24. The emission tests shall be conducted with a fuel delivery system as identical to and calibrated to give the same fuel delivery rate as the engine used during the First Article Tests. The engine shall be capable of satisfying the emission requirements without the use of a catalytic convertor, trap oxidizer, water scrubber or other type of exhaust gas processor with the exception of the DS rated muffler.

(a) Brake specific exhaust emission of hydrocarbons (HC), carbon monoxide (CO) and nitric oxides (NOx). The brake specific exhaust emission of HC shall not exceed 0.5 g/bhp-hr; of CO shall not exceed 5.0 g/bhp-hr; and of NOx shall not exceed 6.0 g/bhp-hr.

(b) Total suspended particulate (TSP). The TSP shall not exceed 15 g/hr for 3, 4, 10, and 11 modes of the 13 mode Federal Test Procedure.

(c) Steady state smoke opacity (SSSO). The SSSO shall not exceed 5 percent for any mode of the 13 mode Federal Test Procedure excluding the high load modes of 5, 6, 8, and 9.

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3.34.26 Starter disconnect. Starter disconnect shall prevent re-energizing the starter motor when the engine is running and/or when the transmission control lever is in any position other than neutral when tested in accordance with 4.3.2.25.

3.34.27 Weighing device. When specified for shipboard use (see 6.2), the weighing device shall be capable of measuring a minimum weight of 100 pounds (45 kg) and a maximum weight equal to the rated capacity of the truck plus 300 pounds (140 kg). Weighing device shall be capable of being adjusted for 25% tare. The weighing device shall be capable of withstanding the pressure caused by placing 150-percent of truck rated load on the forks. Weighing device shall be accurate to 1/2 of 1% and shall read to an accuracy of 5% minimum of full scale. The truck shall be tested in accordance with 4.3.2.26.

3.34.28 Curb-clearance diameter. Articulated and rigid frame truck curb-clearance diameter as defined in SAE J695 shall be 30 feet (9.144 m) maximum when tested in accordance with 4.3.2.27.

3.34.29 Steering. The steer wheels shall be capable of being turned from extreme right to extreme left or vice versa in not more than 6 complete turns of the hand steering wheel. The maximum steering effort through the entire turn shall be not less than 2 pounds (9 N) nor more than 20 pounds (89 N) when measured under the same conditions. Steering mechanism wear (free play) shall not exceed 17 degrees (3 inches (75 mm)) total with engine at idle speed. The steering gear assembly shall be capable of withstanding the 150 pounds (670 N) unbalanced tangential force applied at the rim of the hand steering wheel. Steering maneuverability features shall meet the reliability test course requirements specified herein. In the event of power steering failure or engine failure, and without rated load, steering shall be operable with a force not to exceed 50 pounds. The truck shall be tested in accordance with 4.3.2.28 and Test Method No.10.

3.34.30 Pintle hook. The pintle hook and mounting when mounted on the truck shall be capable of a longitudinal pull of 34,000 pounds (151 kN) and a lateral pull of 17,000 pounds (76 kN) without permanent deformation. The truck shall be tested in accordance with 4.3.2.29.

3.34.31 Roll Over Protective Structure and falling objects protective structure (ROPS/FOPS). The ROPS shall be capable of withstanding the tests specified in SAE J1040. The FOPS shall meet all of the requirements of SAE J231. FOPS and ROPS shall be tested in accordance with 4.3.2.30.

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3.34.32 Rain. Truck shall operate as specified when subjected to simulated rainfall when tested in accordance with 4.3.2.31 and Test Method No.11.

3.34.33 Sideshift attachment. The sideshift attachment shall be capable of side shifting the rated load without deformation to the attachment, truck carriage or upright. Sideshift mechanism shall operate forks to either side of center while carrying rated load a minimum of one half the truck width minus 18 inches (470 mm) (0.5W-18). The truck shall be tested in accordance with 4.3.2.32.

3.34.34 Frame or fork oscillation. The truck rotational motion of the frame and body assembly or the fork assembly about the pivot point with rated load shall be not less than 10 degrees clockwise and 10 degrees counterclockwise relative to a longitudinal vertical plane through the center of the truck. The truck shall be tested in accordance with 4.3.2.33.

3.34.35 Hydraulic fittings. When permanently attached type hose fittings are utilized a replacement hose assembly fitted with reusable type fittings shall be capable of replacing the original hose assembly without any alterations to the hose, hose routing and the truck. The truck shall be tested in accordance with 4.3.2.34 and Test Method No. 12.

3.34.36 Fail-safe hydraulic system. The fail-safe hydraulic system shall operate as specified in 3.21 when tested in accordance with 4.3.2.35 and Test Method No. 13.

3.34.37 Weight testing. When specified for shipboard use (see 6.2), each truck shall be capable of sustaining 150 percent of the rated load minimum for a minimum of ten minutes without damage to the truck in the operational mode when tested in accordance with 4.6.2.2 and Test Method No. 14.

#### 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 the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

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4.1.1 Responsibility for compliance. All items must meet the requirements of section 3 and 5. The inspection set forth in this specification shall become a 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 assuring that all products or supplies submitted to the Government for acceptance comply with all the requirements of the contract. Sampling inspection, as a 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 acceptance of defective material.

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

- (a). First article test and inspection (see 4.3)
- (b). Post tests (see 4.4)
- (c). Quality conformance test and inspection (see 4.6)
- (d). Inspection comparison (see 4.7)
- (f). Government first article inspection (see 4.10)

4.3 First article test and inspection. When a first article inspection is required (see 6.2), the contractor shall furnish one or more trucks which shall be the first production items which shall be subjected to all examinations and tests specified in Table I and Table II. Acceptance of the first article trucks shall not exclude the remaining trucks from the quality conformance inspections and tests specified in 4.6. The first article shall consist of one unit, except at the contractors option, a second unit may be used for the HI Shock and saline atmosphere tests. Prior to examination and test of the truck(s) the following shall be performed:

- (a). Furnish a schedule of maintenance to be followed during all testing of the first produced truck. A list of special tools, if any, required to perform this maintenance shall also be provided.
- (b). Service the truck with oils and greases specified herein and designated for use in the ambient temperature at which the test will be conducted.
- (c). Perform truck break-in period when required by the manufacturer.

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4.3.1 Examinations

4.3.1.1 Examinations. Prior to testing in accordance with 4.3.2, the first produced trucks shall be examined for deficiencies marked "X" in Column 1 of Table I.

4.3.1.2 Safety Examination. Safety examinations shall be conducted to insure that the trucks furnished under this specification meet or exceed the safety requirements of UL 558, Type DS. Acceptable evidence of meeting these requirements shall be a certified report(s) from Underwriter's Laboratories indicating that the trucks conform to the requirements of UL 558 (see 6.5).

4.3.2 Tests. Upon successful completion of the examinations specified in 4.3.1 the truck shall be subjected to the tests marked "X" in Column 1 of Table II. Test conditions and schedule shall be as follows:

(a). Unless otherwise specified herein (see 6.2), tests shall be conducted at the ambient temperature and climatic conditions existing at the place of test. Only that maintenance established by the contractor and submitted as a maintenance schedule prior to commencement of tests shall be performed during the tests.

(b). Tests may be conducted in any order desired except the endurance tests followed by hydraulic drift and steering wear tests shall be conducted last.

(c). Rated load is defined as the load equivalent to an unrestrained cube with overall dimensions twice the required load center dimension. Rated load weight tolerances shall be plus or minus one (1) percent.

(d). Load center is defined as the horizontal longitudinal distance from the intersection of the horizontal load carrying surfaces and vertical load-engaging faces of the forks to the center of gravity of the load. Tolerance for dimensions shall be plus or minus 1/4 inch (6 mm).

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TABLE I. Inspection Schedule

First Article 1	Quality Conformance 2	Requirement 3	Requirement Paragraph 4	Deficient	
				Yes 5	No 6
x		Safety Rating	3.3 & 4.3.1.2		
x		Fungus & Moisture	3.4.5		
x		resistance			
x		Human factors	3.5		
x		engineering			
x		Lubrication	3.6		
x		Pressure-release	3.6.1		
x		device			
x		Lubrication tag	3.6.2		
x		Lubrication	3.6.3		
x		fittings			
x		Maintainability	3.7		
x		Enclosures	3.7.1		
x		Access openings	3.7.2		
x		Drainage	3.7.3		
x		Replenishment	3.7.4		
x		Filters	3.7.5		
x		Screw threads	3.8		
x		Plating	3.9		
x		Oil sampling	3.10		
x		valves			
x		Engine	3.11, 3.11.1 & 3.11.2		
x		Governor	3.12		
x		Starting system	3.13		
x		Alternator	3.13.1		
x		Alternator	3.13.2		
x		regulator			
x		Battery	3.13.3		
x		Battery mounting	3.13.4		
x		Battery cables &	3.13.5		
x		terminals			
x		Fuel system	3.14		
x		Air cleaner	3.14.1		
x		Air filter	3.14.2		
x		restriction			
x		indicator			
x		Fuel stainer &	3.14.3		
x		water separator			
x		Cooling system	3.15		
x		Fan	3.15.1		
x		Water pump	3.15.2		
x		Thermostat	3.15.3		
x		Radiator	3.15.4		

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TABLE I. Inspection Schedule Continued

First Article 1	Quality Conformance 2	Requirement 3	Requirement Paragraph 4	Deficient Yes 5 No 6	
x		Gaskets, seals & packing	3.15.5		
x		Engine coolant hose	3.15.6		
x		Exhaust system	3.16		
x		Cold weather system aids	3.17		
x		Drive assembly	3.18		
x		Transmission	3.18.1		
x		Oil filter	3.18.2		
x		Front & rear axle disconnect	3.18.3		
x		Universal joints & drive shafts	3.18.4		
x		Front & rear axles	3.18.5		
x		Wheels	3.18.6		
x		Tires	3.18.7		
x		Steering system	3.19		
x		Rigid frame steering	3.19.1		
x		Articulated frame steering	3.19.2		
x		Brakes	3.20		
x		Service brakes	3.20.1		
x		Service brake holding device	3.20.2		
x		Parking brake	3.20.3		
x		Deadman control	3.20.4		
x		Hydraulic system	3.21		
x		Hydraulic lines	3.21.1		
x		Pressure hose disconnect	3.21.2		
x		Pressure hose fittings	3.21.3		
x		Pressure tubing	3.21.4		
x		Pressure tube fittings	3.21.5		
x		Suction lines	3.21.6		
x		Suction hose clamps	3.21.7		
x		Low pressure pilot lines	3.21.8		
x		Return lines	3.21.9		
x		Hydraulic pump(s)	3.21.10		
x		Filters	3.21.11		

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TABLE I. Inspection Schedule Continued

First Article 1	Quality Conformance 2	Requirement 3	Requirement Paragraph 4	Deficient	
				Yes 5	No 6
x		Return line	3.21.11.1		
x		Suction filter	3.21.11.2		
x		Pressure filter	3.21.11.3		
x		Hydraulic system contamination indicator	3.21.12		
x		Reservoir	3.21.13		
x		Relief valve	3.21.14		
x		Hydraulic accumulator	3.21.15		
x		Hydraulic control valves	3.21.16		
x		Cylinders	3.21.17		
x		Hose reels	3.21.18		
x		Forklift mechanism & carriage assembly	3.22		
x		Tilt mechanism	3.22.1		
x		Carriage	3.22.2		
x		Load backrest	3.22.3		
x		Sideshift	3.22.4		
x		Fork positioner	3.22.5		
x		Forks	3.22.6		
x		Frame or fork oscillation	3.23.1 & 3.23.2		
x		Engine cover	3.23.3		
x		Wheel guards	3.23.4		
x		Operator access	3.23.5		
x		Seat	3.23.6		
x		Seatbelt	3.23.7		
x		Pintle hook	3.23.8		
x	x	Towbar	3.23.9		
x		Slings & tiedown attachments	3.23.10		
x		ROPS/FOPS	3.23.11		
x		Handtool box	3.23.12		
x		Weighing device	3.24		
x		Dial indicator	3.24.1		
x		Digital indicator	3.24.2		
x	x	Personnel cab	3.25		
x		Glazing	3.25.1		
x		Interior	3.25.2		
x		Window wipers & washer	3.25.3		
x		Ventilation fans	3.25.4		

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TABLE I. Inspection Schedule Continued

First Article 1	Quality Conformance 2	Requirement 3	Requirement Paragraph 4	Deficient Yes 5 No 6	
x		Heater & defroster	3.25.5		
x		Electrical system	3.26		
x		Circuit breakers	3.26.1		
x		Lights	3.26.2		
x		Blackout lighting	3.26.3		
x		Horn	3.26.4		
x		Slave receptacle	3.26.5		
x		Controls Location	3.27		
x		Controls	3.28		
x		Floodlamp control	3.28.1		
x		Blackout lighting	3.28.2		
x		Engine-run control	3.28.3		
x		Starting system control	3.28.4		
x		Braking & declutch control	3.28.5		
x		Service brake control	3.28.6		
x		Accelerator control	3.28.7		
x		Transmission control	3.28.8		
x		Parking brake control	3.28.9		
x		Lift, sideshift, positioners, frame or fork oscillation & tilt control	3.28.10		
x		Rigid frame steering control	3.28.11		
x		Horn control	3.28.12		
x		Window wipers & washer control	3.28.13		
x		Heater & defroster control	3.28.14		
x		Ventilation fan control	3.28.15		
x		Instrument gauges control	3.28.16		

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TABLE I. Inspection Schedule Continued

First Article 1	Quality Conformance 2	Requirement 3	Requirement Paragraph 4	Deficient Yes 5 No 6	
x		Engine starting aid control	3.28.17		
x		Cooling system fan disconnect control	3.28.18		
x		Electrical system disconnect control	3.28.19		
x		Instrument panel	3.29		
x		Electrical system gauge	3.29.1		
x		Engine oil pressure gauge	3.29.2		
x		Engine coolant temperature gauge	3.29.3		
x		Transmission temperature gauge	3.29.4		
x		Hourmeter	3.29.5		
x		Fuel level gauge	3.29.6		
x		Air pressure gauge & warning light	3.29.7		
x		Deadman control light	3.29.8		
x		Fan disconnect warning light	3.29.9		
x		Service brake warning light	3.29.10		
x		Identification	3.30		
x	x	Identification marking plate	3.30.1		
x		Instruction, warnings, caution plates	3.30.2		
x		Shipping data plate	3.30.3		
x		Wheel loading plate	3.30.4		
x		Safety rating plate	3.30.5		
x		Oil sampling	3.30.6		
x		Slave receptacle plate	3.30.7		
x		Vehicle marking	3.31		
x		Truck capacity marking	3.31.1		
x	x	Registration number marking	3.31.2		

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TABLE I. Inspection Schedule Continued

First Article 1	Quality Conformance 2	Requirement 3	Requirement Paragraph 4	Deficient Yes 5 No 6	
x		Tire pressure marking	3.31.3		
x		Safety rating marking	3.31.4		
x		Supplementary markings	3.31.5		
x		Slinging & tiedown markings	3.31.6		
x		Safety warnings	3.31.7.1 & 3.31.7.2 & 3.31.7.3		
x		Fuel type marking	3.31.8		
x	x	Shipboard marking	3.31.9		
x	x	Structural testing marking	3.31.10		
x	x	Paint marking	3.31.11		
x		Castings & forgings	3.32.1		
x		Metal fabrication	3.32.2		
x		Welding	3.32.3		
x		Bolted connections	3.32.4		
x		Riveted connections	3.32.5		
x		Treatment & painting	3.33		
X		Walkway coating	3.33.1		
x		Noise hazard sign (when required)	3.34.7.1		
x	x	Preservation & packing	5.1		
		Marking	5.2		

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TABLE II. Test Schedule

First Article 1	Quality Conform. 2	Post Test 3	Test 4	Test Paragraph 5	Performance Paragraph 6	Test Method 7
x			Fording	4.3.2.1	3.4.4 & 3.34.1	1
x			Axle weight distribution	4.3.2.2(a)	3.34.2(a)	
x			Dynamic stability	4.3.2.2(b)	3.34.2(b)	
x			Lift system stability	4.3.2.2(c)	3.34.2(c)	
x			Slope ascension	4.3.2.3(a)	3.34.3(a)	
x			Lateral slope (static)	4.3.2.3(b)	3.34.3(b)	
x			Lateral slope (dynamic)	4.3.2.3(c)	3.34.3(c)	
x			Speed	4.3.2.4	3.34.4	
x			Acceleration	4.3.2.5	3.34.5	
x			Highway transportability	4.3.2.6(a)	3.34.6(a)	
x			Air transportability	4.3.2.6(b)	3.34.6(b)	2
x			Noise limit (operator station)	4.3.2.7(a)	3.34.7(a)	
x			Noise limit (exterior)	4.3.2.7(b)	3.34.7(b)	
x			EMI	4.3.2.8	3.34.8	
x			High Impact shock	4.3.2.9	3.34.9	
x			Endurance (durability)	4.3.2.10.1	3.34.10.1	3
x			Endurance placement)	4.3.2.10.2	3.34.10.2	4
x			Truck configuration	4.3.2.11	3.34.11(a) to 3.34.11(k)	
x			Lift height	4.3.2.12	3.34.12	5
x			Lifting speed	4.3.2.13	3.34.13	5
x			Lowering speed	4.3.2.14	3.34.14 or 3.34.15(b)	5
x			Truck weight	4.3.2.15	3.34.15(a) or 3.34.15(b)	
x		x	Hydraulic drift	4.3.2.16	3.34.16	6
x			Overload	4.3.2.17	3.34.17	7

TABLE II. Test Schedule Continued

First Article 1	Quality Conform. 2	Post Test 3	Test 4	Test Paragraph 5	Performance Paragraph 6	Test Method 7
x		x	Service brakes	4.3.2.18	3.34.18 (a) & 3.34.18 (b) & 3.34.18 (c) & 3.34.18 (d)	8
x		x	Parking brake & deadman control	4.3.2.19	3.34.19	
x			Resistance to saline atmosphere	4.3.2.20	3.34.20	
x			Slinging & tiedown attachments	4.3.2.21	3.34.21	
x			Maintainability	4.3.2.22	3.34.22 (a) to 3.34.22 (l)	
x			Tires & tire loading	4.3.2.23	3.34.23	9
x			Deck loading	4.3.2.23	3.34.24	9
x			Exhaust emission requirements	4.3.2.24	3.34.25 (a) to 3.34.25 (c)	
x			Starter disconnect	4.3.2.25	3.34.26	
x		x	Weighing device	4.3.2.26	3.34.27	
x			Curb clearance diameter	4.3.2.27	3.34.28	
x		x	Steering	4.3.2.28	3.34.29	10
x			Pintle hook	4.3.2.29	3.34.30	
x			ROPS/FOPS protective structure	4.3.2.30	3.34.31	
x			Rain	4.3.2.31	3.4.3 & 3.34.32	11
x			Sideshift mechanism	4.3.2.32	3.34.33	
x			Frame or fork rotation	4.3.2.33	3.34.34	
x			Hydraulic fittings	4.3.2.34	3.34.35	12
x			Fail-safe hydraulic system	4.3.2.35	3.34.36	13
		x	Disassembly & examination	4.4.2	3.2	
	x		Run-in test	4.6.2.1	3.2	3 & 4
	x		Weight testing	4.6.2.2	3.34.37	14

4.3.2.1 Fording. The truck fording capability shall be tested in accordance with Test Method No. 1. Failure to conform to 3.4.4 and 3.34.1 and the following evidence and malfunctions shall constitute failure of this test.

- (a) Evidence of water in the torque convertor, transmission, engine oil sump, front and rear axles, fuel tank, hydraulic reservoir, brake reservoir, wheels, instruments and gages.
- (b) Malfunctioning of any electrical component.
- (c) Malfunctioning of any brake component.
- (d) Malfunctioning of any hydraulic component.
- (e) Malfunctioning of any steering component.
- (f) Malfunctioning of torque convertor and transmission.
- (g) Evidence of corrosion which prevents the correct function of the truck.
- (h) Inability to start the engine when fording.

4.3.2.2 Truck stability. The truck stability shall be tested as specified herein:

(a) Axle weight distribution. Determine and record the truck curb weight without rated load. Determine and record the weight on the rear axle of the truck without rated load and the forks positioned at 24 inches (610 mm) above the ground. Record truck weight with rated load test as determined by the truck weight test (see 4.3.2.15). Determine and record the weight on the rear axle of the truck with rated load and with the forks positioned 24 inches (610 mm) from the ground. Curb weight and axle weights shall be determined using a platform scale. Tests shall be performed with the operator in the seated position. Failure to conform to 3.34.2(a) shall constitute failure of this test.

(b) Dynamic stability. Accelerate the truck to maximum speed with the rated load in the travel position at full rearward tilt and abruptly bring the truck to a complete stop. Observe and record the position of the truck tires and the rated load. Failure to conform to 3.34.2(b) shall constitute failure of this test.

(c) Lift system stability. Lift the rated load to its maximum lift height and then lower the rated load at the truck's maximum lowering speed. Abruptly terminate lowering the load approximately 24 inches (610 mm) above the ground. Observe and

record the position of the truck tires. Failure to conform to 3.34.2(c) shall constitute failure of this test.

4.3.2.3 Slope operation, parking brake and deadman control. The truck slope operation and parking brake shall be tested as specified herein. Also, when truck is specified for shipboard use (see 6.2) the deadman control shall be tested as specified herein.

(a) Longitudinal slope ascension, parking brake and deadman control. Place the truck with rated load at the bottom of a 100 ft (31 m) 45 % (24 degrees) minimum longitudinal slope. The slope may be of any composition (e.g., asphalt, concrete, dirt, stone, etc.). Proceed forward in low gear up the slope. The truck shall be brought to a complete stop at the middle of the slope and the parking brake engaged. After the two minute waiting period release the parking brake and proceed up the slope onto a horizontal surface. Stop the truck and back down the slope in reverse low gear onto a horizontal surface. Repeat the preceding procedure for a total of 20 times. The force needed to apply the parking brake shall be determined on at least five of the 20 passes. When specified for shipboard use (see 6.2), the deadman control shall be tested on the reverse descent the same as the parking brake except the parking brake control shall not be activated and the operator shall leave the seat for the two minutes. Failure of this test occurs if the truck cannot complete all of the passes up and down the slope on consecutive attempts and any if any tire movement is observed when the parking brake or deadman control are applied in accordance with 3.34.3(a) and 3.34.19.

(b) Lateral slope (static). Position the lateral axis of the truck parallel to a 30 % (17 degrees) minimum lateral slope with the rated load positioned at a 24 inch (610 mm) lift height. The use of the truck frame or fork oscillation function is permitted during this test. Observe and record if any truck tire leaves the ground. Failure to conform to 3.34.3(b) shall constitute failure of this test.

(c) Lateral slope (dynamic). Drive the truck without the rated load in low gear in the clockwise and counterclockwise directions on a 30 % (17 degrees) minimum slope at a minimum of 2 miles per hour. The use of the truck frame or fork oscillation is permitted during this test. Observe and record if any truck tire leaves the ground. Failure to conform to 3.34.3(c) shall constitute failure of this test.

4.3.2.4 Speed. Start the truck with rated load from a dead stop on a level surface and accelerate to the truck's maximum speed in high gear. When specified for shipboard use (see 6.2), start the truck without rated load. Record the time required for the truck to travel between two marks spaced 528 ft (161 M) apart on a

straight level track. Repeat the test 3 times in both the forward and reverse directions. The truck speed shall be the average of three test runs. Failure to conform to 3.34.4 shall constitute failure of this test.

4.3.2.5 Acceleration. Start the truck without the rated load from a dead stop on a level surface accelerating to the truck's maximum speed in forward first gear on a straight and level 100 foot (31 M) course. Record the time to reach the 100 foot (31 M). Repeat the test 3 times in both the forward and reverse directions. The acceleration shall be the average of three test runs. Repeat the test in high gear. Failure to conform to 3.34.5 shall constitute failure of this test. When specified for shipboard use (see 6.2), this test is not required.

4.3.2.6 Transportability. The truck transportability shall be tested as specified herein (see 6.2):

(a) Highway transportability. Test truck in accordance with Test Method No. 15. Failure to conform to 3.34.6(a) shall constitute failure of this test.

(b) Air transportability. Test the truck in the USAF C-130 aircraft in accordance with Test Method No. 2. Nonconformance to 3.34.6(b) shall constitute failure of this test. When specified (see 6.2), the contractor shall prepare a Transportation Report in accordance with Data Item Description DI-PACK-80880 in lieu of actual drive-on/drive-off or mock-up testing.

#### 4.3.2.7 Noise level measurement

(a) Operator's station. Measure equivalent continuous noise level (Leq) in accordance with MIL-STD-1474 at the operators station during performance testing. Microphone shall be located no more than six 6 inches (150 mm) from operator's approximate ear location. Duty cycle test shall be run in lieu of the steady-state test of MIL-STD-1474. All lifting and lowering operations shall be accomplished with the truck stationary at truck's maximum lifting and lowering speeds. Cumulative noise exposure measurement shall require a minimum of 1 hour of continuous operation on the test course. Nonconformance to 3.34.7(a) at the operator's station shall constitute failure of this test.

(b) Exterior. Measure the maximum steady state noise level in accordance with MIL-STD-1474 for exterior noise for construction and materials handling equipment. Nonconformance to 3.34.7(b) at 24.5 feet (7.5 m) shall constitute failure of this test.

(c) Noise hazard. Whenever the noise level of the truck exceeds 85 dB (A) when tested as specified herein for the

operator's station and exterior the noise hazard signs conforming to MIL-STD-1474 shall be posted on truck.

4.3.2.8 Electromagnetic interference (EMI). The truck EMI shall be tested as specified in SAE J551. When specified for shipboard use (see 6.2), the truck shall be tested in accordance with MIL-STD-462. Acceptable evidence of meeting this requirement shall be a certified test report(s) from an independent testing laboratory acceptable to the government (see 6.5). Nonconformance with the requirements of 3.34.8 shall constitute failure of this test.

4.3.2.9 High impact shock. When specified for shipboard use (see 6.2), one first article truck shall be tested by the contractor in accordance with MIL-S-901. Acceptable evidence of meeting this requirement shall be a certified test report(s) from an independent high shock testing laboratory acceptable to the government (see 6.5). Prior to actual test, contractor shall submit a formal procedure to be used during the high shock test for approval. Procedure shall indicate applicable documents, test requirements, description of test, hardware configuration, preparation for testing, visual inspections, initial operational tests, evaluation of damage, shock test report, definition of failure, cause for rejection, completion of shock testing and post shock examination and post operational tests. Operational tests shall include lifting/lowering speed, acceleration, vehicle speed, slope ascension, under-clearance and stopping distance. Pursuant to 6.1 of MIL-S-901, the following ordering data shall apply to the test truck which shall be mounted on the Floating Shock Platform during the test and to the trucks furnished by the supplier:

- (a) Shock tests: HI (High-Impact); Shipboard Machinery, Equipment and Systems, Requirements For, MIL-S-901.
- (b) Issue of DODISS shall be the issue in effect on the date of invitation for bids or request for proposals.
- (c) Grade A shock-proofness required.
- (d) Deck-mounted principal units.
- (e) The truck is Class I, modified. The modification is that the truck rests on pneumatic rubber tires which are similar in action to some resilient mountings.
- (f) Heavyweight.
- (g) Type A Test.
- (h) Following the explosion of the depth charge at 20-foot (6 m) standoff, the truck shall comply with (i) and then with (j).

Failure of the truck to comply with (i) and (j) or failure or harmful permanent deformation of any component shall be regarded as failure of the truck to meet the H.I. Shock requirement in accordance with 3.34.9.

(i) The truck shall be secured to the deck simulator of the Floating Shock Platform in accordance with the instructions of the contract.

(j) The truck shall not be operated during the shock, but it shall be operated briefly after each shock, to show lifting, lowering, drive wheels jacked up and rotating forward and reverse, sideshift operation, and steering.

k) After successful test of the truck and provided the truck did not sustain damage beyond that permitted in accordance with (g), the shock-tested truck with battery may be submitted as the final production item under the contract after being refurbished to appear new.

(l) See (d).

(m) Only first produced truck required to be tested.

#### 4.3.2.10 Endurance.

4.3.2.10.1 Durability. Truck shall be tested in accordance with Test Method No. 3. The reliability test shall be conducted on a continuous basis during each operating 8 hour day minimum. The average speed around the test course shall be 5 miles per hour. The 2600 circuits must be completed without any failures. If failure(s) occur before completion of 2600 circuits, the failure(s) must be corrected and test restarted, beginning at the first circuit. Nonconformance with the requirements of 3.34.10.1 are defined as follows:

(a) Any malfunction which cannot be remedied by adjustment, repair or replacement action by contractor personnel using contractor tools and parts within 30 minutes.

(b) The total time of malfunctions exceeds 5% of the time required to complete the specified number of circuits.

(c) Failure to commence operation, cessation of operation or degradation of performance capabilities specified herein.

(d) Damage to the truck by continued operation such as fluid leaks, overheating or an internal component failure of the engine, transmission, axles, brakes, differential and hydraulic pump.

(e) Personnel safety hazard.

(f) Truck overturn or instability which results in either the steer or drive wheel(s) losing contact with the ground for more than five seconds.

(g) The capacity of the fuel tank is insufficient to permit 8 hours of continuous operation.

Notes: (1) Only routine maintenance as prescribed by the contractor prior to the test is permitted.

(2) Record the reason and amount of time involved for each truck stoppage or malfunction, including refueling, during the endurance test.

4.3.2.10.2 Load placement. Truck load placement rate shall be tested in accordance with Test Method No. 4. Nonconformance with the requirements of 3.34.10.2 shall constitute failure of this test.

4.3.2.11 Truck configuration. Truck overall height, length, width, ground clearance, fork size, fork tilt, fork spacing, fork reach, and fork sideshift travel shall be determined and recorded. Measurements failing to meet the minimum dimensions or exceeding the maximum dimensions indicated in 3.34.11(a) through 3.34.11(k) shall constitute failure of this test.

4.3.2.12 Lift height. Truck lift height shall be measured in accordance with Test Method No. 5. Nonconformance with the requirements of 3.34.12 shall constitute failure of this test.

4.3.2.13 Lifting speed. Truck lifting speed with rated load shall be measured in accordance with Test Method No. 5. Nonconformance with the requirements of 3.34.13 shall constitute failure of this test.

4.3.2.14 Lowering speed. Truck lowering speed with and without rated load shall be measured in accordance with Test Method No. 5. Nonconformance with the requirements of 3.34.14 shall constitute failure of this test.

4.3.2.15 Truck weight. Determine and record the truck weight without the rated load using a platform scale. Nonconformance with the requirements of 3.34.15(a) or 3.34.15(b) shall constitute failure of this test.

4.3.2.16 Hydraulic drift. Test the truck's hydraulic drift in accordance with Test Method No. 6. Nonconformance to 3.34.16 shall constitute failure of this test.

4.3.2.17 Overload. Test the truck in accordance with Test Method No. 7. Failure is defined as permanent deformation, fractures, broken welds and leakage in the hydraulic system.

This requirement does not include the hydraulic pump, the hydraulic relief valve and the weighing device. Nonconformance with the requirements of 3.34.17 shall constitute failure of this test.

4.3.2.18 Service brakes. Test the truck stopping distance, brake system strength, and restraint after water immersion in accordance with Test Method No. 8. Nonconformance with the requirements of 3.34.18(a) through 3.34.18(d) shall constitute failure of this test. Failure of the brake strength test is defined as any fluid leak, ruptured lines or permanent deformation within the brake system.

4.3.2.19 Parking brake and deadman control. Test the truck parking brake as specified in the slope operation test (4.3.2.3(a)). When specified for shipboard use (see 6.2), the deadman control shall also be tested as specified in the slope operation test (4.3.2.3(a)). Nonconformance to 3.34.19 shall constitute failure of this test.

4.3.2.20 Resistance to saline atmosphere. When specified for shipboard use (see 6.2), the first article (first produced) truck shall be tested in accordance with MIL-STD-810, Method 509.2, Salt Fog. Acceptable evidence of meeting this requirement shall be a certified test report(s) from an independent testing laboratory acceptable to the government (see 6.5). Preparation of the assembled truck prior to exposure to salt fog shall be in accordance with Method 509.2, Section II, paragraph II-2.5. Any evidence of non-compliance with 3.34.20 shall be cause for rejection of the truck. Pursuant to Method 509.2, Section I, paragraph I-4.2, the following details are designated:

(a). Test duration: Exposure period shall be 72 hours followed by 168 hour drying period.

(b). Configuration: All exterior surfaces of the truck, including the exposed surface of each piston rod, shall be cleaned and exposed to salt fog and the drying. The rod(s) of the tilt and of the side shift cylinder(s) shall be at full extension. The lift cylinder rod which is exposed when the lift assembly is lowered fully shall be so cleaned and exposed. Components such as bearings and lift chains which are permanently lubricated during service use shall be lubricated in accordance with instructions of supplier prior to test. Individual electrical components may be tested separately instead of with the entire truck.

(c). Cyclic conditions: Not required.

(d). Salt concentration: 5 percent.

(e). Additional guidelines:

(1) Visual inspection after 24 hour and 72 hour exposure, but no washing or operation until examination following full exposure and drying period. Truck shall be dried at room temperature while loosely covered with a sheet of clear plastic to retard drying and allow visual inspection.

4.3.2.21 Slinging and tiedown attachments. Test the truck slinging and tiedown attachments in accordance with tests indicated in MIL-STD-209. When truck is specified to be air transportable (see 6.2), the slinging and tiedown attachments shall also be tested in accordance with Air Force Design Handbook DH-11. When specified for shipboard use (see 6.2), the slinging and tiedown attachments shall also not sustain any permanent deformation as a result of the high impact shock test. Nonconformance to 3.34.21 shall constitute failure of test.

4.3.2.22 Maintainability. Perform and record time required to perform each maintenance operation. List any special tool required to perform any of the maintenance operations. Nonconformance to 3.34.22 shall constitute failure of this test.

4.3.2.23 Tires, tire loading and deck loading. The truck with rated load in the carry position shall be operated over soft terrain at a speed of 2 miles per hour (3.2 km/hr) for 30 minutes minimum. Also, test the truck tire loading and when specified for shipboard use (see 6.2) the deck loading in accordance with Test Method No. 9. Nonconformance with requirements of 3.34.23 and 3.34.24 shall constitute failure of this test.

4.3.2.24 Diesel engine emissions. When specified for shipboard use (see 6.2), the diesel engine emissions test shall be conducted. Acceptable evidence of meeting this requirement shall be a certified test report(s) from an independent testing laboratory acceptable to the government (see 6.5). Nonconformance with the requirements of 3.34.25 shall constitute failure of this test.

4.3.2.25 Starter disconnect. Test the truck to ensure the diesel engine starter motor can only be energized when the transmission lever is in the neutral position. Attempt to energize the starter motor when the transmission lever is in the forward or reverse positions and/or when the engine is running. Any evidence of starter motor operation shall constitute nonconformance to 3.34.26 and failure of this test.

4.3.2.26 Weighing device. When specified for shipboard use (see 6.2), the weighing device for the Type A truck shall be tested for conformance to the requirements of 3.34.27. With the truck positioned on a smooth, level surface and with the mast vertical, the unloaded forks shall be elevated to a height of 20-24 inches (510-610 mm). By use of the lift control valve, the forks shall

be dropped 1-4 inches (25-102 mm) and abruptly stopped. Adjust tare to show zero load where read-out most consistently came to rest each time within the first ten seconds and mark the zero position. This procedure shall be repeated four times. Repeat the test with rated load and record the weights indicated on the indicator. The average of the four readings shall be used to determine weighing scale accuracy. Nonconformance with requirements of 3.34.27 shall constitute failure of this test.

4.3.2.27 Curb clearance diameter. Truck shall negotiate a non-stop left turn of 360 degrees in the forward direction. Mark the position of the truck at two 180 degree points. Measure the distance between the two points and determine the truck turning diameter. Repeat the test to negotiate a non-stop right turn in the forward direction. Nonconformance to 3.34.28 shall constitute failure of this test.

4.3.2.28 Steering. Test the truck steering in accordance with Test Method No. 10. Nonconformance with requirements of 3.34.29 shall constitute failure of this test.

4.3.2.29 Pintle hook. The truck pintle hook shall be subjected to a longitudinal drawbar pull of 34,000 pounds (151,000 N) and a lateral pull of 17,000 pounds (76,000 N). Nonconformance with the requirements of 3.34.30 shall constitute failure of this test.

4.3.2.30 ROPS/FOPS protective structure. Test the ROPS/FOPS in accordance with SAE J231 or SAE J1040. In lieu of test, a certified test report on the same ROPS/FOPS is acceptable. Nonconformance with requirements of 3.34.31 shall constitute failure of this test.

4.3.2.31 Rain. Test the truck in accordance with Test Method No. 11. Nonconformance with requirements of 3.4.3 and 3.34.32 shall constitute failure of this test.

4.3.2.32 Sideshift attachment test. Record the sideshift travel distance from center of carriage to the maximum sideshift position. Operate the sideshift attachment for 100 full cycles at full speed from extreme left to extreme right and back to extreme left per cycle with the rated load on the forks. Test may be interrupted when hydraulic system temperatures exceeds the maximum safe operating temperature. During the last 50 cycles, the control shall be released abruptly when the load is in approximately mid-position between the left and right extremes. Upon completion of the 100 cycles, the attachment and its components shall be examined for compliance with 3.34.33. Examine the truck and sideshift attachment for any evidence of damage and permanent deformation. Nonconformance with requirements of 3.34.33 shall constitute failure of this test.

4.3.2.33 Frame or fork rotation. The truck, with rated load in the carry position, shall be positioned on a level surface. Verify with a 60 inch (1525 mm) level the truck is in a true horizontal position. Rotate the truck frame or forks to the maximum truck rotation and measure and record the degrees of rotation. Nonconformance with requirements of 3.34.34 shall constitute failure of this test.

4.3.2.34 Hydraulic hose fittings. When the truck is equipped with permanent type hose fittings the hose assembly shall be tested in accordance with Test Method No. 12. Nonconformance with requirements of 3.34.35 shall constitute failure of this test.

4.3.2.35 Fail-safe hydraulic system. The fail-safe hydraulic system shall be tested in accordance with Test Method No. 13 and shall meet the requirements of 3.34.36 and 3.21.

#### 4.4 Post Tests.

4.4.1 Post Tests. After successful completion of testing specified in 4.3.2, the first produced truck shall be subjected to the tests marked "x" in column 3 of Table II. Nonconformance with any of the performance requirements specified herein shall constitute failure of first article test.

4.4.2 Post test disassembly and examination. Upon completion of all testing indicated in 4.4.1 the hydraulic reservoir shall be pressurized and checked for leaks and each engine cylinder compression shall be measured and recorded. The truck shall be disassembled as required to permit the following components to be removed and disassembled in detail for visual examination and measurements. A complete description of the condition and measurements of each component shall be recorded and photographs shall be taken of components in which excessive wear or corrosion has occurred. Evidence of permanent deformation, broken components, excessive wear and excessive corrosion shall indicate nonconformance with the requirements of 3.2 and shall constitute failure of this test.

(a). Engine. Cylinder head(s), all valves, two pistons and piston pins with the lowest recorded compression readings, two main bearings, two connecting rod bearings and turbocharger when furnished with the engine.

(b). Transmission and torque convertor.

(c). Universal joints and drive shafts.

(d). Differential(s).

(e). Drive planetaries.

- (f). Wheel brake drums.
- (g). Steering cylinders, valves and steering pump if furnished.
- (h). Hydraulic system pump, control valves, all cylinders and hose(s) with fitting where leakage has been observed.

4.5 First Article (first produced) inspection and test report. When specified in the contract or order, a First Article Inspection Report (4.3.1) and a First Article Test Report (4.3.2) shall be prepared (see 6.3). Each inspection, test result and report shall be witnessed and verified by a government representative and shall bear the government representative's stamp. First article test truck USN registration number, manufacturers serial number and date of report shall be indicated on the cover of the report.

#### 4.6 Quality Conformance Inspection and Tests.

4.6.1 Quality Conformance Inspections. Each production truck shall be inspected for compliance marked "x" in column 2 of Table I. Nonconformance with the requirements specified herein shall be cause for rejection of truck.

4.6.2 Quality Conformance Tests. Each production truck shall be tested for compliance marked "x" in column 2 of table II. Nonconformance with the performance requirements specified herein shall be cause for rejection of the truck.

4.6.2.1 Production truck(s) run-in test. Each truck shall be run for a minimum of one hour in accordance with Test Method No. 4 and for 10 circuits minimum at 5 mph (8 k/hr) minimum in accordance with Test Method No. 3. After the completion of the run-in test each truck shall be inspected for evidence of leaks, permanent deformation, and failure to meet the performance requirements specified herein shall constitute failure of this test.

4.6.2.2 Weight testing. When specified for shipboard use (see 6.2), test each truck in accordance with Test Method No. 14. This requirement does include the hydraulic pump, the hydraulic relief valve and the weighing device. Failure is defined as permanent deformation, fractures, broken welds and leakage in the hydraulic system. Nonconformance with the requirements of 3.34.37 shall constitute failure of this test.

4.7 Inspection Comparison. The government may select trucks at any time during the contract production period and subject the trucks to the inspections specified in Column 1 of Table I and to the tests specified in Column 1 of Table II to determine conformance to the requirements of this specification. The

inspections will be performed by the Government, at a site selected by the Government, on units selected at random from those which have been accepted by the Government and will not include the previously inspected and tested truck(s). In addition to any test specified as part of the inspection comparison, the government reserves the right to conduct any and all other tests contained in this specification as part of the inspection comparison, and failure of such additional tests shall have the same effect as failure of those tests specified as inspection comparison.

4.7.1 Inspection failure. Failure of an inspection comparison truck to meet any requirement specified herein during and as a result of the inspection and tests specified herein during and as a result of the inspection and tests specified in 4.2 shall be cause for rejection of the inspection comparison truck(s) and shall be cause for refusal by the Government to continue acceptance of production trucks until evidence has been provided by the supplier that corrective action has been taken to eliminate the deficiencies. Correction of such deficiencies shall be accomplished by the supplier at no cost to the Government on trucks previously accepted and produced under the contract. Any deficiencies found as a result of the inspection comparison will be considered prima facie evidence that all trucks accepted prior to the completion of inspection comparison are similarly deficient unless evidence to the contrary is furnished by the supplier and such evidence is acceptable to the contracting officer.

4.8 Preproduction sample truck(s). Any changes or deviations of production truck(s) from the approved preproduction model during production will be subject to the approval of the contracting officer. Approval of the preproduction model will not relieve the supplier of his obligation to furnish truck(s) conforming to this specification.

4.9 Incident report. When the contractor is conducting the inspections and tests specified herein, any malfunction or failure will require a written report of the incident be submitted to the contracting officer within 24 hours. As a minimum, the report shall describe components and parts affected, test and operating conditions, date of incident, hour meter reading, how detected and description of incident and corrective action taken.

4.10 Government first article inspection. When a government first article inspection is required (see 6.2), the government will conduct a user review as specified herein.

4.10.1 User review test. The government user review test will be conducted to give the government an opportunity to identify any changes which may be required to the specifications specified

herein to meet shipboard requirements. The truck shall be available for shipboard use and operated by government personnel during normal shipboard operations for a period of fourteen consecutive calendar days for approximately eight hours each day. Any day the truck is not available for more than four hours due to repair and maintenance requirements shall not be considered a calendar day. Government user test will be conducted in accordance with instructions in the contract or purchase order. In the event of government changes to the specifications or damage to the truck as a result of government error or misuse, the contract will be equitably adjusted.

4.10.2. Delivery. The contractor shall deliver one preproduction truck to the Naval facility specified herein (see 6.2). The cost of transportation to and from the test site shall be borne by the contractor. The contractor shall provide notification of truck shipment to the contracting officer and the Naval facility a minimum of 20 days prior to shipment.

4.10.3 Contractor personnel. When requested by the contractor and approved by the government, contractor's personnel may witness the user test. When required (see 6.2), government clearance for contractor personnel will be provided. Transportation and billeting costs of contractor personnel shall be borne by the contractor.

## 5. PACKAGING

5.1 Preservation, packing, and marking. Each truck shall be preserved, packed and marked in accordance with MIL-STD-162 for type I mobile or type II crated, as specified (see 6.2). The degree of preservation shall be level A, Level B, Level C or commercial, and the degree of packing shall be level A, level B, level C or commercial as specified (see 6.2).

5.2 Marking. Marking shall be in accordance with MIL-STD-129.

## 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 trucks described herein are intended for operation in and around military supply facilities, for moving cargo from warehouses and terminals onto piers for loading ships, for operation over rough paved and unpaved surfaces for long distances and traversing uneven railroad crossings. When specified for shipboard use (see 6.2), the truck shall also be utilized for stacking, unstacking and moving cargo on weather, flight and hanger decks onboard marine vessels.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of the specification.
- (b) List of non-government documents not listed in the DODISS and the date of issue (see 2.2).
- (c) Specify truck lifting capacity (see 1.2, 3.34.15).
- (d) When a first article test and inspection is required, test location, size of truck to be furnished, and time frame required for submission of first article test results (see 3.1, 4.3).
- (e) Specify when a minus (-) 25° F (-32° C) operating temperature is required (see 3.4.1, 3.17, 3.25.5, 4.3.2).
- (f) Specify when the truck is for shipboard use (see 3.2, 3.9, 3.18.7, 3.20.1, 3.20.4, 3.23.10, 3.24, 3.26.2, 3.26.4, 3.28.2, 3.28.3, 3.29.8, 3.31.9, 3.31.10, 3.31.11, 3.34.1, 3.34.4, 3.34.5, 3.34.8, 3.34.9, 3.34.19, 3.34.21, 3.34.24, 3.34.25, 3.34.27, 3.34.37, 4.3.2.3, 4.3.2.5, 4.3.2.8, 4.3.2.9, 4.3.2.19, 4.3.2.20, 4.3.2.21, 4.3.2.23, 4.3.2.24, 4.3.2.26, 4.6.2.2, 6.1, 6.5).
- (g) Specify when the truck shall be equipped with a towbar (see 3.23.9).
- (h) Specify when the truck shall be equipped with a personnel cab (see 3.16, 3.25, 3.31.7.2, 3.31.7.3, 3.34.7.1).
- (i) Specify when the truck shall be painted with an alternate color and finish (see 3.33).
- (j) Specify the required type(s) of transportability (see 3.34.2.1, 3.34.6, 4.3.2.6, 4.3.2.21).
- (k) Specify level of preservation, packaging and packing (see 5.1, 6.7).
- (l) Specify when a government first article inspection is required, location where user test is to be conducted and required government clearances. (See 4.10, 4.10.2, 4.10.3).
- (m) Specify when a technical manual verification review is required, location where review is to be conducted and required government clearances (see 6.10.1, 6.10.1.2, and 6.10.1.3)
- (n) Specify when a Transportation Report shall be prepared in lieu of drive-on drive off tests (see 4.3.2.6).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data are requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To ensure correct contractual application of the data requirements, a Contract Data Requirements List (DD Form 1423) must be prepared to obtain the data, except where DOD FAR Supplement 27.475-1 exempts the requirement for a DD Form 1423.

Paragraph No.	Data Requirement Title	Applicable DID No.
4.3.2.6	Transportation	DI-PACK-80880
4.5 & 6.4	First Article Inspection Test Report	DI-T-4902
4.9	Incident Report	DI-T-23724

The above DID's were those cleared as of the date of this specification. The current issue of 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 First article. When a first article inspection is required, the contracting officer should provide specific guidance to offerors whether the item should be a preproduction sample, a first article sample, a first production item, a standard production item from the contractor's current inventory (see 3.3) and the number of items to be tested as specified in 4.3. The contracting officer shall also include specific instructions in acquisition documents regarding arrangements for examinations, approval of the first article test results, and disposition of the first articles. Invitation 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. Bidders should not submit alternate bids unless specifically requested to do so in the solicitation.

6.5 DS safety rating, high shock, electromagnetic interference, diesel emission, and saline atmosphere tests. The contracting officer shall include in the solicitation the requirements that the manufacturer shall locate independent testing facilities to conduct the DS safety rating inspection and to conduct the high impact shock, electromagnetic interference, saline atmosphere and diesel emission tests.

6.6 Technical Manuals. The requirements for technical manuals should be considered when this specification is applied on a contract. If technical manuals are required, military specifications and standards that have been cleared and listed in DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL) must be listed on a separate Contract Data Requirements List (DD Form 1423), which is included as an exhibit to the contract. The technical manuals must be acquired under separate contract line item in the contract. The technical manual shall also include complete instructions for component removal and replacement to prepare the truck for air transportability.

6.7 Conditions for use of level B preservation. When Level B preservation is specified (see 5.1 and 6.2), this level of protection should be limited to truck(s) which are transported over the seas onboard marine vessels and when long term storage is required.

6.8 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

6.9 Subject term (key word) listing.

Forklift truck  
Rough terrain  
Diesel engine driven  
Pneumatic rubber tires  
Shipboard

6.10 Technical manual verification

6.10.1 Technical manual verification review. When a government technical manual verification is required (see 6.2), the government will conduct the review as specified herein.

6.10.1.1. Technical manual verification review. The technical manual verification review will be conducted by the government to validate that the truck's final technical manual accurately reflects the truck configuration, general information, operating instructions, safety rating, preventive maintenance, repair and overhaul, illustrated parts breakdown and parts list index. The truck will be operated only to the extent required by the technical manual to ensure that each section of the manual is accurate. Repair and overhaul operations will not be conducted, but will be reviewed for clarity. The illustrated parts breakdown and parts list index will be reviewed to the extent possible without major disassembly of the truck. The manual review shall be conducted after successful completion of first article inspection. The truck shall be available for review for a period of fourteen consecutive calendar days. Government

review will be conducted in accordance with instructions in the contract or purchase order. In the event the technical manual does not accurately reflect the truck, a written list of discrepancies will be included in the prefinal technical manual review comments.

6.10.1.2 Delivery The contractor shall deliver one preproduction truck to the Naval facility specified herein (see 6.2). The cost of transportation to and from the test site shall be borne by the contractor. The contractor shall provide notification of truck shipment to the contracting officer and the Naval facility a minimum of 20 days prior to shipment.

6.10.1.3. Contractor personnel. When requested by the contractor and approved by the government, contractor's personnel may witness the review. When required (see 6.2), government clearance for contractor personnel will be provided. Transportation and billeting costs of contractor personnel shall be borne by the contractor.

6.11 Transportation Report When specified (see 6.2), the contracting officer shall include in the solicitation the requirements for the contractor to submit the Transportation Report indicated in paragraph 6.3 to Wright Patterson AFB and SPCC 0341 prior to the start of truck construction and First Article Test to ensure compliance with the air transportability requirement specified herein. Wright Patterson approval will be forwarded to SPCC 0341 for final approval.

Custodians:

Army - ME  
Navy - SA  
Air Force - 99

Preparing Activity:

Navy - SA

Review Activities:

Air Force - 84  
DLA - CS  
Army - MT, AT

User Activities:

Navy - OS  
DLA - DOSO-DER

Project No. 3930-0639

## APPENDIX

### FOR

TRUCK, FORKLIFT.DIESEL ENGINE DRIVEN, 120 INCH (3050 MM)

LIFT HEIGHT, DS SAFETY RATED, PNEUMATIC RUBBER TIRES,

ROUGH TERRAIN, FOR SHIPBOARD USE

1.0 Scope. This appendix is a mandatory part of the specification. The information contained herein is intended for compliance.

2.0 Applicable documents. This section is not applicable to this appendix.

## TEST METHOD NO.1

### FORDING

#### 1.1. Test course.

1.1.1 The test course shall be a sandy beach area and a body of sea water of sufficient depth to permit submersion of the truck with rated load to a depth of 60 inches (1525 mm) minimum for a shipboard truck (see 6.2) or 36 inches (910 mm) for a shorebased truck.

#### 1.2. Test apparatus.

1.2.1 The first article truck with rated load shall have a horizontal white line painted on each side of the truck at a height of 60 inches (1525 mm) above ground level for a shipboard truck, 36 inches (910 mm) for a shorebase truck.

#### 1.3. Fording test.

1.3.1 Drive the truck with rated load in the forward direction away from the beach into the water to the specified depth, including wave action. At no time shall the water level be lower than the center line of the wheels. Maneuver the truck until it is parallel to the shoreline and perform the following operations:

(a) Drive the truck in the forward direction in first gear at a maximum safe speed for 3 minutes minimum. The steering system shall be actuated to extreme left and to extreme right at least one time. Stop the truck by applying the service brakes and apply the parking brake.

(b) Release the parking brake and drive the truck in the reverse direction in first gear at the maximum safe speed for 3 minutes minimum. The steering system shall be actuated to extreme left and to extreme right at least one time. Stop the truck by applying the service brakes. Operate all hydraulic cylinders, except steering, through one complete cycle.

(c) Repeat steps 1.3.1 (a) - (b) for a minimum of 18 minutes (3 complete cycles).

(d) After three complete cycles, turn off engine. Wait three minutes and restart engine.

1.3.2. Drive truck ashore and repeat steps 1.3.1 (a) - (d).

(Cont.)

1.3.3 Repeat the procedure in 1.3.1 and 1.3.2 for two consecutive days, eight (8) hours per day. Prior to leaving the water for the last time each day, activate all of the truck's hydraulic systems, except steering, for a minimum of three cycles.

1.3.4 At the completion of each day's testing and before conducting any servicing, oil samples shall be taken from the lowest points of the specified locations in 1.3.5.

1.3.5 At the end of the second eight hour period and after scheduled maintenance or servicing, the truck shall be parked on the beach in an unprotected location with the parking brake activated. The truck shall remain parked in this location for a period of ten (10) days minimum. At the end of the ten day period, oil samples shall be taken from the lowest point of the specified locations in 3.5.

1.3.6 After the ten (10) day storage period, repeat the eight (8) hour test indicated in 1.3.1 and 1.3.2 above.

1.3.7 At the completion of the eight (8) hour test, oil samples shall be taken from the lowest drainage point of the truck components specified in 1.3.7.1.

1.3.7.1. Oil samples shall be taken from the truck one hour after completing testing for the day, and before servicing. The samples shall be analyzed for salt and water contamination. Oil samples shall be taken from the following locations:

1.3.7.1.1 Transmission

1.3.7.1.2 Torque convertor

1.3.7.1.3 Diesel engine oil sump

1.3.7.1.4 Hydraulic reservoir.

1.3.7.1.5 Fuel tank

1.3.7.1.6 Each axle including the differential.

1.3.7.1.7 Each wheel hub

TEST METHOD NO. 2  
AIR TRANSPORTABILITY

2.1. TEST COURSE:

2.1.1 Level, flat surface

2.2. TEST APPARATUS:

(a) At the contractor's option, a mock-up of the USAF C-130 aircraft in lieu of actual drive on - drive off test on the specified aircraft. The mockup is defined as a structure which reproduces the ramp angles, ramp crests, entrance and interior dimensions and the locations of the aircraft tiedowns.

(b) Platform or axle scale

(c) Common handtools

2.3. TEST PROCEDURE:

2.3.1 Perform, time and record the time required to disassemble truck items such as counterweights, tophandler, cab, mast and overhead guard as necessary to meet the specified air transportable configuration.

2.3.2 Determine and record the weight supported by the steer axle in the air transportable configuration by driving both steer wheels onto a platform scale or jacking up each wheel with an axle scale.

2.3.3 Determine and record the weight supported by the drive axle in the air transportable configuration by driving both set of drive wheels onto a platform scale or jacking up each set of dual wheels with an axle scale.

2.3.4 When a Government aircraft is used, the government loadmaster will then drive the truck in the air transportable configuration onto and off the specified aircraft. The contractor will conduct all drive-on and drive-off tests when a mockup of the aircraft is utilized.

2.3.5 Difficulties encountered in the loading operation shall be recorded with particular reference to interference with aircraft structure, damage to the cargo floor or when unusual positioning operations are required to stow the truck.

2.3.6 The truck then shall be tied down in accordance with the restraint criteria specified in MIL-STD 1791. Details on the arrangement of tiedown attachments to the aircraft floor shall be included in the test report.

TEST METHOD NO. 3  
DURABILITY

3.1. TEST COURSE:

3.1.1 The test course layout shall be constructed in accordance with Figure 1. The total course length shall be 750 feet (230 meters), plus or minus 30 feet (9 meters).

3.2. TEST APPARATUS:

- (a) First article truck.
- (b) Rated load.

3.3. TEST PROCEDURE:

3.3.1 Perform truck break-in period, if required, prior to commencement of test.

3.3.2 Drive the truck with rated load in the carry position for 2400 circuits over the test course. One circuit is defined as a complete lap around the course.

3.3.3 The truck's speed shall average 5 miles per hour minimum around the test course.

3.3.4 The truck shall be driven 1300 circuits in the clockwise direction and 1300 circuits in the counterclockwise direction.

3.3.5 At the end of each hour stop the truck and perform the following truck functions:

3.3.5.1 Operate all hydraulic functions, except steering, through ten complete cycles.

3.3.5.2 Operate the parking brake.

3.3.5.3 Operate the truck floodlamps.

3.3.5.4 Turn off and restart the engine.

TEST METHOD NO.4  
LOAD PLACEMENT

4.1. Test Course

The test course shall be level, improved surface laid out in accordance with Figure 2.

4.2. Test Apparatus:

- (a) Palletized loads (three each, rated load).
- (b) Platforms (two each, 8 feet (2.4 m) high).
- (c) Two wooden blocks.

4.3. Test Procedure:

- (a) Position the platform at points 3 and 2 as shown on Figure 2.
- (b) Position the loads at points 1, 4, and 5 on Figure 2. Place a block under one side of loads 4 and 5 so that load 4 will be tilted approximately 6 degrees to the right and load 5 will be tilted approximately 6 degrees to the left.
- (c) Start at point 1, pick up the load, and move to point 3. Place the load on the platform at point 3 and proceed to point 5. Pick up the load at point 5 and move it to point 1. Place the load on the platform at point 2 and proceed to point 4. Pick up the load at point 4 and move it to point 1. Continue the cycle moving from point 1 to point 3, from point 3 to point 5, etc. picking up or placing the loads as applicable. The truck shall maneuver within the area of the course during the operations.
- (d) The test shall be conducted for 1 hour. A minimum of 36 loads shall be moved in the 1 hour test period.
- (e) Each load shall be picked up at full extension.
- (f) Record number of loads moved in the 1 hour time period.

TEST METHOD NO. 5  
LIFTING & LOWERING SPEED TEST

5.1. Test area shall consist of a dry, level, improved surface.

5.2. Test apparatus:  
a. Stopwatch  
b. Tape measure  
c. Rated Load

5.3. Test procedure

A. Lift Height

1. With rated load on forks, raise load to maximum lift height and level forks.
2. Measure and record distance from level surface to top of fork tine.

B. Lifting & lowering speed

1. With rated load on forks, record time to raise load to maximum lift height from level surface and calculate velocity.

2. Record time to lower forks at maximum speed to ground. Measure distance traveled and calculate velocity.

3. Repeat steps B.1 & B.2 for a total of 3 times. Velocity shall be average of the 3 trials.

4. Remove load from forks.

5. Raise forks to maximum lift height. Record time to lower forks to ground. Measure distance traveled and calculate velocity.

6. Repeat step B.5. for a total of 3 times. Velocity shall be the average of the three trials.

TEST METHOD NO. 6  
HYDRAULIC DRIFT

6.1. Demonstration Course: Level, improved surface.

6.2. Test apparatus

- a. Tape measure
- b. Inclinator
- c. Hydraulic fluid temperature measuring device

6.3. Test Procedure

A. Heat hydraulic fluid by exercising hydraulic functions until fluid in reservoir exceeds 120°F (49°C). Raise load to maximum lift height, insuring forks are level. Record distance from ground to a reference point on the load.

B. After ten minutes, record distance from reference point to ground and determine angle of forks from the vertical.

TEST METHOD No. 7  
OVERLOAD TEST

7.1. Test Course

(a) Test area shall consist of a level, improved surface with provisions for anchoring rear of truck to prevent tipping and for blocking the front wheels to prevent tire overloading.

7.2. Test Apparatus

- (a) Load equivalent to 300% of the rated capacity of truck.
- (b) Load equivalent to 200% of the rated capacity of truck.
- (c) Magnetic particle or dye penetrant.

7.3. Test procedure

A. Place the truck on the test area, anchor the rear of the truck to the ground, and support truck on blocks to prevent tire overloading. The relief and replenishing valve may be taken out. Weighing devices may be isolated for this test. Position the forks in a manner to support the load, laterally centered, raised 30 inches (760 mm) above the ground, and level. Place load, equivalent to 300% of the rated capacity, on the forks and leave for a minimum period of 10 minutes. Remove the load and examine the truck for damage.

B. With the truck on the test course and the forks positioned as in Step A except laterally displaced to the extreme right, place twice the rated load on the forks. Leave the load on the forks for a minimum of 5 minutes. Remove the load and laterally displace the forks to the extreme left position. Place twice the load on the forks and leave on for a minimum of 5 minutes. Remove the load and examine the truck for damage.

C. Inspect truck structure, frame, lift mechanism, and hydraulic system for damage, leakage, broken welds, etc. Inspect forks at a minimum of 6 inches (150 mm) of each side of heel by magnetic particle or dye penetrant method.

TEST METHOD NO. 8  
SERVICE BRAKES

8.1. Test Course

- (a) Dry, level, improved surface.
- (b) Dry surface, 45% slope.
- (c) Body of water of sufficient depth to completely immerse brakes.

8.2. Test Apparatus

- (a) Rated load.
- (b) Tape Measure.
- (c) Pedal force gage.

8.3. Test Procedure

A. The truck with rated load in carry position shall be driven at 5 mph on a level dry paved surface. The service brakes shall then be applied to bring the truck to a complete stop. Record the distance from where the brakes were first applied to where the truck has stopped. Record force applied at brake pedal to bring the truck to a stop. Repeat this test for a total of 10 times. Distance and force needed to stop truck shall be the average of the 10 trials.

B. The truck with rated load in carry position shall be driven in reverse down a 45% slope at 5 mph. Service brakes shall be applied to bring the truck to a complete stop. Record distance from where brakes were first applied to where the truck has stopped. Record force applied at brake pedal to bring the truck to a stop. Repeat this test for a total of 10 times. Distance and force needed to stop truck shall be the average of the 10 trials.

C. The truck with rated load in carry position shall be driven into water of sufficient depth to completely immerse the brakes. The truck shall then be positioned on a minimum of 45% slope with brake pedal fully depressed. Place a reference mark on the ground in line with the front axle and on the front tire. Keep the service brake depressed for 10 minutes. After the 10 minute test, examine any movement of the front tire from the reference point. Record force on brake pedal needed to keep the truck stationary.

D. Apply 300 pounds force (1330 N) to brake pedal, hold for 5 minutes, and release. Repeat 3 times. Inspect truck for any damage.

(Cont.)

E. The truck with rated load in carry position shall be driven at a minimum speed of 5 mph. The truck's transmission shall be placed in neutral and the truck's engine shall be turned off. (Ensure truck speed is still at least 5 mph). Apply service brakes and bring truck to a complete stop. Record the distance from where the brakes were first applied to where the truck has stopped. Repeat this test for a total of 10 times. Distance shall be the average of the 10 trials.

TEST METHOD No. 9  
TIRES AND TIRE LOADING

9.1. Test Course

9.2. Test Apparatus

- (a) Weigh scale.
- (b) Rated load.

9.3. Test Procedure

A. With rated load on truck, position truck on weigh scale in such a manner that only the right front wheel is resting on the weigh scale. Sideshift load to the extreme right position and extend forks to maximum extension. Record the weight supported by the wheel and determine the area of the tire in contact with the surface. With load in the same position, determine the wheel loading for the right rear tire.

B. With rated load on truck, position truck on weigh scale in such a manner that only the left front wheel is resting on the weigh scale. Sideshift load to the extreme left position and extend forks to maximum extension. Record the weight supported by the wheel and determine the area of the tire in contact with the surface. With load in same position, determine the wheel loading for the left rear tire.

C. Without rated load on truck, determine wheel loading of each wheel and area of the tire in contact with the surface.

TEST METHOD NO. 10  
STEERING TEST

10.1 Test Course.

(a) Level, improved surface configured as shown in Figure 3.

10.2 Test Apparatus

- (a) Force measuring gage.
- (b) Rated load.
- (c) Semi-circular piece of cardboard, at least 1" in diameter greater than the diameter of the steering wheel

10.3 Test Procedure

10.3.1. Rigid Frame Trucks - With rated load on forks, truck stationary, and steer wheels in extreme left position, record number of steering wheel rotations needed to turn steer wheels to extreme right position. Measure force needed to turn steering wheel. With wheels in extreme right position, record number of steering wheel rotations needed to turn steer wheels to extreme left position. Measure and record force needed to turn steering wheel.

10.3.2. Articulated Frame Trucks - With rated load on forks, truck stationary, and steering wheel turned to the extreme left position, record number of steering wheel rotations needed to turn steer wheels to extreme right position. Measure and record force needed to turn steer wheel. With steering wheel in extreme right position, record number of steering wheel rotations needed to turn steer wheels to extreme left position. Measure and record force needed to turn steer wheel.

10.3.3 Steering Wheel Freeplay Measurement With steer wheels parallel to the truck's longitudinal axis, engine at idle, and without rated load, attach the cardboard to the steering column so that the cardboard is parallel to the steering wheel. Place a reference mark on the steering wheel. Turn steering wheel to the right until wheels start to move. Place a mark on the cardboard in alignment with the reference mark on the steering wheel. Turn the steering wheel to the left until the wheels start to move. Place a mark on the cardboard in alignment with the mark on the steering wheel. Determine angle between the two marks.

10.3.4 Steering Wheel Force Test With steering wheel in extreme right position, apply a force of 150 pounds (670 N) tangential to the steering wheel for a minimum of 15 seconds. Perform this procedure two more times.

(Cont.)

Repeat procedure with the steering wheel turned to the extreme left position.

10.3.5 Steering with Power Assist or Engine Failure.

(a) Deactivate the power steering assist.

(b) Repeat steps 10.3.1 and 10.3.2 as applicable to type of truck.

(c) Forks may be removed or retracted for this portion of the test. Truck shall be driven through test course as shown in Figure 3 without any part of the truck crossing the boundary lines. Truck shall successfully negotiate course in no more than 35 seconds.

TEST METHOD NO.11  
RAIN TEST

11.1. TEST APPARATUS:

- a. Timing device.
- b. Measuring device (U.S. Weather Bureau type preferred).
- c. Spray Fixture.

11.2. TEST PROCEDURE

- a. Subject the truck to a simulated rainfall of not less than 4 inches per hour. The simulated rainfall shall impinge on the truck at an angle of 45 degrees, plus or minus 5 degrees, with a force equivalent to a 30 mi/h (48 km/h) wind. The simulated rainfall shall disperse uniformly over the surfaces of the truck.
- b. Expose the top and left side of the truck to the rain described above for a period of 5 minutes with engine off. With rain still flowing, start engine and allow engine to idle to 2 minutes.
- c. Repeat (b) with the top and front exposed.
- d. Repeat (b) with the top and right exposed.
- e. Repeat (b) with the top and rear exposed.
- f. Stop the rainfall and allow the truck to stand for not less than 30 minutes with the engine off. Drain a small quantity of fluid from each fluid reservoir (except cooling system) and examine for presence of water.
- g. Check electrical components, gages, cab (if furnished), and the air cleaner for water entry and damage.

TEST METHOD NO.12  
HYDRAULIC FITTINGS

12.1. Test Apparatus:

- (a) Common handtools.
- (b) Hose assembly fitted with field attachable fittings.

12.2. Test Procedure:

- (a) Remove one hydraulic hose assembly which has permanent type fittings.
- (b) Replace the hose assembly with a hose assembly fitted with field attachable fitting to assure interchangeability.
- (c) Repeat (a) and (b) above until each hose assembly with permanent type fittings is replaced with a hose assembly with field attachable fittings.
- (d) After every hose assembly with permanent fittings has been replaced with a hose assembly with field attachable fittings, reinstall the original hose assemblies on the truck.

TEST METHOD No. 13  
Fail Safe Hydraulic System

13.1. Test Course: Level surface.

13.2. Test Apparatus:

- (a) Rated load
- (b) Tape measure

13.3. Test Procedure:

(a) Raise rated load to approximately one half of the maximum lift height.

(b) Measure distance from surface to a reference point on the load.

(c) WARNING: NO PERSONNEL SHALL STAND UNDER OR IN FRONT OF THE LOAD FOR THE FOLLOWING STEP!

(d) Shut off the engine. Cut a hydraulic line that supplies fluid to the lift cylinder. (A petcock may be used in lieu of a cut hose to simulate failure.)

(e) When hydraulic fluid stops flowing, remeasure vertical position of reference point to surface.

(f) Demonstrate ability of manual override system lower the load safely to the surface.

Test Method No. 14  
Weight Test

14.1. Test Course

(a) Dry, level surface with provisions for anchoring the truck to prevent tipping.

14.2. Test Apparatus

(a) 150% of rated load

14.3. Test procedure:

Position the truck at rest on a smooth level surface, the forks level and raised 6 inches (152 mm) above the surface. Secure the truck as necessary to prevent the truck from overturning. With a crane or another forklift truck, place 150% of the rated load on the forks such that the center of mass of the test load is on the truck's centerline and at the rated load center. Let the 150% load on the truck for ten minutes minimum. Remove load and restraints and visually inspect the forks, lift assembly, and other structural components for cracks, elongation, permanent deformation, fractures or failures.

TEST METHOD NO. 15  
AXLE DISCONNECT AND TOWING SPEED

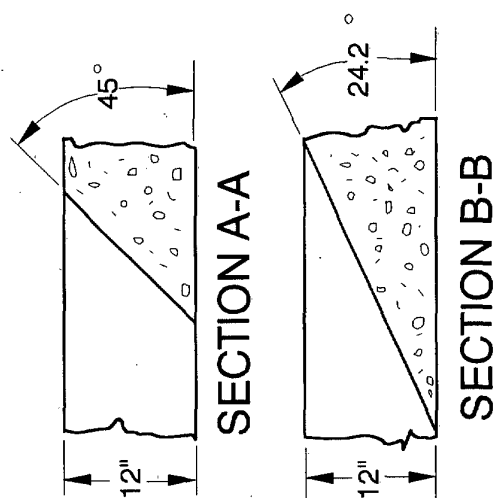
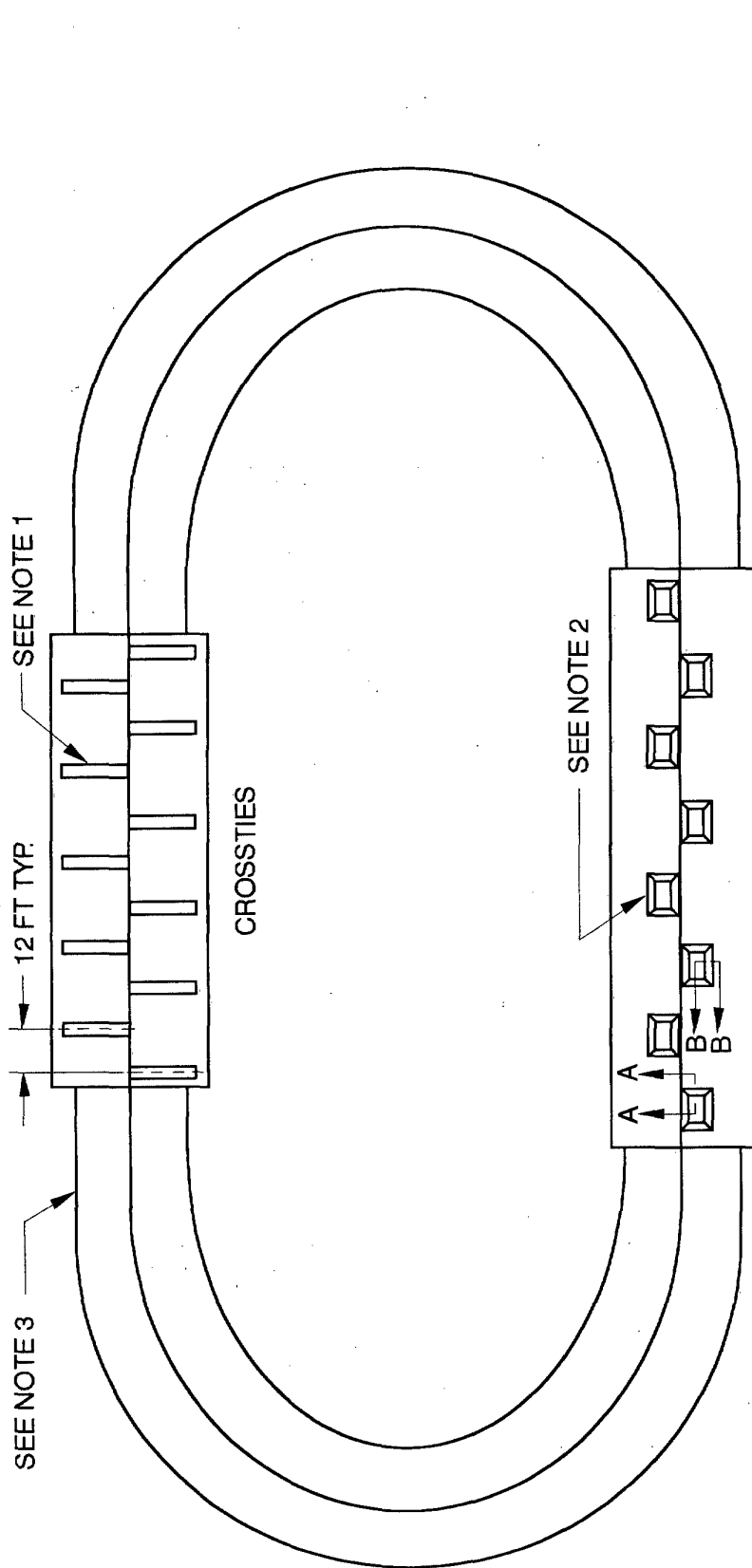
15.1. Test Course: Improved surface suitable for towing operations at 35 mph.

15.2 Test Apparatus:

- (a) Tow vehicle capable of towing truck at 35 mph.
- (b) Tow bar or chains suitable for towing.

15.3 Test Procedure:

- (a) Determine time required to disconnect axles for towing.
- (b) With axles disconnected, tow truck at 35 mph for a minimum of 50 miles.
- (c) After 50 miles, engage axles and drive truck for a minimum of 30 minutes, demonstrating the full operating capability of the truck's engine, transmission and hydraulic system. Inspect axles and drivetrain for damage.



- NOTES:
1. ELEVEN CROSSTIES 6"x6"x6', ANCHORED TO PREVENT MOVEMENT.
  2. EIGHT CONCRETE POTHOLES 6' WIDE, 8' LONG AND 12" DEEP SUNK FLUSH WITH GROUND LEVEL SIDES SLOPED 24.2 DEG. ENDS SLOPED 45 DEG. DEGREES ARE MINIMUM.
  3. STABILIZED SURFACE 15' WIDE MINIMUM EACH END COURSE.
  4. CONCRETE SURFACE BETWEEN ALL POTHOLES AND CROSSTIES.
  5. DRAWING NOT TO SCALE.

FIGURE 1  
DURABILITY COURSE

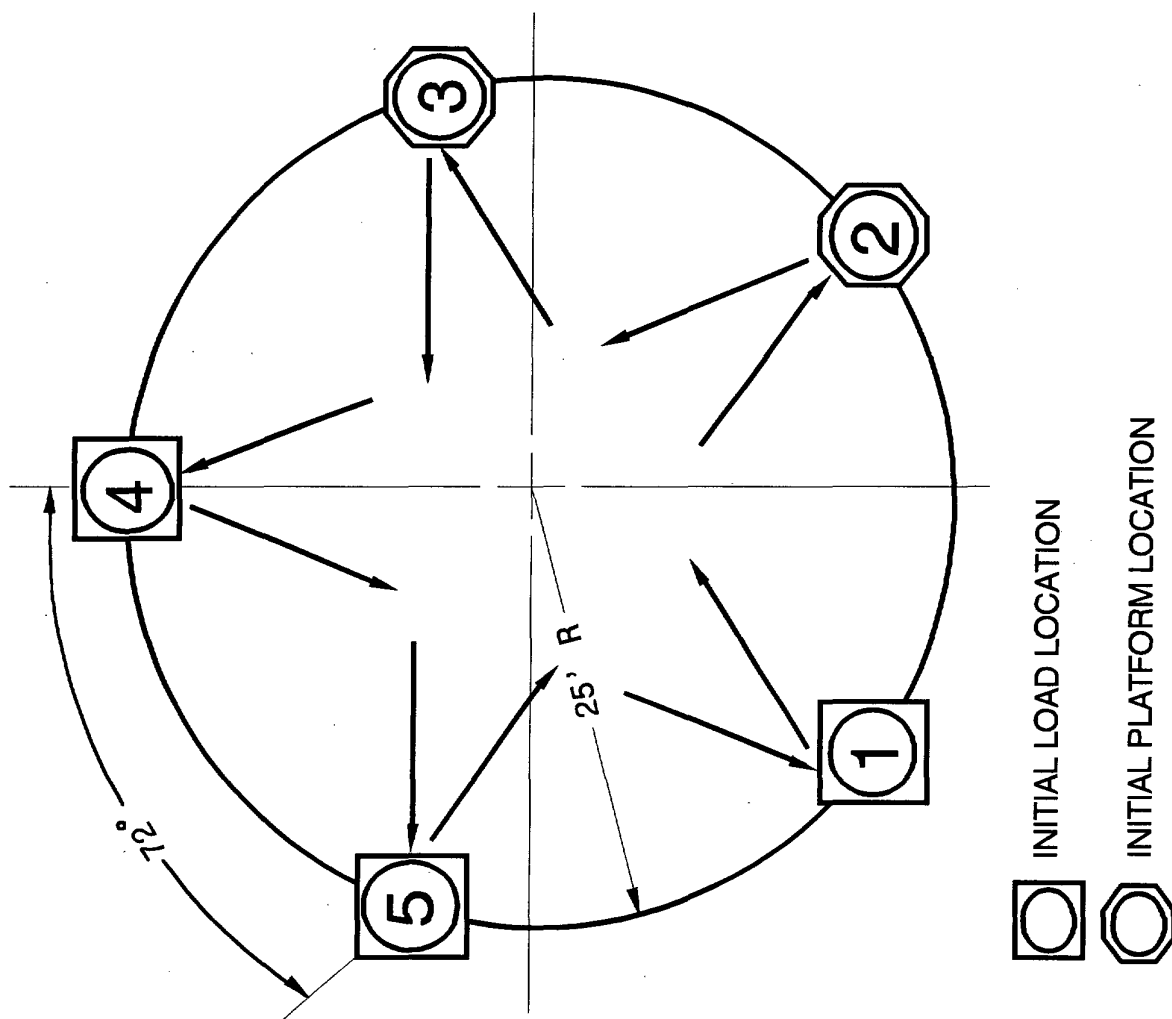
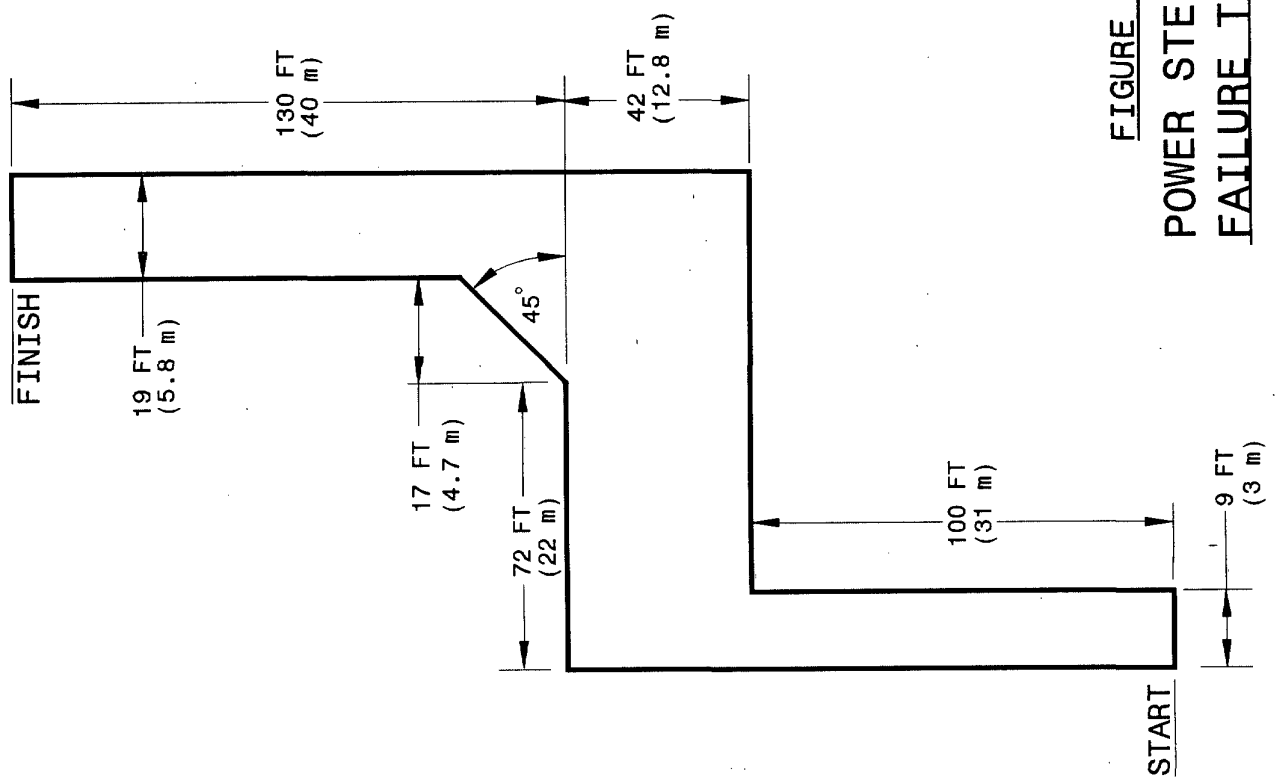


FIGURE 2  
LOAD PLACEMENT COURSE



**FIGURE 3**  
**POWER STEERING**  
**FAILURE TEST COURSE**

# STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

## INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of 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.

<b>I RECOMMEND A CHANGE:</b>		<b>1. DOCUMENT NUMBER</b> MIL-T-40632 Rev. B.	<b>2. DOCUMENT DATE (YYMMDD)</b> 94/08/07
<b>3. DOCUMENT TITLE</b> TRUCK, FORKLIFT, DIESEL ENGINE DRIVEN, 120 INCH LIFT HEIGHT, DS SAFETY RATED			
<b>4. NATURE OF CHANGE</b> (Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)			
<b>5. REASON FOR RECOMMENDATION</b>			
<b>6. SUBMITTER</b>			
<b>a. NAME (Last, First, Middle Initial)</b>		<b>b. ORGANIZATION</b>	
<b>c. ADDRESS (Include Zip Code)</b>		<b>d. TELEPHONE (Include Area Code)</b> (1) Commercial (2) AUTOVON (if applicable)	<b>7. DATE SUBMITTED (YYMMDD)</b>
<b>8. PREPARING ACTIVITY</b>			
<b>a. NAME</b> COMMANDING OFFICER NAVY SHIPS PARTS CONTROL CENTER		<b>b. TELEPHONE (Include Area Code)</b> (1) Commercial (717) 790-4025 (2) AUTOVON 430-4025	
<b>c. ADDRESS (Include Zip Code)</b> CODE 0341 5450 CARLISLE PIKE, P.O. BOX 2020 MECHANICSBURG, PA 17055-0788		<b>IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:</b> Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	