[INCH-POUND]
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MILITARY SPECIFICATION

TRUCK, LIFT, FORK, ELECTRIC, SIDELOADER FOUR-DIRECTIONAL, SHIPBOARD, MISSILE-CARRYING, 4000 POUND CAPACITY

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a 4000-pound special purpose, electric, type EE, heavy duty missile carrier for shipboard use.

2. APPLICABLE DOCUMENTS

2.1 Government Documents

2.1.1 Specifications, standards and handbooks. The following specifications, standards and handbooks form a part of this specification to the extend 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)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commanding Officer, Navy Ships Parts Control Center, Post Office Box 2020, Attention: Code 036, Mechanicsburg, Pennsylvania 17055 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N6017 (FSC 3930)

SPECIFICATIONS

FEDERAL

W-B-133 - Battery, Storage (Lead-Acid Industrial, Portable Service)

QQ-C-320 - Chromium Plating (Electrodeposited).

QQ-P-416 - Plating, Cadmium (Electrodeposited)

GG-P-455 - Plates and Foils, Photographic (Photosensitive Anodized Aluminum)

TT-E-489 - Enamel, Alkyd, Gloss (For Exterior and Interior Surfaces).

VV-B-680 - Brake Fluid, Automotive

VV-L-751 - Lubricating Oil, Chain, Wire Rope, and Exposed Gear

VV-F-800 - Fuel Oil, Diesel

MILITARY

MIL-P-116 - Preservation, Methods of.

MIL-V-173 - Varnish Moisture and Fungus Resistent (For Treatment of Communications, Electronic and Associated Equipment)

MIL-P-514 - Plates, Identification, Instruction, and Marking, Blank

MIL-T-704 - Treatment and Painting of Material.

MIL-L-2104 - Lubricating Oil, Internal Combustion Engine, Tactical Service.

MIL-F-3541 - Fittings, Lubrication.

MIL-G-3859 - Grease Guns, Hand, High Pressure, Lever Operated; Cartridge and Bulk Loading

MIL-S-901 - Shock Tests, H.I. (High Impact); Shipboard.

MIL-L-2105 - Lubricating Oil, Gear, Multi-Purpose.

MIL-M 3971 - Meter, Time Totalizing, Non-Hermetically Sealed, Electric, General Specification For.

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

MIL-P-15011 - Pallet, Material Handling, Wood, Post Construction, 4 Way Entry.

MIL-L-21260 - Lubricating Oil, Internal Combustion Engine, Preservation and Break-In.

MIL-D-23003 - Deck Covering Compound, Nonslip, Lightweight.

DOD-P-23236 - Paint Coating System, Steel Ship Tank, Fuel and Salt Water Ballast

DOD-C-24529 - Chargers, Battery, Lift Truck and Pallet Transporter Battery Service (Metric).

MIL-A-46153 - Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty, Single Package.

MIL-L-46167 - Lubricating Oil, Internal Combustion Engine, Arctic.

STANDARDS

FEDERAL

FED-STD-595 - Colors

FED-STD-H-28 - Screw, Thread Standards for Federal Services.

MILITARY

MIL-STD-105 - Sampling Procedures and Tables For Inspection By Attributes

MIL-STD-129 - Marking For Shipment And Storage

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

MIL-STD-162 - Materials Handling Equipment, Self-Propelled: Preparation for Delivery and Storage

MIL-STD-209 - Slinging Eyes and Attachments for Lifting and Tying Down Military Equipment

MIL-STD-461 - Electromagnetic Interference Characteristics Requirements for Equipment

MIL-STD-810 - Environmental Test Methods

MIL-STD-889 - Dissimilar Metals

MIL-STD-1375- Provisioning, Initial Support, General Requirements for.

MIL-STD-1472- Human Engineering Design Criteria

HANDBOOKS

MILITARY

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: Standardization Documents Order Desk), 700 Robbins Avenue, Philadelphia, PA 19120-5094)

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

DEPARTMENT OF LABOR

29 CFR, Chapter XVII, Part 1910 - Occupational Safety and Health Standards (OSHA)

(Applications for copies should be addressed to the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402).

2.2 Non-Government Publications. The following documents form a part of this document to the extenet specified herein. Unless otherwise specified, the issues of the documenmts which are DOD adopted shall be 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 ths issue of the documents cited in the solicitation (see 6.2).

AMERCIAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

B 56.1 Safety Standards for Powered Industral Trucks

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

B 633 -Electrodeposited Coatings for Zinc on Iron and Steel

B 56.11.3 -Load Handling Symbols for Powered Industrial Trucks

D 3951 -Packaging, Commercial

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

SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE J475 - Screw Threads

SAE J517 - Hydraulic Hose

(Application of copies should be addressed to the American Society for Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pennsylvania 15096).

THE TIRE AND RIM ASSOCIATION, (T&RA)

Tire and Rim Association Yearbook

(Application for cop8ies should be addressed to the Tire and Rim Association, Inc., 3200 W. Market St., Akron, OH 44313)

UNDERWRITERS LABORATORIES INC.

UL 583 - Standard for Electrical - Battery Powered Industrial Trucks

(Application for copies should be addressed to: Underwriters Laboratories Inc., 1285 Walt Whitman Road, Melville, Long Island, New York 11746; 207 East Ohio Street, Chicago, Illinois 60611; or 1655 Scott Boulevard, Santa Clara, California 95050)

(Nongovernment standards and other publications are normally available from the organizations which prepare or distrubute 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 document and the references cited herein, (except for related associated detail specifications, specification sheets, or MS standards), the text of this documenmt 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 (see 6.2), a first produced truck shall be subjected to a first article inspection in accordance with 4.3.

3.2 Materials.

3.2.1 Plating. All threaded fasteners, washers or cotter pins, required to fabricate the truck, except those in contact with oil in reservoirs, and those inside corrosion resistant components shall be zinc or cadmium plated or made of corrosion resisting material. Exposed surfaces of hydraulic piston rods shall have a hard chromium finish over an undercoat of nickle in accordance with QQ-C-320. Exposed surfaces of shafts, rods, axles, and keys where corrosion would impair disassembly shall have zinc or chromium finish as described above or be fabricated from corrosion resistant material equal or superior to SAE 316 stainless steel. 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.

3.2.2 Screw threads. Screw threads required for installation, assembly, or replacement shall be in accordance with FED-STD-H-28, or standard metric threads.

3.2.3 Castings. Castings shall be free from blowholes, porosity, shrinkage defects, cracks, or other defects. Castings shall not be repaired to adversely affect the strength or intended use. Sufficient finish shall be allowed to permit machining for leakfree sealing at covers, closure points, and fasteners. Castings shall be suitably spot faced or machined to assure proper sealing of fasteners such as bolts, lockwashers, nut assemblies and cap screws.

3.2.4 Welds. Welded joints shall be sound, smooth, free from pits, holes, fissures, rough projecting edges, and slag, and shall be thoroughly fused to the base metal.

3.2.5 Bearings. Unless otherwise specified herein, rotating parts shall be mounted on sealed ball roller or tapered bearings.

3.2.6 Lubrication. Readily accessible means shall be provided for applying and, where necessary, checking the level of lubricant in all parts and components. Oil drain plugs and connections shall provide for ready drainage using ordinary maintenance shop tools and shall be located as to provide ready drainage without interference from frame members or other parts of the truck structure and without requiring the use of flexible connections or other special devices.

3.2.6.1 Lubricants. The truck shall operate as specified herein when lubricated with standard military lubricants listed in MIL-HDBK-267(SH).

3.2.6.2 Lubrication fittings. Lubrication fittings shall conform to MIL-F-3541, type I, II, or III. Fittings shall be located in a protected position and shall be accessible to a hand-operated grease gun conforming to MIL-G-3859, with a 10-inch (25mm) flexible extension. Accessibility to fittings shall be provided without the removal or adjustment of accessories or parts.

3.2.6.3 Lubrication seals. All lubrication seals shall be properly sized and seated to prevent leakage of lubricant through or around positioned seals.

3.2.7 Dissimilar Metals. Unless suitably protected against electrolyte corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimiliar metals and methods of protecting them are defined and described in MIL-STD-889.

3.3 Environmental conditions.

3.3.1 Temperature.

3.3.1.1 Storage. The vehicle shall be capable of storage for 72 hours at 125 degrees F.(52 degrees C.) + 5 degrees F.(2 degrees C.) and 95-100 percent relative humidity without corrosion or deterioration of any part which results in complete or partial loss of any required performance characteristic when tested in accordance with 4.3.2.16.

3.3.1.2 Operation. The vehicle shall be capable of continuous operation in 10 degrees F (-12.2 degrees C.) to 115 degrees F.(43 degrees C.) ambient air (control of relative humidity not necessary). When tested in accordance with paragraph 4.3.2.17, the vehicle may be operated in an ambient temperature of 75 degrees F (24 degrees C) with results interpolated to 115 degrees F (43 degrees C). During the ambient test, the temperature of critical heat areas shall not exceed 250 degrees F (121 degrees C). Also, the vehicle shall be operated in an ambient temperature of +10 degrees F (-12.2 degrees C) with the same results.Test at 10 degrees F.(-12.2 degrees C.) may be conducted on modified course to accommodate to cold chamber dimensions with approval of Government. Test shall proceed until temperatures of hydraulic fluid and of heat-producing areas stabilize, after which test shall then be conducted for an additional hour and shall then be terminated or for a total of 4 hours, whichever is the lesser.

3.4 Safety. The vehicle shall conform to the applicable requirements of American National Standards Institute publications: Standard for Electric-Battery-Powered Industrial Trucks UL 583 Type EE and Safety Standard for Powered Industrial Trucks ASME B56.1. Trucks shall also comply with the requirements of OSHA 29 CFR, Chapter XVII, Part 1910.

3.4.1 Certification. Trucks shall bear U.L. stamp of approval for type EE. In addition, the contractor shall submit to the contracting officer or his authorized representative satisfactory evidence that the trucks furnished under this specification meet other requirements of 3.4 . Acceptable evidence of meeting these other requirements shall be certified test reports from recognized independent testing laboratories acceptable to the Government, indicating that the trucks conform to the requirements of 3.4. Also, the truck shall be furnished with a safety nameplate specified herein. (see 3.9.1.4)

3.5 Maintainability. Provision shall be made for adjustment, servicing and replacement of all electrical assemblies and components, battery(ies), wearing parts of load handling assembly, brake system, steering assembly, tires, wheels, and horn without the removal of any major parts other than access covers. The edges of hand access opening shall be smooth and shall be provided with removable or hinged covers. Covers shall be secured with flush mounted bolts or quick opening fasteners removable with ordinary hand tools. Fasteners which must be repeatedly used in maintenance operations shall be made captive and effective for 1000 openings. Frame members or other obstructions shall not interfere with the servicing of or draining of oils and lubricants from any assembly or components. Removal of plugs from drain openings shall provide for complete drainage. All special hand tools required for maintenance of the truck shall be provided and shipped with each truck procured.. The truck shall be designed so as not to require preventive maintenance or repair services at intervals shorter than 2000 laps when tested as specified herein except for servicing truck batteries and removing foreign matter from tire treads. Reservoir level checks are not considered scheduled maintenance. The ratio of man hours of scheduled and unscheduled maintenance required to the hours of operation performed shall not exceed .08.

3.5.1 Maintenance operations. Each operation in the following operations list shall be accomplished by one man in not more than the time specified, using common tools and special tools, if any, furnished with the truck.

Maintenance Operation (time in Minutes)	Type EE
a. Remove and Replace Drive Motor Brushes	90
b. Remove and Replace Hydraulic Pump Motor Brushes	90
c. Remove and Replace Steer Motor Brushes	90
d. Remove and Replace all Contactor Tips	90
e. Remove and Replace all Filters, Screens and Strainers in Hydraulic System	105
f. Bleed and Adjust Brakes and Refill Master Cylinder (2 men)	45
g. Remove and Replace Each Tire	60

3.6 Design and construction. The vehicle shall be designed for sideloading a 4000 pound (1814 KG) load at 24-inch (610 MM) load center measured from the vertical face of the forks. The vehicle, with mast lowered and forks retracted, shall not exceed the following overall dimensions: 69 inches (1753 MM) wide, when carrying a missile container 38 inches (965 MM) wide, 112 inches (2845 MM) long, and 78 inches (1981 MM) high.

The gross weight of the empty vehicle with battery(ies) shall not exceed 11,500 pounds (5200 KG). There shall be no evidence of oil and lubricant leaks, corrosion, accelerated wear, failures, or permanent deformation which affects the vehicle's performance when stored, operated, or tested as specified in 4.3.2. Means of lubrication shall be provided for bearing surfaces of moving parts. There shall be no exposed bolts, clamps, gages, fittings, lifting pads, or other appendages which can be caught or hooked while the vehicle is working in a confined space, There shall be no part of the hydraulic system extending outboard or below the body of the vehicle unless it is properly guarded against damage. The vehicle shall not have inaccessible pockets or spaces where liquids,grease, or dirt may collect. The vehicle shall be capable of loading, transporting to and from stowage, and unloading each of the weapons shown in Figure 1 in conforming to Figures 2 and 3. Provision shall be made for effective simultaneous operation of the following functions while vehicle is carrying maximum rated load: travel perpendicular or parallel to mast travel; lift; tilt; sideshift; steer.

3.6.1 Electric equipment. Electric components shall be of corrosion-resistant materials or design. Means shall be provided to prevent wheels rolling on a wet deck from spraying or contaminating electrical components. The electrical circuitry, including all components and connections except as specified below, shall be protected from the effects of fungus growth and mositure by an overall treatment with a varnish conforming to MIL-V-173 Composition I or II as applicable with 1 percent copper 8-quinolinolate (by weight) based on the nonvolatile content of the varnish:

(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.

The varnish shall be applied by spray, brush or combination of both to give a minimum dry-film thickness of 1 mil 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. Composition II shall be used only in cases when local air pollution regulations for the application of the varnish precludes the use of Composition I. When Composition II is used, the supplier shall provide evidence to the Government that the use of Composition II is required and shall certify that the Composition II material complies with Rule 66, Air Pollution Control District, County of Los Angeles, CA."

3.6.1.1 Speed Controller. The speed controller shall be silicon rectifier type (SCR) providing stepless control in forward and reverse directions to attain maximum battery economy throughout the speed range. The SCR shall be of heavy duty design for continuous truck use and shall not incur failure or damage when the truck is tested in accordance with section 4. The controller shall provide means to permit precision maneuvering in restricted areas. It shall provide smooth transition between and through each successive speed range and shall have automatic means to prevent starting and reversing direction except in low speed. Forward and reverse motions shall be only by actuation of the acceleration control.

All contactors shall be designed to provide maximum interchangeability of parts. Contactors shall be designed for operation on 36-volt direct current and shall be easily replaceable. Contactors shall have easily replaceable tips equal to or superior to copper alloy or silver compositions. Replacement of contactor tips shall be accomplished by use of hand tools only. There shall be no evidence of failure in any part of the controller when the truck undergoes the tests required in section 4.

3.6.1.2 Enclosure and shields. Vehicles shall comply with the type EE requirements of UL 583. All conductors, except battery cables, emerging from enclosures shall be through fittings that will prevent spark propagation to the atmosphere and prevent airborn dust from entering the enclosures.

3.6.1.3 Overcurrent devices. Overcurrent devices shall be provided on each power control circuit.

3.6.1.4 Critical surfaces and heat-actuated devices. The temperature of any surface open to atmosphere shall comply with the requirements in 3.3.1.2. The surfaces may be cooled by any safe means consistent with the requirements of 3.6. At least 2 safety thermal relays shall be mounted on each surface at critical heat areas and shall be set to disconnect the battery power to the affected circuit(s) if the surface temperature exceeds 250 degrees F.(120 degrees C.). These requirements shall be met when the vehicle is tested according to applicable tests of 4.3.2.17.

3.6.1.5 Control panel. The control panel shall be designed for easy removal as a unit or of individual components, and the panel cover shall be readily removable without interference from the vehicle structure or other major components. All controls and indicators shall be permanently labeled as to function. Mounting studs, bolts, and nuts shall be recessed in back of the panel and be secured so that they will not turn or become loose when an assembly is removed from the panel.

3.6.1.6 Conductors. Indentification of control wiring shall be provided through color coding, numbered markings, tags, or similar means for continuous identification of wiring. All wiring external to the vehicle body and frame which is subject to damage shall be encased in rigid metal conduit, except that flexible metal conduit may be used where flexing occurs. Similar protection shall be provided for exposed wiring in the operator's compartment. Conductors passing through metal enclosures shall be protected by loom, rubber bushings or other protective material and shall be securely anchored to prevent movement of conductors relative to the opening. All terminal connections shall be made with spring lock washers or lock nuts or be provided with other means to prevent accidental loosening as a result of vibration or unintentional movement of wire terminal ends.

3.6.2 Power system.

3.6.2.1 Motors. Either hydraulic or electric motors shall be provided to power the various functions.

3.6.2.1.1 Traction control. Provision shall be made that the power to the traction motor(s) be shut off and braking be automatically applied when the operator leaves the vehicle seat.

3.6.2.1.2 Electric motors. Electric motors shall be heavy duty 36-volt D.C. industrial types and shall be totally enclosed in accordance with the requirements of 3.6. Motors shall be capable of withstanding the mechnical stresses and current loads caused by tests required in section 4. The resultant strains and temperature rise shall not cause failure or damage, including excessive pitting, deterioration of any component part which results in complete or partial loss of any required performance characteristic. The drive motor(s) shall be positively connected to the drive(s) and the hydraulic pump motor shall be positively connected to the pump. If textile or steel cable reinforced belt is used, means for tensioning adjustment shall be provided. Motor(s) shall be capable of withstanding sustained operation without evidence of insulation breakdown, short circuit, or failure of any component. Each motor shall be provided with thermal relay switch(es) to disconnect to motor circuit when necessary to prevent the outside surface temperature of the motor(s) from exceeding 250 degrees F.(120 degrees C.). Thermal relays shall be located in critical heat areas and shall interrupt the current to only the overheated circuit.

3.6.2.1.2.1 Insulation. Insulation for motors shall meet or exceed class B, F, or H, or a combination of them, as defined in NEMA Standrds, except that silicone material in any form shall not be used in the motors. Insulation shall be selected to provide a balance of operating characteristics including torque, speed, and limiting temperature in totally enclosed motors. The electrical and mechanical properties of the insulated windings shall not be impaired by the application of the limiting temperature of the insulating material so as to disqualify it for continuous use service.

3.6.3 Battery and battery accessories.

3.6.3.1 Battery. The vehicle shall operate from a nominal 36 volt system with an 850 ampere hour minimum capacity battery at a 6-hour rate of discharge. Battery shall be capable of being recharged by a Type III charger per DOD-C-24529. If more than one battery is supplied each truck shall be equipped with sufficient charging cable to interconnect the batteries and connect to a single 36-volt charger. The vehicle shall be capable of operating continuously with one charge of battery(s) with breaks not to exceed 5 minutes per hour during the test of 4.3.2.4 in the simulated compartment, loading, unloading, and transporting and shall be capable of 50 cycles minimum over the endurance test course in accordance with 4.3.2.6 without changing or charging the battery(s). Battery(s) required during first article, initial production, and sample testing shall be supplied wet and charged with one or more of these trucks. Batteries for the remainder of the trucks shall be supplied dry and charged by the manufacturer for overseas shipments and wet and charged for shipment originating in CONUS factories to CONUS destinations.

3.6.3.2 Battery connectors. Vehicles shall be equipped with 2-contact, type EC mounting half battery connectors. Charging connectors shall be so arranged that the vehicle cannot be operated while connected to the charging source. Connector internal components such as springs, retaining clips, screws, etc., shall be made of corrosion proof materials or protected against corrosion to satisfactorily pass the corrosion and contamination test specified in 4.3.2.15.

3.6.3.2.1 Safety cutout system. In order to insure that no current shall be flowing while the EC connector is being disconnected, a magnetic contactor shall be installed in one of the two main power lines from the EC battery mounting half connector. The control circuit for the magnetic contactor shall be wired with 2 switches in series, either of which shall cause the contactor to open and disconnect all power. The first switch shall be a seat switch. The second switch shall be an emergency switch with a mushroom type button located within easy reach of the operator.

3.6.3.3 Battery compartment. Dimensions of the battery compartment shall be sufficient to accomodate the battery, battery leads, and battery connectors without chafing. Effective means shall be provided for cushioning and securing the battery to prevent movement. The compartment shall have an independent restraining mechanism specifically designed to restrain the battery in the compartment until released and for no other purpose. The compartment construction shall permit horizontal removal of the battery, and means shall be provided for quick battery removal and replacement by a manual force of 75 pounds (330N) maximum which may be multiplied by a mechanical advantage device if needed. Means, such as a battery dolly/stand equipped with rollers and suitable for handling by a forklift truck while carrying the battery, shall be provided with each vehicle to support the battery immediately after removal from or prior to insertion into the battery compartment. Battery/dolly stand shall have a restraining device to secure battery to the dolly to prevent battery roll off under rolling ship conditions during battery transfer. The method provided shall permit replacement of the battery in 10 minutes maximum with use of hand tools. The inside of the compartment shall be finished with an acid resistant coating in accordance with DOD-P-23236, class 2 to resist deterioration through normal contact with electrolyte. The compartment shall be easily accessible for cleaning and battery servicing and shall contain no inaccessible pockets which are difficult to clean. The compartment shall comply with the requirements for UL type EE battery enclosure. The dolly/stand shall have a device to secure it to the truck while supporting the battery. Covers of battery compartments shall have quick opening fasteners.

3.6.4 Drive unit. Each gear, with the exception of worm gears, shaft and axle shall be of heat-treated alloy steel. The drive shall be a gear reduction unit(s) connected to the driving motor(s), totally enclosed and operating in a constant oil bath. The final gear reduction may be in a totally enclosed casing but be arranged for positive periodic lubrication of gear teeth. Drive gear housing(s) shall be equipped with filler and magnetic drain plug. Provision shall be made for adjustment where necessary to compensate for wear in the differential and pinion. All required drain plugs, check plugs, or oil level checking and filling devices shall be accessible without removing major components.

3.6.5 Hydraulic system. Power used for lifting, extension, retraction, and auxiliary hydraulic systems shall be independent of the traction motor. The lifting system shall provide for smooth lowering of load at a maximum speed of 60 feet per minute (fpm) (18 meters per minute) in event of failure of or damage to hydraulic lines.

Provision shall be made to protect hydraulic system against pressures exceeding 150 percent of pressure needed to perform maximum operational functions. Sump tank and hydraulic system shall be capable of being drained without spillage and without removal of hoses, The sump tank shall be of welded steel construction, initially clean, and provided with a dipstick marked "Full" and "Low" or equivalent. The sump tank breather cap, the dipstick, and the hydraulic cylinders shall be provided with means to prevent contamination of hydraulic fluid by direct impingement or seepage of water. The pump suction line shall be protected by a full flow 50-mesh or smaller opening screen filter with emergency bypass, magnets, and bubble diffuser. A full flow 25-micron absolute filter with emergency bypass shall be in the return line and shall have sufficient capacity to pass all oil at 70 degrees F.(21 degrees C.) or above through the filter medium while the rated load is lowered at the maximum rate. The design and location of the filters shall be compatible with the pump and other components of the hydraulic system. Pressure drop across a new suction line filter assembly shall not exceed 0.75 psi. (5.2 KPa). The automatic bypass shall open at not less than 2.0 psi (14 KPa) and shall permit full flow at not more than 3.5 psi (24 KPa). The design shall be such that contamination trapped by the filter will not be released into the system when the emergency bypass is open or when the filter is removed for servicing. Pressure drop across new return line filter shall not exceed 10m psi (69 KPa) at an oil temperature of 150 degrees F (65 degrees C) plus or minus 5 degrees F (3 degrees C). The filters shall include a means of indicating when maintenance is required and shall be located so that maintenance can be accomplished without removal of other components (except covers), without entering the sump, and without draining the system . Provision shall be made for 25-micron absolute filtration of replacement fluid and of air passing in through the breather, but need not include a means for indicating when maintenance is required. Filter elements shall be capable of being changed in not longer than 30 minutes. The sump filter opening shall be at least 1 inch (2.5mm) in diameter. The sump tank shall have a capacity not less than 110 percent of the amount of fluid required for the hydraulic system's operation and in addition shall have sufficient capacity to prevent air from entering the hydraulic system with all hydraulic pistons fully extended and shall have sufficient free air capacity to prevent oil from being discharged through tank filler cap when maximum return flow of oil is surged into the tank from the system, The hydraulic cylinders shall be provided with wiper rings to preclude entry of dust or dirt into the packing. Surface treatment for piston rods shall be in accordance with the requirements of 3.2.1. Each truck shall be provided with means such as hand pump for adding replacement fluid through the filter. Means shall be provided to secure dipstick in place. Hydraulic hose lines shall be adequately protected from chaffing in all areas where chaffing may occur. Hydraulic hose fittings shall be of the reusable type, suitable for field replacement in accordance with appropriate Society of Automotice Engineers Standards. Permanentley attached type pressure hose couplings are acceptable as orginal equipment hose assemblies. Field attachable reusable fittings shall be compatible with truck design such that they will replace each permanently attached coupling, and the replacement hose assembly shall fit in place of the orginal hose. Pressure hose shall be as specified in SAE J517, except 100 R7 type hose is not acceptable.

3.6.5.1 Contamination levels for hydraulic system. When the hydraulic system is tested as specified in 4.3.2.20, particle counts shall not exceed 1000 particles per milliliter greater than 10 micrometers, and particle counts shall not exceed 10 particles per milliliter greater than 20 micrometers.

3.6.6 Structure.

3.6.6.1 Chassis and frame. The frame and related structure shall have sufficient depth to afford protection for working parts. There shall be no permanent distortion of the frame when the truck is lifted with the fittings specified in 3.6.6.1.1.

3.6.6.1.1 Lifting fittings. The vehicle shall be provided with 4 or more eyes, rings, or other means to enable the truck to be hoisted in the horizontal attitude by means of a multipendant sling with equal length pendants or be provided with a lifting adapter for use with equal length pendants. The fittings shall be designed for both hook and shackle end fittings on the pendants. Each fitting shall be capable of supporting the weight of the vehicle including battery. When the fittings are not being used, they shall not protrude beyond the major outline of the vehicle (see 3.7). The fittings shall be located so that a strongback or spreader bar(s) shall not be required to prevent 10 foot maximum length sling pendants from damaging the vehicle. The tie down fittings of 3.6.6.1.2 may be used for lifting, provided they comply with lifting requirements herein.

3.6.6.1.2 Tiedown fittings. The vehicle shall be provided with 4 or more fittings to secure the unloaded vehicle to the deck when the deck is tilted alternately 35 degrees in opposite directions, 70 degrees total motion. (This requirement pertains to a ship rolling in heavy weather.) The restraining force that may be provided by jacks or wheel brakes shall not be considered in the design of the securing fittings. The fittings shall be located for securing vehicle parallel and perpendicular to the axis of motion. The fittings shall be 24 inches (610 MM) minimum above the deck. The lifting fittings of 3.6.6.1.1 may be used for tiedown, provided they comply with the tiedown requirements herein.

3.6.6.2 Body. The vehicle body shall enclose the drive unit assembly, steering mechanism, and speed controller when these components are not individually housed. Provision shall be made for immediate and easy access to all working parts requiring examination and maintenance.

3.6.6.3 Operator's compartment. The operator's compartment shall provide protective space with the minimum dimensions of 38 inches (965 MM) front to back and 24 inches (610 MM) wide at platform floor. The operator's compartment shall be designed for rapid and unobstructed egress from the vehicle without release of bars or gates and shall be strong enough to prevent its collapsing and pinching the operator in event of collision. Compartments shall be constructed to withstand the energy of the vehicle with rated load traveling at maximum speed when tested in accordance with 4.6.11. Compartment shall have clearly visible warning stenciled for operator to keep feet within compartment during operation. The operator's compartment shall have sufficient depth and width for the operator to sit comfortably without body extremities extending beyond the planned outline of the compartment. The compartment shall contain a full height guard of safety glass, plexiglass or expanded metal to present the

operator from reaching into the mast mechanism. The compartment shall be in compliance with MIL-STD-1472B.

3.6.6.4 Seat. A cushion seat and a cushion backrest shall provide comfortable seating for the operator when operating the vehicle. The seat shall be adjustable by the operator from the operating position without the use of tools.

3.6.6.5 Driver's overhead safety guard. An overhead safety guard shall be provided for the protection of the driver. The guard shall be of bars, rods, tubing, or plate, and the maximum distance in width and length of openings shall not exceed 6 inches (144 MM). Open spaces shall be uniformly distributed and shall be not less than 50 percent of the overall area. A solid plate shall not be permitted. The overhead safety guard shall be capable of withstanding the impact of a 100 pound (45 Kg) solid hardwood cube (or equivalent) dropped a distance of 5 feet (1.5M) ten times, without fracture and without permanent deformation exceeding 3/4 inches (19mm). It shall be of sufficient strength to support a uniformly distrubuted static test load equal to 5000 pounds (2270 Kg). After the load has been applied for 60 seconds, the deflection shall not be less than 15 inches (380mm) from the top of the steering wheel to the underside of the guard. A minimum distance of 39 inches (990 MM) shall be provided from the underside of the guard to the lowest point of the seat cushion surface when a 150-pound (68 KG) maximum weight operator is seated in the driving position. The guard shall not interfere with the normal movement of the driver when entering, leaving, or operating the vehicle. The design of the guard shall be such that neither a long load resting against the vertical faces of the forks nor any part of the mast or forks or fork carriage shall make contact with any part of the guard at full rearward tilt of the forks at any elevation. If the overall height of the guard exceeds the height limitation of 3.8.11, the guard shall be removable without use of special tools.

3.6.6.6 Masts. Masts shall be of the telescopic roller bearing type and shall provide 72 inches (1829 MM) minimum of lift height with maximum rated load on the forks. Mast height shall not exceed 96 inches (2438 MM) when raised. Components of the mast structure, when lowered, shall not completely obscure the operator's horizontal or downward line of sight on the load side of the vehicle. The operator shall be able to see the tip of at least 1 fork at any height without leaving his operating position when there is no load on the forks. Means shall be provided in the mast assembly to compensate, by adjustment or replacement, for wear between lateral rolling contacts without disassembly of the mast. Upper and lower limit positive stops shall be provided to prevent over travel. The lift mechanism shall be designed to control premature elevation of an intermediate section during raising and binding of these sections during lowering or when lifting off-center loads (side shifts). The mast assembly shall be capable of withstanding stresses induced by the tests of 4.3.2.8.1 and 4.3.2.8.2. See 3.8.11 for overall height limitation.

3.6.7.7 Forks. Forks shall be capable of withstanding stresses caused by the tests of 4.3.2.8.1 and 4.3.2.8.2 and shall be covered with non-skid coating on the upper horizontal surfaces. Forks shall be 2-1/8 inches (54 MM) thick maximum, 5 inches (127 MM) wide maximum, and 36 inches (914 MM) long + 1/2 inch (12 MM).

Forks shall taper uniformaly on the underside from 14 inches (356 MM) from tips to within 1 inch (25mm) of tips. Fork thickness shall not exceed 1/2 inch (12mm) at the tips. Forks shall exhibit no permanent deformation, cracking, or failure when subjected to overload tests as specified herein and inspected in accordance with 4.3.2.8.3.

3.6.6.8 Sideshifter mechanism. Fork spread and shift mechanism shall be provided, and the forks shall be independently and laterally adjustable by means of independent control levers located adjacent to the lift and tilt control levers. Overall fork width, measured at outer edges of forks, shall be adjustable from 20 inches (508 MM) to 50 inches (1270 MM), and forks shall be capable of shifting laterally 7-1/2 inches (190 MM) to either side of the centerline when the overall fork width spread is at the medium spread of 35 inches (889 MM). The forks shall exert slight outward pressure when lifting. The forks shall be capable of simultaneous movement in the same direction while loaded. The sideshifter mechanism shall withstand the tests of 4.3.2.2 without failure, cracking, or permanent deformation.

3.6.6.9 Reach mechanism. The vehicle shall operate as a sideloader and shall be capable of extending the forks to a point where the verticle face of each fork is 4 inches (102mm) minimum beyond the overall profile of the vehicle. The sideshift mechanism and lift mechanism each shall be operated through their full ranges of motion when the mast is extended. A chain, if used in the reach mechanism, shall be easily adjustable not less than one complete link without removal or shimming of any main component or structure. Operation of reach mechanism shall not cause physical damage due to shock to any truck component at the extreme limits of travel. The reach mechanism shall be capable of with standing stresses imposed by requirements in 3.8.3 and the stresses resulting from allowing the fork tips or a load on the fork to strike a fixed obstruction during reaching or sideshifting operation without failure, cracking, or permanent deformation as a result of the tests of 4.3.2.1. If the vehicle can be moved with forks extended, the mechanism shall be capable of withstanding stresses resulting from allowing the forks or rated load on forks to strike a fixed obstruction while vehicle is moving at slow speed, not greater than 1 mile per hour (mph) (1.6 KM/hr), while inching an empty pallet, while handling rated load of vehicle, or while the vehicle is rotating about its geometric center when tested in accordance with 4.3.2.1.

3.6.6.10 Jacks. Jacks, if provided, shall each have a deck bearing area not less than 50 square inches (322 square CM). Deck contact surface of each jack base shall be covered with a high hysteresis rubber molded to a metal plate securely attached to jack base to prevent jack base movement relative to a steel deck and to promote conformity of jack base to deck irregularities. Maximum deck loading by any jack shall not exceed 7000 pounds (3175 KG) under any condition of loading on a level surface. An appropriately located, clearly visible warning sign for personnel to keep feet clear of jacks when in operation shall be provided. A maximum of four jacks shall be used.

3.6.6.11 Wheels. Vehicles shall be mounted on flat-faced wheels. The wheels shall have anit-friction bearings. There shall be at least 2 drive wheels. When equipped with new tires, the wheels shall clear any part of the vehicle structure by at least 1/4 inch (6 MM) under all operating conditions. Should any mode of operation cause any drive wheel(s) to be lightly loaded and tend to slip, the other drive wheel(s) shall retain its full tractive power.

Should the steer wheel(s) be lightly loaded it shall retain sufficient load to provide positive steering control of the vehicle.

3.6.6.12 Tires. The tires shall be new and unused and shall be selected from sizes listed in the Tire and Rim Association Yearbook. The tires shall be of the industrial solid rubber or cushion type and shall have commercial, nondirectional treads or may be smooth. The tires shall be molded onto a new press-on type steel band. Design of the vehicle shall insure minimum scrubbing of tires in any direction of travel or when switching direction of travel.

3.6.6.13 Drive wheel mounting. Drive wheel mounting shall insure that 1 drive wheel will maintain contact with the deck while the other wheel(s) negotiates an obstacle when tested as specified in paragraph 4.3.2.12.

3.6.7 Steering. The vehicle shall be capable of travelling perpendicular and parallel to the direction of mast travel. Steering control for travel perpendicular to the direction of mast travel shall be an automotive type steering wheel. Steering control for travel parallel to the direction of mast travel shall be accomplished by steering wheel or by independent braking of drive wheeels. Steering controls shall be designed for ease of operation. The controls shall be located so as to make it unnecessary for any part of the driver's body to project over the plan outline of the vehicle. Outside diameter of the hand steering wheel shall be 12 inches (305 MM) minimum, 20 inches (508 MM) maximum. Chains, if used in this steering mechanism, shall be easily adjustable not less than 1 complete link without removal of any vehicle structure or major component. The steering controls shall be such that the vehicle is capable of rotating 360 degrees horizontally about its geometric center. Power steering, shall be provided to assist the operator in normal operation and shall not prevent manually steering the vehicle in the event of electrical failure which would necessitate pushing or towing. The steering mechanism for travel parallel to the longitudinal axis of the vehicle shall provide steering geometry without error greater than 3 degrees throughout any position of the steering angularity. Clockwise rotation of the steering wheel shall provide for clockwise turning of the vehicle in the forward direction. There shall be a minimum of 7 inches (178 MM) between the lowest point on the steering wheel rim and a horizontal plane passing through the highest point of the unoccupied seat cushion. Provision shall be made for adjustment where required to compensate for wear of all major steering parts and for lubrication of all friction points. A reservoir, if provided shall be readily accessible for checking lubricant level. Wear of the steering mechanism shall be measured in accordance with paragraph 4.3.2.5 Free play following endurance test shall not exceed 3 inches (76 MM) for manual steering or for power steering with the pump motor running. The steering system shall be capable of withstanding an unbalanced tangential force of up to 150 pounds (68 MM) applied at the rim of the hand steering wheel without permanently deforming any part of the steering mechnism when it is tested in accordance with paragraph 4.3.2.5.

3.6.8 Brakes. Brakes shall be provided for all wheels, including auxiliary crab wheels. The vehicle shall be equipped with the brake system specified in 3.6.8.1 through 3.6.8.3.

3.6.8.1 Service brakes. The service brakes shall retard, smoothly control, and stop the truck, both with and without load under all operating conditions.

All wheels shall have brakes provided with a dual output master cylinder creating a dual hydraulic circuit (split hydraulic) brake system. Automatic and manual brake adjustment shall be provided. Automatic adjustment shall maintain correct lining to drum or disc adjustment without looseness or lockup. The automatic adjusters shall be of the guarded or enclosed type protected from enviromental damage or malfunction. Manual brake adjustment mechanisms shall be accessible and shall be adjustable using common hand tools or a star wheel brake tool. The brake system shall conform to the requirement of ANSI B56.1. A controllable braking system shall be utilized for service brakes with control located for foot operation by the seated operator. Foot pedal shall be at least 4-1/2 inches (114 MM) wide and shall be provided with corrugated or friction surface to prevent slipping of the operator's foot. Operator shall be able to control the applied braking force. The service braking force must stop and hold the vehicle in accordance with requirements of 3.8.13.

3.6.8.2 Deadman brake. The deadman brake shall be automatically applied when the operator leaves the vehicle and may be a combination service/deadman brake or parking/deadman brake. The braking system shall be interlocked with a switch(es) which shall interrupt the electrical current to the traction motor(s) when the deadman brake is actuated. The braking force must hold the vehicle in accordance with the requirements of 3.8.13.

3.6.8.3 Parking brake. The parking brakes shall be capable of holding the vehicle in accordance with the requirements in 3.8.13. The parking brake shall be a mechanical friction brake acting directly on the wheels or on any shaft positively connected to the drive. For those trucks with jacks as a part of their design engagement of the parking brake may be used to lock on the jacks and hold the vehicle in accordance with the requirements of 3.8.13.

3.7 Controls and instrumentation. The requirements of 3.6 shall apply, where applicable. All controls shall be located for convenient operation by the seated operator, including having foot-operated controls move in line with operator's leg. Controls and instrumentation shall be constructed to be moisture and weather resistant to prevent entry of moisture under all weather conditions.

3.7.1 Controls. Each switch and lever type control except directional control shall be self-centering, permanently identified as to function, and provided with a position marking (decals are not acceptable) either at the switch or lever or, in case of the directional speed controls, on a diagram visible to the operator, The clear distance between adjacent controls shall be 2 inches (51 MM) minimum, All hand controls shall have a directional motion similar to the resulting motion of the vehicle operation to be performed and shall provide precise and smooth operation. All controls shall be operable when gloves are worn. Controls shall not interfere with the operators egress from operators compartment.

3.7.1.1 Directional controls. Travel controls shall provide two directions of travel perpendicular to each other. Directional controls shall provide forward and reverse travel in each direction. The directional controls shall not interfere with the operator attempting to enter or leave the truck and shall be for convient hand operation. A wheel position indicator shall be provided and located within vision of the seated operator.

3.7.1.2 Lift and tilt controls. Lift and tilt controls shall be lever type and conveniently located for simultaneous right and left hand operation. Tilt control shall be immediately to the right of the lift control. Rearward (toward the operator) motion of lift and tilt controls shall raise or tilt load toward the vehicle. Modulation of the speed of lift, tilt, and lowering shall be readily controllable with and without load on the forks. The lift and tilt mechanisms shall be operable with mast extended or retracted and at intermediate positions.

3.7.1.3 Sideshifter and fork spread control. Control levers for sideshift and fork spread shall be provided, located as a pair adjacent to the lift and tilt control levers, and for simultaneous operation by operator's right and left hands.

3.7.1.4 Extension-retraction control. A single lever shall control the mast extension-retraction mechanism. The mast shall be extended by movement of the lever away from the operator, and retraction of the mast shall be accomplished by movement of the lever toward the operator. Means shall be provided to prevent extension and retraction of the mast unless jacks, if provided, are fully lowered. Jacks, if provided, shall remain fully lowered until mast is fully retracted.

3.7.1.5 Accelerator control. A foot operated accelerator control shall be provided and located for right foot operation by the seated operator.

3.7.1.6 Key power switch. A keyed power switch shall be furnished. The key shall be removable only when the switch is in the "off" position. When the switch is in the "off" position, control circuits shall be open. All vehicles procured under a given contract shall be keyed identically. Two keys in addition to the key supplied with each vehicle shall be forwarded to each consignee.

3.7.2 Instruments. All gages and meters shall be products of manufacturers regularly engaged in producing these types of instruments. Except for the hour meter, they shall be flush mounted in a location convenient to and plainly visible to the seated operator.

3.7.2.1 Hour meter. An electrically operated hour meter which registers only the total number of operating hours of the motors shall be provided. The hour meter need not be visible to the operator, but shall be located so that it is readily accessible. The meter shall comply with the requirements of MIL-M-3971.

3.7.2.2 Battery protector. A battery indicator shall be provided. The indicator shall be a solid state device requiring no adjustment except a periodic light bulb check or replacement. It shall be tamper proof and carry UL approval. It shall be designed to protect the battery from approaching a dangerously low state of discharge by first warning the operator by means of a signal light, or fuel gage and signal light. After a short interval of time or after the consumption of an additional amount of electrical energy, it shall interrupt the lift control circuit making the lift mechanism, inoperative until the battery had been replaced or recharged.

The circuit shall be such that the operator cannot activate the lift control circuit by unplugging and replugging the battery after it has been 80% discharged, (typically 1150 specific gravity). Unplugging and replugging the battery prior to reaching 80% discharge shall not inactivate the lift control circuit. The discharge indicator shall reset when a battery charged to 56%, of full capacity (typically 1200 specific gravity) is put on the truck. The discharge indicator may have controls to adjust the discharge setting and there set level to values other than 80% and 56%, provided such settings can be made without electrical test equipment and the positions of the settings are indicated by indelible markings on the controls. When a gage is used, it shall be mounted on the driver panel, and it shall display energy in the familiar empty to full type display used in gasoline vehicles. There shall be a defined point where the truck lift mechanism becomes inoperative. Location and method of mounting shall provide plain visibility of the indicator to the driver without creating interference with truck operation, maintenance, and entry and egress movements of the operator.

3.7.3 Accessories.

3.7.3.1 Horn. Vehicle shall be equipped with an electric horn with a push button, mounted for convenient operation by the operator. The horn shall be operable without requiring the operator to completely release the steering controls. Horn button assembly and electrical wiring for the horn shall be constructed to be moisture, corrosion, and weather resistant.

3.7.3.2 Towing fitting. Ring or pin type fitting shall be provided to permit the vehicle to tow a load or to be towed. The fittings shall be centered at each end of the truck and shall not protrude beyond the major outline of the vehicle when not in use. The fittings shall be capable of withstanding the forces produced in accordance with 3.8.13.

3.7.3.3 Flood lights. Each truck, shall be equipped with two sealed beam 25 watt minimum, flood lamp, shock mounted in an elastomer ring housing. Directional adjustment range of the lights shall be 45 degrees above and below the horizontal plane. Horizontal adjustment shall also be provided. One flood lamp shall be mounted for forward illumination and one for rearward illumination. A seperate switch for each flood lamp shall be provided in the operators compartment. Each flood light 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.

3.7.3.4 Weighing device. When specified (see 6.2), the truck shall be equipped with a weighing device such as digital readout of a pressure transducer or the indication of Bourdon tube dial indicator; it shall be connected to and operate from the system for raising and lowering the forks. The entire instrument and connections shall be shock and corrosion resistant, and the transparent cover shall be resistant to damage by shock or heat. If a dial indicator is furnished, the next eight sentences particularly apply. The dial shall be not less than 6 inches (152 MM) in diameter and shall be marked in 50-pound (20 KG) increments on gages of 10,000-pound (4535 KG) or lesser capacity and in 100-pound (45 KG) increments on gages greater than 10,000-pound (4535 KG) capacity. The dial shall be capable of being rotated 36 degrees by means of external tare adjusting knob.

Bearing points or locking device(s) shall prevent dial rotation owing to shock loads or vibration that occur during test of first article truck or production truck. The indicating pointer shall be capable of 360 degree rotation for full scale reading. The entire indicator case shall be filled with deodorized kerosene 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 in an easily accessible position on the case. The weighing device shall be certified by its manufacturer to an accuracy of 1/2 of 1% and shall read to an accuracy of 5% of full scale reading as demonstrated when tested in accordance with 4.3.2.31.Accuracy of weighing device within required tolerances shall be verified by supporting data. Weighing device shall be capable of withstanding the pressure caused by placing 150-percent of truck rated load on the forks without sustaining damage when tested in accordance with 4.3.2.31. The readout shall be within the view of the operator when he is in the operating position. The truck shall meet all requirements of this specification with weighing device installed.

3.8 Performance requirements.

3.8.1 Lifting speed. Speed of fork lift with maximum rated load after 3 hours of operation on the endurance course under conditions specified in paragraph 4.3.2.26 shall be not less than an average of 20 feet per minute (600 meters per minute) and shall not exceed 40 feet per minute (1200 meters per minute) when measured from floor level to maxmum lift height. The lifting system shall provide smooth and precise positioning of loaded and unloaded forks.

3.8.2 Lowering speed. The average speed of lowering the forks carrying maximum rated load and unloaded after 3 hours of operation on the test course under conditions specified in paragraph 4.3.2.26 shall be not less than 30 feet per minute (9 meters per minute) or greater than 60 feet per minute (18 meters per minute. The movement of loaded and unloaded forks shall be smooth when being lowered at maximum speed with valve fully open. The hydraulic control system shall be damped, metered, or easily regulated manually to reduce shock and prevent the vehicle from overturning when load is fully extended and lowered at maximum speed and then stopped suddenly at any height when tested in accordance in paragraph 4.3.2.26. Forks shall rest on deck when fully lowered.

3.8.3 Extension and retraction. The vehicle shall be capable of fully extending and fully retracting the maximum rated load on forks in not less than 4 or more than 6 seconds.

3.8.4 Jacks. Time required to lower jacks if provided, shall be 11 seconds maximum. Time required to raise jacks shall be 7 seconds maximum.

3.8.5 Maneuverability. Maneuverability shall not be impaired in any direction on slopes up to and including 15 degrees with maximum rated load and without load. After traveling 10 feet (3048 MM) minimum in a straight line in any direction on a 15-degree slope with maximum rated load and without load, the vehicle shall be capable of stopping from travel parallel and perpendicular to mast travel and retracing its path within 3 inches (76 MM).

The vehicle shall be operated on a slope with a steel surface coated with slip-resistant deck coating conforming to MIL-D-23003. The vehicle, with a uniformly distributed 4000-pound (1820 MM) load on a 112-inch (2844 MM) long by 40-inch (1016 MM) wide skid centered laterally and square with the forks, shall be capable of operating in 90-degree intersecting aisle 92 inches (2336 MM) wide without reversal of direction. The above capability shall be tested with the forks fully retracted and with the load in carrying position. Vehicle shall be capable of placing and removing this loaded skid, centered laterally and square on the forks, in a stacking space 120 inches (3048 MM) wide, both on the floor and at a height within 6 inches (152 MM) of specified maximum fork height, from a 92-inch (2336 MM) aisle. Vehicle shall be capable of transporting, placing, and removing long loads as shown in Figure 1 in confined spaces as shown in Figures 2 and 3. Vehicle shall be capable of performing specified maneuvering functions when tested in accordance with 4.3.2.4.

3.8.6 Steering effort. The steer wheels shall be capable of being turned from extreme right to extreme left and vice versa in not more than 7 turns of the hand steering wheel with a maximum force of 10 pounds (45 N) on the steering wheel when the loaded vehicle is stationary on a horizontal steel platform coated with a slip-resistant deck coating.

3.8.7 Speed. The vehicle on a level surface shall be capable of forward, reverse, and sideward speeds of 3.0 miles per hour (4.8 kilometers per hour) minimum with maximum rated load and 4.0 miles per hour (6.4 kilometers per hour) maximum without load.

3.8.8 Slope ascension. With forks in a stowed position and with maximum rated load in carrying position and without load, the vehicle shall be capable of ascending and descending a 15-degree slope in any direction in the forward, reverse, and sideward directions of travel. The slope surface shall be steel, coated with a slip-resistant deck coating conforming to MIL-D-23003, type II. The vehicle shall be able to accelerate from a stop on the slope and proceed in the same direction initially started.

3.8.9. Acceleration. From stop, the vehicle carrying maximum rated load shall have an average acceleration rate in forward, reverse, and sideward directions such as to travel 22 feet (6.7 meters) in 10 seconds maximum. This capability shall be demonstrated on a level surface. Compliance with this requirement shall be measured in accordance with paragraph 4.3.2.21.

3.8.10 Upright tilt. The lift mechanism shall provide forward tilt of 3 degrees plus or minus 1/2 degree with no load on the forks at all positions of tilt, extended and retracted. A positive rearward tilt of 10 degrees plus or minus 1/2 degree shall be provided, with maximum rated load on the forks, with forks extended and retracted. All of the above measurements are relative to the top surface of the forks with the vehicle on a horizontal surface. Forward and rearward tilt shall be controllable between limits at all fork heights and to all extensions.

3.8.11 Overall height. With forks lowered, the collapsed mast height or the overall height of any vehicle component shall not exceed 78 inches (1981 MM) measured from the deck.

3.8.12 Underclearance. The vehicle carrying maximum rated load shall have sufficient underclearance to permit operation from horizontal plane, up and down a 10-percent slope and over the test course described in paragraph 4.3.2.6 Intersections of slopes and horizontal planes shall be lines (no fillets or rounding). No portion of the vehicle, other than the wheels and grounding strap(s), shall contact the ground or any obstacle while negotiating the slopes and test course.

3.8.13 Braking. The service, deadman, and parking brakes shall be capable of developing a retarding force equal to at least 36 percent of the gross weight of the vehicle with and without maximum rated load while the vehicle is being towed in both forward and reverse directions perpendicular to the direction of mast travel over a level steel platform coated with slip-resistant deck coating conforming to MIL-D-23003, type II. The service brakes shall develop the required braking forces with 50 to 150 pounds (23 to 70 KG) pedal force, and service brake system shall be capable of withstanding an applied force on the brake pedal of 250 pounds (113 KG) without failure of any component. In all retarding force tests, the force shall be applied in a horizontal plane at a height equal to the height of the center of gravity of the unloaded vehicle or of the vehicle carrying maximum rated load as applicable. When tested in accordance with paragraph 4.3.2.22, the stopping distance shall comply with the applicable requirement of ANSI B56.1. The service, deadman and parking brake shall be capable of retaining truck with rated load on the 15 degree slope specified in both forward and reverse directions.

3.8.14 Endurance cycles. The vehicle shall be capable of undergoing complete endurance tests specified in paragraph 4.3.2.6 and lift tests specified in 4.3.2.7 without failure or permanent deformation of any part or component. After completion of the endurance tests, the lift assembly shall hold maximum rated load for 5 minutes with 1-inch (25 MM) maximum total drift. Packing nut (if used) adjustment shall not be permitted during this test.

3.8.15 Stability. The vehicle shall remain stable when positioned on a steel tilt platform coated with slip-resistant deck coating conforming to MIL-D-23003, type II, and subjected to the inclines and load conditions of 3.8.15.1 and 3.8.15.2.

3.8.15.1 Stacking. All wheels or jacks shall remain in contact with the tilt platform when the platform is inclined to 15 degrees in any direction with maximum rated load 48 inches (1219 MM) above the tilt platform and the forks at maximum sideshift in each direction at maximum extended and maximum retracted positions. All wheels or jacks shall remain in contact with the platform when the platform is inclined to 15 degrees in any direction with 4000 pounds 1814KG) at 24-inch (610 MM) load center, 72 inches (1829 MM) above tilt platform, and with the forks at maximum sideshift in each direction to maximum extended and maximum retracted positions.

3.8.15.2 Traveling. The moving vehicle stability with maximum rated load and with the forks retracted shall be such that all wheels shall remain in contact with the tilt platform inclined to a minimum of 15 degrees in any direction. The load shall be at the long load carry position. All functions shall operate and shall be under the control of the operator at any position on a 15-degree slope both with truck unloaded and with truck carrying maximum rated load.

3.8.16 Deck loading. Single wheel and single jack loading shall not exceed 7000 pounds (3174 KG) when the maximum rated load is carried on the forks in any condition of extension, retraction, or height of lift on a level surface. Single wheels shall be such that the average tire pressure over the gross bearing area does not exceed 250 pounds per square inch (p.s.i.) (1723 KPA) for wheel loadings up to 150-percent of the loading specified above. The minimum dimension measured across the gross bearing area of single wheels shall be not less than 6 inches (152 MM) under a wheel loading 7000 pounds (3174KG). Jack requirements shall be as specified in 3.6.6.10.

3.8.17 Mast mechanism overload.

3.8.17.1 Static. The vehicle shall withstand 300-percent of maximum rated load at 24-inch (610 MM) load center with the forks retracted and 20 inches above the floor and shall withstand 200-percent maximum rated load at 24-inch (610 MM) load center with the forks fully extended and 20 inches (508 MM) above the floor when tested as specified in 4.3.2.8.1.

3.8.17.2 Dynamic. The lift, reach, tilt, and sideshift mechanisms shall be capable of being operated through all ranges of motions with 150-percent of maximum rated load at 24-inch (610 MM) load center when tested as specified in 4.3.2.8.2.

3.8.18 HI (High-Impact) shock requirement. When specified (see 6.2), the truck and the battery as a component of the truck shall be designed to withstand Type A HI shock as a grade A item in accordance with MIL-S-901 when tested in accordance with 4.3.2.19.

3.8.19 Static discharge device. The truck shall be equiped with 2 replaceable electrically conductive flexible straps or non-ferrous chains to discharge static electricity through contact with deck. The electrical resistance between truck chassis and the deck through the static discharge device shall not exceed 250,000 ohms when tested in accordance with 4.3.2.33 or the two straps shall be Underwriters Laboratories approved. Where UL approval is granted, test of 4.3.2.33 shall be waived.

3.8.20 Electromagnetic interference. The vehicle shall comply with electromagnetic interference limits of MIL-STD-461, Part 8, Class C1, Group II, and as tested in paragraph 4.3.2.9.

3.8.21 Sea water. The vehicle shall be capable of being sprayed with sea water or subjected to salt fog without corrosion or deterioration of any part or complete or partial loss of any required performance characteristic when tested as specified in 4.3.2.15.

3.8.22 Rain. The vehicle shall be capable of operating with required mobility after exposure to rain when tested in accordance with 4.3.2.14 without corrosion or deterioration of any part or complete or partial loss of any required performance characteristic.

3.9 Vehicle marking.

3.9.1 Vehicle plate marking.

3.9.1.1 Identification plate. Each individual forklift and each separable attachment removable for either surface or air transportable purposes (e.g. overhead guard, fork carriage or counterweights) except forks shall be identified in accordance with MIL-STD- 130 on identification plates conforming to MIL-P-514, type I, style 1, composition C (GG-P-455, type I, grade A, class 1) material. Additional information shall be indented or embossed on the plate(s) as specified in Table I. Plates shall be furnished and installed by the contractor. A shipping data plate shall be furnished and installed which shall conform to MIL-P-514, type III, composition C (GG-P-455, type I, Grade A, class 1) and in addition, shall indicate the silhouette of the forklift in transport position indicationg the center of gravity, the location and capacity of the lifting and the tiedown attachments. The plates shall be attached by screws, drive screws, bolts, or rivets in conspicuous protected locations.

TABLE I

TRUCK, LIFT, FORK, ELECTRIC, SIDELOADER, FOUR-DIRECTIONAL, SHIPBOARD, MISSILE CARRYING, 4000-POUND CAPACITY, TYPE EE
CAPACITY.....4000 (1815 KG).....pounds at 24 inch (610 MM) load center
NAME OF MANUFACTURER.....
SERIAL NUMBER.....
REGISTRATION NUMBER.....
MODEL NUMBER.....
SAFETY TYPE EE.....
WEIGHT.....(with battery)....
WHEEL LOADING (4000 pounds (1815 KG) on retracted forks
NON DRIVE WHEEL(S) (each).....pounds.....
DRIVE WHEELS(S) (each).....pounds.....
JACK LOACING (4000 POUNDS (1815KG) extended forks)
(each).....pounds.....
NOT TO BE USED IN HYPERGOLIC SPACES

3.9.1.2 Instruction plates. The forklift shall be equipped with instruction plates conforming to MIL-P-514, type III, composition C (GG-P-455, type I, grade A, class 1) material, or commercially proven decals, including warnings, cautions and diagrams describing any special or important procedures to be followed in assembling, operating or servicing the forklift.

3.9.1.3 Wheel loading plate. Each forklift shall be equipped with a wheel loading plate conforming to MIL-P-514, Type III, Composition C, (GG-P-455 Type 1, grade A, class 1) material. Plate shall be attached by screws, bolts, or rivets in a conspicuous location. As a minimum a plate shall have the information shown in Table II

TABLE II WHEEL LOADING PLATE

Wheel loading (no load on forks)	
Drive wheels (each side)	pounds(kilograms)
Steer wheels (each)	pounds(kilograms)
Wheel loading (rated load on forks)	
Drive wheels (each side)	pounds(kilograms)
Steer wheels (each)	pounds(kilograms)

3.9.1.4 Safety Rating Each truck shall be equipped with a safety designation plate conforming to MIL-P-514, type III, composition C (GG-P-455, type I, grade A, class 1). As a minimum, the plate shall indicate the truck manufacturer's name, truck's complete model number, safety designation (Type E, EE, or EX), independent testing laboratory's name, independent laboratory's registration or index number assigned to the inspected truck, and the date and the location of independent laboratory's inspection.

3.9.1.5 Battery Plate Each truck shall be equipped with a battery information plate attached to the truck conforming to MIL-P-514, type III, composition C (GG-P-455, type I, grade A, class 1) material. As a minimum, the plate shall indicate battery weight, dimensions, ampere-hour capacity at a 6-hour rate, voltage, number of cells, number of plates, cable lead length and position.

3.9.2 Vehicle paint marking. The lifting capacity of the truck shall be painted in block numbers 3 inches (80 mm) inches high on each side of the mast. When space does not allow 3 inch (80 mm) numbers, 1 inch (25 mm) numbers may be used on the mast. The assigned registration number for each truck shall be painted in block numbers three 3 inches (80mm) high on each side of the truck. Durable black enamel markers indicating the safety designation of the truck shall be applied on each side and on the rear of the truck in a visible but protected location. These markers shall be in accordance with ANSI/UL 583. In addition, supplementary marking and load handling symbols as specified in ASME/ANSI B56.11.3 are also required. Slinging and tiedown markings shall be stenciled "LIFT" or "TIEDOWN" in the appropriate locations on the exterior of the equipment in block letters not less than 1 inch (25mm) in height. "No rider" warning shall be painted in block numbers 2 inches (25mm) high on the rear of the mast. Block numbers shall be painted in black enamel.

3.9.2.1 Special marking. Trucks shall be marked in black color number 17038 in accordance with FED-STD-595. When the mast is painted black, markings placed on the mast shall be in white enamel. Marking paint shall be in accordance with TT-E-489. Characters shall be block-type capitals and Arabic numerals. Marking location and information and character size shall be as shown in Table III.

TABLE III SPECIAL MARKING

Information	Example	Location	Character Size
Capacity	10,000 Lbs. (4540 kg)	On each side of mast	2 inch (50 mm) height
Rider warning	NO RIDERS	On rear of mast	2 inch (50 mm) height
Service designation and U S military property number	USN 13-XXXXX	On each side and rear	1.5 inch (38mm) height

3.9.2.2 Shipboard Marking. Trucks shall be identified with words SHIPBOARD USE APPROVED in black (Color Number 17038 of FED STD-595) 1.5 inches (38mm) high block type capital chartacters located on each side and rear of the truck.

3.9.2.3 Structural testing marking. Trucks shall be identified with the words:STRUCTURALLY TESTED, the test date and the manufacturer's name in black (color Number 17038 of FED-STD-595) 1.5 in (38mm) high block type capital characters located on each side of the truck.

3.9.3 Vehicle stamp marking. The U. S. Military Property Number shall be indelibly stamped into the external plate of the truck body. The marking shall be located on the right side of the truck, approximately 6 inches (152 mm) below the center of the entrance to the operator's compartment. Marking shall be in 0.25-inch (6 mm) high block letters and numbers.

3.10 Treatment and painting. The vehicle shall be cleaned, treated and painted in accordance with MIL-T-704, type A, except that the finish coat shall be yellow gloss enamel color No. 13538 of FED-STD-595 and conforming to TT-E-489. An alternate commercial rust-inhibiting primer may be used in lieu of the primer specified, provided that the substituted primer has all the service properties of the specified primer and is compatible with the alkyd finish coat specified. Machined or polished surfaces shall be masked prior to painting. Lift chains, sprockets, rollers, plastics, hoses, and drive belts shall not be painted, except that slight overspray will be accepted, provided there is not interference with the proper functioning of the component. Paint shall not be applied to working surfaces where interference with working parts would result. Vehicle accessories, motor controls, instruments plated by the manufacturer of such items, and wiring shall not be painted by the contractor and shall be adequately protected or masked from overspray.

3.11 Interchangeability. All parts having the same part number shall be functionally and dimensionally interchangeable. Interchangeable parts are defined as two or more like parts possessing such functional and physical characteristics as to be equivalent in performance and durability and capable of being exchanged one for the other without alteration of the parts themselves or of adjoining parts, except for adjustment, and without selection for fit or performance.

3.12 Repair parts and maintenance tools. Repair parts and maintenance tools

shall be furnished in accordance with MIL-T-1375.

3.13 Items furnished with vehicle. Manuals, repair parts, maintenance tools, operating tools, and accessories shall be delivered with each vehicle. All special hand tools required for maintenance of the truck shall be provided with each truck procured.

3.14 Repair parts support. Supplier shall be responsible for making available any parts that are peculiar to the contractor or produced exclusively for the contractor. A list of these parts shall be furnished the cognizant technical activity through the contracting officer as a part of the provisioning data to be submitted. These parts shall be available for a period of no less than 15 years from date of contract. Should the contractor not make these parts available, he shall provide sufficient procurement data, production, design, and manufacturing processing data to facilitate Government procurement or manufacture. The contractor shall be capable of providing and supply parts support within a 30 day time frame for a minimum of 15 years, which is the projected life cycle of the truck.

3.15 Workmanship. All workmanship on the vehicle shall be in accordance with the engineering and production standards of the material handling industry and the intended shipboard use. All parts of the vehicle before and after painting shall be clean and free from sand, rust, dirt, fins, pits, sprues, scale, flux, and other harmful extraneous material. Edges and surfaces exposed to operating and maintenance personnel shall be smooth and rounded to the extent that a hazardous surface does not exist

3.15.1 Steel and other fabrication. Metals used in the fabrication of the vehicle shall provide original quality surface finish and shall be free from kinks and sharp bends. Metals having corroded or pitted surfaces shall not be acceptable. The straightening of materials shall be done by methods that will not cause weakening or injury to the material. Burrs and sharp edges shall be removed sufficiently to assure correct fits and to prevent loosening of fasteners and damage to components. Flame cutting may be employed instead of shearing or sawing. Splatter and slag shall be removed from exposed cuts and from re-entrant cuts, All modular assembly fabrication shall be manufactured to provide interchangeability of components.

3.15.2 Rivet connections. Rivet holes shall be accurately formed and shall have burrs removed. Rivets shall be driven with power tools. Rivet heads shall be full, neatly made, concentric with rivet holes, in full contact with the surface of the member. Excessive upsetting of rivets to fill holds shall not be acceptable.

3.15.3 Bolted connections. Bolt holes shall be accurately formed. Washers or lockwashers or a combination of the two shall be provided on all bolts, studs and capscrews having straight threads. Self-locking nuts are acceptable in lieu of nuts and lockwashers. All nuts shall have full thread engagement, and all threaded fasteners shall have tightening and thread engagement in accordance with SAE J475.

3.15.4 Welding. The surfaces of the 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 permanet deformation or failure when the parts connected by the welds are subject to proof and service loading, Parent materials, weld filler metals, and fabrication techniques shall be as required to enable the forklift to conform to the examination and test requirements specified in Section 4. Parts to be joined by filler welds shall be brought into as close contact as possible and in no event shall be separated by more than 3/16 inch unless appropriate bridging techniques are used. The welding process used in fabrication of the forklift shall be at the option of the supplier.

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) specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall 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 inspections and tests. The inspection requirements specified herein are classified as follows:

(a) First produced truck inspection and tests (see 4.3).

(b) Quality conformance inspection (see 4.4).

(c) Examination of preparation for delivery (see 4.5).

4.3 First produced truck inspection. Prior to examination and test of the truck specified in 3.1 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 required to perform this maintenance shall be provided.

(b) Service the truck with oils and greases specified herein and designated for use in the ambient temperature at which the tests will be conducted.

(c) Break in the truck as prescribed by the supplier.

4.3.1 Inspections.

4.3.1.1 Pretest examination Prior to testing according to 4.3.2, one or more of the first produced trucks as specified in 3.1 shall be examined for the defects marked "X" in Column 1 of Table IV.

4.3.1.2 Post-test inspection (see 4.3.2.34).

4.3.2 Tests. Upon successful completion of the inspection specified in 4.3.1.1, the truck shall be subjected to the tests marked "X" in Column 1 of Table V. Acceptance of a first produced truck shall not exclude the remaining trucks from the quality conformance inspection and acceptance provisions specified in Section 4. Test conditions and schedule shall be as follows:

(a) Unless otherwise specified herein, tests shall be conducted at the ambient temperature and climatic conditions existing at the place of test. The test surface, unless otherwise specified for specific tests, shall be level within +/- 1 degree. The surface of the test area shall produce a coefficient of friction of .5 or greater for trucks equipped with cushion tires, or .5 or greater for trucks equipped with solid tires. (If the specified coefficient of friction is not available, it is permissible to cover the travel surface with a friction increasing material). Only that maintenance established by the supplier and submitted as a maintenance schedule prior to commencement of tests shall be performed during the tests.

(b) Tests shall be in accordance with Table V and may be conducted in any order desired except that reliability and post test shall be the last tests conducted. An "X" in the applicable column indicates the tests that shall be conducted.

(c) Rated load, test load, capacity load and calibrated load shall be established with a load equivalent to an unrestrained cube with overall dimensions twice the load center dimension and whose center of gravity is located at the geometric center of the cube. The tolerance for weight shall be plus or minus 1 per cent.

(d) Load center shall be 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. The tolerance for dimensions shall be plus or minus 0.5 per cent.

TABLE IV - EXAMINATION SCHEDULE

First Produced Inspection	Quality Conform	Defects	Requirement Paragraph
X	X	Plating not as specified	3.2.1
X	X	Screw threads not as specified	3.2.2
X	X	Castings not as specified	3.2.3
X	X	Welds not as specified	3.2.4
X	X	Rotating parts not mounted on bearings	3.2.5
X	X	Accessible grease fittings not provided	3.2.6
X	X	Safety requirements not as specified for type EE	3.4
X	X	Weight exceeds allowable	3.6
X		Speed controller not as specified	3.6.1.1
X	X	Enclosures and shields not as specified	3.6.1.2
X	X	Overcurrent devices not provided with each circuit where required	3.6.1.3
X	X	Thermal relays for critical surfaces not installed	3.6.1.4
X	X	Controls and indicators not permanently labeled	3.6.1.5
X	X	Means of identification for conductors not provided	3.6.1.6
X	X	Static discharge device not provided	3.6.1.7
X		Traction control not as specified	3.6.2.1.1
X		Electric motors not as specified	3.6.2.1.2

First Produced Inspection	Quality Conform	Defects	Requirement Paragraph
X		Insulation not as specified	3.6.2.1.2.1
X		Vehicle not designed for 36-volt DC operation	3.6.3.1
X	X	Battery connectors not as specified	3.6.3.2
X		Battery compartment not as specified	3.6.3.3
X		Drive assembly not as specified	3.6.4
X		Frame depth does not protedt working parts	3.6.6.1
X	X	Lifting fittings not provided	3.6.6.1.1
X	X	Tiedown fittings not provided	3.6.6.1.2
X		Vehicle body not as specified	3.6.6.2
X		Easy access to all working partsd not provided	3.6.6.2
X		Operators compartment not as specified	3.6.6.3
X	X	Seat not as specified	3.6.6.4
X	X	Overhead guard not as specified	3.6.6.5
X	X	Mast not as specified	3.6.6.6
X		Fork dimensions not as specified	3.6.6.7
X		Sideshift mechanism not as specified	3.6.6.8
X		Reach mechanism not as specified	3.6.6.9
X	X	Jacks not as specified	3.6.6.10
X	X	Wheels not as specified	3.6 6 11

First Produced Inspection	Quality Conform	Defects	Requirement Paragraph
X	X	Tires not as specified	3.6.6.12
X		Drive wheel mounting not as specified	3.6.6.13
X	X	Steering system not as specified	3.6.7
X		Vehicle steering geometry not as specified	3.6.7
X	X	Brakes not as specified	3.6.8
X	X	Controls and instrumentation not as specified	3.7
X	X	All controls are not provided with proper markings	3.7.1
X	X	Directional controls not as specified	3.7.1.1
X	X	Lifting and lowering controls are not as specified	3.7.1.2
X	X	Sideshifter and fork spread controls not as specified	3.7.1.3
X	X	Extension/retraction controls not as specified	3.7.1.4
X	X	Jack control not as specified	3.7.1.4
X	X	Accelerator control not as specified	3.7.1.5
X	X	Key power switch not as specified	3.7.1.6
X	X	Instruments not located as specified or do not function correctly	3.7.2
X	X	Vehicle not equipped with an electric horn	3.7.3.1

First Produced Inspection	Quality Conform	Defects	Requirement Paragraph
X	X	Towing fitting not as specified	3.7.3.2
X	X	Flood lights not as specified	3.7.3.3
X	X	Vehicle marking not as specified	3.9
X	X	Treatment and painting not as specified	3.10
X	X	Repair parts, maintenance tools not as specified	3.12 & 3.13
X		Workmanship not as specified	3.15

Table V - Test Schedule

First Prod	Quality Conform	Post Test	TEST	Test Paragraph	Require. Paragraph	Test No.
X	X	X	Extension and retraction	4.3.2.1	3.8.3	
X	X		Strength of side shift and reach	4.3.2.2	3.6.6.8 & 3.6.6.9	
X	X	X	Jack operation	4.3.2.3	3.8.4	
X	X		Steering radius	4.3.2.4	3.6.7	1
X	X		Maneuverability	4.3.2.4	3.8.5, & 3.6.7	
X	X		Steering	4.3.2.5	3.6.7 & 3.8.6	1
X	X		Underclearance	4.3.2.6	3.8.12	2
X	X		Endurance	4.3.2.6	3.8.14	2
X	X		Lift ass'y drift	4.3.2.7.1	3.8.14	
X	X		Mast assembly overload	4.3.2.8.1 and 4.3.2.8.2	3.8.17.1 and 3.8.17.2	3
X			Electromagnetic compatibility	4.3.2.9	3.8.20	
X			Stability	4.3.2.10	3.8.15	4
X	X		Deck loading	4.3.2.11	3.8.16	
X			Drive wheel mounting	4.3.2.12	3.6.6.13	
X			Operator's compartment	4.3.2.13	3.6.6.3	
X	X		Rain	4.3.2.14	3.8.22	5
X	X		Saline atmosphere	4.3.2.15	3.8.21	
X	X		Storage	4.3.2.16	3.3.2.1	
X	X		Operating temperature	4.3.2.17	3.3.2.2	6
X			Chassis and frame	4.3.2.18	3.6.6.1	

First Prod	Quality Conform	Post Test	TEST	Test Paragraph	Require. Paragraph	Test No.
X			HI shock	4.3.2.19	3.8.18	
X	X		Hydraulic system	4.3.2.20	3.6.5	7 8 9 10
X	X	X	Acceleration	4.3.2.21	3.8.9	11
X	X	X	Brakes	4.3.2.22	3.8.13	12
X	X	X	Speed	4.3.2.23	3.8.7	13
X	X	X	Slope ascension	4.3.2.24	3.8.8	14
X	X	X	Upright tilt	4.3.2.25	3.8.10	15
X	X	X	Lifting and lowering speed	4.3.2.26	3.8.1 & 3.8.2	16
X	X	X	Lift, collapsed mast height	4.3.2.27	3.8.11	17
X			Lifting and tie-down attachments	4.3.2.28	3.6.6.1.1	18
X	X		Maintainability	4.3.2.29	3.5	19
X	X		Operator's overhead guard	4.3.2.30	3.6.6.5	20
X			Weighing device	4.3.2.31	3.7.3.4	21
X			Battery protector	4.3.2.32	3.7.2.2	22
X			Static discharge	4.3.2.33	3.6.1.7	23

4.3.2.1 Extension and retraction. With maximum rated load raised to carrying height, the load shall be extended and retracted the full horizontal distance. Measure this distance and record the time in seconds from the instant extension or retraction begins to the end of extension or retraction to determine compliance with 3.8.3.

4.3.2.2 Strength of sideshift and reach. The vehicle shall be tested to the strength requirements of 3.6.6.8 and 3.6.6.9 as follows prior to the endurance test of 4.6.5:

(a) Use the simulated stanchion specified in 4.3.2.13 as a fixed obstruction.

(b) Vehicle at rest, forks at 35-inch (889 MM) outer edge overall width, centered, and tips extended to edge of vehicle, further extended at maximum speed with right fork pushing empty pallet conforming to MIL-P-15011 minimum 12 inches (300mm) and force it to strike fixed obstruction.

(c) Repeat (b) with left fork.

(d) Sideshift 7-1/2 inches (190 MM) right of centerline and repeat (b) and (c).

(e) Sideshift 7-1/2 inches (190 MM) left of centerline and repeat (b) and (c).

(f) Vehicle at rest. Vertical faces of forks 4 inches (102 MM) beyond overall profile of vehicle and centered, rear of pallet aligned with heels of forks; use sideshift left to push pallet 4 inches (102 MM) at maximum sideshift speed into fixed obstruction, striking obstruction with center of side of pallet.

(g) Repeat (f) except sideshift right to push pallet into fixed obstruction.

(h) Vehicle at rest,forks holding simulated Talos missile on cradle with weight and dimensions as shown in Figure 1, forks 12-17 inches (304-432 MM) above deck,near side of load 1/4-1/2 inch (6-12 MM) from edge of vehicle, load secured to mast structure, carriage sideshifted 7-1/2 inches (190 MM) right of centerline, forward right corner of load 3 inches (76 MM) from fixed obstruction; extend at maximum speed and force corner of load to strike fixed obstruction.

(i) Repeat (h) except sideshift 7-1/2 inches (190 MM) left of center, left front corner of load 3 inches (76mm) from fixed obstruction before start of extension.

(j) Vehicle at rest, forks centered and vertical faces 4 inches (102 MM) minimum beyond overall profile of vehicle, same load as (h), forks 12-17 inches (304mm-432mm) above deck, right edge of load 4 inches (102 MM) from fixed obstruction; sideshift right at maximum speed and force load to strike obstruction.

(k) Repeat (j) except sidehsift left and force left edge of load to strike fixed obstruction.

(l) If vehicle is capable of moving with forks extended, (l) - (u) are applicable: Extend forks until verticle faces 4 inches (102 MM) minimum beyond overall profile of vehicle, at 35-inch (889 MM) outer edge overall width, carriage shideshifted 7-1/2 inches (190 MM) right of centerline, with vehicle moving at 1/2 - 1 mile per hour (mph) (0.8-1.6 km per hour) in direction of mast extension use right fork to push empty pallet specified in (b) into fixed obstruction.

(m) Repeat (l) except sideshifted 7-1/2 inches (190 MM) left of centerline and use left fork to push empty pallet.

(n) With carriage centered, forks extended, and pallet aligned as in (f); move vehicle left at 1/2 -1 mph (0.8-1.6 KM/HR) so that left fork pushes empty pallet in direction perpendicular to mast travel into fixed obstruction.

(o) Repeat (n) except push empty pallet right with right fork into fixed obstruction.

(p) With forks loaded and positioned as in (h) except vertical faces of forks 4 inches (102 MM) minimum beyond overall profile of vehicle, move vehicle at 1/2 - 1 mph (0.8-1.6 KM/HR) in direction of mast extension until forward right corner of load strikes fixed obstruction.

(q) Repeat (p) except sideshift 7-1/2 inches (190 MM) left of centerline and strike left forward corner of load against obstruction.

(r) With forks loaded and positioned as in (p), except carriage centered, move truck right perpendicular to direction of mast travel at 1/2 - 1 mph (0.8-1.6 KM/HR) until right edge of load strikes fixed obstruction.

(s) Repeat (r) except move truck left and force left edge to strike obstruction.

(t) With forks loaded and positioned as in (r) rotate vehicle clockwise 150 degrees about the center of its geometric configuration and force the left forward corner of the load to strike the fixed obstruction. Rotational speed shall be not less than 1/8 radian per second.

(u) Repeat (t), except rotate counterclockwise and force right forward corner to strike fixed obstruction.

(v) Evidence of cracking, permanent deformation, or failure of any part of the truck as a result of the tests specified in this paragraph shall be cause for rejection.

4.3.2.3 Jack operation. Jacks shall be lowered onto a level surface. Record the time in seconds to completely lower the jacks. The jacks shall then be raised. Record the time in seconds to completely raise the jacks. The times recorded for raising and lowering shall be in accordance with the requirements of 3.8.4.

4.3.2.4 Maneuverability. The vehicle shall be tested on a 15-degree slope of steel covered with slip-resistant deck coating in accordance with MIL-D-23003 type II or of concrete not rougher than the slip-resistant coating to determine compliance with steering, traversing, and retracting of path requirements of 3.6.7 and 3.8.5. The vehicle shall be tested without load and with maximum rated load for 360-degree rotation on a level surface for compliance with 3.6.7. The vehicle shall be tested on a level surface for stacking ability and ability to operate in intersecting aisles in accordance with 3.8.5. The vehicle shall be tested for capability of handling long loads in confined spaces in accordance with 3.8.5, for time operating without changing or charging the battery while working in a simulated compartment in accordance with 3.6.3.1, and for operating in ambient air at 115 degrees F (46 degrees C) or operating at 75 degrees F (24 degrees C) with results interpolated to 115 degrees F (46 degrees C) in accordance with 3.4.2.2 without critical heat areas exceeding 250 degrees F (120 degrees C) in accordance with 3.7.1.4. A compartment in accordance with Figure 2 shall be simulated on a level area and shall be stacked with test loads simulating terrier missiles and boosters and tartar missiles in containers shown in Figure 1 and located as in Figure 2. The air temperature in the test area shall be maintained at 115 degrees F.(46 degrees C.) or operating at 75 degrees F (24 degrees C) with results interpolated to 115 degrees F (46 degrees C) minimum. The vehicle shall continuously transport and load and unload the simulated compartment depositing and picking up the test loads at the simulated elevator. Note that the location shown as 7.2 PROJ CHARGE on Figure 2 represents an obstruction not to be moved. Means shall be provided to remove and deposit the test loads at the elevator location to aid the vehicle during the test loading and unloading of the compartment. The test shall be continuous for 7 1/2 hours, except for a 5-minute break permitted each hour and one battery charge permitted during the test. Inability of the vehicle to satisfy each maneuverability requirement or to complete required 7 1/2 hours of continuous operation as specified or evidence of overheating of the critical heat areas shall be cause for rejection.

4.3.2.5 Steering gear. The Steering mechanism shall be tested to determine that the operator can comfortably turn the wheel, without interference from adjacent truck structure, from extreme right to extreme left and vice versa, within the limit specified in 3.8.6. An unbalanced tangential force of 150 pounds (68 KG) shall be applied to the steering wheel to determine compliance with 3.6.7. Test shall be conducted in accordance with Test Method No. 1. Loads shall be applied in the plane of the steering wheel. Test shall be conducted with the truck stationary on a horizontal steel platform coated with a slip-resistant deck coating.

4.3.2.6 Endurance test. Tests to determine compliance with 3.6.3.1 and 3.8.14 shall be conducted as outlined in Test Method No. 2 for electric fork lift trucks. The vehicle shall be capable of operating without battery change or charge in accordance with 3.6.3.1.

4.3.2.7 Lift assembly. After completion of tests described in 4.3.2.6, the lift assembly shall be capable of undergoing 250 cycles as follows to determine compliance with 3.8.14:

(a) Extend forks and engage maximum rated load.
(b) Lift and tilt load back.

(c) Retract load.
(d) Raise load to maximum lift height.
(e) Lower load to 1/2 maximum lift height.
(f) Extend load and operate side shifter to full travel in both directions and return to mid-position.
(g) Lower load to floor.
(h) Tilt load forward and release load.
(i) Retract forks.
(j) Stop 60 seconds.
(k) Repeat (a) through (j) 249 times.

4.3.2.7.1 Failure criteria. During the test of 4.3.2.7 there shall be no deformation, breakdown, failure, short circuit, or replacement of any component. At the completion of the 250 cycles the vehicle shall be capable of raising the maximum rated load to full lift height and holding it with not more than 1 inch (25mm) vertical drift in 5 minutes and not more than one degree of rotational drift from the vertical.

4.3.2.8 Static and dynamic overload tests. During the static and dynamic overload tests, the vehicle may be secured by cables or chains to prevent overturning. The pressure relief valve(s) shall be made inoperative. The hydraulic system shall show no leakage or breakage when the vehicle is subjected to tests of 4.3.2.8.1 and 4.3.2.8.2.

4.3.2.8.1 Static. The vehicle shall be tested in accordance with Test Method No. 3 with 300 percent maximum rated load at 24-inch (610 MM) load center with the forks in the retracted position of 20 inches (508 MM) above the floor. The vehicle shall be tested with 200-percent maximum rated load at 24-inch (610 MM) load center with the forks in the fully extended position and 20 inches (508 MM) above the floor.

4.3.2.8.2 Dynamic. The lift, reach, tilt, and sideshift mechanisms shall be operated through all range of motions with 150-percent maximum rated load at 24-inch load center. The fork spread function shall not be operated with a load on the forks.

4.3.2.8.3 Inspection. Following overload tests, the forks shall be examined visually and shall be inspected for cracks 6 inches (152 MM) either side of the heel by use of magnetic particle or dye penetrant method.

4.3.2.9 Electromagnetic interference characteristics. The first produced truck equipped for electromagnetic compatibility in accordance with 3.8.20 shall be tested as specified in MIL-STD-461. The supplier shall furnish the approving activity the report of the test required by MIL-STD-461. Upon approval of the report and provided all other requirements of the specification are met, the approved truck shall be used as a model for all production trucks.

4.3.2.10 Stability. Tests to determine compliance with the requirements of 3.9.15 shall be conducted on a steel tilting platform with a slip-resistant deck coating in accordance with MIL-D-23003, type II. The slip-resistant deck coating may be omitted provided the vehicle satisfactorily completes all test requirements on a smooth metal platform. The platform shall be elevated to attain the specified slopes.

Suitable restraint such as a slack chain or cable shall be provided to prevent complete over-turning of the vehicle in the event the desired stability is not maintained. Failure of the vehicle to maintain the required stability is not maintained. Failure of the vehicle to maintin the required stabilty under test shall be sufficient cause for rejection of the vehicle.

4.3.2.11 Deck loading. The vehicle shall be tested for compliance with 3.8.16 by recording each individual wheel and jack loading with the load at full extension and at full retraction and side shifted maximum in each direction. Tire and jack base pad prints shall be made for the maximum loading conditions and shall be furnished with the First Article Test report.

4.3.2.12 Drive wheel mounting. The vehicle shall be tested for conformance to 3.6.6.13 while negotiating obstacles during the endurance test of paragraph 4.3.2.6.

4.3.2.13 Operator's compartment. The vehicle shall be tested for conformance to 3.6.6.3. The vehicle carrying maximum rated load at a speed not less than 3 miles per hour (4.8 Km per hour) in directions both parallel to and perpendicular to the direction of mast travel shall strike a simulated stanchion with the sides of the operator's compartment. The collisions shall be normal to the sides, rather than sideswiping, one each at the approximate center of each side. The simulated stanchion shall be made of American Iron Pipe, size 8-inch (203 MM), double strength, secured rigidly top and bottom, length not to exceed 96 inches (2438 MM). For this test, the vehicle shall not be driven by a seated operator; it shall be towed or be driven by remote control.

4.3.2.14 Rain test. The unloaded vehicle shall be tested to determine compliance with the requirements of 3.3.1 by Test Method No. 5. Evidence of moisture in instruments or controls or inability to perform any normal function shall constitute failure of this test.

4.3.2.15 Saline atmosphere test. When specified for shipboard use or for resistance to corrosion in saline atmosphere (see 6.2), the truck shall be tested in accordance with MIL-STD-810, Test Method 509, Salt Fog. At the option of the supplier, the truck may be tested as a completely assembled unit or by components and subassemblies. If the truck is tested in the form of components and subassemblies, the following parts may be omitted: chassis, frame, body, counterweight, and battery furnished without cover. All other parts, including components, fasteners, subassemblies, battery furnished with cover, and the electric system shall be tested. Whether in assembled or in disassembled condition, the truck shall not be washed or operated in accordance with II-3 of Method 509 until the exposure and drying periods have been completed.

4.3.2.15.1 Assembled truck. Preparation of the assembled truck prior to exposure to salt fog shall be in accordance with II-2.5 of Method 509. All exterior surfaces of the truck, including the exposed surface of each piston rod and excluding only surfaces such as those of lift chains which are lubricated in service use, shall be cleaned and exposed to salt fog and the drying. The rod(s) of the tilt and of the sideshift cylinder(s), if provided, shall be at full extension.

The lift cylinder rod which is exposed when the lift assembly is lowered in accordance with 4.3.2.15.3 b(1) herein shall be so cleaned and exposed. Components such as bearings which are lubricated in service use shall be lubricated in accordance with instructions of supplier prior to test.

4.3.2.15.2 Unassembled truck. Preparation of the truck tested as subassemblies and components shall be in accordance with II-2.5 of Method 509. Exterior surfaces of all of the parts shall be so cleaned, except those specifically omitted above and those which are lubricated in service use. Those surfaces, components, and subassemblies which are lubricated in service use shall be lubricated in accordance with instructions of the supplier prior to test. Surfaces to be cleaned and exposed to salt fog and for drying shall include the exposed surface of each piston rod. The rod(s) of the tilt and of the sideshift cylinder(s) if provided shall be at full extension for the cleaning and exposure. The lift cylinder rod surface which is exposed when the lift assembly is lowered in accordance with 4.3.2.15.3 b(2) shall be so cleaned and exposed.

4.3.2.15.3 Details. Pursuant to paragraph I-4.2 of Method 509, the following test information is given:

a. Exposure period shall be 72 hours followed by 168-hour drying period.

b. Configuration:

(1) Assembled truck resting on load tires with mast at full forward tilt and carriage at maximum sideshift to expose rod of shift cylinder if provided, and with mast lowered to where tips of forks rest on 4-inch (100 mm) x 4-inch (100 mm) wood blocks.

(2) Unassembled truck parts supported as convenient with large pieces in positions similar to assembled positions described in (1) and resting on 4-inch (100 mm) x 4-inch (100 mm) wood blocks. Small pieces supported as nearly as possible to 30 degrees from vertical by cords, hooks, or racks.

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.

(2) Evidence of harmful corrosion, loss of mobility of parts or inability to disassemble parts for service or repair shall constitute failure of this test. Operation of electrical system is required.

4.3.2.16 Storage. To determine compliance with 3.3.1.1 and prior to the corrosion and contamination test, the ujnprotected vehicle shall be stored in a controlled temperature-humidity chamber for 72 hours at 125 +/-5 degrees F (52 degrees C +/- 2 degrees and 95-100 per cent relative humidity.

Test for compliance shall be in accordance with paragraph 4.3.2.6 (one cycle). Corrosion or deterioration of any part which results in complete or partial loss of any required performance characteristic shall be cause for rejection.

4.3.2.17 Temperature stabilization test. Test truck in accordance with Test Method No. 6. Non conformance with the requirements of 3.6.1.4 shall constitute failure of this test.

4.3.2.18 Chassis and frame test. Test truck in accordance with paragraph 3.6.6.1. Non conformance with the requirements of 3.6.6.1 shall constitute failure of this test.

4.3.2.19 HI Shock test. When truck is specified to be designed to meet HI Shock requirement (see 6.2), a first produced truck with battery shall be tested by the contractor in accordance with MIL-S-901. The contractor shall locate a non-government shock test facility, arrange the test, and pay for the test. 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, and completion of shock testing/post shock examination. Pursuant to 6.1 of MIL-S-901 the following ordering data shall apply to the first article truck and battery which shall be mounted on the Floating Shock Platform during 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) The truck is class I, modified. The modification is that the truck rests on solid rubber or polyurethane tires which are similar in action to some resilient mountings.

(e) Type A test in which the truck is the principal unit and the battery is a subsidiary component.

(f) The truck is deck mounted.

(g) The truck is base mounted.

(h) The truck has unrestricted orientation.

(i) The truck with battery installed shall be secured to the deck simulator of the floating shock platform with tiedowns furnished by the testing laboratory.

(j) N/A

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

(l) Following the explosion of the depth charge at 20-foot (6 m) standoff, the truck and battery shall comply with (k) and the battery shall successfully demonstrate that it can reach rated capacity in accordance with 4.4.3 of W-B-133 except that not more than 2 cycles of charge shall be allowed after the HI shock testing. Minor permanent deformation of battery components and minor loss of electrolyte from splashing are permitted. Cracked or leaking cells, fractured intercell connectors, major loss of electrolyte, or failure to power the truck in accordance with (k) or to reach rated capacity in accordance with (k) shall constitute failure of the battery to meet the High Impact Shock requirement. Failure of the truck to comply with (k) or failure or permanent deformation of any component preventing operation of truck shall be regarded as failure of the truck to meet the H. I. Shock requirement.

(m) Acceptance authority is Navy Ships Parts Control Center, Code 0361, 5450 Carlisle Pike, P.O. Box 2020, Mechanicsburg, PA 17055-0788.

4.3.2.20 Hydraulic pump vacuum. Install a vacuum gage into the pump suction line immediately adjacent to the pump or at the pump. Install a thermocouple in the hydraulic reservoir. Run the pump at RPM encountered in truck operation governed RPM. Measure the pump inlet pressure in inches of mercury vacuum at the specified temperature and speed. Nonconformace to 3.6.5 shall constitute failure of this test. The oil temperature for this test shall be at 150 degrees F (132 degrees C) plus or minus 10 degrees F (10 degrees C). The pump vacuum shall be at least between 5 and 6 inches (17 and 20 KPa).

4.3.2.20.1 Suction line. The suction line(s) consisting of all fittings and hoses between the pump(s) and reservoir shall be tested by capping one end of the line and applying a minimum of 25 inches of mercury (84 KPa) vacuum to the other end of the line and holding the vacuum for a minimum of 1 minute. Coat all suction line junctures with detergent foam. Evidence of leakage or a reduction of outside circumference of more than 15 percent shall constitute failure of this test.

4.3.2.20.2 Hydraulic pump(s). Operate the pump(s) at maximum RPM encountered in truck operation and at 1-1/2 times maximum system working pressure for not less than 2 minutes. Check for external leaks at assembled surfaces and the shaft seal. Non conformance to 3.6.5 shall constitute failure of this test.

4.3.2.20.3 Hydraulic filter, cylinders, fittings and system cleanliness. Test the hydraulic filter in accordance with the Test Method No. 7, 8, 9, and 10. Nonconformance to 3.6.5 and 3.6.5.1 shall constiture failure of this test.

4.3.2.21 Acceleration. Test the truck in accordance with Test Method No. 11. Non conformance to 3.8.9 shall constitute failure of this test.

4.3.2.22 Brakes. Test the truck in accordance with Test Method No. 12. Non conformance to 3.8.13 shall constitute failure of this test.

4.3.2.23 Speed. Test the truck in accordance with Test Method No. 13. Non conformance to 3.8.7 shall constitute failure of this test.

4.3.2.24 Slope acscension. Test the truck in accordance with Test Method No.14. Non conformance to 3.8.8 shall constitute failure of this test.

4.3.2.25 Upright tilt. Test truck in accordance with Test Method No.15. Non Conformance to 3.8.10 shall constitute failure of this test.

4.3.2.26 Lift and lowering speeds. Test the truck in accordance with Test Method No. 16. Non conformance to 3.8.1 and 3.8.2 shall constitute failure of this test.

4.3.2.27 Lift and collapsed mast height. Test in accordance with Test Method No. 17. Failure to conform to the requirements of 3.8.11 and 3.6.6.6 shall constitute failure of this test.

4.3.2.28 Lifting and tiedown attachments. Test in accordance with Test Method No. 18. Failure to conform to the requirements of 3.6.6.1.1 shall constitute failure of this test.

4.3.2.29 Maintainability. Test in accordance with Test Method No. 19. Failure to perform the operations in the alloted time as specified in 3.5 shall constitute failure of this test.

4.3.2.30 Overhead guard strength. Test the truck in accordance with Test Method No. 20. Non conformance with the requirements of 3.6.6.5 shall constitute failure of this test.

4.3.2.31 Weighing Device. Test the truck in accordance with the Test Method No. 21.. Non conformance with the requirements of 3.7.3.4 shall constitute failure of this test.

4.3.2.32 Battery Protector. Test in accordance with Test Method No. 22. Non conformance with the requirements of 3.7.2.2 shall constitute failure of this test.

4.3.2.33 Static Discharge. Test the truck in accordance with Test Method No. 23. Non conformance with the requirements 3.6.1.7 shall constitute failure of the test.

4.3.2.34 Post test inspection. Upon completion of tests in 4.3.2, the truck shall be subjected to the tests marked "X" in column 3 of Table V. Nonconformance with applicable requirements shall constitute a failure.

4.3.3 Inspection failure. Failure of a first-produced truck to meet any requirement specified herein, during and as a result of the examination and tests specified in 4.3.1 and 4.3.2 shall be cause for refusal by the Government to accept any production truck until evidence has been provided by the supplier that corrective action has been taken to eliminate deficiencies. Correction of such deficiencies shall be accomplished by the supplier at no cost to the Government on trucks produced under the contract.
Any deficiencies found as a result of the first inspection and tests will be considered prima facie evidence that all trucks accepted prior to the

completion of first inspection and tests are similarly deficient unless evidence to the contrary is furnished by the supplier and such evidence is acceptable to the contracting officer.

4.4 Quality conformance inspection.

4.4.1 Tests. Each truck shall be tested carrying a rated load as specified in Column 2 of Table V. Failure of any test shall be cause for rejection. Overheating, failure of any components, malfunction of any control, or evidence of leakage of fluids shall be cause for rejection of the truck. Unless otherwise specified (see 6.2), all tests shall be conducted utilizing a contractor furnished battery equal to the battery specified in 3.6.3.1.

4.4.2 Examination. After successful completion of all tests specified in 4.3.2, each truck shall be examined for the defects marked "X" in Column 2 of Table IV. Presence of one or more defects shall be cause for rejection.

4.5 Examination of preparation for delivery. The preservation, packaging, packing, and marking shall be examined to determine compliance with MIL-STD-162.

5. PACKAGING

5.1 Preservation, packaging, and packing. Shall be in accordance with MIL-STD-162 or ASTM D3951 as specified (see 6.2).

5.2 Marking. Unless otherwise specified (see 6.2), marking for shipping and storage 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 are intended for stacking, unstacking and moving loaded and empty missile containers aboard ships. The ship decks on which the trucks are used may be either stationary or may be pitching and rollling in heavier sea states.

6.2 Acquisition requirement. Acquisition documents shall specify the following:

(a) Title, number and date of this specification.

(b) Issue of the DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1).

(c) When first article test is required (see 3.1).

(d) When weighing device is required (see 3.7.3.4)

(e) Specify level of packaging (see 5.1).

(f) When resistance to saline atmosphere is required (see 3.8.21).

(g) When HI Impact Shock is required (see 3.8.18).

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract. The applicable Data Item Descriptions (DID's) should be reviewed in conjunction with the specific acquisition to ensure that only essential data is requested/provided and that the DID's are tailored to reflect the requirements of the specific acquisition. To insure 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.

Reference Paragraph	DID Number	DID Title	Suggested Tailoring
3.2	DI-T-4902	First Article Inspection Test Report	———

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

6.4 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.

6.5 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 3.1.1) 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.

6.6 Conditions for use of level B preservation. When level B preservation is specified (see 5.1), this level of protection should be reserved for the

acquisition of forklift trucks for resupply worldwide under known favorable handling, transportation and storage conditions.

6.7 Subject term (key word) listing.

Electric
Fork
Lift
Truck

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

Custodian:
Navy - SA

Preparing Activity
Navy - SA

Project No. 3930-0654

APPENDIX

TEST METHODS

10. SCOPE

10.1 Scope. The test methods contained within this appendix are to determine whether trucks procured under this specification conform to the requirements set forth. The information contained herein is intended for compliance.

20. APPLICABLE DOCUMENTS. This section is not applicable to this appendix.

30. TEST METHODS.

TEST METHOD NO. 1

STEERING

Part I. Wear of Steering Mechanism.*

* This part of test method to be followed before and after reliability test.

1. Test Course: Smooth, clean, dry, level surface.

2. Test Apparatus:

   (a) Piece of stiff fiber board.
   (b) Ruler.

3. Test Procedure:

   (a) Place unloaded truck on a dry, level concrete suface with its front wheels parallel to the longitudinal axis of the truck. With power steering, pump motor is to be running.

   (b) Attach to the steering column, immediately below the steering wheel and parallel to it, a piece of stiff fiber board or similar material which is semi-circular in shape and which has radius at least one inch greater than the radius of the steering wheel.

   (c) Mark a reference point on the upper portin of the outer edge of the steering wheel; mark a corresponding point on the fiber board template.

   (d) Turn the steering wheel counterclockwise until the wheel of the truck begins to turn. Mark a point on the fiber board template corresponding to the reference point on the outer edge of the steering wheel.

   (e) Repeat operation (d) in the clockwise direction.

   (f) Remove the fiber board template from the truck and place it on a flat surface. Measure the distance between the 2 points made in accordance with operations (d) and (e) above. This distance, in inches, is the free play of the steering wheel.

TEST METHOD NO. 1 (CONTINUED)

Part II. Steering Wheel Turning and Tangential Force Tests.

1. Test Course: Smooth, clean, dry, level surface.

2. test Apparatus:

   (a) Steering wheel adapter pulley.
   (b) Tension dynamometer.

3. Test Procedure:

   (a) Place unloaded truck on clean, dry, level, smooth concrete with steer wheels in a straight ahead position.

   (b) Attach an adapter pulley, having a root diameter equal to the steering wheel diameter, to the spokes of the hand steering wheel.

   (c) Apply a steady force to a dynamometer attached to the adapter pulley in a counterclockwise direction and in the wheel plane until the wheel turns.

   (d) Record the maximum gage reading in 60-degree increments of steering wheel to within 15 degrees of the roadwheel steer angle.

   (e) Perform (c) and (d) in a clockwise direction.

   (f) Steps (b) through (e) may be performed with a torque reading instrument in lieu of an adapter pulley.

   (g) Turn steering wheel clockwise until steer wheel hit the stop. Apply 150 lb (68KG) unbalanced tangential force to the steering wheel and maintain force for a minimum of 15 seconds. Perform this operation two more times.

   (h) Repeat step (g) in counterclockwise direction.

   (i) Measure the number of turns of the hand steering wheel required to turn the steer wheels from the extreme left position to the extreme right position. Repeat operation in the opposite direction.

   (j) Measure and record steering wheel diameter and steering wheel to seat clearance.

TEST METHOD NO. 2

ENDURANCE TEST

1. Test Course:

(a) Layout of course. The test course shall be set up equivalent to the provisions of Figure A-2. Aisle widths shall not exceed fourteen (14) Feet (4.2 M). The course perimeter shall be demarcated with suitable barriers or indicators. Rubber pylons or suitable markings shall be placed on all corners and other critical points to assist in keeping the truck being tested within the course limits. Loads for positon 1,2, and 3 shall be place on both sides of the test course. When the truck is proceeding in the counter clockwise direction it shall only pickup the loads from the side of the truck that the forks are located on. (e.g. If the truck when moving forward in counterclockwise direction has forks on the right side, then it shal only pick the loads on the right side of the test course). The opposite shall be followed when moving in the clockwise direction.

(b) Obstacle inclusion. The obstacle test shall be set up in accordance with the provisions of Figure A-3, as a part of the course. Iron, wood, cement or steel blocks may be used. A guideline 15 feet (4.5M)long shall be provided to the left of the centerline of the course and parallel to it. The inner edge of this guideline shall be at a distance from the course centerline equal to one-half of the truck width or one-half of the load width (whichever is greater) plus 6 inches (150mm). This spacing and arrangments will allow the left wheels of the truck under test to pass over the first block and then the right wheels to pass over the second block while the truck is moving forward in a straight line parallel to the guideline.

(c) Ramp Inclusions. The course shall include a ramp constructed in accordance with the provisions of Figure A-4.

(d) Course surface. The course shall be paved with concrete having a fine float finish, or equivalent type surface having a fine smooth finish. It shall be dry, clean and free of any nonplanned obstacles or foreign material while conducting the reliability test.

(e) Container Areas. Test loads of missile containers with rated load shall be placed in position (1), (2), and (3) of figure A-2. The containers shall weigh 4,000 pounds (1800KG)and be 38 inches (970mm) wide, 35 inches (890mm) high and 202 inches (5m) long. Three (3) containers shall be placed in the first position, one (1) container in the second position and initially no containers in the third position. The front face of the load shall be placed four (4) feet (120cm) from the edge of the course.

2. Test Procedures:

The truck shall complete 2,000 circuits of the test course as detailed below.

(a) The light switch shall be turned "off" and "on" at the beginning of each lap and upon entering each container area.

(b) The truck under test shall begin each lap at the point labeled "START" on Figure A-2. As the operator starts the truck, he shall operate the horn for approximately 1 second. On lap number 1, the truck shall procede in a forward direction, following the centerline along the portion of the course marked "A" until it reaches the first load area. The rated load will have been placed in this location.

(c) The truck shall stop and crab in to the face of the load area marked "X", raise forks to maximum fork height so hydraulic relief valve is activated, then adjust fork height and remove the loaded container. The truck shall back out of the stack aisle into the main aisle, and proceed along the main aisle in the portion of the course marked "B" until it reaches the second load area.

(d) The truck shall proceed with load to a point beyond the container area opening, reverse its direction, and move to the face of the load area marked "Y". The truck shall crab in and place the rated load on top of the stack marked "Y."

(e) The truck shall crab out of the aisle into the main aisle, and proceed forward along the main aisle in the portion of the course marked "C" until it reaches the third load area.

(f) The truck shall stop and crab in, pick up rated load which has been placed in the location marked "Z". The truck shall back out into the main aisle, and proceed further along the main aisle in the portion of the course marked "D" until it reaches the portion of the course marked "E", containing the obstacle blocks.

(g) The obstacle blocks shall be traversed by the truck being driven through this area in a straight line so that its left wheels pass over the first block and right wheels pass over the second block. This part of the test may be conducted at low speed with the transmission in low range. However, the truck shall not be stopped prior to or while going over the blocks.

(h) The trucks shall proceed further along the main aisle in the portions of the course marked "F" and "G" until it reaches the position on the ramp labeled "Stopping Point." The driver shall stop the truck and then resume ascending the ramp. After the top of the ramp is reached, proceed along the main aisle in the portion of the course marked "J", "K", and "L".

(i) When the truck reaches the portion of the course marked "M", the operator shall stop. On every other lap, the operator shall turn off the master switch, then turn "ON". After completion of this portion of the test, proceed along the main aisle and start the next cycle. All stops shall be at the maximum safe deceleration rate.

The operator shall actuate and release the parking brake at least once during each circuit.

(j) The truck shall then reenter the portion of the course marked "A". In portions "A", "B", "C", and "D", the procedure shall be tha same a described in preceding paragraphs, except that the truck shall place a test load at each point where it was previously indicated that the truck picked one up, and pick up a load where it was previously indicated one was placed. Maneuvers in the balance of the course beyond the portion marked "D" shall be the same as described in preceding paragraphs.

(k) One-half of the total number of laps shall be traversed in the opposite direction with all operations reversed accordingly. This may be accomplished after completion of each 8-hour operating day or multiple thereof. That is, 50 percent of the laps shall be accomplished in the clockwise direction and 50 percent in the counterclockwise direction or vice versa. The test course need not be rearranged for the reverse travel.

(l) "The Hourly Time Record Sheet" shall be filled out for each operationg hour of the performance test. Average lap speed per hour shall be recorded.

(m) Maintenance and inspections shall be performed in accordance with the maintenance service and inspection sheet.

MAINTENANCE SERVICE AND INSPECTION SCHEDULE
MATERILAS HANDLING EQUIPMENT-ELECTRIC

The following inspections and checks shall be made prior to endurance testing and prior to the post testing. Items 1 through 12 shall be accomplished after completion of the endurance test.

1. Check all instruments for proper operation--check free play in steering--check horn operation.

2. Check brake pedal travel--check fluid level--adjust brakes if necessary--check safety seat brake--check linkage and operation--inflate tires to proper pressure (cold) and remove all foreign matter from tires.

3. Inspect all lights, windshield wipers and mirror. (When applicable.)

4. Check battery--water level and specific gravity.

5. Check hydraulic oil dipstick--add oil if necessary.

6. Inspect all safety equipment--fire extinguishers, overhead guards; check for cracked or bent forks.

7. Check controller contact tips, switches, operation.

8. check motor brush wear, spring tension, commutator wear-blow out carbon dust.

9. check acceleration control--speed--time delay--general operation.

10. Check cylinders for leaks and wear--wipe off.

11. Inspect all wires and terminals; tighten and replace where necessary.

12. Lubricate chassis using manufacturer's reference charts--replace missing or broken fittings where necessary--make all necessary adjustments.

13. Inspect drive unit--check for noise--check oil level--fill if necessary--do not overfill.

14. Inspect steering gear--check oil level--fill if necessary--do not overfill.

15. Inspect carriage and channel assembly (rollers, carriage and mast) for wear and damage--adjust and align if necessary.

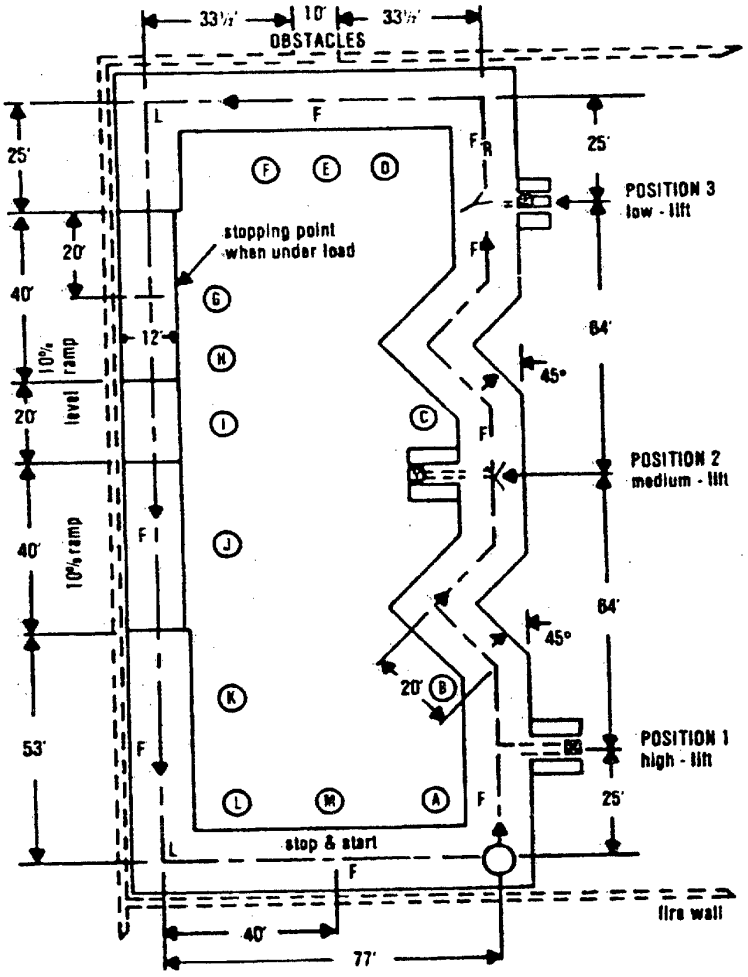
16. Inspect lift chains for wear and damage.

17. check brake lining and drums, check wheel cylinders.

18. Wheel bearings--repair and adjust, tighten all hub flange bolts.

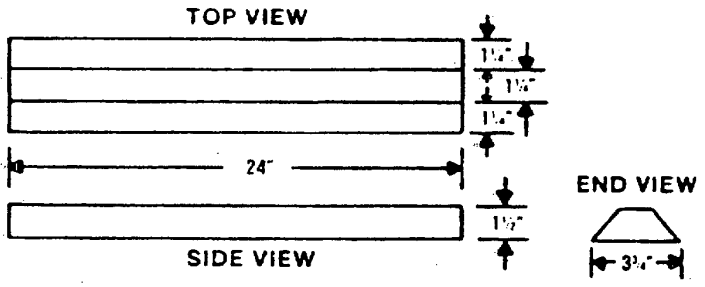
19. Hydraulic system--check for noise, leaks and operation--tighten all lines and fittings.

TYPICAL INDOOR TEST COURSE



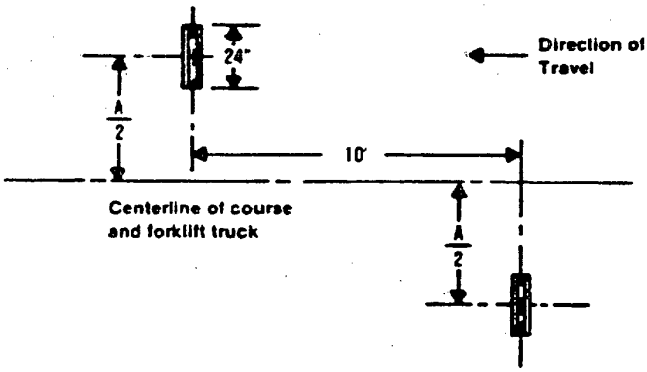
LEGEND:
F = Forward
B = Backward
L = Left turn (facing forward)
R = Right turn (facing forward)
(A), ETC. = Section designation

FIGURE A-2



2 Blocks required
Blocks to be attached to test course as shown below

LAYOUT OF OBSTACLE COURSE



A = Distance between centerline of driving wheels

Figure A-3. DETAILS OF OBSTACLE CONSTRUCTION FOR TRUCK, FORK, LIFT, SOLID RUBBER TIRES

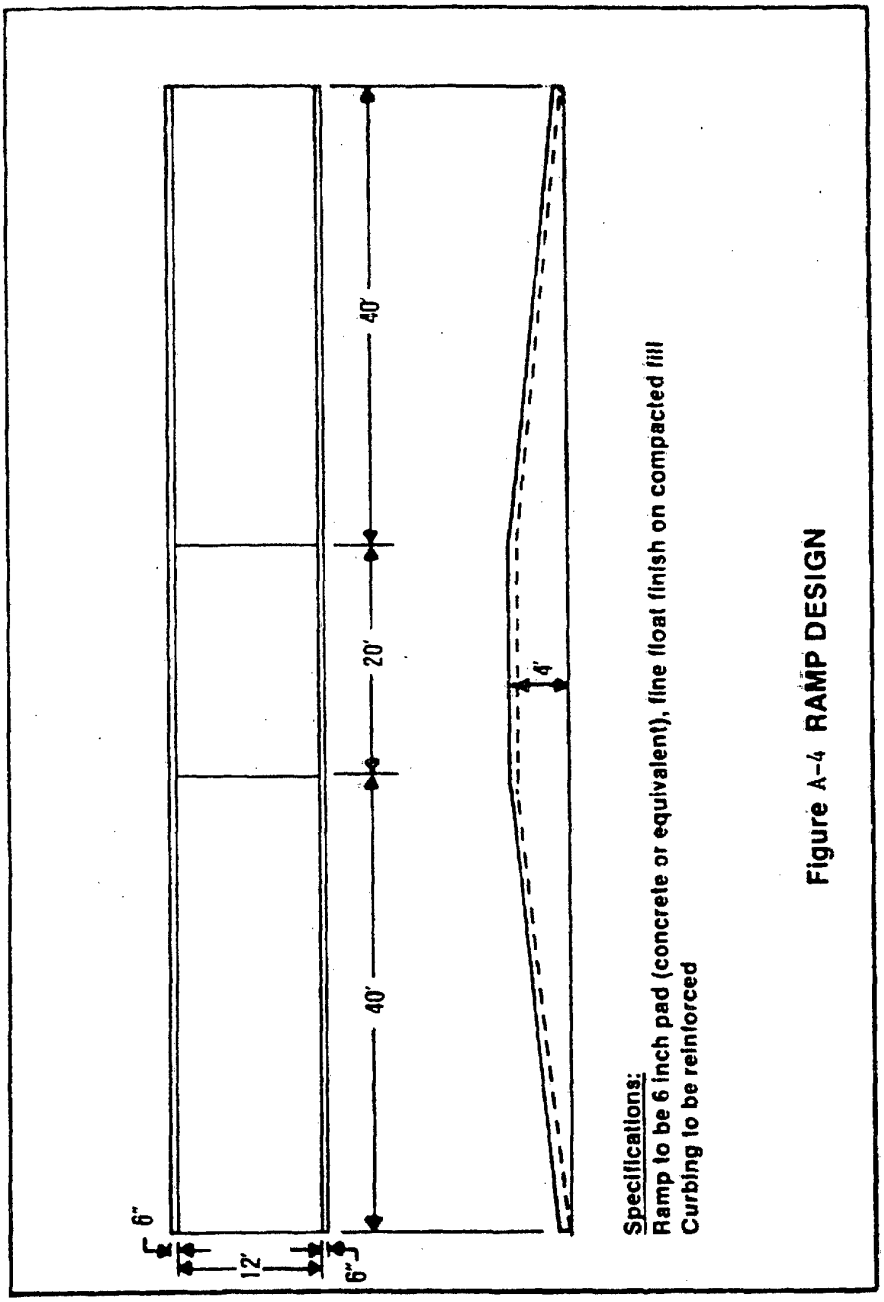


Figure A-4 RAMP DESIGN

HOURLY TIME RECORD SHEET

Date _____

Truck Manufacturer _____ Clock Readings: _____

Model _____ Test Location _____ Start _____

Serial No. _____ Recorded by _____ Finish _____

Time	Laps	Average Lap Time	Comments

Instructions:

1. Start decimal minute stop watch at zero at beginning of each hour.
2. Record watch reading at end of each hour and record elapsed time.

TEST METHOD NO. 3

MAST ASSEMBLY OVERLOAD

1. Test Course:

   (a) Level, flat surface.
   (b) Anchor.

2. Test Apparatus:

   (a) Magnetic particle or dye penetrant capability.

3. Test Procedure:

   (a) Place truck on level surface and support it with blocks under the axle or frame to relieve strain on tires. Position mast in true vertical position, with rated load on forks in normal carrying positon. External means may be utilized to hydraulically lock the tilt cylinder.

   (b) Secure truck to floor in a manner to compensate for the additonal test loads to be placed on forks. Counterweight may be added to assist the holding force. Apply counterblancing forces in a vertical direction.

   (c) With crane or another truck, place a test load of the rated capacity in position over the first test load such that the center of mass of the test load is on the truck's longitudinal centerline and at the rated load center.

   (d) Check strain or holddown devices and hydraulic system to determine whether the additional test load can be placed on forks. Tighten holddown devices if necessary.

   (e) With the crane or another truck, place the third test load carefully in position over the first two loads so that the center of mass of load is on the longitudinal centerline of the truck and at the rated load center.

   (f) When placing the overload on trucks, personnel should stand clear and crane operator should stand by to remove load if there is any evidence of immediate collapse or failure in truck structure.

   (g) The 300 percent rated load may be applied as one load in lieu of three loads as described in (c) through (f).

   (h) If truck accepts the additional test load without immediate failure, let overload stand on truck for 10 minutes.

   (i) Remove loads.

TEST METHOD NO. 4

LONGITUDINAL AND LATERAL STABILITY (SEE NOTES 1 & 2)

1. Test Course:

(a) Tilt table.

2. Test Apparatus:

(a) Clinometer.
(b) Plumb bob.
(c) Tape measure.

3. Test Procedure:

A. Longitudinal Stacking (Fig. 1)

1. Test No. 1 Forward

(a) Place truck with rated load on an initially level platform with the forks facing toward the tilting axis of the platform.

(b) With load positioned on the centerline of the fork carriage, lower the jacks and extend mast to maximum position.

(c) Elevate the test load to the maximuml height, then tilt platform to 15 degrees. Check to insure all jacks remain in contact with the platform. Truck position on the platform shall be maintained by frictional forces between jack pads and platform.

2. Test No. 2 Rearward

(a) Place truck with rated load on an initially level platform with the forks facing away from the tilting axis.

(b) With load positioned on the centerline of the fork carriage, retract mast to maximum position. Lower the jacks.

(c) Elevate the test load to the maximum height, then tilt platform to 15 degrees. Check to insure all jacks remain in contact with the platform.

3. Test No. 3 Rearward -- Operator Side End Down Grade

(a) Place truck with rated load on an initially level platform and lower the jacks, such that a line drawn through the center of the two (2) jack pads closest to the tilt axis is parallel to the platform tilting axis.

(b) With load at deck height, side shift down grade, rertact mast to maximum position.

(c) Elevate the test load to the maximum height, then tilt platform to 15 degrees. Check to insure all jacks remain in contact with the platform.

4. Test No. 4 -- Operator Side End Up Grade

(a) Place truck with rated load on an initially level platform, lower the jacks such that a line drawn through the center of the two (2) jacks closest to the tilt axis is parallel to the platform tilting axis.

(b) With load at deck heifght, side shift down grade, retract mast to maximum position.

B. Traveling (fig. No. 2)

1. Test No. 5 Travel (Lateral)

(a) Place truck with rated load on an initially level platform with forks facing upgrade of platform tilting axis and drive wheels parallel to tilting axis.

(b) With load positioned on the centerline of the fork carriage and fully retracted, elevate load to the deck height of the truck.

(c) Tilt platform to 15 degrees and check to insure all wheels remain in contact with the platform.

2. Test No. 6 Travel (Lateral)

Repeat Test No. 5 with forks facing platform tilting axis.

3. Test No. 7 Crab Travel (Longitudinal)

(a) Place truck with rated load on an initially level platform with forks facing upgrade of platform tilting axis and drive wheels parallel to platform tilting axis.

(b) Repeat Test No. 7 procedure steps b and c.

4. Test No. 8 Crab Travel (Longitudinal)

Repeat Test No. 5 with forks facing platform tilting axis.

TABLE OF [illegible]TS

TRUCK, LIFT, FORK, ELECTRIC, SHIPBOARD,
MISSILE-CARRYING, SOLID RUBBER TIRES, 4000 LB. CAPACITY

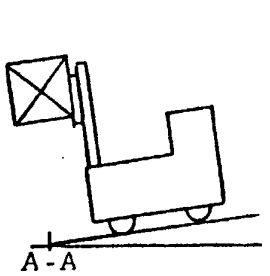
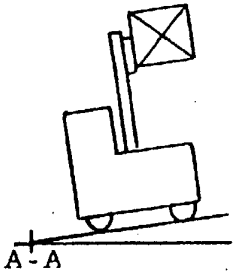
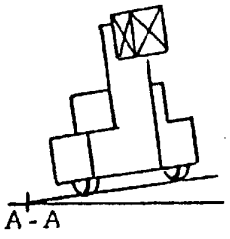
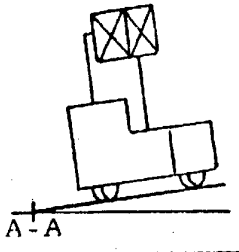
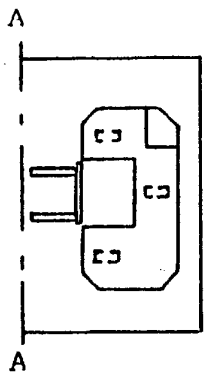
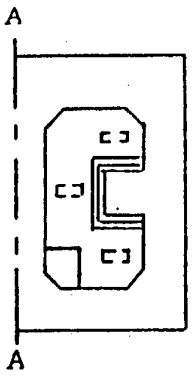
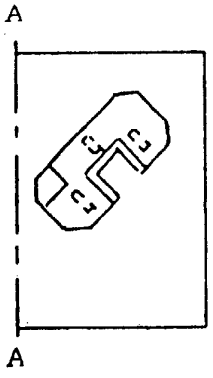
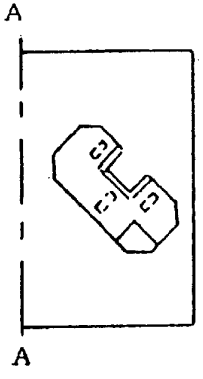
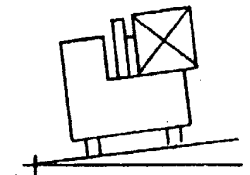
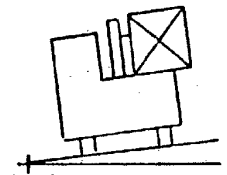
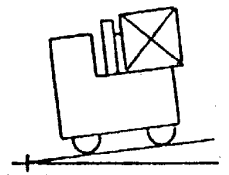
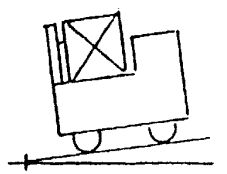
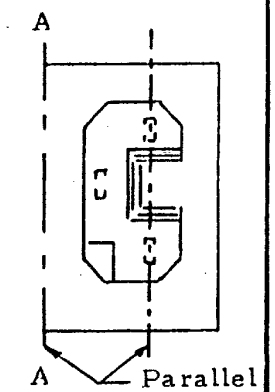
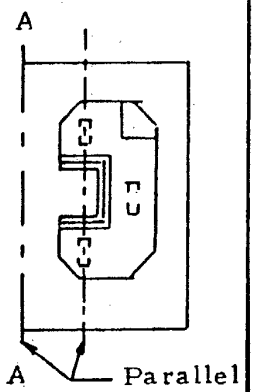
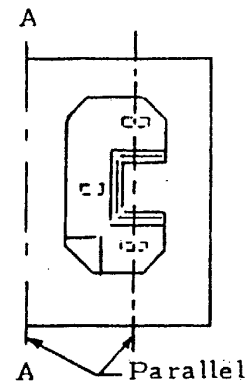
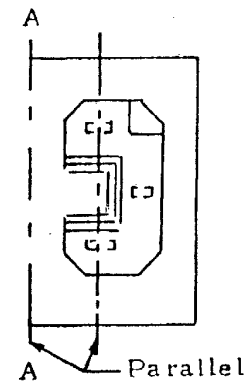
Test No.	1	2	3	4
Test	Longitudinal Stacking			
Operation	Crab			
Load	4000 Lbs. @ 24 In. L.C.			
Load Position	Extended	Retracted	Retracted	Retracted
Jacks	Down	Down	Down	Down
Lift Height	Maximum			
Slope (Degrees)	15	15	15	15
				
A-A = Platform Tilt Axis				

Fig. 1

TABLE OF TESTS

TRUCK, LIFT, FORK, ELECTRIC, SHIPBOARD,
MISSILE-CARRYING, SOLID RUBBER TIRES, 4000 LB. CAPACITY

Test No.	5	6	7	8
Test	Travel			
Operation	Transport		Crab	
Load	4000 Lbs. @ 24 In. L.C.			
Load Position	Retracted			
Jacks	Up			
Lift Height	Load on Deck			
Slope (Degrees)	15			
				
A-A = Platform Tilt Axis				

TEST METHOD NO. 5

RAIN TEST

1. Test Apparatus:

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

2. Test Procedure:

(a) Subject the truck to a simulated rainfall of not less that 4 inches (100mm) per hour. The simulated rainfall shall impinge on the truck at an angle of 45 degees plus or minus 5 degrees with a force equivalent to a 30 mph (48KM/HR) wind. The simulated rainfall shall dispense uniformly over the surface of the truck.

(b) Expose the top and left side of the truck to the rain described above for a period of 5 minutes.

(c) Repeat (b) with top and front exposed.

(d) Repeat (b) with top and right side exposed.

(e) Repeat (b) with top and rear exposed.

(f) Examine all instruments and electric controls for evidence of moisture.

(g) Demonstrate operation of the truck.

TEST METHOD NO. 6

TEMPERATURE STABILIZATION

1. Test Course:

   (a) Shall be in acccordance with Figure 1.

2. Test Apparatus:

   (a) Thermocouple(s).
   (b) Pyrometer.
   (c) Oven.
   (d) Thermometer.

3. Test Procedure:

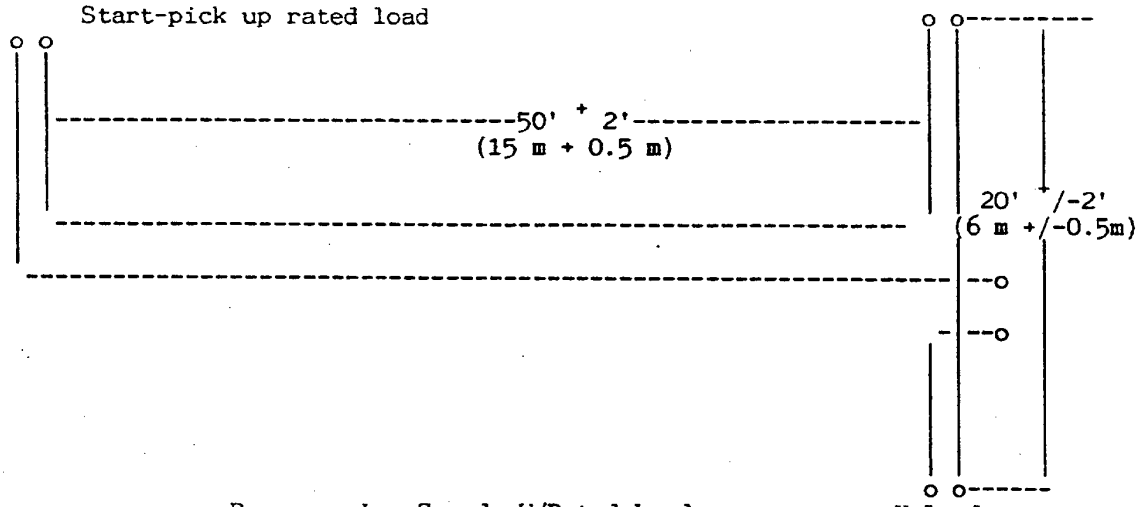
   (a) Remove thermal switches and place in oven. Slowly INCREASE temperature until switches open. Read and record temperatures at which thermal switches open.

   (b) Reinstall thermal switches on truck and install thermocouple(s) adjacent to thermal switches. Additional thermocouple shall be submerged in the hydraulic reservoir.

   (c) When required, place truck in facility where ambient temperature can be maintained.

   (d) Operate truck continuously at low speed over the test course. Read and record temperatures including ambient at intervals of not more than 15 minutes. Continue operation on test course until all critical temperatures stabilize for two consecutive readings.

FIGURE 1 (TEST METHOD NO. 6)



Reverse, Low Speed, W/Rated Load
Forward, Low Speed, W/Rated Load
Reverse, Low Speed, W/O Rated Load
Forward, Low Speed, W/O Rated Load

Note: On alternate laps, the load should be picked up where it was previously deposited and redeposited where it was previously picked up. The load shall be raised to full lift height before it is deposited.

TEST COURSE FOR ELECTRIC (SPARK ENCLOSED) FORK LIFT TRUCK

(MOTOR AND RESISTOR HOUSING HEAT STABILIZATION)

TEST METHOD NO. 7

HYDRAULIC SYSTEM CLEANLINESS

1. Test Apparatus:

   (a) Liquid Automatic Particle Counter.

2. Test Procedure:

   (a) When hydraulic line volume exceeds 1/2 the volume of the related cylinder, connect the hydraulic lines on the cylinders to bypass related components.

   (b) Run the pump pumping the oil through each circuit for not less than 5 minutes. Performing the particle count as described in (d) below.

   (c) Connect each line to its related component. Operate each previously bypassed function of the system for 5 minutes continuously through full stroke and at maximum rates. Perform the particle count as described in (d) below.

   (d) The procedure for determining contamination shall be as follows:

      (1) Contamination levels shall be determined by particle counts. The particle counter used for evaluation of the samples shall be Calibrated in accordance with ANSI Recommended Standard Method for Calibration of Liquid Automatic Particle Counter using "AC" Fine Test Dust (ANSI B93.28). The required counts shall be the average of not less than three consecutive counts. Samples may be taken from the reservoir or upstream of the filter(s) used for cleanup.

TEST METHOD NO. 8

HYDRAULIC FILTER

1. Test Apparatus:

(a) Pressure gages.
(b) Temperatures gages.
(c) Flowmeter.
(d) Timer.
(e) Oil conforming to MIL-L-2104, Grade 10.

2. Test Procedure:

(a) Filter housing proof test.

(1) Block housing outlet port. Pressurize the filter housing to 100 psi (689kpa) (30 psi (206kpa) for suction filters) minimum, and hold for not less than 60 seconds. Examine for leaks.

(b) Pressure drop.

(1) Install th filter with new element in the test stand or on the truck. Establish maximum system flow through the filter at an oil temperature of 150 degreees F (66 degrees C), plus or minus 5 degrees (2 degrees C). Measure and record the pressure drop across the filter assembly.

(c) Bypass valve pressure drop.

(1) Plug the filter element chamber oil exit or otherwise obstruct all flow though the filter element. Reinstall the housing in the test circuit with outlet port open. Establish and maintain the oil temperature at 150 degrees F (66 degrees C). Increase upstream pressure to 10 psi (69kpa) more than that determined in (b) above (1.75psi (12kpa) for suction filters). Observe contamination indicator. Increase upstream pressure until the indicator enters bypass area or bypass valve leakage exceeds 5 percent of maximum system flow, whichever occurs first. Observe and record pressure. Increase pressure until bypass is fully open. Establish maximum system flow. Observe and record pressure and flow.

(2) Use any combination of on-the-truck and off-the-truck filtration for cleanup.

(3) When bottle sampling is used, extract a sample for analysis from a turbulent point in the system with the pump running or within 2 minutes of shutdown. When dynamic sampling is used, connect the counter sensor to the system, using a bypass line and a branch line. The bypass line shall connect to the system, have a flow rate ot less than 5 times the sensor flow rate, and may return fluid directly to the reservoir. The branch line to the sensor shall be into the bypass line and shall be not more than 12 inches (305mm) in length. Any flow restriction devices shall be placed down-stream of the particle counter sensor. Particle counts should be allowed to stabilize before recording counts.

(e) Continue cleanup procedures as described in respective paragraphs above until the average of not less than three consecutive counts is less than 1000 particles per milliliter larger than 10 micrometers and less than 10 particles per millileter larger than 20 micrometers.

TEST METHOD NO. 9

CYLINDER PROOF

1. Test Apparatus:

   (a) Hydraulic test bench or the truck capable of developing two times system working pressure.
   (b) Pressure gage.
   (c) Thermocouple.

2. Test Procedure:

   (a) Double acting cylinder.

      (1) Position and mechanically hold the piston at the approximate midpoint of the cylinder.

      (2) Fill both sides of the piston with oil at a minimum of 120 degrees f (49 degrees C).

      (3) With the head end port capped, apply an oil pressure equal to 1.5 times the working pressure to the rod end of the piston for minimum of 60 seconds. Release pressure.

   (b) Single acting cylinder.

      (1) Extend cylinder to maximum extension by filling with oil at a minimum of 120 degrees f (49 degrees C).

      (2) Apply oil pressure equal to 1.5 times the working pressure at the inlet port for a minumum of 60 seconds. Release pressure.

TEST METHOD NO. 10

HYDRAULIC FITTINGS

1. Test Apparatus:

   (a) Common handtools.

2. Test Procedure:

   (a) Remove one hydraulic hose assembly which has permanent type fittings.

   (b) Replace the hose assembly with an equivalent field attachable fitting only to assure interchangeability.

   (c) Repeat (a) and (b) above until each hose assembly with permanent type fittings is replaced with a hose assembly with reuseable fittings.

   (d) After every hose assembly with permanent fittings has been replaced with a hose assembly with reuseable fittings, reinstall the original hose assemblies on the truck.

TEST METHOD NO. 11

ACCELERATION

1. Test Course:

   (a) Level, flat surface.

2. Test Apparatus:

   (a) Tape measure.
   (b) Stopwatch.

3. Test Procedure:

   (a) Operate truck 15 minutes prior to test.

   (b) Accelerate the truck in forward gear at maximum speed through the specified distance from a standing stop. Record time at end of required distance.

   (c) Repeat (b) for a total of six runs, three in each direction, except only time measurement is required.

   (d) Acceleration time shall be the average of six runs.

TEST METHOD NO. 12

SERVICE BRAKE, AND DEADMAN BRAKE

1. Test Course:

Level, clean, dry, concrete, having a coefficient of friction not less than .50.

2. Ramp Test Apparatus:

(a) Pedal force gage.
(b) Tension dynamometer.
(c) Block and tackle.

3. Test Procedure:

A. Brake Pressure Test.

(a) Attach the pressure gage to the brake pedal in a manner which enables pressure to be applied to the face of the gage.

(b) Apply 250 pound (112KG) pressure to the brake pedal, hold for one minute and release. Repeat this operation 10 times.

(c) Inspect for component failure.

B. Service Brake.

(a) Drive truck forward with load on 15 degree ramp apply service brake and hold for one minute. Observe to insure truck remains stationary. Drive truck forward and apply again repeat procedure five times.

(b) Repeat step (a) but in the reverse direction.

(c) Drive truck forward with load on 15 degree ramp and apply deadman brake and hold for one minute. Observe to insure truck remains stationary. Safety chains may be used for this test. Repeat procedure five times.

(d) Repeat step (c) but in the reverse direction.

(e) Repeat steps (a) through (c) without load.

TEST METHOD NO. 13

SPEED

1. Test Course:

   (a) Test course shall be a dry, level surface of sufficient length to attain maximum speed prior to entering measured distance, plus measured distance, plus sufficient stopping distance.

2. Test Apparatus:

   (a) Tape measure.
   (b) Stopwatch or electronic timer.

3. Test Procedure:

   (a) Operate the truck with fully charged battery with rated load in carry position 15 minutes prior to test.

   (b) Drive the truck a sufficient distance to attain maximum speed prior to entering the measured test course.

   (c) Record length of measured distance and time to traverse measured distance. Measured distance shall be equal to or greater than 44 feet (14 m).

   (d) Repeat for a total of six runs, in forward gear, three in each direction, except only time measurement is required.

   (e) Repeat total of six runs in reverse gear, three in each direction, except only time measurement is required. Trvel speeds in forward and reverse shall be the average of the six runs in the corresponding runs.

TEST METHOD NO. 14

SLOPE ASCENSION - PARKING BRAKE

1. Test Course:

(a) Ramp

2. Test Apparatus:

(a) Clinometer.
(b) Spring scale.

3. Test Procedure:

(a) Drive truck forward with rated load up a 15 degree ramp, stop and reverse and drive down ramp. Repeat (5) times changing the angle of ascension and descension each time.

(b) Apply parking brake and using the spring scale measure force required at end of the operating lever.

(c) Release service brakes and observe whether truck remains stationary.

(d) Release parking brake and start from a standstill, and descend ramp.

(e) Repeat steps 3(a) through 3(d) without load.

TEST METHOD NO. 15

UPRIGHT TILT

1. Test Course:

   (a) Level, flat surface.

2. Test Apparatus:

   (a) Clinometer.

3. Test Procedure:

   (a) Tilt.

      (1) Place truck without load on flat level surfce, using clinometer to insure truck is level.

      (2) Raise forks to an elevation of 2 feet (610mm) above the surface, tilt boom as far forwarded as possible, and record angle of tilt shown on clinometer located on front surface of outer mast channel.

      (3) Tilt boom as far rearward as possible and record angle of tilt on clinometer located on front surface of outer mast channel.

TEST METHOD NO. 16

LIFTING SPEED - LOWERING SPEED

1. Test Apparatus:

   (a) Tape measure.
   (b) Stopwatch

2. Test Procedure:

   (a) Measure and record distance in inches from floor to top surface of forks in full lowered position.

   (b) With battery fully charged record time in seconds required to raise rated load to maximum fork height using timing device. Record the difference between maximum fork height and the height of the forks in the lowered position.

   (c) Record time to lower rated load at maximum speed (full open valve) to 3- to 4-foot (910 to 1220 mm) height. Load to be abruptly stopped at at the 3- to 4-foot (910 to 1220 mm) height.

   (d) Repeat steps (b) and (c) a minimum of 20* times, except no measurements are required.

   (e) Remove load and raise empty forks to maximum fork height.

   (f) Record time in seconds required to lower forks to lowerd position.

* During quality conformance test repeat steps (b) and (c) only 3 times.

TEST METHOD NO. 17

MAXIMUM FORK HEIGHT

COLLAPSED MAST HEIGHT

1. Test Course:

   (a) Level, flat surface

2. Test Apparatus:

   (a) Tape measure.
   (b) Plumb bob.
   (c) Liquid level or clinometer.

3. Test Procudure:

   (a) Measure the true vertical distance from floor to uppermost projection of the upright assembly with mast in true vertical position as determined by a clinometer. (This is the actual collapsed mast height).

   (b) Adjust rated load to 12 inches, (305 mm) plus or minus 4 inches, (102 mm) above ground level and postition mast in true vertical position using clinometer and plumb bob.

   (c) Attach the plumb bob to the theoretical intersection of the front surface and top surface of the forks and mark a reference point on the ground.

   (d) Elevate the test load to the maximum height and check the reference point. If necessary, reposition the mast so that the plumb bob is directly over the original reference point.

   (e) Measure and record the true vertical distance from floor to the top surface of the forks at the specified load center. (This is maximum fork height). Measure and record the true vertical distance from floor to the top of the mast. (This is maximum mast height).

TEST METHOD 18

LIFTING AND TIEDOWN ATTACHMENTS

A. Lifting Attachments

1. Test Procedure:

(a) Lift the truck with battery and hold in suspension in normal transport position using slings that converge not more than 24 feet (7.3m) above the lowest extremity of the truck. Measure clearance between each sling and the truck. Measure eye openings and clearance dimensions of the attachment. Measure pull on each attachment.

(b) Restrain the truck by anchoring the main frame and subject each attachment to a pull of 2-1/2 times the load it carried when initially suspended. This pull shall be applied in the direction as determined in (a) above.

(c) An alternative method of test is to lift the truck with battery as in (a) above and add weights to the main frame until the force is 2-1/2 times the initial force on each attachment. Hold each load for a minimum of 90 seconds.

B. Tiedown Attachments

2. Test Procedure:

(a) Inspect that tiedown attachments are so located that tiedown legs will fall within a 45 degree working cone.

(b) With the truck anchored by means other than the tiedown attachments, subject each attachment to the load specified below.

(c) Each tiedown eye shall withstand without yeilding, its proportion of the following loads: 4.0 times the maximum weight of truck and battery in the direction of the longitudinal axis of the equipment, 2.25 times in the direction of the verticle axis, and 1.5 times in the direction of the lateral axis. The loads shall be applied in each direction of the axis and shall be distributed proportionally only among the tiedown eyes which would effectively resist motion if the combined directional load was applied through the center of gravity of the equipment. The test loads shall be applied for not less than 3.0 seconds and not more than 6.0 seconds.

(d) Breakage or deformation of the tiedown such that it can no longer withstand the required loads or failure to conform to 3.7.7.1.2 shall constitute failure of the test. Local deformation in the tiedown and nearby vicinity does not constitute failure of the test.

TEST METHOD NO. 19

MAINTAINABILITY

1. Test Course:

Shop area of sufficient size to permit unobstructed surveillance of maintenance.

2. Test Apparatus:

(a) Common handtools.
(b) Special tools (if furnished with truck).

3. Test Procedure:

(a) Examine truck for accessibility of major assemblies.

(b) Examine position of drains with respect to accessibility.

(c) Using the tools, demonstrate that major assemblies are accessible for repair and maintenance.

(d) Demonstrate both the accessibility of drains and the path of discharge of lubricants by activating drainage controls.

(e) Perform and time each operation on the maintenance operations list (see 3.6).

TEST METHOD NO. 20

OVERHEAD SAFETY GUARD

1. Test Apparatus:

(a) Tape measure.
(b) 100 pound (45KG) solid hardwood core (or equivalent) test weight.
(c) 500 pound (225KG) high density cube (when a high density overhead safety guard is specified).

2. Test Procedure:

(a) Place truck on level surface.

(b) Examine safety guard and take measurements from a suitable reference point to various points on the bars or tubings in order to determine the amount of deflection at conclusion of test.

(c) Place or hold 100 pound (45KG) test weight 5 feet (1520mm) above the safety guard so that it will drop vertically on the safety guard between the supporting side rails of the guard. The test weight shall be positioned so that it will drop flat on the bars or tubes and not edgewise.

(d) Release test weight.

(e) Repeat steps (c) and (d) selecting points at random on safety guard upon which test weight is to be dropped a total of 10 times.

(f) At conclusion of drops, examine the overhead safety guard for fractures, permanent deformation in excess of allowable deflection.

(g) Apply static test load on the applicable specification sheet to overhead guard and observe whether guard has sufficient strength to withstand applied load(s).

The following tests are required when a high strength overhead guard is specified.

(h) See (a) & (b) above.

(i) Place or hold 500 pound (225KG) test weight 8 feet (2440mm) above the safety guard so that it will drop vertically on the safety guard between the supporting side rails of the guard. The test weight shall be positioned so that it will drop flat on the bars or tubes and not edgewise.

(k) See (d), (e) and (f) above.

TEST METHOD NO. 21

WEIGHING DEVICE

1. Test Area:

   (a) Level, flat surface.

2. Test Apparatus:

   (a) Test load.

3. Test Procedure:

   (a) With the truck at rest on a smooth, level surface and with the mast vertical, the unloaded forks shall be elevated to a height of 20 - 24 inches (510-610mm). By use of the control valve, the forks and carriage shall be dropped 1 to 4 inches (25 to 100mm) and abruptly stopped.

   (b) Repeat (a) four times.

   (c) Adjust tare to show zero load where readout most consistently came to rest during (b) within approximately the first ten seconds and mark the zero position.

   (d) With the truck at rest on a smooth level surface and with the mast vertical the forks shall elevate a calibrated load equal to the rated capacity of the truck plus zero, minus 1-percent to a height of 20 - 24 inches (510-610mm) and through the control valve the load shall be dropped from 1 to 4 inches (25 to 100mm) and then stopped abruptly.

   (e) Repeat (d) four times.

   (f) Failure of the weighing device to weigh the calibrated load during (e) within the required accuracy shall be cause for rejection.

   (g) With the truck at rest on a smooth level surface, mast vertical, forks 20 inches (510mm) above the suface, a calibrated load equal to 150 percent of the truck rated capacity shall be placed on the forks.

   (h) Remove the load and repeat the weight accuracy test procedure prescribed in (g).

   (i) Failure of the weighing device to weigh the calibrated load within the required accuracy and repeatability shall be cause for rejection.

TEST METHOD NO. 22

BATTERY PROTECTOR

1. Test Apparatus:

   (a) Potentiometer

2. Test Procedure:

   (a) Verify with a potentiometer that battery voltage is 2.12 volts times the number of cells and that the signal light or fuel gauge indicates "full charge". Operate the lift control.

   (b) Increase the value of potentiometer resistance observing voltage across the battery protector voltage terminal to 1.7 volts per cell and after one half hour observe that the warning light indicating "low state of discharge" has been activiated. After a short interval of time (not to exceed 15 minutes) operate lift control and confirm lift will not operate.

   (c) Unplug and replug the battery and verify the lift control will not operate. Increase the voltage with the potentiometer to 2.06 volts per cell and observe that the lift control with operate and warning lights are reset.

TEST METHOD NO. 23

STATIC DISCHARGE

1. Test Course:

   (a) Shop area.

2. Test Apparatus:

   (a) Test instrument detailed below.
   (b) Plywood
   (c) Small piece of brass or aluminum plate.

3. Test Procedure:

   (a) Place a piece of 1/8-inch (3mm) thick plywood under each tire in order to eliminate any conductivity between truck tires and floor.

   (b) Place a brass or aluminum plate, 1/8-inch (3mm) thick by 2-1/2 inch (63mm) minimum diameter, on the floor such that the conductive static discharge strap of truck rests on plate.

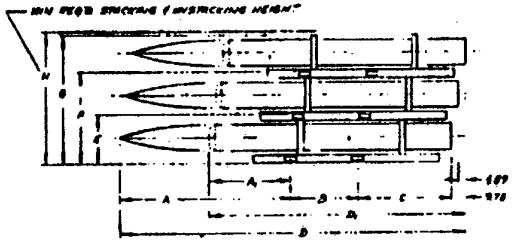
   (c) Connect one electrode of the test instrument detailed to the chassis of the truck.

   (d) Connect the other electrode of the test instrument to the brass or aluminum plate. This electrode shall consist of a spring clip that is clamped to the edge of the plate.

   (e) Confirmed resistance greater than 250,000 ohm shall be cause for rejection of static discharged device.

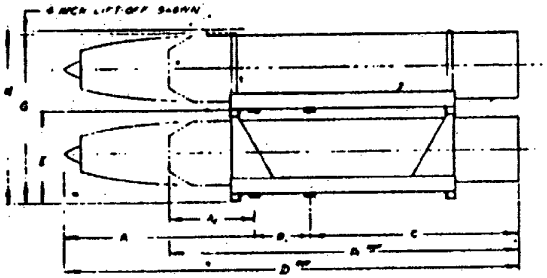
Note: Test instrument details:

The voltage applied by the testing instrument should be between 90 and 500 volts. Low voltage instruments may be used, but if the static discharge device shows more than the maximum resistance by tests with instruments of less than 500 volts, a test with a 500 volt instrument should be made to obtain confirmation. The instrument used should consist of two dry electrodes. One electrode should consist of spring clip for clamping to the aluminum or brass plate. The other electrode should be such as to provide a good electrical connection to some metallic portion of the truck chassis.



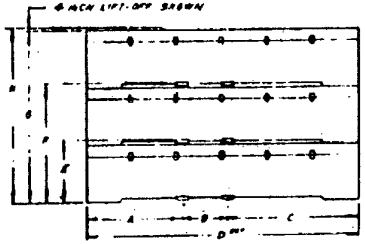
TARTAR STANDARD ER/TERRIER MISSILE & BOOSTER ON MK 12 CRADLE

NO SCALE



TALOS MISSILE ON MK 6 CRADLE / TALOS BOOSTER ON MK 7 CRADLE

NO SCALE



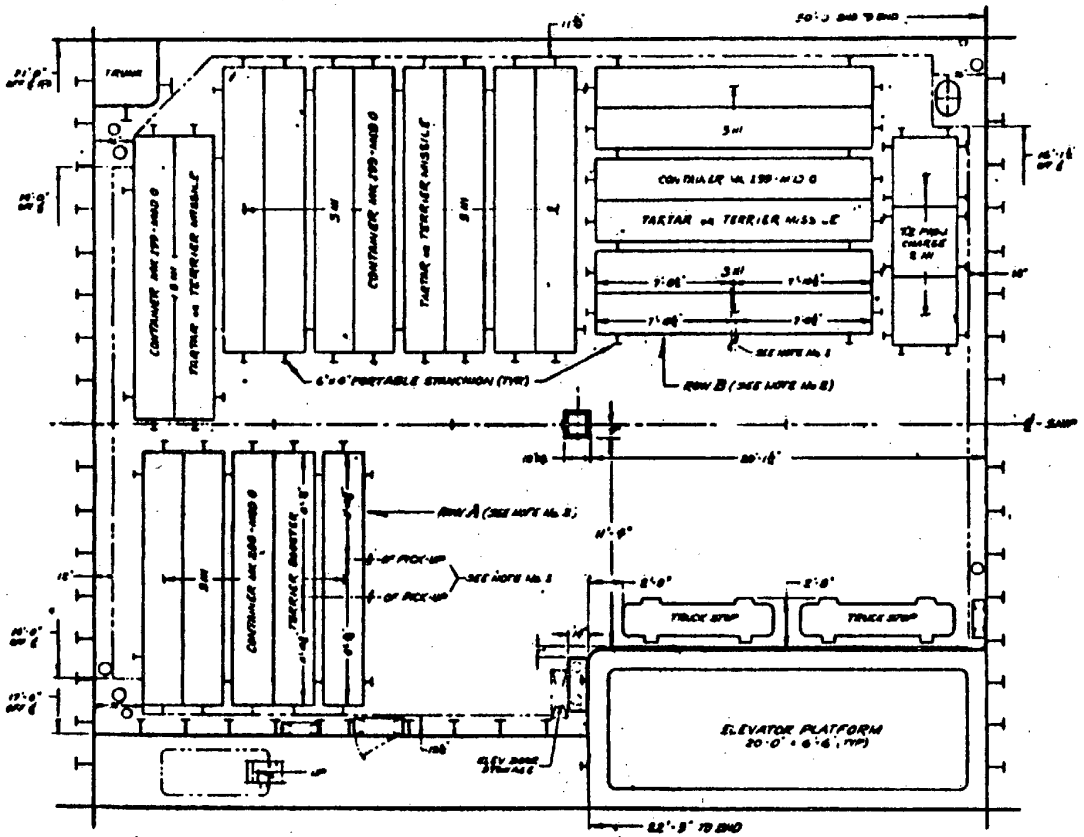
WEAPONS IN CONTAINERS

NO SCALE

WEAPONS STACKING CONFIGURATIONS CHART

WEAPONS	CRADLE / CONTAINER	SIZE & WEIGHT (1 MISSILE) LENGTH	WIDTH	HEIGHT	WEIGHT	WEAPON CONFIGURATION DIMENSIONS Dim A	Dim A_1	Dim B	Dim C	Dim D	Dim D_1	Dim E	Dim F	Dim G	Dim H
STANDARD ER TERRIER MISSILE	CRADLE MK 8	168.99	24.0	24.75	1893 #	11.09		33.5	37.75	175.1		27.795	31.875	71.97	74.9
STANDARD TERRIER BOOSTER	CRADLE MK 8	134.68	24.0	28.93	2020 #	32.89		39.5	66.84			46.48	27.795	58.648	76.76
STANDARD MR TARTAR BOOSTER	CRADLE MK 8	180.975	24.0	24.75	1516 #	38.96		38.9	81.795	190.75		27.795	31.875	71.97	73.9
TALOS MISSILE	CRADLE MK 6	256.1	41.0	42.0	3775 #	105.776		32.0	46.579	296.1		49.9		86.5	90.5
TALOS BOOSTER	CRADLE MK 7	132.1	41.0	42.0	4467 #		37.875	32.0	69.479		196.1	49.9		86.5	90.5
TERRIER MISSILE	CONTAINER MK 199	187.0	27.0	29.81	1965 #	76.8		39.875	79.679	187.0		33.91	68.62	87.98	91.98
TERRIER BOOSTER	CONTAINER MK 200	187.0	27.0	29.81	2450 #	52.625		34.0	78.375	147.0		33.91	62.62	81.98	91.98
TARTAR	CONTAINER MK 378	262.5	28.25	28.87	6930 #	100.79		36.0	71.19	201.9		33.875	61.78	84.685	90.685
ASROC	CONTAINER MK 189	196.8	28.79	32.8	1800 #	34.0		30.0	78.3	196.9		33.78	68.89	91.9	101.9
TORPEDO MK 46/46	CONTAINER MK 197	114.0	20.0	22.0	550 #	61.812		31.0	61.938	114.0		25.9	37.89	63.06	69.06

FIGURE 1

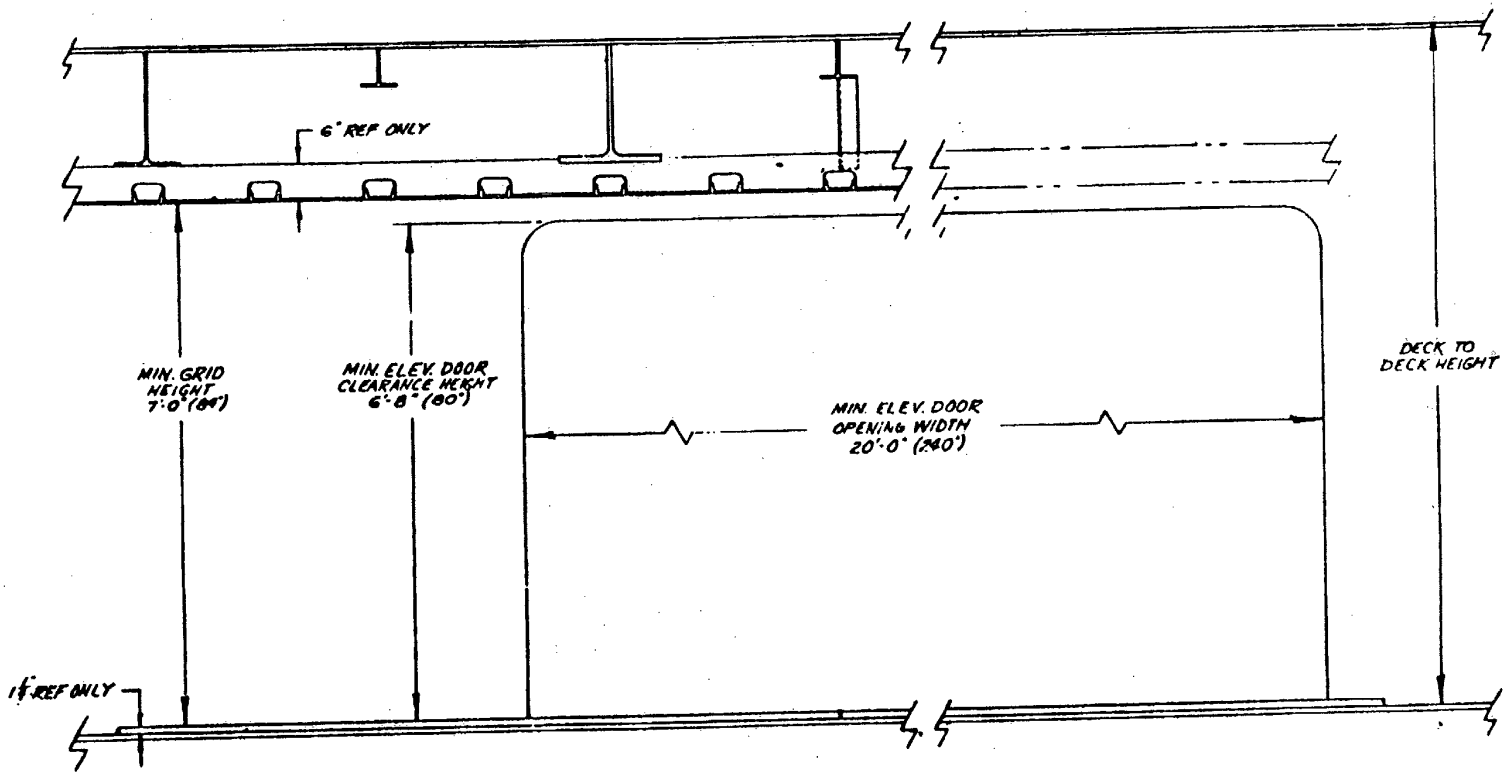


PLAN VIEW
TYPICAL CARGO WEAPONS SPACE
SCALE: 3/8"=1'0"

NOTES:

1. CONSIDER THAT THE LOAD CENTER OF EACH MISSILE CONTAINER ALTERNATES WITH EACH ONE REMOVED, SINCE THE MISSILES MAY BE ORIENTED IN EITHER DIRECTION.
2. WEAPON ROWS 'A' AND 'B' MUST HAVE THE CAPABILITY OF BEING EITHER COMPLETELY REMOVED INDEPENDENTLY OR BY ALTERNATING THE REMOVAL OF EACH CONTAINER FROM FIRST ONE ROW AND THEN THE OTHER.

FIGURE 2



TYPICAL ELEVATION
AUXILIARY SHIP'S CARGO WEAPONS SPACE

SCALE: 1" = 1'-0"

FIGURE 3

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