

MIL-T-52509C(ME)  
1 October 1980  
SUPERSEDING  
MIL-T-52509B(ME)  
16 October 1972

## MILITARY SPECIFICATION

TRACTOR, FULL-TRACKED, LOW-SPEED, DIESEL-ENGINE-DRIVEN;

### SECTIONALIZED AND NON-SECTIONALIZED

This specification is approved for use by the Mobility Equipment Research and Development Command, Department of the Army, and is available for use by all Departments and Agencies of the Department of Defense.

#### 1. SCOPE

1.1 Scope. This specification covers air transportable, air-droppable, and helicopter transportable diesel-engine-driven, full-tracked tractors.

1.2 Classification. The tractors shall be of the following types, as specified (see 6.2):

Type I - Non-Sectionalized (Air Transportable, and Air-Droppable).

Type II - Sectionalized (Air Transportable, Air-Droppable and Helicopter Transportable).

#### 2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal form a part of this specification to the extent specified herein:

#### SPECIFICATIONS

##### MILITARY

MIL-P-514	- Plates, Identification, Instruction and Marking, Blank.
MIL-L-2104	- Lubricating Oil, Internal Combustion Engine, Tactical Service.
MIL-L-2105	- Lubricating Oil, Gear, Multipurpose.

FSC 2410

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Mobility Equipment Research and Development Command, ATTN: DRDME-DS, Fort Belvoir, VA 22060 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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|-------------|--|
| MIL-T-3351  | - Tractor, Full-Track, Low Speed; Tractor, Wheeled, Agricultural; and Tractor, Wheeled, Industrial; and Their Attachments, Packaging of. |
| MIL-M-7866  | - Molybdenum Disulfide, Technical, Lubrication Grade.  |
| MIL-G-10924 | - Grease, Automotive and Artillery.  |
| MIL-G-23827 | - Grease, Aircraft and Instrument, Gear and Actuator Screw.  |
| MIL-A-46153 | - Antifreeze, Ethylene Glycol, Inhibited, Heavy Duty, Single Package.  |
| MIL-L-46167 | - Lubricating Oil, Internal Combustion Engine, Arctic.   |
| MIL-E-52798 | - Enamel, Alkyd, Camouflage.   |

## STANDARDS

### MILITARY

- |              |  |
|--------------|--|
| MIL-STD-129  | - Marking for Shipment and Storage.  |
| MIL-STD-209  | - Slinging Eyes and Attachments for Lifting and Tying Down Military Equipment                      |
| MIL-STD-669  | - Loading Environment and Related Requirements for Platform Rigged Airdrop Materiel.               |
| MIL-STD-814  | - Requirements for Tiedown, Suspension and Extraction Provisions on Military Materiel for Airdrop. |
| MIL-STD-1188 | - Commercial Packaging of Supplies and Equipment.  |
| MIL-STD-1410 | - Methods for Selection of Industrial Engines for End Item Application.                            |

### MILITARY HANDBOOK

AIR FORCE SYSTEM COMMAND  
Design Handbook DH1-11

- Air Transportability.

(Copies of specifications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

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

### TECHNICAL INFORMATION PACKAGE

(Application for copies should be addressed to US Army Mobility Equipment Research and Development Command, ATTN: DRDME-H, Fort Belvoir, VA 22060.)

### SOCIETY OF AUTOMOTIVE ENGINEERS (SAE)

SAE Handbook.

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

### 3. REQUIREMENTS

**3.1 General.** The tractor shall be the latest model of the standard product of the contractor and shall have demonstrated industry acceptability by having been manufactured, marketed, and sold in significant numbers to the commercial public for the same or similar application, interfacing with the same or similar components, except as specified herein, for at least 1 year prior to invitation for bids or request for proposal. Product improvements incorporated in the commercial production units in this 1 year period are acceptable. In the case of a recently introduced item, the contractor shall submit sufficient valid industrial operational/test data including all test reports for the item and its components, such as; engine, transmission and hydraulic system, field user reports, including any failures or problem areas, and corrective action taken to demonstrate acceptability of the item. When specific requirements are not stated herein, all items listed as standard equipment in the contractor's published specification brochures and catalogs, or normally furnished to commercial customers as standard equipment, shall be furnished. The tractor shall be equipped with any optional equipment necessary to comply with requirements specified herein. Optional equipment is defined as equipment not standard with the tractor but which has been furnished to the commercial customer, such as special features or allied equipment. The tractors shall be equipped with all components necessary to enable the tractors to function reliably and efficiently in sustained operation. The tractors shall conform to all federal laws and regulations governing safety, noise levels, and pollution, which are in effect on the date of invitation for bids or request for proposal.

**3.2 Description.** The type I and II tractors shall be diesel-engine-driven, crawler type, with oscillating tracks and shall be equipped with a Rollover Protective Structure (ROPS) and Falling Object Protective Structure (FOPS), towing winch, drawbar, angledozer, and a hydraulic system for operation of attachments.

**3.2.1 Type I.** The type I tractor with ROPS/FOPS and winch removed (if required) shall be capable of being loaded and rigged on an air delivery platform in accordance with MIL-STD-669, air transported and air delivered by parachutes.

**3.2.2 Type II.** The type II tractor with ROPS/FOPS and winch removed (if required) shall meet the requirements specified for type I (see 3.2.1) and shall also be capable of being sectionalized into two (2) sections for external air transport by helicopter sectionalization material may be removed for airdrop.

**3.3 First article (preproduction models).** The contractor shall furnish two (2) tractors of each type for examination and demonstration within the time frame specified (see 6.2), to prove prior to starting production that his production methods and choice of design detail will produce tractors that comply with the requirements of this specification. The examination and demonstrations shall be as specified in Section 4. Following successful completion of the

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examination and demonstration by the contractor, the Government shall perform a simulated airdrop demonstration on one of each type tractor at a site selected by the Government. The examination and all demonstrations conducted by the contractor shall be subject to surveillance and approval by the Government. Acceptance of the preproduction models will be dependent on successful completion of the examination, contractor demonstrations, and the Government conducted simulated airdrop demonstration.

3.4 Production tractors. All tractors furnished under this specification shall be physically and mechanically identical to the first article tractors approved by the Government.

3.5 Material. Material not specified herein shall be selected by the contractor and shall be subject to all provisions of this specification (see 6.4).

3.6 Safety. All available standard or optional accessories shall be included to provide protection for maintenance and operating personnel from rotating or reciprocating parts and from all parts subject to high operational temperatures and so located as to be a hazard. Exhaust discharges shall be directed so as to not endanger personnel. All platforms and steps shall have anti-skid surfaces. The starting system shall be such that the transmission must be placed in neutral before the engine can be started or the transmission must be placed in neutral before the tractor can be set into motion. Contractor's standard grab irons shall be provided.

3.6.1 Sound level. The exterior sound level of the tractors shall not exceed 88 dB(A) when measured in accordance with SAE J88. If the sound level in the area occupied by the operator exceeds 85 dB(A) when measured in accordance with SAE J919, a warning plate containing the following shall be permanently affixed to the tractor in a conspicuous protected location. ("CAUTION: EAR PROTECTION REQUIRED WHEN TRACTOR IS OPERATING"). The plate shall have a yellow background with black lettering and shall be on corrosion-resistant material.

3.6.2 Rollover protective structure (ROPS) and falling object protective structure (FOPS). The tractors shall be equipped with a removable bolted down ROPS/FOPS canopy. The canopy shall be removable and replaceable without cutting or welding. The ROPS/FOPS shall conform to SAE J1040 and SAE J231, respectively. A seat belt conforming to SAE J386 shall be properly installed for use by the operator. Quick disconnect fittings (electric, etc.) shall be provided as applicable to facilitate canopy removal. A slinging eye(s) shall be provided to facilitate removal of ROPS/FOPS. The rear of the ROPS shall be covered by a protective screen. Front sweeps are not required.

### 3.7 Physical characteristics.

3.7.1 Weight limits. The type I and II tractors without the removable ROPS canopy, sectionalization kit and winch, if required, but, with all other attachments, accessories, coolant, lubricating and hydraulic systems filled to capacity and with not less than 25 percent nor more than 75 percent fuel shall have a base weight of not more than 30,600 pounds. The type II tractor when sectionalized into two (2) sections shall weigh not more than 16,000 pounds per section.

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**3.7.2 Dimensions.** The overall width and length of the type I and II tractors with attachments mounted shall not exceed 105 inches and 288 inches respectively. In order to conform to a height limitation of 100 inches when rigged for airdrop, the reducible height of the tractors, including greasers, should be not more than 91 inches. No major component removal, except ROPS canopy shall be required to obtain the reduced height. The tractors shall be operable after component removal. If the reducible height exceeds 91 inches, the contractor must demonstrate prior to step 1 proposal date that his tractor can be rigged so as to conform to the 100 inch limit, and withstand the forces encountered in the simulated airdrop impact test (see 4.5.2.12), without damage or permanent deformation.

**3.8 Sectionalization.** The type II tractor less ROPS and winch if required, shall be capable of being sectionalized into two sections for helicopter transport. The weight of either section shall not exceed 16,000 pounds. The powered section shall be drivable and steerable under its own power for a distance of 50 feet over relatively flat unimproved areas. Reassembly time with tools furnished with the tractor under field conditions without the assistance of other powered equipment shall not exceed 4 hours. Cutting and welding are not permitted. Components and accessories used in sectionalization and reassembly shall be stored on the tractor or in a demountable container attached to the tractor but shall not interfere with the operation of the tractor.

**3.9 Performance.** The tractors and attachments shall withstand the usage encountered in military operations such as dozing, ditching, backfilling, slope operation, winching and operation in arid, abrasive soils, and in all types of weather as specified herein, without breakage, malfunction, or permanent deformation.

**3.9.1 Environmental conditions.** Without the use of any external means, equipped with only standard and optional equipment, the engine shall start within five (5) minutes and the tractor shall operate under full-load conditions within fifteen (15) minutes after engine start in any ambient temperature from minus 25° F to plus 120° F. Cold start aids must be integral with the tractor and no aids may be used which rely upon external support such as an electrical power source. Hand-held aerosol cans are not permitted. The tractor shall be capable of operating in hot humid tropical environments and dry dusty environments.

**3.9.2 Travel speed.** The tractors without towed load, shall travel at not less than the following speeds when the engine is operating at full-load governed speed:

- (a) Low gear forward - 1.4 mph.
- (b) High gear forward - 6.0 mph.
- (c) Low gear reverse - 1.4 mph.
- (d) High gear reverse - 6.0 mph.

**3.9.3 Drawbar pull.** The tractors equipped as specified herein shall deliver not less than 24,000 pounds drawbar pull at a speed of not less than 1.0 mph. This pull shall be reserve tractive force as defined in SAE J872.

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3.9.4 Stability. The tractors shall operate on 35 percent side slopes and 60 percent longitudinal slopes, or any combination thereof, without either track losing contact with the ground. All moving parts requiring lubrication shall be lubricated when the tractor is operating under these conditions.

3.9.5 Fording. The tractors shall start and operate during and after shallow fording in fresh water to any depth up to and including 20 inches including wave action without damage or leakage of water into reservoirs containing lubricants.

3.10 Engine. The diesel engine shall meet the requirements of MIL-STD-1410 for application in a class II end item. The diesel engine shall be the engine furnished commercially including all systems, components, accessories, and auxiliaries. The exhaust stack shall be equipped with a rain cap or shall be fabricated and mounted to prevent the entry of rain or snow.

3.10.1 Engine horsepower. The applied net horsepower of the engine at the flywheel when measured in accordance with SAE J816, shall be not less than 105 horsepower.

3.10.2 Engine cooling system. The contractor's standard or optional cooling system meeting the requirements of 3.9.1 shall be provided.

3.10.3 Fuel tank. The fuel tank shall be of a type regularly furnished as standard equipment with a capacity for 10 hours of continuous normal operation. The tank shall be equipped with a means for draining water and sediment from the bottom of the tank.

### 3.11 Drive train.

3.11.1 Transmission. The transmission shall be of the full power shift or hydrostatic type. The power shift type shall be in combination with a torque converter and shall provide not less than two forward and two reverse gear ratios, all of which shall be manually selected. A manual lock shall be provided to lock the shift lever in neutral position to prevent accidental engagement during starting and periods of idling.

3.11.2 Torque converter. The torque converter shall be the contractor's converter regularly furnished commercially with the power shift transmission for this size tractor.

### 3.12 Track assemblies.

3.12.1 Tracks and track frames. The contractors standard track frames shall be provided.

3.12.2 Track shoes and grousers. The contractor's standard track shoes and grousers, not less than 16 inches in width shall be provided.

3.12.3 Track gage. The track gage shall be not less than 74 inches.

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3.12.4 Track roller guards. Standard or optional inner and outer track roller guards shall be furnished for each track assembly. The guards shall provide continuous coverage for the full length of the track frame.

3.12.5 Sprocket guards. When spoke or web-type sprockets are furnished, each sprocket shall be protected by the contractor's standard or optional guards completely covering the open portion.

3.12.6 Front idler guards. When spoke or web-type front idlers are provided, heavy duty or extreme service inner and outer guards shall be furnished to completely cover the open portion of each front idler above the track frame.

3.12.7 Rock guards. The underside of each tractor shall be provided with the contractors standard rock guards. The rock guards shall protect the engine, all drive line components, and transmission housings and, except for those portions which are part of the tractor's frame, shall be removable.

3.12.8 Radiator guard. A heavy-duty or severe service radiator guard shall be furnished.

3.13 Steering and braking. The contractors standard steering system shall be provided. The contractor's standard brake system is acceptable providing the transmission is not disconnected from the power train when the service brakes are applied.

3.14 Operator's compartment.

3.14.1 Seat. The contractors standard commercial operator's seat shall be provided. The seat shall be located to provide the operator with convenient access to operating controls, and visibility of the work zone and all instruments and gages mounted in the operator's compartment when seated with seat belt fastened and properly adjusted.

3.14.2 Instrument and indicators. The following instruments and indicators shall be provided and shall be located on the instrument panel except the hourmeter which may be remotely mounted:

- (a) Engine lubricating oil pressure gage.
- (b) Engine cooling liquid temperature gage.
- (c) Hourmeter.
- (d) Torque converter temperature gage.
- (e) Transmission clutch oil pressure gage or warning light.
- (f) Air filter restriction gage or warning light.
- (g) Ammeter, voltmeter, or battery charging indicator.
- (h) Hydraulic oil level indicator (dipstick, sight tube or gage) if offered.

Any additional instruments, or indicators offered as standard by the contractor shall also be provided.

3.14.3 Controls. All controls for the tractor's and their attachments shall be located in the operators compartment and shall be within reach of the operator in his normal operating position.



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3.14.4 Decelerator or accelerator. The tractors shall be equipped with a foot operated decelerator or accelerator.

3.15 Hydraulic system. The tractors shall be equipped with the contractor's standard hydraulic system which shall provide sufficient force for operating all attachments and related components.

3.16 Electrical systems. The tractors shall be equipped with the contractor's standard or optional 24 volt electrical system which meets the requirements specified herein.

3.16.1 Battery. The battery or batteries shall be the contractor's standard or optional batteries for cold weather starting as specified in 3.9.1.

3.16.2 Alternator. The alternator shall be the contractor's standard or optional alternator that will provide adequate service under all operating conditions specified herein.

3.16.3 Lighting. The following minimum number of lights with associated circuits, circuit-breakers, or other protective devices and switches if available as standard or as an option shall be provided: two headlights, one rear light and one dash light. The front and rear lights shall be guarded or mounted in a protected location.

3.16.4 Electromagnetic radiation. The tractors shall comply with the electromagnetic radiation limits of SAE J551.

3.16.5 Horn. A conventional operator controlled horn shall be furnished.

3.16.6 Back-up alarm. A back-up alarm conforming to SAE J994 shall be furnished.

3.17 Towing device(s). One or more of the contractor's standard or optional heavy-duty hook(s) shall be furnished on the front of each tractor.

3.18 Attachments. The following attachments shall be furnished with the tractors as specified in 3.2.

3.18.1 Angle dozer. An angle dozer shall be provided that meets the requirements specified herein. The dozer shall be hydraulic operated and provide the following movements: raising, floating, holding, lowering, tilting and angling. The dozer angle to either side shall be a minimum of 23 degrees. The tilting and angling adjustments may be hydraulic, manual, or a combination thereof.

3.18.2 Winch. The winch shall be a single drum, reversible, single or dual speed, hydraulically controlled overwind towing winch. Winch controls shall be located in the operator's compartment. One-hundred and fifty feet of 3/4 inch wire rope with a hook shall be furnished on the winch. The hook's capacity shall be greater than the breaking strength of the wire rope. The winch shall be of a size normally furnished for this size tractor. If the winch must be removed to meet transportability requirements specified herein, a gasket sealing cover plate for the winch drive opening shall be provided.



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**3.18.3 Drawbar or towing coupler.** A drawbar or towing coupler integral with the winch specified in 3.18.2 shall be furnished. A drawbar or towing coupler pin with locking device permanently attached to the drawbar or towing coupler shall be provided.

**3.19 Transportability.** The tractors shall be capable of being transported by surface, rail, ocean-going carriers, and C130, C141, and C5A aircraft. The tractor shall withstand the impact forces encountered in air and rail shipments without damage or permanent deformation. The tractor shall conform to MIL-STD-669 for airdrop from C-130 aircraft and shall withstand stresses imposed when tested in accordance with 4.5.2.12 without breakage or permanent deformation of any structural member or component, or loss of ability of the tractor to perform all of its intended functions. When rigged for airdrop in accordance with MIL-STD-669, the tractors shall meet the established tipoff curves for C-130 and C-141 aircraft as defined in AFSC Design Handbook DH1-11. The tractor shall be equipped with slinging provisions and shall be capable of being lifted without damage using slings. The tractor shall be equipped with tiedown provisions for transport by above modes. Suspension and extraction parachute provisions shall be provided for parachute delivery. Complete diagrams and instructions for lifting the tractor and tying down the tractor on freight cars and truck trailers shall be furnished in the operator's manual. The operator's manual shall also include instructions for component removal when required for transport. The contractor shall provide sufficient data to the Government with the step I proposal to confirm that the tractor being supplied can be loaded and transported in the C130, C141 and C5A aircraft. Removal of ROPS and other components to reduce overall height or width shall not prevent the tractor from driving onto military transport equipment under its own power.

**3.19.1 Parachute suspension provisions.** Four integral suspension provisions conforming to MIL-STD-814 shall be furnished on the tractors. The parachute suspension provision shall withstand the stresses in the amount and direction of pull specified without weld failure or permanent deformation of the tractor or the provision.

**3.19.2 Slinging provisions.** The tractor shall be provided with four slinging provisions conforming to MIL-STD-209. In addition, each section of the type II tractor shall be provided with four slinging provisions conforming to MIL-STD-209. The provisions shall enable the tractor to be lifted in the normal traveling or operating position. Provisions shall be positioned so that the lifting strain shall be in line with the longitudinal axis of the eye of the provision. Provisions shall be fastened to members which will withstand stresses in the amount and direction of pull specified for the provision without weld failure or permanent deformation of the tractor or the provision. Parachute suspension provisions may be used as slinging provisions if they meet the requirements of MIL-STD-209.

**3.19.3 Tiedown provisions.** The tractor shall be provided with integral provisions to permit tiedown of the tractor to the floor or deck of the transportation medium or the airdrop platform. The tiedown provisions shall conform to MIL-STD-209 and MIL-STD-814 and shall withstand stresses in the amount and direction of pull specified without weld failure or permanent deformation of the tractor or the provision.

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3.19.4 Extraction parachute provision. A single fitting shall be provided on the tractor for attachment of the parachute extraction system. Except as specified herein, the fitting shall conform to MIL-STD-814 and shall withstand stresses in the amount and direction of pull specified without weld failure or permanent deformation of the tractor or the provision. In lieu of the limit load specified in MIL-STD-814, the limit load of the provision shall be 56,580 pounds. The design ultimate strength of welded sections shall be four (4) times the limit load.

3.20 Identification plates and marking. Each tractor shall be furnished with an identification plate showing the contractor's model number, NSN, USA registration number, serial number, weight, date of manufacture and date of delivery. The identification plate shall be permanently affixed to the tractors in a readily accessible and conspicuous location. Plates shall conform to MIL-P-514 or contractor's standard plates subject to the approval of the contracting officer. All attachments or components removed or disassembled for shipment shall be matchmarked for proper reassembly. The tractors and each attachment shall be identified in accordance with the contractor's standard method.

3.21 Instruction plates. The tractors shall be equipped with instruction plates including warnings and cautions suitably located and permanently affixed, describing any special or important procedure to be followed in operating and servicing the tractor. Plates shall conform to MIL-P-514 or contractor's standard plates subject to the approval of the contracting officer. Instructions for disassembly of the type II tractor into two sections and reassembly shall be provided on cards approximately 8-1/2 inches by 11 inches which shall be encased in laminated plastic. One set shall be furnished with each type II tractor.

3.22 Shipping data plates. Shipping data plates for each tractor shall be furnished and shall show the silhouette of the tractor and each section (type II tractor only), indicating the location and capacity of slinging provisions, tiedown provisions, extraction provisions, suspension provisions, center of balance and shipping weight. Plates shall conform to MIL-P-514 or contractor's standard plates subject to the approval of the contracting officer. The plates shall be attached to the left side of the tractors and shall show the locations as viewed from the left side. The plates on the sections, (type II tractor only) shall be located in conspicuous protected locations. All plates shall be permanently attached.

3.23 Treatment and painting. The portions of the tractors normally painted shall be cleaned, treated, primed and painted in accordance with the contractor's standard commercial practice. The finishing coat shall be in accordance with MIL-E-52798, forest green color.

3.24 Stenciling instructions. Stenciling instructions shall be provided with each set of technical publications. The instructions shall be provided in card form showing location and wording for tiedown, slinging, suspension and extraction provisions, and the center of gravity for the type I and type II tractors, and the sectionalization storage areas on the type II tractor.

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3.25 Lubrication. A lubrication means shall be provided for all moving parts requiring lubrication. Each tractor shall be serviced and run-in with military lubricants conforming to MIL-L-2104, MIL-L-2105, MIL-L-46167, MIL-M-7866, MIL-G-10924, and MIL-G-23827 as applicable.

3.26 Technical publications. Such technical publications as are specified (see 6.2) shall be furnished.

3.27 Special tools. Any nonstandard or special tools required for equipment operation and operator maintenance of the tractors shall be furnished with the tractors.

3.28 Toolbox. A lockable storage compartment(s) or toolbox of sufficient size to hold all tools and equipment requirement for operation and operator maintenance shall be provided.

3.29 Technical information package. The contractor shall complete and submit a Technical Information Package within the time frame specified (see 6.2), depicting the tractor and its components exactly as it will be furnished. The Technical Information Package shall be submitted with all bids and proposals.

3.30 Government-furnished equipment (GFE). The following items shall be furnished by the Government (see 6.3):

- (a) Container NSN 7520-00-559-9618 complete with maintenance forms. (The contractor shall furnish the fasteners and install the containers on the tractors.)
- (b) Supplemental operating, maintenance and repair parts instructions. (SOMARPI).

3.31 Basic issue items. When specified, (see 6.2) each item in the Basic Issue Item List shall be furnished with each tractor.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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.

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

- (a) Preproduction inspection (see 4.3).
- (b) Quality conformance inspection (see 4.4).
- (c) Inspection of packaging (see 4.6).

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**4.3 Preproduction inspection.** The first article (preproduction model) tractors (see 6.2), furnished by the contractor shall be examined (see 4.3.1), and demonstrated (see 4.3.2), to determine compliance with the requirements of this specification. Prior to the examination and demonstration of the tractors, the following shall be performed:

- (a) Service the tractors with the lubricants specified.
- (b) Break in the tractors as prescribed by the contractor.

**4.3.1 Preproduction examination.** Prior to the preproduction demonstration, the tractors shall be examined for the defects marked "X" in column 1 of table I. Presence of one or more defects shall be cause for rejection. Prior to the preproduction demonstration the tractors shall be examined and compared with this specification, with the contractor's published brochures, with the commercial manuals, and with the completed Technical Information Package. Any discrepancy between the specification, brochures, manuals, or Technical Information Package and the preproduction models shall be cause for rejection. Prior to the preproduction demonstration, the certifications, and certified test reports required by 4.5.2.13, and 4.5.2.14 shall be examined. Incomplete, inaccurate, or otherwise unacceptable certifications, or certified test reports shall be cause for rejection.

**4.3.2 Preproduction demonstration.** Upon successful completion of the examination specified in 4.3.1, the preproduction model tractors shall be subjected to the demonstrations marked "X" in column 1 of table II. Failure of any demonstration or any demonstration reports shall be cause for rejection.

**4.4 Quality conformance inspection.**

**4.4.1 Individual examination.** After successful completion of the demonstration specified in 4.4.2, each tractor shall be examined for the defects marked "X" in column 2 of table I. Presence of one or more defects shall be cause for rejection.

**4.4.2 Individual demonstration.** Each tractor shall be demonstrated as specified in column 2 of table II. Failure of any demonstration shall be cause for rejection.

**4.5 Inspection schedule.**

**4.5.1 Examination.** The examination shall be in accordance with table I.

**4.5.2 Demonstrations.** Demonstrations shall be conducted in accordance with table II in the sequence listed.

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TABLE I. Examination schedule.

Preproduction Model(s)	Individual	Defects	Requirement Paragraph
1	2	3	4
X	X	101. Safety provisions not as specified.	3.6
X	-	102. Dimensions not as specified.	3.7.2
X	X	103. Fuel tank not as specified.	3.10.3
X	X	104. Transmission not as specified.	3.11.1
X	X	105. Torque converter not as specified.	3.11.2
X	X	106. Tracks and track frame not as specified.	3.12.1
X	X	107. Track shoes and grousers not as specified.	3.12.2
X	-	108. Track gage not as specified.	3.12.3
X	X	109. Track rollers guard not as specified.	3.12.4
X	X	110. Sprocket guards not as specified.	3.12.5
X	X	111. Idler guards not as specified.	3.12.6
X	X	112. Rock guards not as specified.	3.12.7
X	X	113. Radiator guard not as specified.	3.12.8
X	X	114. Steering and braking not as specified.	3.13
X	X	115. Seat not as specified.	3.14.1
X	X	116. Instruments and indicators not as specified.	3.14.2
X	X	117. Controls not as specified.	3.14.3
X	X	118. Decelerator or accelerator not as specified.	3.14.4
X	X	119. Hydraulic system not as specified.	3.15
X	X	120. Electrical system not as specified.	3.16
X	X	121. Battery(s) not as specified.	3.16.1
X	X	122. Alternator not as specified.	3.16.2
X	X	123. Lighting not as specified.	3.16.3
X	X	124. Horn not as specified.	3.16.5
X	X	125. Back-up alarm not as specified.	3.16.6
X	X	126. Towing hook(s) not as specified.	3.17
X	X	127. Angle dozer not as specified.	3.18.1
X	X	128. Winch not as specified.	3.18.2
X	X	129. Drawbar or coupler not as specified.	3.18.3
X	X	130. Identification plates and marking not as specified.	3.20
X	X	131. Instruction plates not as specified.	3.21
X	X	132. Shipping data plates not as specified.	3.22
X	X	133. Treatment and painting not as specified.	3.23
X	X	134. Stenciling not as specified.	3.24
X	X	135. Lubrication not as specified.	3.25
X	X	136. Special tools not as specified.	3.27

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TABLE I. Examination schedule(cont'd).

Preproduction Model(s)	Individual	Defects	Requirement Paragraph
1	2	3	4
X	X	137. Tool box not as specified.	3.28
X	-	138. Technical Information Package incomplete or not up to date.	3.29
X	X	139. Government-furnished equipment not installed.	3.30
X	X	140. Parts or components missing.	Section 3
X	X	141. Assembly incomplete or incorrect.	Section 3
X	X	142. Cracked or broken parts or assemblies.	Section 3
X	X	143. Leaks in coolant, fuel, or oil lines.	Section 3
X	X	144. Permanent deformation of any part or assembly.	Section 3
X	X	145. Material not of same quality as used on preproduction model.	Section 3
X	X	146. Tractors not as specified.	Section 3

TABLE II. Demonstration schedule.

Preproduction Model(s)		Individual	Test	Test Paragraph	Requirement Paragraph
Type I	Type II				
X	X	X	Production run-in	4.5.2.1	3.25
-	X	-	Sound level	4.5.2.2	3.6.1
X	X	-	Weights	4.5.2.3	3.7.1 and 3.22
X	X	-	ROPS removal	4.5.2.4	3.6.2 and 3.19
-	X	-	Sectionalization	4.5.2.5	3.8
X	X	-	Parachute provisions	4.5.2.6	3.19.1
X	X	-	Slinging provisions	4.5.2.7	3.19.2
X	X	-	Tiedown provisions	4.5.2.8	3.19.3
X	X	-	Extraction provisions	4.5.2.9	3.19.4
-	X	-	Construction tasks	4.5.2.10	3.9 and 3.10.3
-	X	-	Drawbar pull	4.5.2.11	3.9.3
X	X	-	Airdrop	4.5.2.12	3.19

4.5.2.1 Production run-in. Start and operate each tractor for not less than 1/2 hour on a skid plate, or on a test track, to assure operation of all components and to allow for minor adjustments (see 3.25). All controls and attachments shall be manipulated and the tractor shall be operated in each gear selection in both forward and reverse directions. Evidence of contamination,

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leakage, permanent deformation, malfunction, or damage to the hydraulic system or other tractor components, or inability of any tractor control or component to operate as specified shall be cause for rejection of the tractor by the Government until corrected to the Government's satisfaction. The Government may require additional run-in after deficiencies are corrected. Any defect found during production run-in shall be prima facie evidence that tractors previously accepted are similarly defective unless evidence, satisfactory to the contracting officer, is furnished by the contractor that they are not similarly defective.

4.5.2.2 Sound level. The contractor shall perform sound level tests in accordance with SAE J88 and SAE J919. Certified prior test data is acceptable if available. Nonconformance to the requirements of 3.6.1 shall constitute failure of this demonstration.

4.5.2.3 Weight. The weight of the tractors and tractor sections shall be measured with a scale calibrated within 6 months of the demonstration. Inability to meet the requirements of 3.7.1 shall constitute failure of this demonstration.

4.5.2.4 ROPS/FOPS removal and replacement. The removal and replacement of the ROPS/FOPS canopy shall be demonstrated following procedures in contractor's manual. Permanent deformation or damage to any part of the ROPS/FOPS canopy or its mounts, or inability to meet the requirements of 3.6.2 and 3.19 shall constitute failure of this demonstration.

4.5.2.5 Sectionalization. The type II tractor less ROPS/FOPS shall be demonstrated for compliance to sectionalization requirements of 3.8. The demonstration shall be conducted on a relatively flat unimproved area of sufficient size for disassembly, maneuvering, and reassembly of the tractor. Using hand tools furnished with the tractor (no power tools allowed), separate the tractor into two sections. Drive the powered section under its own power for a distance of 50 feet from the remaining section and steer the powered section at least 45 degrees to the longitudinal axis of the remaining section. Drive and steer the powered section to join with the remaining section and reassemble the two sections into a composite unit using the above hand tools only. Record the time required for the maneuvering and reassembly operation. No chains, cables, hoists, blocking, or other vehicles shall be used to assist in the disassembly, maneuvering, and reassembly operations. Nonconformance to 3.8 shall constitute failure of this demonstration. The sectionalization demonstration will be compared to the disassembly and assembly instructions specified in 3.21.

4.5.2.6 Parachute suspension provisions. The parachute suspension provisions shall be demonstrated to prove conformance to 3.19.1. Apply a force of 1.5 times the limit load as specified in MIL-STD-814 to each of the parachute suspension provisions. Weld failure or permanent deformation of the tractor or suspension provisions shall constitute failure of this demonstration.

4.5.2.7 Slinging provisions. The slinging provisions shall be demonstrated to prove conformance to 3.19.2. Nonconformance to 3.19.2, weld failure, or permanent deformation of the tractor or the slinging provisions shall constitute failure of this demonstration. The demonstration procedure shall be as follows:



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- (a) Lift the tractor and hold in suspension in its normal travel position using slings that converge not more than 24 feet above the lowest extremity of the tractor. Spreader bars are permitted. Determine the force and angles of application for each provision. Measure the clearance between each sling and the tractor.
- (b) Restrain the tractor by anchoring the main frame and subject each slinging provision to a force equal to the working load specified in MIL-STD-209. This force shall be applied in the direction as determined in (a) above. Hold each load for a minimum of 90 seconds.
- (c) Repeat (a) and (b) above for each section of the type II tractor.

4.5.2.8 Tiedown provisions. The tiedown provisions shall be demonstrated to prove conformance to 3.19.3. Apply a limit load as specified in MIL-STD-814 to each of the tiedown provisions, weld failures or permanent deformation of the tractor or the tiedown provisions shall constitute failure of this demonstration.

4.5.2.9 Extraction parachute provisions. The extraction parachute provision shall be demonstrated to prove conformance to 3.19.4. Apply a force equal to 1.5 times the limit load specified in 3.19.4 to the provision. Weld failure or permanent deformation of the tractor or the extraction parachute provision shall constitute failure of this demonstration.

4.5.2.10 Construction tasks. The type II tractor shall be demonstrated as follows for a total of 40 hours to prove conformance to 3.9 and 3.10.3. Non-conformance to 3.9 and 3.10.3, or any malfunction, permanent deformation, or breakage of mechanical or electrical components shall constitute failure of this demonstration.

- (a) Demonstrate bulldozing in virgin or compacted soil for not less than 32 hours.
- (b) Demonstrate "V-type" ditching to a depth of not less than 18 inches, for not less than 7 hours.
- (c) Demonstrate the winch for not less than 1 hour by winching a load that will create a line pull of not less than 20,000 pounds.

4.5.2.11 Drawbar pull. Tractor drawbar pull shall be demonstrated as specified in 3.9.3. Inability to meet the requirements as specified shall constitute failure of this demonstration.

4.5.2.12 Airdrop. The tractor shall be subjected to simulated airdrop impact demonstration in accordance with MIL-STD-669 to prove conformance to 3.19. This demonstration will be conducted by the Government at a Government facility; however, acceptance of the preproduction models will be dependent on the successful completion of this demonstration. The demonstration shall consist of the following:

- (a) Rig the tractor in accordance with MIL-STD-669 and confirm that the rigged weight and dimensions conform to the requirements of AFSC Design Handbook DHI-11.
- (b) Drop test the machine in accordance with MIL-STD-669.
- (c) After the first drop, the machine shall be derigged, examined, started, and driven forward and backward a few feet, and all controls shall be actuated.

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- (d) The machine shall then be sectionalized and reassembled in accordance with the contractor's instructions to ascertain that no damage was done to the sectionalization features by the test drop. (This step is omitted for the type I machine).
- (e) Re-rig and drop test the machine a second time in accordance with MIL-STD-669.
- (f) After de-rigging, the tractor shall be demonstrated for 8 hours performing 20 percent of each of the construction tasks in 4.5.2.10.

Failure to meet weight and dimensional requirements of Design Handbook DH1-11, weld failure, leakage, permanent deformation of any structural member or component, inability to reassemble the components removed for airdrop, inability to disassemble and reassemble the type II tractor, or inability of the tractor to perform its intended functions shall constitute failure of this demonstration.

**4.5.2.13 Certification.** The contractor shall certify in writing to the contracting officer that the tractor complies with the environmental condition requirements of 3.9.1, the stability requirements of 3.9.4, the fording requirements of 3.9.5, the engine requirements of 3.10, the horsepower requirements of 3.10.1, the braking requirements of 3.13, the winch hook requirements of 3.18.2 and the rail shipment requirements of 3.19. If certification is not supplied, these requirements shall be demonstrated. Nonconformance shall constitute failure of these demonstrations.

**4.5.2.14 Certified test reports.** The contractor shall furnish certified test reports to prove compliance with the ROPS/FOPS requirements of 3.6.2, tractor travel speeds of 3.9.2, and electromagnetic radiation of 3.16.4. If certified test reports are not available, these requirements shall be demonstrated. Nonconformance shall constitute failure of these demonstrations.

**4.6 Inspection of packaging.** The preservation, packing, and marking shall be examined to determine compliance with MIL-T-3351 (for level A and B) and MIL-STD-1188 (for commercial).

## 5. PACKAGING

**5.1 Preservation.** Preservation shall be level A, B, or commercial as specified (see 6.2).

**5.1.1 Level A.** Each complete tractor, components, and attachments shall be preserved in accordance with level A preservation and packaging requirements of MIL-T-3351.

**5.1.2 Level B.** Each complete tractor, components, and attachments shall be preserved in accordance with the level B preservation and packaging requirements of MIL-T-3351.

**5.1.3 Commercial.** Each complete tractor and all items issued with the tractor shall be suitably preserved and packed in accordance with MIL-STD-1188 for retail distribution directly to a using customer and in a manner to assure carrier acceptance and safe delivery to destination at lowest ratings in compliance with carrier rules and regulations applicable to the mode of transport-

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tion. In addition, the following specific requirements shall be accomplished. Items with critical surfaces required for fit or function shall be provided protection by the use of preservative coatings, volatile corrosion inhibitors, or desiccated packs. Items requiring protection from physical damage to surfaces, or which are fragile by nature, shall be protected by wrapping, pack compartmentization or cartonizing of the individual item. The cooling system shall be filled with a fresh solution of 50 percent water and 50 percent anti-freeze conforming to MIL-A-46153, and a tag attached indicating the temperature to which the cooling system can be subjected before freezing. The crankcase shall contain the required amount of lubricating oil. A guide shall be furnished indicating in detail the preservation materials to be removed, in detail, and any other servicing required prior to placing the tractor in operation.

5.2 Packing. Packing shall be level A, B, or commercial as specified (see 6.2).

5.2.1 Level A. Each complete tractor, preserved as specified in 5.1, shall be packed in accordance with the level A packing requirements of MIL-T-3351, as specified for type II unboxed (mobile) tractor.

5.2.2 Level B. Each complete tractor, preserved as specified in 5.1, shall be packed in accordance with level B packing requirements of MIL-T-3351, as specified for type II unboxed (mobile) tractor.

5.2.3 Commercial. Each complete tractor preserved as specified in 5.1, shall be packed in accordance with MIL-STD-1188. Commercial packing must protect items against physical and environmental damage during shipment, handling and storage.

### 5.3 Marking

5.3.1 Military. Marking for level A or B protection shall be in accordance with MIL-STD-129.

5.3.2 Commercial. Marking for commercial packaging shall be in accordance with MIL-STD-1188.

## 6. NOTES

6.1 Intended use. The tractors are intended for dozing, ditching, excavation, backfilling, winching, towing and for airborne and air assault operations.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number and date of this specification.
- (b) Type tractors required (see 1.2).
- (c) Time frame required for submission of the preproduction models (see 3.3).

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- (d) Technical publications required (see 3.26).
- (e) Time frame for completing and submitting a Technical Information Package (see 3.29).
- (f) When Basic Issue Items are to be furnished (see 3.31).
- (g) Level of preservation and level of packing required (see 5.1 and 5.2)

6.3 Government-furnished equipment. The contracting officer should arrange to furnish the equipment specified in 3.30.

6.4 Recycled material. It is encouraged that recycled material be used when practical as long as it meets the requirements of the specification (see 3.5).

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**DOCUMENT IDENTIFIER (Number) AND TITLE** MIL-T-52509C(ME) Tractor, Full-Track, Low-Speed, Diesel-Engine-Driven; Sectionalized and Non-Sectionalized

**NAME OF ORGANIZATION AND ADDRESS OF SUBMITTER**

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