

INCH-POUND

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SUPERSEDING  
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## PERFORMANCE SPECIFICATION

### TRUCK, FORKLIFT, 4,000 POUND CAPACITY, VARIABLE REACH, ROUGH TERRAIN

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

#### 1. SCOPE

1.1 Scope. This document covers a variable reach (see 6.3.5), rough terrain (see 6.3.6) forklift truck with a 4,000 pound lift capacity at a reach of 23.5 feet.

#### 2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements documents cited in section 3 and 4 of this specification, whether or not they are listed.

#### 2.2 Government documents.

2.2.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the applicable issue of these documents are those listed in the specific issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2.b).

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use improving this document should be addressed to: WR-ALC/LVR, 225 Ocmulgee Court, Robins AFB GA 31098-1647, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation (see 6.2.b).

## SPECIFICATIONS

### FEDERAL

A-A-52557 - Fuel Oil, Diesel; For Posts, Camps and Stations

(Unless otherwise indicated, copies of the above specifications, standards, and handbooks are available from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, Philadelphia, PA 19111-5094.)

2.3 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DoD adopted are those listed in the issue of the DoD Index of Specifications and Standards (DoDISS) cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DoDISS are the issues of the documents cited in the solicitation (see 6.2.b).

### AMERICAN SOCIETY OF MECHANICAL ENGINEERS (ASME)

ASME B56.6 - Safety Standard for Rough Terrain Forklift Trucks

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

### ELECTRONIC INDUSTRIES ASSOCIATION (EIA)

IS-647 - Requirements for the Control of Electromagnetic Interference Emissions and Susceptibility Characteristics of Equipment Intended to Operate in Severe Electromagnetic Environments  
IS-648 - Measurement of Electromagnetic Interference Characteristics of Equipment Intended to Operate in Severe Electromagnetic Environments

(Application for copies should be addressed to Electronic Industries Association, Engineering Department, 2500 Wilson Boulevard, Arlington, VA 22201.)

### SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

SAE J98 - Personnel Protection for General Purpose Industrial Machines  
SAE J185 - Construction and Industrial Equipment, Access Systems for  
SAE J386 - Operator Restraint System for Off-Road Work Machines  
SAE J833 - Human Physical Dimensions

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SAE J898	-	Control Locations for Off-Road Work Machines
SAE J925	-	Minimum Service Dimensions for Off-Road Machines
SAE J994	-	Alarm, Backup, Electric Performance Test and Application
SAE J1040	-	Performance Criteria for Rollover Protective Structure (ROPS) for Construction, Earth Moving, Forestry, and Mining Machines
SAE J1511	-	Steering for Off-road, Rubber-Tired Machines

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

#### THE TIRE AND RIM ASSOCIATION, INC. (TRA)

##### The Tire and Rim Association Yearbook

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

2.4 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

### 3. REQUIREMENTS.

3.1 First article. When specified (see 6.2.d), a sample shall be subjected to first article inspection in accordance with 4.2.

#### 3.2 Materials.

3.2.1 Recycled, recovered, or environmentally preferable materials. Recycled, recovered, or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the operational and maintenance requirements, and promotes economically advantageous life cycle costs.

3.2.2 Dissimilar metals. Unless suitably protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other.

3.3 Operating environment. The engine shall start within 5 minutes at any ambient temperature between  $-25^{\circ}\text{F}$  and  $+125^{\circ}\text{F}$  without any form of engine or other component preheating. The truck shall operate as specified herein within 15 minutes after engine start in any ambient temperature from  $-40^{\circ}\text{F}$  to  $+125^{\circ}\text{F}$ . Equipment shall be provided to maintain the cab temperature at a minimum of  $+40^{\circ}\text{F}$ . Equipment shall be provided to maintain the windshield clear of ice and snow without the operator leaving the cab.

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3.4 Winterization. When specified (see 6.2.e), the truck shall be furnished with type A or type C winterization. Measures to achieve operation at the temperatures specified for each type of winterization may include but shall not be limited to coolant heater, engine oil heater, heavy duty battery, battery heater, thermal insulation in cab, glow plugs, measured shot ether injection, air dryer (air brake system only), and arctic type lubricants. If the use of engine coolant, engine oil or battery heaters is elected for winterization, then all heaters shall operate on 110 volt, alternating current. A three wire, 25 foot long cable of adequate capacity for all heaters being used simultaneously shall be provided. If heaters are used, a means to control output level shall be provided to ensure that the temperature of engine coolant and/or engine oil does not exceed +150° F, and battery electrolyte temperature does not exceed +80° F.

3.4.1 Type A winterization. Type A winterization shall allow the truck to start and operate in an ambient temperature of -65° F, and maintain the operator's cab at an internal temperature of at least +40° F.

3.4.2 Type C winterization. Type C winterization shall allow the truck to start and operate in an ambient temperature of -25° F, and maintain the operator's cab at an internal temperature of at least +40° F.

3.5 Human factors. The truck shall be operable and maintainable by personnel ranging from a small person normally clothed through a large person arctic clothed in accordance with SAE J833, SAE J898 and SAE J925. This shall include all travel, load motion, and steering controls, entry to the operator's seat, and access to all fluid level check points. To accommodate operation by small persons, the force on the service brake necessary to meet the requirements of 3.37.17 shall not exceed 80 pounds. The force required to fully set the parking brake (see 3.37.18) shall not exceed 70 pounds if hand operated or 150 pounds if foot activated.

3.6 Safety. The truck shall conform to the applicable requirements of ASME B56.6, SAE J98, and OSHA standards in effect at the time of issue of the solicitation.

3.6.1 Seat belts and operator's restraint. An operator restraint system conforming to SAE J386 shall be installed.

3.6.2 Backup alarm. When specified (see 6.2.f), a backup alarm conforming to SAE J994, type A, B or C shall be furnished.

3.7 Rated load capacity. The truck shall be designed for safe operation with the rated load at all lift heights, boom extensions, fork tilt and fork positions that the truck is capable of achieving. The rated load capacity shall be 4,000 pounds with the load center of gravity 23.5 feet forward of the foremost point of the truck (excluding the boom and forks). For rating purposes, the load shall be considered to be a four-foot cube with the center of gravity at the geometric center of the cube. Because of certain ordnance loads encountered in operational use, the truck shall be designed and manufactured to meet specific stringent structural load-bearing safety margins. A

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structural safety factor (based on yield strength) of at least 3.0 times the rated load, or the maximum dynamic load multiplied by 2, whichever is greater, shall be met (see 6.4).

3.8 Engine. The truck shall be powered by a standard commercial diesel engine. Horsepower and torque shall be sufficient to provide the performance specified herein. The engine shall operate on diesel fuel conforming to A-A-52557 and JP-8 (see 6.6) without detrimental effect on the engine, or its performance.

3.8.1 Engine exhaust. The exhaust system shall incorporate a muffler, and shall terminate at a location clear of the operator's station. The outlet shall not be directed toward the ground and the system shall be protected from damage which could result from traversing rough terrain (see 6.3.6). A means to prevent rain water intrusion into the exhaust system shall be furnished.

3.9 Fuel system. The truck shall be capable of continuous operation for a minimum of eight hours without refueling. The fuel tank filler neck opening shall be capable of interfacing with a fuel filler tube with an outside diameter of 2.90 inches. The fuel tank shall be capable of being fully drained to allow the truck to be air transportable.

3.10 Powertrain.

3.10.1 Transmission. The transmission shall provide at least two forward and two reverse speeds. Selective forward and reverse directional controls activated by the operator's foot are not acceptable. A manually shifted transmission or clutch is not acceptable. The transmission shall provide for positive inching or declutch control throughout the entire engine rpm range, in both forward and reverse directions. The inching or declutch control shall permit lifting of rated load, at maximum engine speed, while the transmission is in a forward or reverse gear, with no vehicle motion.

3.10.2 Axles. The front and rear axles shall be rated at a capacity equal to or greater than the maximum load each axle will be subjected to. The front axle (the axle in front of the operator) shall ensure that power is transmitted to the wheel having traction when the opposite wheel is off the ground. If an operator-controlled locking type is used, a means to inform the operator that the front axle is locked shall be provided.

3.11 Electrical system.

3.11.1 Starter switch. The starter switch shall not activate the engine starter while the engine is running, nor at any time when the engine is not running and the transmission is in any forward or reverse gear.

3.11.2 Lighting. The truck shall have sufficient exterior illumination to be operated at night in both forward and rearward modes. Instrument panel lighting shall be provided.

3.11.3 Batteries. Except when Type A winterization is specified (see 6.2.e), the batteries shall be the maintenance-free type.

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3.11.4 Master switch. A keyless master switch, with a corrosion resistant identification plate, shall be installed in a convenient location making it possible to disconnect the battery from all electrical loads during the performance of maintenance actions.

3.11.5 Wiring schematic. A corrosion resistant plate containing the electrical schematic of the forklift truck shall be installed in an area where normal usage will cause it no damage. The plate may be located behind a panel that can be opened by hand.

3.12 Hydraulic system. If the truck design incorporates a hydraulic system, the requirements of 3.12.1 and 3.12.2 shall apply.

3.12.1 Hydraulic reservoir. The hydraulic reservoir filler opening shall be capable of interfacing with a filler tube with an outside diameter of 1.94 inches.

3.12.2 Hydraulic schematic. A corrosion resistant plate containing the hydraulic schematic of the truck shall be permanently installed in an area where normal usage will cause it no damage. The plate may be located behind a panel that can be opened by hand.

3.13 Lift system. Because of certain loads encountered in operational use, the truck shall be designed and manufactured to meet specific stringent lift system safety margins and shall be equipped with a fail-safe lift system which maintains safe control of the rated load if electrical, hydraulic or pneumatic system failure occurs. To prevent damage to military weapons during lifting and lowering operations, drift in the lift system components shall be limited to a maximum drift rate of 0.5 inch per hour (see 6.4).

3.14 Fork assembly. To successfully interface with military pallets and shipping containers, the fork assembly shall have the following dimensions and restrictions:

- a. Length of forks: 48.0 plus or minus 0.5 inches.
- b. Width of forks: 4.5 inches maximum.
- c. Thickness of forks: 2.56 inches maximum.
- d. Taper: Taper shall begin 18 to 24 inches from tip and continue to a final thickness of 0.75 inches at the tip.

3.15 Fork carriage. The fork carriage shall have a maximum width of 40 inches.

3.15.1 Frame or carriage oscillation. The forks, in relation to the ground, shall be capable of oscillating (tilting laterally) at least 6 degrees above and below the horizontal ( total oscillation of 12 degrees). This may be accomplished either by oscillating the frame of the truck, or by oscillating the carriage. The oscillation control shall be within reach of the seated operator.



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3.16 Boom assembly. The boom shall provide fore and aft (horizontal) extension and retraction, and tilting movement for raising and lowering the fork carriage. The maximum angle that the boom can be tilted, with rated load on the forks, shall be limited to 45 degrees. The truck shall be capable of meeting all requirements of this document with this limitation.

3.17 Load backrest. An easily removable load backrest shall be furnished. The backrest shall be capable of supporting loads as high as 34.0 inches, but shall not extend more than 35.0 inches above the top surface of the forks. The backrest shall be the same width as the carriage. The backrest shall be capable of being removed or installed within five minutes, by two people without tools. Provisions shall be provided for stowing the backrest on the truck. The backrest shall have two rings, holes or other devices, that are capable of accepting a hook with a maximum dimension of 2.0 inches. The maximum thickness of the device, to allow hooks of the chain to fasten to the device, shall be 0.63 inch. The centerline of the devices shall be located on the load backrest 30.0 (+ or - 2.0) inches above the load carrying surfaces of the forks. The devices shall have a structural safety factor of at least 3 to 1 when a forward horizontal load, equal to the rated load, is equally applied to both devices.

3.18 Load handling controls. All load motion controls shall be controlled by the operator's right hand and shall be self-centering, such that they return to the neutral position when released.

3.19 Cab. The truck shall be equipped with an enclosed cab that shall incorporate falling object protective structure (FOPS) as specified in ASME B56.6, roll over protective structure (ROPS) requirements as specified in SAE J1040, and emergency exit requirements conforming to SAE J185. If the cab must be disassembled for removal, the heaviest section shall not weigh more than 70 pounds. Any electrical connection(s) that must be separated for cab removal shall be the quick-disconnect type.

3.19.1 Cab lifting device. If the cab must be removed for air-transport, and the cab is removed as a whole unit, a cab lifting device shall be provided. Provisions for securely storing the lifting device on the truck when not in use shall be provided.

3.20 Slope operation. The truck, with and without rated load in the carry position, shall be capable of being driven in at maximum steering angle, full circle operation, in both directions, on a 20 percent slope without any wheel leaving the ground.

3.21 Parking brake. A parking brake independent from the service brakes shall be provided.

3.21.1 Parking brake indicator. An indicator light that illuminates when the parking brake is applied shall be provided.

3.22 Horn. A horn or similar means of giving emergency warning to pedestrians or drivers of other vehicles shall be provided.

3.23 Steering. If power assisted steering is necessary to comply with the requirements of 3.5, it shall meet emergency steering requirements as specified in SAE J1511.

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3.24 Towing hitch. A pintle-type towing hitch shall be installed at the center rear of the truck. The center of the hitch opening shall be positioned to accommodate loads with their towing ring approximately two feet above the ground. The pintle shall be capable of sustaining a rearward, horizontal force of at least 3 times the gross vehicle weight (GVW) of the truck.

3.25 Towing lugs. Towing lugs of sufficient diameter to accept common chains and hooks of 3.0 inches diameter shall be furnished so that the truck can be towed from the front. The lugs shall be capable of sustaining a forward, horizontal force of at least three times the GVW of the truck.

3.26 Tires. The tires shall be pneumatic, with an off-road tread pattern. Tire loading shall not exceed the tire load limits specified in The Tire and Rim Association Yearbook when using the off-the-road 5 MPH tables.

3.27 Wheel guards. The truck shall be designed so that material is not thrown off the rotating tires onto cab windows or light assemblies. If wheel guards are used, each wheel guard shall be capable of supporting at least 300 pounds in any one square foot area without evidence of damage.

3.28 Preparation, primer and paint. All exterior surfaces and all interior surfaces normally painted shall be prepared and primed with procedures and materials compatible with the final paint. Unless otherwise specified (see 6.2g), the final paint shall be a standard, commercially available, polyurethane, color commonly known as "forest green".

3.28.1 Desert sand. When specified (see 6.2g), the final paint shall be a standard, commercially available, polyurethane, no-gloss tan color.

3.28.2 Gray. When specified (see 6.2g), the final paint shall be a standard, commercially available, polyurethane, light gray color.

3.28.3 Color of markings. Markings for green trucks shall be black paint, and desert sand trucks shall be white paint. Lusterless gray trucks shall have no markings. The following markings shall be applied in the indicated locations:

- a. Vehicle capacity ("4,000 POUNDS") on the lifting arms, mast, or front of truck.
- b. "NO RIDERS" on each side of truck.

3.29 Item identification. A corrosion resistant plate shall be permanently installed on the instrument panel, or another visible, protected location. The following information shall be on the plate:

Truck, Lift, Fork

Capacity: "4,000 pounds at reach of 23.5 feet"

National stock number:



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Contract number:  
Serial number:  
Model number:  
Registration number:  
Manufactured by:  
    Name:  
    Address:  
US Property:

3.30 Instruction plates. All warning and instruction plates describing safety items or procedures to be followed during operation and servicing shall be included.

3.31 Load Chart. A corrosion resistant plate, showing the load capacity of the truck at all boom extensions and lift heights shall be permanently installed in a location clearly visible to the operator.

3.32 Maintainability. Provisions shall be made for adjustment, servicing, or replacement of parts and components using common tools. Dimensions of hand or arm access openings shall be in accordance with SAE J925 for arctic clothing.

3.33 Servicing. All lubrication points and fluid reservoirs shall be easily accessible for inspection and servicing and shall be located in a manner such that servicing personnel exposure to injuries and burns to is minimized.

3.34 Air transportability. The forklift truck shall be air transportable in C-130, C-141, C-5 and C-17 aircraft (see 6.5).

3.34.1 Conversion to and from air transport mode. Conversion from operational mode (see 6.3.4) to air transport mode (see 6.3.1) shall not take more than 60 minutes. Conversion from air transport to operational mode shall take not more than 60 minutes. Conversion to or from the air transport mode shall be accomplished by no more than two persons equipped with only common hand tools. No other equipment or vehicle shall be required. Tire air pressure can not be reduced or increased from operational mode level when converting to or from air transport mode.

3.34.2 Operation in air transport mode. The operator must be able to drive the truck onto and off of C-130, C-141, C-5 and C-17 aircraft. This will require that the operator be at, or below, the height specified in 3.35.b and still be able to control the truck (see 6.5).

3.35 Weights and dimensions. Limiting weights and dimensions shall be as follows (see 6.5):

a. Maximum height in operational mode: 126 inches (to allow for C-130 aircraft tail clearance).

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b. Maximum height in air transport mode: 102 inches. (The C-130 rear cargo opening is 120 inches wide by 108 inches high. A six inch clearance is required for cargo entering the aircraft).

c. Maximum weight in air transport mode: 13,000 pounds on each axle.

3.36 Slings and tie downs. Permanently installed slinging and tiedown devices that enable the truck to be lifted in its normal travel position and to be secured to the load surface of a transportation medium shall be provided. The attachment points shall be designed to interface with aircraft attachment points through the use of MB-2 and CGU-3E cargo tie down chains (25,000 pound capacity), MB-1 and CGU-4E cargo tie down chains (10,000 pound capacity), and CGU-1B cargo straps (5,000 pound capacity) (see 6.5.1). The attachment points shall have a structural safety factor of 2.3 to 1, based on static load. The notation "LIFT HERE" or "TIE DOWN" shall be stenciled near each lifting and tie down device, in the color specified in 3.28.3. There shall be a permanently installed, corrosion resistant, metal plate that shows the center of gravity location in the air-transport mode, and tie down instructions in C-130 and C-141 aircraft.

3.37 Performance.

3.37.1 Lifting speed. The forks with rated load shall be able to raise at a speed of not less than 55 feet per minute (fpm) over the entire distance from ground level to maximum lift height. With the engine idling at engine manufacturer's idle speed, the unloaded forks shall be able to raise at a speed of not less than 5 fpm over the entire lift range.

3.37.2 Lowering speed. The lowering speed of the forks with rated load shall be not more than 80 fpm. The lowering speed of the unloaded forks shall be not less than 10 fpm.

3.37.3 Boom extension and retraction speeds. The truck shall be capable of extending the boom, with rated load, at maximum lift angle of the boom at a speed of not less than 55 feet per minute (fpm). It shall be capable of retracting the boom at maximum lift angle, from maximum boom extension to retracted boom position at a speed of not less than 55 feet per minute with no load, and not greater than 100 fpm with rated load on the forks. It shall also be capable of extending and retracting rated load when the boom is horizontal, from fully retracted position to maximum extension and from maximum extension to fully retracted position at a speed of not less than 55 fpm.

3.37.4 Travel speed. The travel speed with rated load shall be at least 15 miles per hour (mph) in forward direction, and not less than 7 mph in reverse.

3.37.5 Lift height. The truck shall be capable of raising the loaded forks to a height of at least 25 feet when measured from ground to top surfaces of horizontal forks.

3.37.6 Lowest fork position. With the load backrest at 6 feet forward reach, the top surface of the forks shall be capable of being positioned at least 6 inches below ground level.

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3.37.7 Horizontal reach. With the boom horizontal, it shall be capable of extending the vertical load bearing surface of the load backrest at least 21.5 feet forward of the forward-most portion of the truck.

3.37.8 Fork tilt. With no load on the forks, the minimum forward tilt (forks tips lowered) shall be 12 degrees from horizontal and the minimum rearward tilt (fork tips raised) shall be 12 degrees from horizontal. The forward tilt shall be with the boom retracted and at the maximum lift angle, and the rearward tilt shall be at the retracted carry position.

3.37.9 Constant tilt. The truck shall be capable of maintaining a constant fork tilt angle, within plus or minus two degrees, as the forks are raised (either empty, or loaded with any load up to and including the rated load) from ground level to maximum lift height and lowered back to ground level with no change to the tilt control lever position being necessary. The tilt angle setting at the initiation of fork motion shall be the reference point from which the four degree variation is determined, and can be any tilt angle the truck is capable of achieving, including the horizontal plane (0 degree tilt).

3.37.10 Fork position and sideshift. To allow for interfacing with loaded pallets, the forks shall be capable of spreading to at least 38.0 inches and closing to not more than 10.5 inches, when measured to the outside of the forks, and shall be capable of sideshifting at least 5.0 inches in either direction from centerline, for a total horizontal travel of 10 inches.

3.37.11 Fork visibility. The truck shall be configured to allow the visibility of at least one fork tip at any fork height, fork tilt, or fork spacing when there is no load on the forks.

3.37.12 Stability. The truck shall meet the longitudinal stability stacking, longitudinal stability travel, lateral stability stacking, and lateral stability travel stability requirements as specified in ASME B56.6.

3.37.13 Drift. The boom assembly shall be capable of holding the rated load at maximum lift angle and full boom extension for 60 minutes with not more than 0.5 inch of vertical drift, when the truck is stabilized at ambient temperature.

3.37.14 Ground clearance. When the truck is fully fueled and serviced, the ground clearance of the truck shall be not less than 12 inches with the rated load at retracted carry position. The truck, when empty or fully loaded, shall be able to go from a horizontal surface up a 25 degree ramp, to another horizontal surface with only the tires contacting the ramp.

3.37.15 Ceiling clearance. To unload stacked boxes from 20 foot ISO containers, the vertical distance from the top of the boom, or carriage (whichever is highest) to the lowest point on the forks, or carriage, (whichever is lowest) shall be not more than 30.0 inches. This dimension shall be with the backrest removed.

3.37.16 Turning diameter. The turning diameter shall be not more than 34.5 feet.

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3.37.17 Service brakes. The service brakes shall stop the truck with rated load, within the distance specified in the Stopping Distance Method of ASME B56.6, with not more than 80 pounds of force on the brake pedal (see 3.5). The service brakes shall meet the Drawbar Drag Method of ASME B56.6, except a drawbar drag equal to 25 percent of truck gross weight shall be produced with not more than 80 pounds of force on the brake pedal (see 3.5).

3.37.18 Parking brake. The parking brake shall be capable of holding the fully loaded truck, on a 20 percent grade, in both up and down slope directions. The force required to fully set the parking brake shall be not more than 70 pounds, if hand actuated, or 150 pounds if foot activated (see 3.5).

3.38 Electromagnetic interference (EMI). The truck shall meet the EMI requirements (emissions and susceptibility) as specified in EIA IS-647.

3.39 Noise limits. The sound level measured at the operator's station shall not exceed 94 dB(A). If the sound level is between 84 and 94 dB(A), see 6.2.h.

3.40 Workmanship. The truck shall be constructed in accordance with commonly accepted industrial workmanship standards.

#### 4. VERIFICATION

4.1 Classification of inspections. The inspections shall be classified as follows:

- a. First article inspection and demonstration (see 4.2).
- b. Conformance inspections (see 4.3)

4.2 First article inspection. The first article truck and its components shall be compared to Section 3 of this document to verify compliance through examination and testing in the order specified below.

4.2.1 First article examination. The first article truck shall be examined in accordance with 4.5.

4.2.2 Noise level. Measure noise level at operator's ear with the engine operating at maximum rpm and while lifting rated load. Nonconformance with 3.39 shall be cause for rejection. If noise level is between 84 and 94 dB(A), the noise warning plate required by 3.39 shall be on all trucks delivered on this contract.

4.2.3 Electromagnetic interference (EMI). Test the truck in accordance with EIA IS-648 to determine compliance with 3.38. Failure to meet the requirements of 3.38 shall be cause for rejection.

4.2.4 First article operational tests. Test the first article truck in accordance with 4.6.

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4.2.5 First article cold starting test. With all components of the truck stabilized at an ambient temperature of  $-25^{\circ}$  F, the engine shall start within five minutes without assistance from any external power source. Failure to start within five minutes shall be cause for rejection.

4.2.6 First article environmental tests. Operate the truck at  $-25^{\circ}$  for a minimum of twenty hours, then operate at  $+125^{\circ}$  for a second twenty hours using an approved test method (see 6.2.i). The truck shall be capable of operating at least eight hours a day for a cumulative total of 40 hours without failure. In the context of this paragraph, a failure is considered to be any malfunction that cannot be corrected within 30 minutes by adjustment, repair or replacement, which may cause cessation of operation, degradation of performance capabilities, damage to the truck by continued operation, or personnel safety hazard.

4.3 Conformance inspections. Conformance inspection shall include the examination described in 4.5 and the tests described in 4.6.

4.4 Requirements cross-reference matrix. Table I provides a cross-reference matrix of the section 3 requirements tested or verified in the paragraphs below.

4.5 Examination of product. The forklift truck shall be examined for compliance with requirements for materials, winterization, safety, seat belts, backup alarm, engine, engine exhaust, hydraulic system, fork backrest, fork assembly, carriage, boom, cab, battery, lighting, steering, load handling controls, towing hitch, towing lugs, tires, wheel guards, parking brake, horn, slinging and tie downs, master switch, wiring schematic, paint, weight, markings, identification, instruction plates, load charts, servicing, dimensions, roll over protective structure (ROPS), falling object protective structure (FOPS), and workmanship.

4.6 Operational tests.

4.6.1 Test conditions. Unless otherwise specified herein (see 6.2), inspections shall be performed in accordance with the following test conditions:

4.6.1.1 All tests shall be conducted at the ambient temperature and climatic conditions existing at the place of demonstration.

4.6.1.2 Only that maintenance established by the contractor shall be performed during testing.

4.6.1.3 For test purposes, the rated load for the truck shall be a 4,000 pound (+200, -0 pounds) cube, 48 inches on each side, with a center of gravity located at the geometric center of the cube.

4.6.2 Lifting and lowering speed. Measure distance from ground to top surface of forks in fully lowered position. Measure time required to raise rated load from ground to maximum lift height. Subtract distance from ground to top surface of forks from maximum lift height, and calculate lifting speed. Lower rated load, at maximum lowering speed (fully open lowering control) and abruptly stop the load at 1 to 2 foot height. Record this time. Measure distance from ground to

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top surface of one fork. Subtract this figure from the maximum lift height and calculate loaded lowering speed. Remove load and raise forks to maximum lift height. Measure time required to lower forks to ground level. Calculate the unloaded fork lowering speed. Nonconformance with 3.37.1 or 3.37.2 shall be cause for rejection.

TABLE I: Requirements cross-reference matrix

REQUIREMENT	VERIFICATION	REQUIREMENT	VERIFICATION
3.1	4.2	3.29	4.5
3.2.1	4.5	3.30	4.5
3.3	4.2.5, 4.2.6	3.31	4.5
3.4	4.5, 4.2.6	3.32	4.6.23
3.5	4.6.12, 4.6.13, 4.6.23, 4.2.6	3.33	4.5
3.6	4.5	3.34	4.6.22
3.7	4.6.18	3.34.1	4.6.21
3.8	4.5	3.34.2	4.6.22
3.9	4.2.6	3.35	4.5, 4.6.22
3.10	4.2.6	3.36	4.5
3.11.1	4.6.17	3.37.1	4.6.2
3.11.2	4.5	3.37.2	4.6.2
3.11.3	4.5	3.37.3	4.6.3
3.11.4	4.5	3.37.4	4.6.4
3.11.5	4.5	3.37.5	4.6.5
3.12	4.5	3.37.6	4.6.6
3.13	4.6.16, 4.6.19	3.37.7	4.6.7
3.14	4.5	3.37.8	4.6.8
3.15	4.5	3.37.9	4.6.9
3.16	4.5	3.37.10	4.6.10
3.17	4.6.24	3.37.11	4.6.14
3.18	4.5	3.37.12	4.6.15
3.19	4.5, 4.6.21	3.37.13	4.6.16
3.20	4.6.25	3.37.14	4.6.20
3.21	4.5	3.37.15	4.5
3.22	4.5	3.37.16	4.6.11
3.23	4.5	3.37.17	4.6.12
3.24	4.5	3.37.18	4.6.13
3.25	4.5	3.38	4.2.3
3.26	4.5	3.39	4.2.2
3.27	4.5	3.40	4.5
3.28	4.5		

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4.6.3 Boom extension and retraction speed. Determine distance boom travels from fully extended position to fully retracted position. With rated load on forks, measure the time from fully retracted to fully extended position with the boom horizontal and again at approximately 25 degrees. With rated load on forks, measure the time from fully extended to fully retracted position with the boom horizontal and again at approximately 25 degrees. Failure to meet the requirements of 3.37.3 shall be cause for rejection.

4.6.4 Travel speed. Operate the truck at maximum speed in both forward and reverse directions with rated load in load carry position (see 6.3.3). Inability to obtain the speeds specified in 3.37.4 shall be cause for rejection.

4.6.5 Maximum fork lift height. With rated load on the forks, with forks level and at their maximum lift height, measure from ground to top surface of one fork to determine maximum lift height. Nonconformance with 3.37.5 shall be cause for rejection.

4.6.6 Lowest fork position. Locate a level surface adjacent to a 12-inch minimum drop-off. Park the truck on the level surface so that the forks extend over the drop-off. Extend the boom approximately 6 feet from the fully retracted position and with the forks level, lower them to their lowest position. Measure the vertical distance from the top of the forks to the extension of the level surface. Nonconformance with 3.37.6 shall be cause for rejection.

4.6.7 Forward (horizontal) reach. Extend the horizontal boom fully forward, and with the forks level, measure the distance from the foremost point on the forklift truck to the vertical load backrest. If this dimension is less than as specified in 3.37.7 it shall be cause for rejection.

4.6.8 Fork tilt. On a level surface, retract boom fully, raise forks to maximum lift angle and tilt forks fully forward. Measure angle of tilt. Lower forks to carry position, keeping the boom fully retracted and tilt forks to full rearward position. Measure tilt angle. Nonconformance with 3.37.8 shall be cause for rejection.

4.6.9 Fork tine operation (constant tilt). Extend boom fully, position unloaded forks approximately 2 degrees above horizontal, and 2 to 5 inches above ground level. Measure fork tilt. Without touching the tilt control lever, raise forks to maximum fork height, then lower to original position. Verify that the forks maintain the same tilt, within the tolerances specified in 3.37.9 while being raised and lowered. Repeat with rated load on forks and forks at approximately 7 degrees rear tilt. Again verify that forks maintain the tolerance specified in 3.37.9 throughout total movement. Inability to maintain the fork tilt within tolerance specified in 3.37.9 while raising and lowering empty or loaded forks shall be cause for rejection.

4.6.10 Fork side shifting mechanism. The forks shall be side shifted with the rated load on the forks from extreme left to extreme right position and back to extreme left 50 times. The truck shall be capable of side shifting at least 5.0 inches off center, in both directions, throughout the fork spread specified in 3.37.10 to allow for interfacing with loaded 463L pallets. With no load on the forks, the forks shall be adjusted from their most closed position to most open position and then returned to most closed. This shall be considered one cycle. Repeat until 100 cycles have



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been completed. For both side shifting and fork spacing, any binding, erratic movements, inability to complete either test, failure of either system, or overheating of the side shift mechanism shall be cause for rejection.

4.6.11 Turning diameter. With rated load on forks, operate truck in low gear at engine idle speed on a dry, flat apron in a clockwise direction, at maximum steering angle. At least two complete circles should be made before taking any measurements. The path of the outside wheel is marked on the pavement by pouring water on the tire while making the complete circle. To determine turning diameter, measure from the midpoint of tire contact on the pavement to a similar point across the diameter of the trace. Repeat in counterclockwise direction. Nonconformance with 3.37.16 shall be cause for rejection.

4.6.12 Service brakes. Demonstrate that the service brakes can stop the truck with rated load, and can meet the drawbar drag test, as specified in 3.37.17. Failure to meet all requirements of 3.37.17 shall be cause for rejection.

4.6.13 Parking brake. Demonstrate that the parking brake can hold the truck, with rated load on the forks, in both forward and reverse directions, on the slope specified in 3.37.18, for at least 3 minutes. Measure the force required to apply the parking brake. Nonconformance with any requirement of 3.37.18 shall be cause for rejection.

4.6.14 Fork visibility. Position unloaded forks at various lift heights, tilts, and spacings to verify that the visibility requirements of 3.37.11 can be met. Failure to meet 3.37.11 shall be cause for rejection.

4.6.15 Stability. Conduct the "longitudinal stability stacking," "longitudinal stability travel," "lateral stability stacking," and "lateral stability travel" tilting platform tests of ASME B56.6. Failure to meet the minimum tilting requirements specified in ASME B56.6 shall be cause for rejection.

4.6.16 Drift. Raise rated load to maximum lift height, with truck at ambient temperature. Place forks in horizontal position and shut off engine. Measure from ground to top surface of one fork. Let truck sit for time specified in 3.37.13. Remeasure same distance to same point on fork. Nonconformance with 3.37.13 shall be cause for rejection.

4.6.17 Starter disconnect switch. Start the engine and let it run for at least 10 seconds. Energize the starter switch (move to "off" then "on" position if applicable) while the engine is running. Any evidence of starter engagement while the engine is running shall be cause for rejection. With the engine not running, place transmission selector in the lowest forward gear and energize the starter switch. Repeat for all forward and reverse gears. Any evidence of starter engagement while transmission is in any gear shall be cause for rejection.

4.6.18 Overload. Unless otherwise specified in the contract, these procedures will be accomplished only during first article testing. Perform a stress analysis of the truck to determine all critical stress points (see 6.3.2). The entire stress analysis is not necessary, just the location of

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the critical stress points, and the cause of these stresses; 3 times static (rated) load or 2 times maximum dynamic load. Apply strain gauges or other suitable instrumentation at all these critical stress points to measure stress during this test. Place truck on level surface and position supports under the frame or front axle to relieve load on front tires. Secure the rear of the truck to compensate for the additional test load. Fully extend boom, raise forks at least 24 inches above ground level with the forks centered on the carriage. For the test load use the greater of 3 times the static load of 3,000 pounds, or 2 times the maximum dynamic load, as determined in 3.7. Apply this test load to the forks. The center of gravity of the test load shall be located 24 inches forward of the front backrest surface. Let this overload remain on the forks for at least 10 minutes. Remove the load and inspect truck structure, frame, mast or boom assembly, and hydraulic system for deformation, cracks, broken welds, and hydraulic fluid leaks. Inspect forks a minimum of 6 inches on either side of heel by magnetic particle or dye penetrant method. Record readings from strain gauges and convert to, and record, the corresponding stresses. Deformation, cracks, broken welds, or hydraulic fluid leaks shall be cause for rejection

4.6.19 Fail safe hydraulic lift system. This test shall be accomplished when the lift system is hydraulically operated. Raise the rated load to maximum lift height with forks tilted back about five degrees. Measure vertical distance from ground to top surface of one fork. No personnel shall be under or in front of the load during the next step. Disconnect hydraulic line(s) that supply pressure to the lift system. Remeasure vertical distance from ground to same point on fork surface. A drop of more than 1.0 inch shall be cause for rejection. Measure fork tilt. Disconnect hydraulic line(s) that supply pressure to prevent forward tilting. Remeasure fork tilt. A change of more than 2.0 degrees of tilt shall be cause for rejection. Use the over-ride provided to lower rated load to ground.

4.6.20 Ground clearance. Place the fully serviced truck with rated load at load carry position (see 6.3.3) on a level surface. Measure the distance from the center point of tire contact with the ground on one side of the truck to the center point of contact on the other side. (NOTE: If front and rear wheels are different distances apart, select the pair that are farthest apart.) A distance of 25 percent of this measurement on either side of the centerline of the truck defines the zone for measuring ground clearance. Measure distance from ground to lowest point on the truck within this zone. Nonconformance with 3.37.14 shall be cause for rejection.

4.6.21 Conversion to and from air transport mode. With truck in operational mode, convert to air transport mode within the time frame and using only the personnel and equipment specified in 3.34.1. Verify that the cab can be removed (if necessary to meet air transport) and meet the requirements specified in 3.19. With the truck in air-transport mode, convert to operational mode within the time frame and using only the personnel and equipment specified in 3.34.1. Nonconformance with 3.34.1 or 3.19 shall be cause for rejection.

4.6.22 Air transportability verification. With the truck in the air transport mode, verify that it is air transportable in accordance with 3.34. Verify that the truck can be driven in the air transport mode in accordance with 3.34.2 and that it meets all dimension and weight limitations of 3.35. Inability to meet all of these requirements shall be cause for rejection.

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4.6.23 Maintainability. Test the truck in accordance with SAE J925 to determine compliance with 3.32.

4.6.24 Load backrest restraints. Apply a forward, horizontal force of 3.0 times rated load to load restraint devices for 10 minutes. The test load may be applied to all devices at once, or 3.0 times the proportional share of the load may be applied to each device. Remove load and inspect restraint devices, welds and supporting structure for deformation, cracks, broken welds, etc., which shall be cause for rejection.

4.6.25 Slope operation. Operate the truck at clockwise direction, full circle operation, with rated load, on a slope as specified in 3.20. Operate the same except in counterclockwise direction. Repeat full circle operation, in both directions, with no load on the forks. Any tire losing contact with the ground, or any unsafe operation shall be cause for rejection.

## 5. PACKAGING

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2.c). When actual packaging of materiel is to be performed by DoD personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by Inventory Control Point's packaging activity within the Military Department or Defense Agency, or within the Military Department's System Command. Packaging data retrieval is available from managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

## 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 truck should be used primarily to load and unload palletized cargo to and from 8 feet wide by 20 feet long ISO shipping containers (trailer mounted with the container doors 5 feet from the end of the trailer). It will also be used to handle loads of various sizes and weights, up to the rated load. The truck will operate on hard paved surfaces, soft soil, mud, snow, and sand, on level and hilly terrain.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of the specification.
- b. Issue of DoDISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1 and 2.3).
- c. Packaging requirements (see 5.1).

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- d. When first article is required (see 3.1).
- e. When type A or type C winterization is required (see 3.4).
- f. When a back up alarm is required (see 3.6.2)
- g. When final paint color should be other than forest green (see 3.28).
- h. If the sound level is between 84 and 94 dB(A), the contractor should provide a corrosion resistant hazardous noise warning plate stating that operator's hearing protection is required when operating the truck. The plate should have black lettering on a yellow background and located to be clearly visible as the operator enters the cab, or is seated at the controls (see 3.19).
- i. Proposed test method (see 4.6.6).

### 6.3 Definitions:

6.3.1 Air transport mode. The air transport mode should be the fully operational truck with only the following items removed, if necessary, to meet the air transportability requirements:

- a. Cab (see 3.19)
- b. Counterweight(s) (if required)
- c. Cab lifting device (see 3.19.1)

6.3.2 Critical Stress Point. A point, or area, where the stress is greater than 50% of the yield strength of the material, when the truck has the rated load (see 3.7 and 4.6.18) on the forks.

6.3.3 Load carry position. The carry position is defined as boom fully retracted, forks at maximum rear tilt, and heel of forks 24 inches above ground.

6.3.4 Operational mode. The operational mode should be as the truck is configured to meet the performance requirements of this document, including cab and counterweight(s) (if required).

6.3.5 Reach. The horizontal distance from the foremost point on the truck to the center of gravity of the load.

6.3.6 Rough terrain. Terrain covered in snow, or soft soil, or conditions of mud and sand in irregular, hilly terrain.

6.4 Nuclear certification. Refer to Air Force Instruction 91-103, Air Force Nuclear Safety Certification Program for detailed guidance.

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6.5 Air Transportability. Refer to Air Force Systems Command Design Handbook 1-11, Air Transportability for detailed guidance.

6.5.1 Tie down devices. Refer to MIL-T- 25959C, Tie Downs, Cargo, Aircraft, for interface information on the MB-1, MB-2, CGU-4E, and CGU-3E tie down chains. Refer to MIL-T- 27260B, Tie Down, Cargo, Aircraft, CGU-1B, for interface information on CGU-1B tie down straps.

6.6 JP-8 fuel. JP-8 fuel (NATO Code F-34) is almost identical to ASTM D1655 Jet A-1 fuel except that JP-8 has additives such as a corrosion inhibitor/lubricity improver and a fuel system icing inhibitor additive. See MIL-T- 83133, Turbine Fuels, Aviation, Kerosene Types, NATO F-34 (JP-8) and NATO F-35 for detailed information.

6.7 Subject term (key word) listing.

diesel engine driven  
material handling

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

Custodian:  
Air Force - 99

Preparing activity:  
Air Force - 84  
Agent:  
Air Force - 99

(Project 3930-F034)

## STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

### INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
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**I RECOMMEND A CHANGE:**

 1. DOCUMENT NUMBER  
MIL-PRF-83817A

 2. DOCUMENT DATE (YYMMDD)  
97/07/15

## 3. DOCUMENT TITLE

**TRUCK, FORKLIFT, 4,000 POUND CAPACITY, VARIABLE REACH, ROUGH TERRAIN**

 4. NATURE OF CHANGE *(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

## 5. REASON FOR RECOMMENDATION

**6. SUBMITTER**

 a. NAME *(Last, First, Middle Initial)*

b. ORGANIZATION

 c. ADDRESS *(include Zip Code)*

 d. TELEPHONE *(Include Area Code)*

 e. DATE SUBMITTED  
(YYMMDD)

 (1) Commercial  
(2) AUTOVON  
*(If applicable)*
**8. PREPARING ACTIVITY**

a. NAME

WR-ALC/TILCC

 b. TELEPHONE *(Include Area Code)*

 (1) Commercial (912) 926-1183  
(2) AUTOVON 468-1183

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