NOT MEASUREMENT SENSITIVE

KKK-T-2108M
September 15, 1991
SUPERSEDING
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August 1, 1990

FEDERAL SPECIFICATION

TRUCKS AND TRUCK TRACTORS: COMMERCIAL, DIESEL OR GASOLINE ENGINE DRIVEN, 10 900 TO 14 500 KILOGRAMS (24,000 TO 32,000 POUNDS) GVW, 4X2

This specification is approved by the General Services Administration for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers diesel or gasoline engine driven, four-wheel, two-rear-wheel drive, truck chassis, trucks and truck tractors having minimum gross vehicle weights (GVW) of 10 900 to 14 500 kilograms (kg) (24,000 to 32,000 pounds), for normal operating conditions. Vehicles procured under this specification are commercial items which are warranted by the manufacturer as specified in acquisition documents (for military contracts) or as specified in 6.5 through 6.5.4 (for civil agency contracts).

1.2 Classification. The vehicles shall be one of the types and classes shown in table I, as specified (see 6.2):

TABLE I. Vehicle classification.

Type	Nomenclature	Class
I	Chassis, Truck, with Cab (see 3.5.1).	A B C
II	Truck Tractor, with Cab (see 3.5.2).	A B C
III	Truck, Stake, with Cab (see 3.5.3).	A B C
IV	Truck, Dump, with Cab (see 3.5.4).	A B C
V	Truck, Wrecker, with Cab (see 3.5.5 and MIL-T-62491).	- - -
VI	Truck, Maintenance, with Cab (see 3.5.6).	- - -
VII	Truck, Van, with Cab (see 3.5.7).	A B -
VIII	Truck, Refrigerator Van, with Cab (see 3.5.8).	A B -

AMSC N/A

FSC 2320

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

1.2.1 Class. The class of the vehicle shall be determined by its minimum gross vehicle weight rating as follows:

Class A - 10 900 kg (24,000 Pounds)
Class B - 12 700 kg (28,000 Pounds)
Class C - 14 500 kg (32,000 Pounds)

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS
FEDERAL

W-B-131	- Battery, Storage: Vehicular, Ignition, Lighting and Starting.
VV-F-800	- Fuel Oil, Diesel.

MILITARY

MIL-P-514	- Plates, Identification, Instruction and Marking, Blank.
MIL-T-5624	- Turbine Fuel, Aviation, Grades JP-4 and JP-5.
MIL-M-43719	- Marking Materials and Markers, Adhesive, Elastomeric, Pigmented, General Specification for.
MIL-T-62110	- Trucks, Maintenance, with Rotating Hydraulic Derrick, 28,000 to 36,000 GVW, 4x2, 4x4, 6x4, and 6x6, Commercial.
MIL-T-62491	- Trucks, Wrecker: Diesel and Gasoline Engine Driven, 5-Ton to 45-Ton Lifting Capacity, 10,000 to 50,000 Pounds GVW, 4x2, 4x4, 6x4 and 6x6, Commercial.
MIL-T-83133	- Turbine Fuel, Aviation, Kerosene Type, Grade JP-8.

STANDARDS
FEDERAL

FED-STD-297	- Rustproofing of Commercial (Nontactical) Vehicles.

MILITARY

MIL-STD-1223	- Nontactical Wheeled Vehicles Treatment, Painting, Identification Marking and Data Plate Standards.

MS 51113	- Pintle Assembly, Towing: 40,000 Lbs. Capacity, Manual Release.
MS 75020	- Connector, Plug, Electrical - 12 Contact, Intervehicular, 28-Volt, Waterproof.
MS 75021	- Connector, Receptacle, Electrical - 12 Contact, Intervehicular, 28-Volt, Waterproof.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from the Naval Publications and Forms Center, Military Specifications and Standards, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094).

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

DEPARTMENT OF DEFENSE (DOD)
Department of Defense Index of Specifications and Standards (DODISS).

(Copies of the DODISS are available on a yearly subscription basis either from the Government Printing Office for hard copy, or microfiche copies are available from the Director, Navy Publication and Printing Service Office, 700 Robbins Avenue, Philadelphia, PA 19111-5093.)

DEPARTMENT OF TRANSPORTATION (DOT)
Federal Motor Carrier Safety Regulations.
Federal Motor Vehicle Safety Standards.

(Application for copies of DOT publications should reference the Code of Federal Regulations, 49 CFR, and the Federal Register, and should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

ENVIRONMENTAL PROTECTION AGENCY (EPA)
Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines.
Noise Emission Standards for Transportation Equipment - Medium and Heavy Trucks.

(Application for copies of EPA publications should reference the Code of Federal Regulations, 40 CFR, and the Federal Register and should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA)

Subpart N	- Cranes, Derricks, Hoists, Elevators, and Conveyors.

(Application for copies of OSHA publications should reference the Code of Federal Regulations, 29 CFR, and the Federal Register and should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS specified 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).

* AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 4985 - Standard Specification for Low Silicate Ethylene Glycol Base Engine Coolant for Heavy Duty Engines Requiring an Initial Charge of Supplemental Coolant Additive.

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

THE EUROPEAN TYRE AND RIM TECHNICAL ORGANISATION (ETRTO)

Standards Manual

(Application for copies of the ETRTO publications should be addressed to the European Tyre and Rim Technical Organisation, 32, Avenue Brugmann, 1060 Brussels, Belgium.)

NATIONAL BUREAU OF STANDARDS

U.S. Product Standard PS 1-83 for Construction and Industrial Plywood

(Applications for copies of National Bureau of Standards publications should be addressed to the National Center for Standards and Certification, Department of Commerce, Administration Building, Room A-633, Gaithersburg, Maryland 20899.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA No. 70 - National Electric Code.

(Application for copies of NFPA publications should be addressed to the National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.)

NATIONAL TRUCK EQUIPMENT ASSOCIATION (NTEA)

Conversion Hoist Chart.

Dump Body Hoist Chart.

(Application for copies of NTEA publications should be addressed to the National Truck Equipment Association, 38705 Seven Mile Road, Suite 345, Livonia, MI 48152.)

SAE, INC.
SAE Standards and Recommended Practices

J318	- Air Brake Gladhand Service (Control) and Emergency (Supply) Line Couplers - Trucks, Truck-Tractors and Trailers (DOD adopted).
J350	- Spark Arrester Test Procedure for Medium Size Engines (DOD adopted).
J516	- Hydraulic Hose Fittings.
J517	- Hydraulic Hose.
J537	- Storage Batteries.
J551	- Performance Levels and Methods of Measurement of Electromagnetic Radiation from Vehicles and Devices (30-1000 MHz).
J560	- Seven-Conductor Electrical Connector for Truck-Trailer Jumper Cable.
J588	- Turn Signal Lamps.
J589	- Turn Signal Switch.
J682	- Rear Wheel Splash and Stone Throw Protection (DOD adopted).
J683	- Tire Chain Clearance - Trucks, Buses, and Combinations of Vehicles.
J688	- Truck Ability Prediction Procedure (DOD adopted).
J700	- Upper Coupler Kingpin - Commercial Trailers and Semitrailers.
J704	- Openings for Six- and Eight-Bolt Truck Transmission Mounted Power Take-Offs.
J844	- Nonmetallic Air Brake System Tubing (DOD adopted).
J931	- Hydraulic Power Circuit Filtration.
J1067	- Seven-Conductor Jacketed Cable for Truck-Trailer Connections.
J1349	- Engine Power Test Code - Spark Ignition and Diesel.

(Application for copies of SAE publications should be addressed to SAE, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.)

THE TIRE AND RIM ASSOCIATION, INC.
Year Book.

(Application for copies of Tire and Rim Association publications should be addressed to the Tire and Rim Association, Inc., 175 Montrose West Ave., Copley, OH 44321.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this 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 Standard vehicle and accessories. Except as specified in 3.1.1 through 3.1.1.14, the vehicle, components, assemblies, and accessories to be delivered under the contract shall be standard or optional items, which meet or exceed the requirements of this specification. Except as specified in 3.1.1 through 3.1.1.14, no removal, substitution or alteration of the chassis manufacturer's standard or optional chassis model components shall be made. All chassis items shall be as represented in the chassis manufacturer's technical data book. Special bodies or mounted equipment shall be as represented in the body and equipment manufacturer's technical data. Technical data shall be limited to specifications and technical material, identical to that furnished to the authorized company representatives for selection of vehicle models and components, and shall be available to the engineering offices of the procuring activity, prior to delivery of the items. The chassis model furnished shall be not older than the chassis manufacturer's current model on the date of invitation for bids.

3.1.1 Special requirements. In addition to the standard vehicle and components specified in 3.1, the vehicle shall be furnished with special equipment as specified herein.

3.1.1.1 Treatment and painting. The vehicle shall be treated and painted in accordance with MIL-STD-1223. As specified by the procuring activity for the appropriate military service (see 6.2), the exterior color shall be in accordance with MIL-STD-1223. For civil agencies, the manufacturer's standard treatment and painting is acceptable. For civil agencies, unless a specific color is specified (see 6.2), the exterior color shall be selected by the manufacturer from one of the manufacturer's standard, non-metallic light colors. When specified (see 6.2), color selection will be made after contract award from the standard color charts to be supplied by the manufacturer.

3.1.1.2 Markings and data plates. As specified by the procuring activity for the appropriate military service (see 6.2), identification marking and data plates shall be in accordance with MIL-STD-1223. For civil agencies, a decal or sticker shall provide at least the following

information: contract number; purchase order number; date of delivery month and year; and the warranty time, in months and miles (GSA Form 1398). When specified (see 6.2), concealed military markings shall be furnished.

3.1.1.3 Rustproofing. When specified (see 6.2), the vehicle shall be rustproofed in accordance with FED-STD-297. When specified (see 6.2), tropical rustproofing in accordance with FED-STD-297 shall be furnished.

3.1.1.4 Drain plugs. Drain plugs installed in manual transmissions and rear axles shall be of the permanent magnet type.

3.1.1.5 Wood treatment. As specified herein (see 3.5.3.3 and 3.5.7.9), wood shall be treated in accordance with MIL-STD-1223. For civil agency contracts, the manufacturer's standard wood treatment is acceptable.

3.1.1.6 Towing devices. Towing devices consisting of two hooks, loops, eyes or pins or the chassis manufacturer's standard single center mounted eye or pin shall be mounted on the front of the vehicle. When specified, except for type VI maintenance trucks and type VIII refrigerator trucks, (see 6.2), in addition, towing devices shall be mounted on the rear of the vehicle. All towing devices shall be frame rail mounted or reinforced back to each frame rail.

3.1.1.7 Wheel splash and stone throw protection. Type III stakes, type IV dumps, type VII vans, and type VIII refrigerator vans shall have rigid splash shields ahead of the rear wheels and rubber mud flaps to the rear of the rear wheels. Type II tractors shall have rigid quarter fenders to the front of the rear wheels and rubber mud flaps to the rear of the rear wheels. Tractor mud flaps and their extension supports shall be readily removable, to increase landing wheel clearance, without the use of hand tools. A metal strip not less than 3.2 millimeters (mm) (0.125 inch) thick and not less than 25 mm (1 inch) wide, extending the entire width of the mud flap, shall be installed to prevent the bolt heads or bolt nuts from damaging the mud flap. As an alternate method of attaching the mud flaps, tabs or clips with minimum surface contact dimensions of 25 mm (1 inch) high by 32 mm (1.25 inch) wide by 2.4 mm (0.094 inch) thick shall be furnished at each bolt. All tilt cabs shall have rubber mud flaps to the rear of the front wheels. All splash shield and mud flap installations, front and rear, shall conform to the rear splash and stone throw protection provisions of SAE J682. The quarter fenders on tractors need extend down only to the height of the centerline of the rear axle.

3.1.1.8 Trailer towing package. When specified (see 6.2), except for type III stake dump truck, a trailer towing package shall be furnished. The trailer towing package shall consist of a pintle, safety chain attachment devices, a lighting receptacle, a trailer brake control system, and associated reinforcements and wiring, and shall be installed on the rear of the vehicle. The pintle shall be of the rotating type conforming to

MS 51118. The pintle shall be installed on the chassis frame with reinforcements to transfer a vertical tongue load of not less than 1815 kg (4,000 pounds) and a horizontal drawbar load of not less than 178 kilonewtons (kN) (40,000 pounds) directly to the chassis rails. Except on type II tractors, the rearmost portion of the pintle shall be forward, but not more than 100 mm (four inches) forward, of the rearmost part of the vehicle. Two trailer safety chain attachment devices, one adjacent to each side of the pintle, shall be provided. Each attachment device shall provide an ultimate strength at least equal to the GVW of the truck furnished. The attachment devices shall be capable of accommodating a standard grab hook [116 mm (4-9/16 inches) wide, 30 mm (1-3/16 inches) thick, 19.8 mm (25/32-inch) throat width)] for a 16 mm (5/8-inch) chain. The lighting receptacle, conforming to SAE J560 with its conductors connected and color-coded as specified herein, or number coded, shall be mounted in a readily accessible location near the pintle. The lighting receptacle on type IV dump trucks shall be located to prevent damage during dumping of the cargo. The trailer brake control system shall conform to 3.4.11.2.

3.1.1.9 Trailer lighting cable. When specified (see 6.2), a trailer lighting cable conforming to SAE J1067 shall be furnished. The cable shall be coiled and shall be not less than 2800 mm (110 inches) long when fully extended. Both ends of the cable shall be equipped with a round plug conforming to SAE J560. The plugs shall be equipped with a grip for withdrawing from the connector sockets. The cable shall be packaged and stowed in the vehicle tool compartment.

3.1.1.10 Spark arrester. As specified herein (see 3.4.4.1), the vehicle shall be furnished with an exhaust system spark arrester.

3.1.1.11 Hydraulic tailgate (types III, VII and VIII only). When specified (see 6.2), the vehicle shall be equipped with an electric motor driven hydraulic tailgate. Unless otherwise specified (see 6.2), the hydraulic tailgate shall have a rated capacity of not less than 910 kg (2,000 pounds). All hydraulic cylinders shall be provided with flow restrictors in the down port of the cylinders to prevent the tailgate from falling rapidly in the event of a hydraulic system failure. The tailgate platform shall be of the ramping type and shall have a depth of not less than 810 mm (32 inches) exclusive of the ramp. The ramp shall taper down to ground level to facilitate loading with a wheeled hand cart. Platform loading area shall be of nonskid sheet steel. The tailgate shall have devices for holding the platform in stowed position for vehicle travel. When the tailgate is in position for loading the vehicle, the clearance between the rear edge of the vehicle and the tailgate shall be not more than 19 mm (0.75 inch) and the tailgate shall be on the same level as the body floor. Controls shall be mounted outside the body on the curbside of the vehicle. The vehicle ignition switch or a separate switch in the driver's compartment shall allow the driver to disconnect the power source to the tailgate. A decal or plate describing operation of the hydraulic tailgate shall be provided in close proximity to the hydraulic tailgate controls (see 3.1.1.13).

3.1.1.11.1 Rear fold tailgate. Unless a fold-under type tailgate is specified (see 3.1.1.11.2), the tailgate shall fold vertically against the rear of the vehicle for travel. All tailgate operations shall be hydraulically powered or metered, providing for raising, lowering, folding and unfolding without manual assistance. The tailgate platform width shall be not less than 2130 mm (84 inches) for type VII van and type VIII refrigerator van and not less than 2290 mm (90 inches) for type III stake. Rear bumper and additional rear end protection need not be furnished.

3.1.1.11.2 Fold-under tailgate. When specified (see 6.2), the tailgate shall manually fold under the vehicle for travel and manually unfold for use. Hydraulically powered raising and metered lowering shall be provided. The tailgate platform width shall be not less than 2130 mm (84 inches). Rear bumperettes extending to the rear beyond the stowed tailgate shall be provided on each side of the rear, beyond the 2130 mm (84-inch) platform width. Additional rear end protection need not be furnished. (A fold under tailgate is available on vans only with a van roll-up rear door.)

3.1.1.11.3 Rail lift tailgate (types VII and VIII only). When specified (see 6.2), the tailgate shall be a body mounted rail lift type conforming to 3.1.1.11.1. A rear underride guard shall be provided. (A rail lift is available only on vans and only with a van roll-up rear door.)

3.1.1.12 Hydraulic fluid identification plate. When a body hydraulic system is furnished and the hydraulic system requires fluid replenishment, a corrosion-resistant identification plate shall be furnished. The plate shall be installed near the filler cap and shall identify the type of hydraulic fluid to be used. (See 3.1.1.13.)

* 3.1.1.13 Decals and data plates. The hydraulic tailgate operating instructions, the hydraulic fluid identification information and the power takeoff caution notice shall be on a standard decal or plate from the supplier of that item or shall conform to type I or type II, class 1 of MIL-M-43719 or composition A (class 1 or 2) or composition C of MIL-P-514.

3.1.1.14 Brake lights. At least one pair of brake lights shall override the four-way emergency flasher or the two systems shall be independent of each other. Modifications to the manufacturer's standard product to accommodate this requirement shall not compromise conformance to any Federal Motor Carrier Safety Regulation referenced herein or to any Federal Motor Vehicle Safety Standard. If additional lights are added to the vehicle, the lights shall be selected from the chassis manufacturer's standard matching hardware. On truck tractors, the brake lights need to override the four-way flasher only when coupled to a semitrailer.

3.2 General design.

3.2.1 Federal Motor Vehicle Safety Standards. The vehicle and furnished accessories shall comply with all Federal Motor Vehicle Safety Standards in effect on the date of manufacture.

3.2.2 Air pollution control. The vehicle shall comply with the Environmental Protection Agency Regulations governing Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines in effect on the date of manufacture. In addition, vehicles destined for California shall comply with State of California regulations governing air pollution control in effect on the date of manufacture.

3.2.3 Sound level. The cab interior sound level shall not exceed 84db(A) when measured in accordance with Federal Motor Carrier Safety Regulation 393.94. The vehicle exterior sound level shall conform to the Environmental Protection Agency Noise Emission Standards for Transportation Equipment, Medium and Heavy Trucks.

3.2.4 Curb weight. The curb weight shall include the weight of the chassis and cab, with all attachments, accessories, and equipment; the body or fifth wheel (except for chassis type); and a full complement of fuel, lubricants and coolant.

3.2.5 Gross vehicle weight. The gross vehicle weight (GVW) shall consist of the curb weight, operator weight (computed at 80 kg (175 pounds)) and a payload to provide not less than the specified GVW.

3.2.6 Weight distribution. Except as specified in 3.2.6.1 and 3.2.6.2, the distribution of GVW for the purpose of establishing suspension, axle and tire capacities shall be determined with the payload uniformly distributed over the load area. A vehicle with a crew cab shall have the weight distribution determined with 240 kg (525 pounds) of the payload in the rear seat. For type II tractor furnished with a sliding fifth wheel, the weight distribution shall be determined with the sliding fifth wheel in its most forward position of adjustment.

3.2.6.1 Specified GAWR. The gross axle weight rating (GAWR) shall be not less than 4540 kg (10,000 pounds) on the front and 10 200 kg (22,500 pounds) on the rear for class C, type II tractor, and class C, type IV dump. When specified for other vehicle types (see 6.2), front and rear GAWR shall be as designated and 3.2.6 does not apply.

3.2.6.2 Snowplow weight provisions. When a snowplow is specified (see 3.5.4.8), or when specified (see 6.2) to accommodate future installation of a snowplow, increased front GAWR shall be furnished. The front GAWR shall be not less than the load imposed by the snowplow (or a 860 kg (1,900 pound) load located 1520 mm (60 inches) forward of the centerline of the front axle

when snowplow provisions but not a snowplow are specified) plus a uniformly distributed payload over the load area, both totaling a payload to provide not less than the specified GVW. The rear GAWR shall be not less than the load imposed without the snowplow by a uniformly distributed payload over the load area to provide not less than the specified GVW.

3.2.7 Gross combination weight. Gross combination weight (GCW) shall consist of the truck tractor curb weight, operator weight (computed at 80 kg (175 pounds)), and the weight of a semitrailer loaded to provide not less than the specified GCW. The fifth wheel shall be located so that with the truck tractor loaded to GVW, the load ratings of the chassis components are not exceeded.

3.2.8 Ratings. Vehicle ratings shall be the manufacturer's published ratings. Component and vehicular ratings shall not be raised to meet the requirements of this specification. When published ratings are not available, verification of ratings shall be available to the engineering office of the procuring activity. Minimum GVW and GCW ratings shall conform to table II for the specified class of vehicle.

TABLE II. GVW and GCW minimum ratings.

Vehicle class	GVW, kg (pounds)	GCW, kg (pounds)
A	10 900 (24,000)	18 150 (40,000)
B	12 700 (28,000)	20 400 (45,000)
C	14 500 (32,000)	24 950 (55,000)

3.2.9 Overall width. The overall width of the vehicle, exclusive of tires and safety related items such as mirrors, lights, and reflectors shall be not more than 2440 mm (96 inches). The width over the tires shall be not more than 2540 mm (100 inches) for axles rated at 10 430 kg (23,000 pounds) or less and not more than 2640 mm (104 inches) for axles rated at over 10 430 kg (23,000 pounds).

3.2.10 Accessibility. The design of the vehicle and optional equipment shall permit access for routine servicing and shall permit access for replacement and adjustment of component parts and accessories with minimal disturbance of other components and systems.

* 3.2.11 Prohibited materials. Except as permitted in 3.4.11, asbestos materials shall not be used in any form in any part of the vehicle. No item, part or assembly shall contain radioactive materials in which the specific activity is greater than 0.002 microurie per gram or activity per item equals or exceeds 0.01 microcuries.

3.2.12 Cranes. Trucks with mounted cranes shall conform to all applicable OSHA regulations, including OSHA 1926.550.

3.3 Performance.

3.3.1 Speeds and gradeability. High and low speed requirements shall be met with the truck tractor loaded to specified GCW and with all other trucks loaded to specified GVW.

* 3.3.1.1 High speed gradeability. Unless otherwise specified, for military agency contracts, the vehicle shall ascend the standard continuous grades specified in table III at 80 kilometers per hour (km/h) (50 miles per hour (mph)). For all civil agency contracts and when specified (see 6.2) for military agency contracts, the vehicle shall ascend the optional grades specified in table III at 80 km/h (50 mph). Gradeability requirements shall be met with the main transmission in direct drive and, when a multispeed axle is furnished, with the axle in high speed range. Gradeability shall be verified with calculations in accordance with SAE J688 (see 6.3).

* TABLE III. Gradeability.

Vehicle required gross weight, kg (pounds)		Standard percent of grade		Optional percent of grade	
Truck GVW	Truck tractor GCW	Truck	Truck tractor	Truck	Truck tractor
10 900 (24,000)	-- --	2.5	--	2.9	--
12 700 (28,000)	-- --	2.0	--	2.7	--
14 500 (32,000)	-- --	1.5	--	2.6	--
-- --	18 150 (40,000)	--	1.2	--	2.3
-- --	20 400 (45,000)	--	1.1	--	2.2
	24 950 (55,000)	--	0.9	--	1.8

3.3.1.2 Low speed. Low speed for vehicles with a manual transmission shall be calculated with the engine operating at not less than 35 percent of recommended governed speed, and shall provide not more than the vehicle speed (mph) specified in table IV for the corresponding number of available forward speeds.

* TABLE IV. Vehicle low speed requirement.

Number of forward speeds	Maximum low speed, km/h (mph)
5	7.2 (4.5)
7 or 8	5.6 (3.5)
9 or 10	4.8 (3.0)

* 3.3.1.3 Maximum geared speed. The maximum geared speed at engine governed speed shall be not less than 93 km/h (58 mph). Conformance to geared speed specified shall be determined by calculating in accordance with the following formula:

$$\text{Maximum geared speed (km/h)} = \frac{\text{Governed speed (rpm)} \times 1.609}{\text{Total gear reduction} \times \text{tire factor (see 6.3)}}$$

3.3.2 Service brakes. The service brakes shall control and hold the vehicle, when loaded to its specified GVW, on a 30 percent grade. On all vehicles except type II truck tractors, the service brakes shall stop the vehicle, loaded to specified GVW, within the stopping distance requirements of Federal Motor Carrier Safety Regulation 393.52. The service brakes on type II truck tractor shall stop the tractor-semitrailer combination, loaded to specified GCW, within the stopping distance requirements of Federal Motor Carrier Safety Regulation 393.52.

3.4 Chassis components.

3.4.1 Engine. The engine furnished for the specified vehicle class shall be the chassis manufacturer's standard or optional engine for the commercial model truck which meets or exceeds the requirements of this specification.

* 3.4.1.1 Diesel engine. Unless otherwise specified (see 3.4.1.2), the vehicle shall be equipped with a liquid cooled, compression ignition, two-stroke or four-stroke cycle diesel engine with not less than six cylinders. Engine net power figures used in performance prediction calculations shall be determined in accordance with SAE J1349. For military contracts only, the engine shall demonstrate the performance characteristic specified herein when using diesel fuel conforming to VV-F-800. In addition, when specified (see 6.2), the engine shall operate satisfactorily on grade JP-4 and grade JP-5 fuel conforming to MIL-T-5624 under emergency, short duration conditions and on grade JP-8 fuel conforming to MIL-T-83133 under normal conditions. A power loss when operating on JP-4, JP-5 or JP-8 is acceptable.

3.4.1.2 Gasoline engine. When specified (see 6.2), the vehicle shall be equipped with a liquid cooled, internal combustion, four-stroke cycle gasoline engine with not less than six cylinders. The engine furnished shall produce the required vehicle performance when operated on unleaded fuel with a research octane rating of 91, at an engine speed not more than the manufacturer's recommended operating speed. The engine shall be capable of warranted operation on unleaded fuel, when used in accordance with the operator's manual. Engine net power used in performance prediction calculations shall be determined in accordance with SAE J1349. Unless otherwise required by foreign laws, vehicles for overseas use shall be capable of accepting and operating on leaded gasoline.

3.4.1.3 Oil filter. A full flow or combination full flow and bypass oil filter with replaceable element shall be furnished.

3.4.1.4 Governor. An engine governor shall be furnished and set and sealed to limit the engine to the engine manufacturer's recommended operating speed.

* 3.4.1.5 Cooling system. The cooling system shall maintain the engine coolant at a temperature below the boiling point with the vehicle loaded to GVW and operated at an altitude of 3050 meters (m) (10,000 feet) above sea level or in an ambient air temperature of not less than 52° Celcius (°C) (125° Fahrenheit (°F)). The cooling system shall include a surge tank or a coolant recovery reservoir of not less than 1.89 liters (L) (two quart) capacity. On tilt cab models, a radiator servicing access door shall be provided to allow verification of the coolant level. For cooling system servicing see 3.4.26.1.

3.4.1.6 Coolant temperature control. Thermostatic control of engine coolant temperature shall be provided. On diesel engine driven vehicles, the control shall include complete thermostatic control of all coolant flow through the radiator.

3.4.1.7 Fan clutch. A fan clutch shall be provided. The fan clutch shall reduce the fan speed automatically when the fan is not required for engine cooling. The fan clutch shall be asbestos free.

3.4.1.8 Silicone rubber hoses. When specified (see 6.2), silicone rubber radiator and heater hoses shall be furnished.

* 3.4.1.9 Power plant heaters and fuel warmer. When specified (see 6.2), a coolant heater, an engine oil heater, and fuel warmers (diesel engine driven vehicles only) shall be provided. Heaters shall operate on 110-volt alternating current (ac), and shall be wired through a junction block, including fuse or circuit breaker, to a single three-pronged (male), weatherproof slave receptacle for receiving external power and grounding the vehicle. The receptacle shall be located on the streetside of the vehicle, as near the cab door as practicable. A three-wire connecting cable, not less than 7600 mm (25 feet) long and of adequate line capacity to supply power for all heater units simultaneously, shall be furnished. Connecting cable shall include a matching female connector at the vehicle end and a standard three-pronged (two power plus one ground) male connector at the other end. Electrical apparatus shall conform to Federal Motor Carrier Safety Regulation 393.77(c)(7). The electrical insulation of the connecting cable shall withstand normal operating stresses in low ambient air temperatures (down to -51°C (-60°F) without cracking or loss of dielectric capacity. All heater lead wires shall be installed without interfering with vehicle component operation and without loose excess wire. Provisions for stowage of the cable shall be provided in the vehicle cab. Heaters and fuel warmers shall be furnished as follows:

(a) A coolant heater, 1500-watt (W) minimum rating, shall be installed in the engine block or in the lower coolant inlet hose. An engine thermostat with an operating range of 77°C (170°F) to 90°C (195°F) shall be installed

* (b) An oil pan heater of the permanent external surface mount, permanent in-pan mount, or immersion type that meets the following requirements shall be installed.

* (1) Not less than 16 W/L (15 watts per quart) heating capacity

* (2) Not more than 2.8 watts per square centimeter (W/cm^2) (18 watts per square inch) heating capacity

(3) Thermal balance design or thermostat control providing for uninterrupted operation.

(4) Provision for mounting below minimum service oil level.

* (c) An in-line fuel warmer or preheater unit shall be provided on diesel engine driven vehicles to prevent clogging of fuel filters due to wax crystallization in the fuel. The unit shall use engine coolant to transfer sufficient heat to the diesel fuel to heat it from an inlet temperature of -40°C (-40°F) to an outlet temperature of -13°C (+9°F), with a fuel flow rate not less than the maximum fuel demand of the engine fuel system. A coolant shutoff valve shall be provided for the coolant inlet side of the fuel warmer unit. The unit shall not cause heating of the fuel above 27°C (80°F) under any possible condition.

* (d) An in-tank fuel warmer or preheater unit shall be provided on diesel engine driven vehicles. The unit shall use engine coolant to transfer heat to the fuel in one fuel tank. The warmer shall not cause heating of any fuel above 27°C (80°F) under any possible condition, shall not disable or cause elimination of the fuel gage sending unit and shall not violate 3.2.1 or any Federal Motor Carrier Safety Regulation. A coolant shut off valve shall be included. The units required by 3.4.1.9(c) and (d) may be combined.

* 3.4.1.10 Fuel fired engine preheater. When specified (see 6.2) for diesel engine driven vehicles, a diesel fuel fired engine water heater shall be furnished to preheat the engine. The heater shall include a timer, a thermostat and a circulating pump, and shall be connected to the engine coolant system. The heater shall be capable of starting and operating at -51°C (-60°F) and shall heat the engine to +4°C (+40°F) from -51°C (-60°F) in not more than 1 hour. The system shall be equipped with a light, visible to the driver, to indicate that the preheater is operating. The system shall include fuel warmers or preheaters conforming to 3.4.1.9(c) and (d).

* 3.4.1.11 Vernier throttle control. When specified (see 6.2), a manual vernier controlled throttle with quick release shall be furnished, except on electronically controlled engines.

3.4.2 Electrical system. The electrical system shall be in accordance with Federal Motor Carrier Safety Regulations 393.27 through 393.31 and 393.33.

* 3.4.2.1 Starting system. For diesel engine driven vehicles, a 12- or 24-volt starting system, with 12-volt direct current (dc) lighting system shall be furnished. Engine starting equipment shall include an ether starting system, glow plug or electric grid heater. If an ether system is furnished in lieu of a glow plug or grid heater, it shall be of the measured shot type. The measured shot type ether system shall be key operated or manually operated from the driver's compartment, and shall be inoperative with the engine warm. Complete provisions for a replaceable ether reservoir of not less than 355 milliliters (mL) (12 fluid ounces) shall be furnished. A reservoir need not be furnished. When specified (see 6.2) for diesel engines, the starter motor shall be equipped with a thermostat controlled, automatic resetting circuit breaker to protect the motor from overcrank heat damage. The circuit breaker shall not limit cranking ability for a startable engine.

3.4.2.2 Ignition system. For gasoline engine driven vehicles, a 12-volt dc ignition system shall be furnished.

3.4.2.3 Alternator. Unless otherwise specified (see 6.2), on diesel engine driven vehicles, a minimum 75-ampere alternator shall be furnished. The alternator output with the engine at idle speed shall be not less than 45 amperes. Unless otherwise specified (see 6.2), an alternator of not less than 85 amperes rated capacity, and which provides not less than 45 amperes dc output at normal engine idle speed, shall be furnished on gasoline engine driven vehicles.

3.4.2.4 Lighting. All vehicle lights, reflectors, and wiring shall conform to Federal Motor Carrier Safety Regulations 393.12, 393.13, 393.19, 393.20 and 393.22 through 393.26(d). Type I chassis need not be furnished with rear identification lamps or clearance lamps and reflectors. Type IV dump truck rear lighting shall be positioned or guarded to prevent damage during dumping of the cargo. Positioning and guarding shall permit normal replacement of the bulbs and lenses. Lights and reflectors shall not be mounted on vertical surface of rub rails (unless recessed and fully protected) or mounted on vehicle bumpers. When right hand drive is specified by acquisition documents, left-dip headlights shall be provided. Left-dip headlights may be provided as a replacement set, stowed in the cab for shipment.

* 3.4.2.5 Turn signals. Turn signal lamps shall conform to SAE J588. Operating units shall conform to SAE J589, class A, and shall be mounted on the steering column. Turn signal units shall be installed in accordance with SAE J588. Type II truck tractor turn signal units shall be visible when not

in combination with a towed vehicle. Turn signals shall have visible flash indicators. Temporary mounting for rear signal units shall be provided on chassis models.

* 3.4.2.6 Lighting cable for type II truck tractor. The semitrailer lighting cable for type II truck tractor shall conform to SAE J1067. The cable shall incorporate a connector conforming to SAE J560 on the semitrailer end. The cable shall be precoiled and shall have an extended length of not less than 2800 mm (110 inches). The SAE J560 connector shall include a grip for withdrawing from the semitrailer receptacle. Stowage for the cable shall be provided by the means of a hook and hanging loop or a protective holding bracket. When the hook and loop method is used, the cable shall be so attached as to ensure that the plug is pointed down when the cable is stowed. Unless otherwise specified, stowage shall be by:

(a) A hook provided on the rear of the truck tractor cab
(b) A hook on a pogo-stick type hose tender
(c) A protective bracket mounted at the rear of the cab below the roof line.

Each shall hold the cable plug so as to prevent water from entering the terminals. When specified (see 6.2), in lieu of the foregoing locations, the lighting cable; when on the hook, loop or protective bracket; shall be accessible to an operator standing on the ground to the rear of the cab, on the streetside of the vehicle.

3.4.2.7 Batteries. Each battery shall be of 12-volt potential. The total reserve capacity ratings and the total cold cranking ampere ratings at -18°C (0°F), both measured in accordance with SAE J537, shall be not less than specified in table V. The batteries shall be of the maintenance-free type having the maintenance-free characteristics listed in W-B-131.

* TABLE V. Batteries.

Engine type	Reserve capacity (minutes)	Cold cranking (amperes)
Diesel engine, 200 kilowatts (kW) gross (270 gross horsepower) or less	480	1,875
Diesel engine, over 200 kW gross (270 gross horsepower)	640	2,500
Gasoline engine	100	450
Gasoline engine with electric tailgate	115	535

3.4.2.8 Auxiliary 24-volt system with trailer receptacle. When specified (see 6.2), an auxiliary 24-volt system, with a trailer receptacle assembly, shall be furnished. Either a converter type (see 3.4.2.8.1) or an alternator type (see 3.4.2.8.2) system, meeting specified requirements, shall be furnished. A trailer receptacle, conforming to MS 75021-2, with cover assembly, shall be provided in an accessible location on the rear end of the vehicle. A 12-conductor truck tractor cable, not less than 2800 mm (110 inches) long, with both ends of cable equipped with connectors conforming to MS 75020-1 and MS 75020-2, shall be furnished. The cable assembly shall be stowed in the vehicle. The 24-volt, service lighting circuit shall be connected through the appropriate lighting controls to terminals B, D, E, J and L of MS 75021-2. On type II truck tractor, a pogo stick type hose tender shall be provided behind the cab to accommodate and secure the 24-volt cable.

* 3.4.2.8.1 Converter type 24-volt system. The 12- to 24-volt converter(s) shall operate from the 12-volt battery (see 3.4.2.7). The output capacity shall be not less than 24 amperes. More than one converter may be provided to furnish a total of 24 amperes.

3.4.2.8.2 Alternator type 24-volt system. The alternator type 24-volt system shall be separate from the 12-volt vehicle lighting and ignition system and shall include:

(a) Nominal 24-volt alternator with not less than 25 amperes rated capacity and capable of providing not less than 7 amperes dc output at normal engine idle speed
(b) Two 12-volt batteries with a combined capacity of at least 40 ampere-hours at a 20-hour rate or one 24-volt battery with at least 20 ampere-hours capacity at a 20-hour rate
(c) Voltage regulating device
(d) An ammeter for the 24-volt system, mounted on the instrument panel.

3.4.2.9 Radio interference suppression. Unless otherwise specified (see 6.2), the vehicle shall be suppressed to limit electromagnetic radiation in accordance with SAE J551. Any body equipment emitting electromagnetic radiation shall be suppressed to the same level as the vehicle chassis.

3.4.3 Fuel system. The fuel system shall conform to Federal Motor Carrier Safety Regulations 393.65 and 393.67.

* 3.4.3.1 Air cleaner. An air cleaner shall be furnished. When specified (see 6.2), a dry type air cleaner with dash mounted service indicator shall be furnished for diesel engine driven vehicles.

3.4.3.2 Fuel tank(s). Except as specified for type II truck tractor or unless otherwise specified for other vehicle types (see 6.2), fuel tank(s) shall be not less than 189 L (50 gallons) total capacity (163 L (43 gallons) for vehicles destined for California)). Type II truck tractor shall be

equipped with fuel tank(s) of not less than 378 L (100 gallons) total capacity (321 L (85 gallons) for vehicles destined for California)). When more than one fuel tank is furnished on diesel engine driven vehicles, means shall be provided to assure equalized fuel level in both tanks. When more than one tank is furnished on gasoline engine driven vehicles, a selector valve connecting either tank to engine fuel intake shall be provided and means shall be provided to monitor the fuel level of either tank from a single fuel gage; or an equalizing pump shall be used to maintain the same fuel level in both tanks.

3.4.3.3 Fuel and water separator. The manufacturer's standard or optional fuel filter shall be provided. When specified (see 6.2), a fuel and water separator shall be furnished. The separator shall include a water coalescer and a drain valve. When a separator is required, a combination filter/separator unit may be furnished.

3.4.4 Exhaust system. The exhaust system shall conform to Federal Motor Carrier Safety Regulation 393.83. When vertical exhaust mufflers are furnished on type II truck tractors, a heat shield shall be provided. On all other types of trucks, if vertical exhaust mufflers are furnished, and if they are capable of being reached easily by personnel entering or leaving either side of the cab, a heat shield shall be provided. Vertical exhaust systems shall be provided with a hinged rain cap. All horizontal portions of the exhaust system on type II truck tractors which project to the rear of the cab shall be provided with a cover plate that forms a shield to shed fluids, preventing spilled fuel from coming into contact with the exhaust system.

3.4.4.1 Spark arrester. For military contracts, a spark arrester shall be furnished on all type II truck tractors, except when a turbocharged engine is furnished. When specified for other vehicles (see 6.2), a spark arrester shall be furnished, except on vehicles with turbocharged engines. The spark arrester shall have an 80 percent arresting efficiency when rated in accordance with SAE J350.

* 3.4.5 Transmission. Unless a manual transmission is specified, the vehicle shall be equipped with an automatic transmission. When specified (see 6.2), the vehicle shall be equipped with a manual transmission, complete with clutch. The input torque capacity of the transmission shall be at least equal to the maximum torque delivered by the engine. The transmission and axle gear ratios shall be selected to provide the performance specified in 3.3.1 through 3.3.1.3.

* 3.4.5.1 Automatic transmission. The automatic transmission shall include a hydraulic torque converter and not less than four forward gear ratios. Normal driving range selector position shall provide not less than four gear ratios without movement of the selector. The transmission shall be provided with a power takeoff opening. The net torque capacity and the net power rating of the transmission shall exceed the output ratings of the

engine and, for type IV dump trucks, in no case shall the net torque capacity be less than 650 newton-meters (N m) (480 pound feet) or the net power rating be less than 185 kW (250 horsepower.)

* 3.4.5.2 Manual transmission. The manual transmission and other vehicle equipment shall provide not less than the number of vehicle forward speeds specified in table VI. When more than five forward speeds are required, a multispeed transmission, auxiliary transmission, or two-speed axle shall be provided. Gear ratios in the transmission and axle shall be matched to provide a progressive shifting pattern throughout the complete range. The transmission shall be provided with SAE J704 power takeoff openings at the right and left sides. The transmission shall provide for maximum ease of shifting in all speeds.

TABLE VI. Vehicle requirements - minimum number of forward speeds.

Vehicle class	Dump truck and truck tractor	Truck
A	7	5
B	7	5
C	9	8

3.4.5.2.1 Clutch. The clutch shall be the largest capacity clutch offered for the type and class vehicle and engine furnished with the clutch torque capacity exceeding the maximum delivered engine torque. The clutch lining shall be asbestos free.

3.4.5.3 Power takeoff. When a power takeoff is furnished, it shall be of a rated capacity to operate powered equipment. Controls to operate the power takeoff shall be located in the truck cab accessible to the seated driver. See 3.4.1.11. A decal or caution plate reading "DO NOT OPERATE VEHICLE AT HIGHWAY SPEEDS WITH POWER TAKEOFF ENGAGED" shall be provided and installed so as to be readily visible to the seated driver. (See 3.1.1.13.)

3.4.6 Driveline components. Driveline components shall be adequate to transmit the maximum delivered torque of the engine, as developed through the maximum gear train reduction. The driveline shaft for front mounted winches shall have an angle not greater than 16 degrees from the longitudinal plane.

* 3.4.7 Frame. The chassis frame shall be the manufacturer's standard for the type and class vehicle furnished. Type III stake trucks with a hydraulic crane, type III stake dump, type IV dump trucks, and when specified (see 6.2) other vehicle types, shall have a heavy duty main frame or frame reinforcements. The heavy duty frame shall have frame rails of greater section modulus than the manufacturer's standard for the class vehicle furnished and shall provide structural strength at least equivalent to the reinforced frame specified herein for the type vehicle furnished.

Reinforcements shall extend at least from the rear of the front suspension, rear hanger bracket to the front of the rear spring, front hanger bracket. Reinforcements for type III stake dump and type IV dump shall provide sufficient structural strength in the chassis frame, through increased resisting bending moment (RBM), to at least equal the loads imposed, with the dump truck loaded to provide specified GVW. Frame reinforcements for type III stake with crane shall be in accordance with the body manufacturer's recommendations for the size of the crane furnished. Frame rails shall not project beyond the rear end of the body. Unless otherwise specified, on type II tractors, the chassis frame rails shall be cut off immediately to the rear of the rear spring rear hanger brackets or the frame crossmember closest to the rear of these brackets. When specified (see 6.2), the frame rails shall extend and shall taper from maximum cutoff position so as to assist in coupling to a semitrailer. When a RBM is specified in procurement documents, any frame combination of yield strength and section modulus that provides the required RBM is acceptable.

3.4.8 Suspension. Except as specified in 3.2.6.1 and 3.2.6.2, the vehicle shall be equipped with a suspension system with components having a rated capacity at least equal to the load imposed on each member, measured at the ground, with the vehicle loaded to specified GVW. When suspension is rated at the spring pads, unsprung weight shall be deducted. The vehicle shall be equipped with hydraulic, double-acting shock absorbers at the front wheels. When specified (see 6.2), auxiliary rear springs shall be provided.

* 3.4.8.1 Rear air suspension. When specified (see 6.2), for class A and B vehicles, an air suspension system shall be furnished on the rear axle. An air suspension system shall not be furnished on type I chassis or type IV dump truck. The suspension system shall have not less than 60 percent of the sprung weight carried on the air springs. The air suspension system shall incorporate at least one track bar to control lateral movement. Each end of the track bar(s) and of the torque rod(s), if so equipped, shall be equipped with rubber bushings that do not require periodic lubrication. The suspension system shall incorporate leveling valve(s) with time delay or other devices to minimize constant air consumption. On type II truck tractors, the system shall be equipped with an air pressure dump valve. Controls shall be located in the cab, accessible to the seated driver. Hydraulic double-acting shock absorber(s) shall be provided near each of the air springs. The air suspension system shall include mechanisms to prevent damage from excessive extension when lifting and towing the vehicle. The suspension shall be provided with a mechanism at each wheel to assure lifting of the wheel and axle when jacking the vehicle from the applicable jacking location.

* 3.4.9 Axles. Except as specified in 3.2.6.1 and 3.2.6.2, axle ratings shall be at least equal to the load imposed on each axle, measured at the ground, with the vehicle loaded to specified GVW. The wheel bearings and axle spindles shall be oil lubricated. The hubcaps, except for driving

axles, shall have a window for visual determination of oil level. Provisions for venting or withstanding internal pressure build-up and for replenishing the oil supply shall be provided.

3.4.9.1 Two-speed axle. When specified (see 6.2), a two-speed axle shall be furnished, equipped with electric, vacuum, or air shift and provided with ratios which will permit proper gear splitting. The gear ratios shall provide the performance specified in 3.3.1 through 3.3.1.3.

3.4.9.2 Traction control. Type IV dump truck, and when specified (see 6.2) other vehicle types except type II truck tractor, shall be furnished with a traction control on the rear axle. The traction control shall actuate automatically to ensure that power is transmitted to the wheel having traction when the opposite wheel loses traction. Maximum traction capabilities shall be maintained at all times under each drive wheel(s) for the life of the vehicle.

3.4.10 Wheels, rims, tires and tubes. Unless wide base tires are specified, the vehicle shall be equipped with single front and dual rear wheels. Rims and tire ratings shall conform to Tire and Rim Association or European Tyre and Rim Technical Organisation recommendations for the type and size of tires furnished. Except when tube type tires are specified in procurement documents, multipiece rims shall not be furnished on front axles rated at 6350 kg (14,000 pounds) or less and on rear axles rated at 10 430 kg (23,000 pounds) or less. Rim and disc wheel sizes shall be the same for all wheels on class A and B vehicles. Tire size and load range (ply rating) shall be the same for all tires on class A and B vehicles. When specified (see 6.2), wide base type tires and wheels for the front and rear axles shall be provided in lieu of conventional front and dual rear wheels and tires. For classes A and B, wide base wheels shall be interchangeable without the use of an adapter. When specified (see 6.2), 10-stud disc type wheels shall be furnished.

* 3.4.10.1 Tires. Steel belted radial or, when specified (see 6.2), bias ply tires shall be furnished. Unless otherwise specified, low profile or standard profile tires may be furnished. When specified (see 6.2), low profile tires shall be furnished. Tires shall have highway tread. Tires shall be of the tubeless type or, for axles where multipiece rims are permitted (see 3.4.10), may be of the tube type. When tube type tires are permitted herein or specified, multipiece rims may be furnished. Except as specified in 3.2.6.1 and 3.2.6.2, tires shall be of rated capacity at least equal to the load imposed on each tire, measured at each wheel, at the ground, with the vehicle loaded to specified GVW. Tires shall conform to the Tire and Rim Association or to The European Tyre and Rim Technical Organization recommendations.

* 3.4.10.2 Inner tubes. When tube type tires are permitted herein or specified in procurement documents, inner tubes shall be of heavy duty type and shall be of proper size for tires furnished. Tube type radial tires shall have radial tire inner tubes. Tire flaps shall be provided for tube type tires in accordance with Tire and Rim Association recommendations.

3.4.10.3 Carrier for spare tire assembly. When specified (see 6.2), a carrier for a spare wheel or rim and tire assembly shall be installed in a readily accessible location on the vehicle. Threaded fasteners, when used to secure the spare tire in the carrier, shall be constructed of or plated with corrosion resistant material. The carrier design shall enable safe removal or mounting of a spare wheel assembly using only the tools specified in 3.4.16.1. The carrier shall enable the safe removal and installation of the spare tire assembly from and to the vehicle and carrier without personnel positioning themselves or any part of their body under the spare tire assembly. When a carrier is specified for type II truck tractors or type IV dump, it shall be mounted vertically behind the cab above the chassis frame (CAUTION: See 6.9).

* 3.4.10.4 Spare wheel or rim. When specified (see 6.2), a spare wheel or rim shall be furnished. When a spare wheel or rim or a spare tire assembly is furnished on a vehicle without a carrier, it shall be stowed securely on the vehicle for shipment. When a spare wheel or rim is furnished, it shall be of the same size as that furnished on the front axle of the vehicle.

* 3.4.10.5 Spare tire assembly. When specified (see 6.2), a spare tire assembly shall be furnished for the front axle. When specified (see 6.2), a spare tire assembly shall be furnished for the rear axle, in addition to, or in lieu of, a spare tire assembly for the front axle. The spare tire assembly shall be identical to those on the axle for which it is intended. The spare tire assembly(ies) shall include an inflated spare tire(s) mounted on the spare wheel(s) or rim(s).

3.4.10.6 Tire chain clearance. Tire chain clearance in accordance with SAE J683 shall be provided. Allowance for spring deflection shall be included.

3.4.11 Brakes. Brakes shall conform to Federal Motor Carrier Safety Regulations 393.40 through 393.43 and 393.45 through 393.52. Brake linings shall be of nonasbestos material on axles rated at 10 440 kg (23,000 pounds) or less.

3.4.11.1 Service brakes. The vehicle shall be equipped with full-air brakes. The braking system, complete with all necessary components. shall include:

(a) Air compressor, unloader-head type, engine driven and engine lubricated, air or water cooled, and having a capacity of not less than 340 L/min (12 cubic feet per minute (cfm)) for type II truck tractor and not less than 205 L/min (7.25 cfm) for all other vehicle types
(b) Air storage reservoir(s), each tank equipped with drain, and with safety and check valves between the compressor and the last reservoir tank
(c) Foot control, suspended or treadle type
(d) Air control valves
(e) Air pressure gage, visible to the driver
(f) Low air pressure warning, visible and audible
(g) Service brake stop lamp switch
(h) Automatic moisture ejector
(i) For vehicles with rear axles rated at 10 430 kg (23,000 pounds) or less, automatic slack adjusters on cam type brakes or internal self-adjusting brakes on wedge and disc type brakes on all axles. Vehicles without this feature on one axle (rear axle rated at over 10 430 kg (23,000 pounds)) shall not have it on any axle.

3.4.11.1.1 Air dryer. A replaceable cartridge desiccant type air dryer shall be installed in the air brake system. The dryer shall have the capability of removing not less than 95 percent of the moisture in the air being dried. The dryer shall have a pre-cooler and a filter to screen out oil and solid contaminants. The dryer shall have an automatic self-cleaning cycle and a thermostatically controlled heater to prevent icing of the purge valve.

3.4.11.2 Trailer brake control system. In addition to the components specified in 3.4.11.1 and 3.4.11.1.1, a trailer brake control system shall be furnished for type II truck tractor and when a trailer towing package is required (see 3.1.1.8). The trailer brake control system shall include:

(a) Identification of emergency and service lines
(b) Coincident control of trailer brakes with prime mover foot control
(c) Independent hand control for trailer brakes
(d) Prime mover protection valve with dash control and automatic breakaway feature
(e) Trailer stoplight control operable with foot brake and with hand control for trailer brakes
* (f) Two SAE J844 precoiled (or when specified (see 6.2), not precoiled) air hoses, not less than 2800 mm (110 inches) long when fully extended, with SAE J318 gladhand couplers on both ends of hoses (not required for type II truck tractor unless a trailer towing package is specified). The hoses shall be packaged and stowed in the vehicle tool compartment for shipment

(g) Air connectors for trailer with SAE J318 gladhand couplers mounted at the rear of the vehicle, located to prevent interference with a trailer (not required for type II truck tractor unless trailer towing package is specified). Air connectors and gladhands on type IV dump trucks shall be located to prevent damage during dumping of the cargo.

* (h) Two SAE J844 precoiled (or when specified (see 6.2), not precoiled) connecting air hoses, not less than 2800 mm (110 inches) in length when fully extended, equipped with coiled spring hose guards, and SAE J318 gladhand quick connector on trailer end of hoses (type II truck tractor only).

* (i) Unless otherwise specified, supports on the cab or on a pogo stick type hose tender with dummy gladhand connectors to retain hoses when not in use (type II truck tractor only). Supports shall not be mounted on the cab roof. When specified (see 6.2), the dummy gladhand couplers shall be located on the streetside rear of the cab and shall be accessible to an operator standing on the ground.

* (j) Dummy gladhand couplers with security chains or cables (not required for type II truck tractor unless a trailer towing package is specified).

(k) Prime mover only parking brake valve to permit mover parking brakes to be applied while charging the trailer air brake system.

3.4.11.3 Brake controls for use from a towing vehicle. When specified (see 6.2), the vehicle shall be furnished with a system for controlling the brakes from a towing vehicle (wrecker). The installation shall be complete with air brake couplers, relay emergency valve with no-bleed-back feature (except when spring applied emergency brake is furnished), additional air lines and fittings. The service and emergency couplers shall be mounted on the front in a protected position providing for ready attachment of air hoses from a towing vehicle. The service and emergency couplers shall be identified and provided with dummy gladhand couplers with chains. The system shall not compromise conformance to any Federal Motor Carrier Safety Regulation referenced herein or to any Federal Motor Vehicle Safety Standard.

3.4.11.4 Increased braking capability. When specified for class C diesel engine driven vehicles (see 6.2), the service brakes shall be augmented by one of the following braking systems:

(a) An electromagnetic driveshaft retarder
(b) A system which opens all or some of the engine exhaust valves near the end of the compression stroke, thereby converting vehicle motion to a pumping loss
(c) A controlled gate valve in the exhaust manifold, which produces back pressure on the engine pistons during the exhaust stroke
(d) When an automatic or semiautomatic transmission is specified, a hydrodynamic retarder integral with the transmission.

A dash mounted switch shall be provided to activate, modulate, or cut out the brake augmentation. The switch shall be marked to indicate its position. When active, the system shall be fully controlled by means of the conventional driving controls to apply retardation during vehicle deceleration, and to cut it out in the other operating modes. Each of the four systems shall permit type II truck tractors loaded to required GCW, and all other trucks loaded to required GVW, to negotiate a 6 percent downgrade without exceeding 44 km/h (27 mph), within the operating restrictions of the engine and transmission and without the use of service brakes. For (b) or (c), above, the retarder shall be approved by the engine manufacturer.

* 3.4.12 Cab. Unless otherwise specified, the chassis manufacturer shall furnish any type of his standard or optional full width cab. When specified (see 6.2), a cab with a forward tilting hood and fender assembly, including tilting and locking mechanism, shall be furnished. Tilting shall not interfere with present or future installations of additional equipment, such as a snowplow or a front mounted winch. When specified (see 6.2), a tilt type cab with tilting and locking mechanism shall be furnished. In addition, when a sleeper cab is specified (see 3.4.12.4), the cab furnished shall be a tilt type. Tilt cab features shall be in accordance with the Employee Safety and Health Standards of Federal Motor Carrier Safety Regulation 399, including the first step height, which shall be not more than 610 mm (24 inches): Both cab doors shall be equipped with locks, operable from inside the cab through mechanical linkages and equipped with external, key operated locks. Drip rails shall be installed above the cab doors. Safety grips or grab handles shall be provided on each side of the cab to assist personnel in entering and leaving the cab and, in addition, for type II truck tractor, to assist personnel in climbing onto the truck tractor deck plate. When the front tires extend beyond the cab fenders, rubber fender extensions extending at least to the outside of the tire tread shall be furnished. For tilt type cabs, provisions to facilitate cleaning the windshield shall be provided by means of a bumper step, or bumper step cutouts, and a grab handle located under the windshield. When a snowplow or snowplow provisions are specified, service hatches or access hoods shall be furnished to provide access for routine engine maintenance with a snowplow attached. For civil agency contracts, cab equipment shall include: a cigar lighter; tinted glass in all windows, where optionally available from the chassis manufacturer; and dual cab entry assist handles.

* 3.4.12.1 Cab interior. Unless otherwise specified, the cab shall have an upholstered, full width, adjustable seat and back or individual, adjustable, driver's seat and individual passenger seat. When specified (see 6.2), an individual, adjustable, driver's seat and an individual passenger seat shall be provided. When specified (see 6.2), the driver's seat shall be the manufacturer's standard air ride suspension type. The color of the upholstery and the interior finish shall be compatible with the exterior color (see 3.1.1.1). White upholstery shall not be furnished. Interior lighting shall be provided. Two pairs of seat belts shall be installed. Outboard seats, shall have combination pelvic and upper torso restraint seat belts.

* 3.4.12.2 Crew cab. When specified (see 6.2), a four-door, full width crew cab shall be furnished in lieu of the standard full width cab. The cab shall be equipped with two upholstered, full width seats and backs. The front seat shall be adjustable. Three pairs of seat belts shall be installed for both the front and rear seats. Front outboard seats shall have combination pelvic and upper torso restraint seat belts. Cab doors shall be equipped with locks operable from inside the cab through mechanical linkages, with both front doors equipped with an external key operated lock. Cab doors shall have windows with crank operated window regulators. A rear window shall be provided. Interior lighting shall be provided. Safety grips or grab handles shall be provided at each door of the cab to assist personnel climbing into the cab and in addition, for type II tractor, to assist personnel in climbing onto the truck tractor deck plate. The cab roof shall be of one-piece construction; or, if welded, the roof shall give the appearance of one piece, with weld seams being continuous, waterproof, and free of visible bumps or protrusions. Full length drip moldings shall be mounted above the doors.

3.4.12.3 Crew cab seat spacing. With the front seat adjusted to the extreme forward position there shall be not less than 760 mm (30 inches), measured in a horizontal plane, between the front of the rear seat-back and the rear of the front seat-back. A kick-space height of not less than 70 mm (2.75 inches) shall be maintained between the floor and the rear of the front seat in all positions of adjustment. Leg room and space forward of the front seat shall be equivalent to that provided ahead of the seat in a two-door standard cab.

* 3.4.12.4 Sleeper cab. When specified (see 6.2), in addition to the requirements of 3.4.12 and 3.4.12.1, a sleeper cab shall be furnished. The sleeper cab shall be a tilt type cab as specified in 3.4.12. The sleeper compartment shall be not less than 760 mm (30 inches) in depth and shall be fitted with a foam mattress and a sleeper occupant restraint system. A luggage compartment with locking doors on each side of the cab shall be furnished. Curtains and a domelight shall be provided. The sleeper compartment shall have heating and air conditioning. Auxiliary air temperature controls or louvers shall be furnished in the sleeper compartment. The controls or louvers shall provide for remote regulation of both heating and air conditioning from within the sleeper compartment.

3.4.13 Steering. Power steering shall be furnished.

* 3.4.14 Windshield wipers and washers. The vehicle shall be equipped with dual windshield wipers and windshield washers. Windshield wipers shall be of the multispeed type and operated by either air or electric motor(s). When specified (see 6.2), and if electric motor wipers are furnished, intermittent wipers shall be furnished.

3.4.15 Bumper. Unless the bumper is an integral part of vehicle cab, a channel type front bumper shall be provided on each vehicle.

3.4.15.1 Rear end protection. Except for type I chassis, type II truck tractor, and type IV dump, the rear end of the vehicle shall be protected in accordance with Federal Motor Carrier Safety Regulation 393.86. A rear bumper shall be provided as specified herein for the various vehicle types.

* 3.4.16 Tool stowage. Stowage space of sufficient size to accommodate a vehicle jack, hand tools, anti-skid chains (for outside tires on duals only) and emergency reflective triangles shall be furnished. The stowage space shall provide for positive retainment of this equipment during vehicle operation. Stowage space for these tools may be furnished in the cab. When stowage space for these tools is located outside the cab, it shall be weatherproof and shall provide for locking with a padlock.

3.4.16.1 Tools. When specified (see 6.2), each vehicle shall be furnished with tools required for exchanging a mounted tire assembly with the spare assembly, and shall include at least a hydraulic jack, jack handle and wheelnut wrench. The jack shall be of such closed height as to permit its location under an axle, or other satisfactory lift point, at any wheel with the tire flat. The jack, without blocking, shall be capable of raising any wheel of the loaded vehicle to a height adequate to permit removal and replacement of a wheel and tire assembly.

3.4.17 Heater and defroster. The vehicle shall be provided with a hot water heater with fresh air intakes and discharge outlets to the floor and to windshield defroster louvers. The heater shall be complete with blower and mounted controls convenient to the driver. Heaters for civil agencies shall have a minimum of 5860 W (20,000 British thermal units per hour (Btu/hr)) capacity.

3.4.18 Controls and operating mechanisms. All controls and operating mechanisms shall be located for left hand drive. Controls shall be complete and conveniently operable by the driver. Lever controls shall be designed and located to permit easy entrance and exit of the operator to and from the driver's compartment. Instruments and controls shall be identified as to their function and installed in a manner to facilitate removal and servicing. All instruments shall be visible to the driver when seated in the driving position.

* 3.4.19 Accessories and equipment. Chassis equipment shall be complete with all accessories furnished as standard equipment by the manufacturer. The following minimum equipment shall be furnished:

(a) Key operated ignition switch
(b) Ammeter, charging indicator or voltmeter
(c) Fuel gage

(d) Oil pressure gage or red indicator warning light
(e) Engine coolant temperature gage or high coolant temperature or low coolant level red indicator warning light
(f) High coolant temperature or low coolant level alarm buzzer
(g) Speedometer with recording odometer
(h) Ash receptacle
(i) Dual sunvisors
(j) Driver's compartment ventilator other than window
(k) Tachometer (for diesel engine driven vehicles).

For civil agency contracts or when specified for military contracts (see 6.2), an ammeter or voltmeter gage, an oil pressure gage, a coolant temperature gage and an engine shutdown system shall be provided in lieu of the indicators and buzzers specified above. The engine shutdown system shall include an engine coolant temperature, engine coolant level and engine oil pressure red indicator warning light and alarm buzzer. The warning light and buzzer actuation shall precede engine shutdown. The system shall permit engine restart and run for approximately 30 seconds following automatic shutdown.

* 3.4.20 Rearview mirrors. Outside rearview mirrors shall be mounted on both sides of the cab. The mirrors shall have flat and convex areas. The flat portion shall have not less than 320 square centimeters (cm^2) (50 square inches) of reflective area. The convex portion shall have not less than 155 cm^2 (24 square inches) of reflective area and a radius of curvature of not less than 510 mm (20 inches). The convex portion shall be attached to the lower mirror supporting arm and shall not interfere with use of the flat mirror. The mirrors shall have not less than two supporting arms. When specified (see 6.2), the curbside flat mirror shall be of the motorized type, with remote control. The mirror motor shall provide not less than 60 degrees horizontal rotational viewing range. When specified (see 6.2), the flat mirrors shall be electrically heated. Mirror remote and heating controls shall be within reach of the seated driver.

3.4.21 Horn. The manufacturer's standard electric horn shall be furnished. When specified (see 6.2), in addition, an air operated horn shall be provided.

3.4.22 Engine hour meter. For type VI maintenance trucks with the optional winch and when specified for other vehicle types (see 6.2), an engine hour meter shall be furnished. The meter shall have a totalizing mechanism of not less than 9,999 hours for the chassis engine to register accurately the number of hours of operating time. The meter shall be of rugged construction to ensure continuous trouble-free performance under severe operating conditions. The engine hour meter shall be mounted on the cab instrument panel or in the engine compartment in a readable location.

3.4.23 Back-up alarm. Type IV dump truck, and when specified (see 6.2) other vehicle types, shall be provided with an audible, pulsating, signaling device (electrical or mechanical) to caution personnel when the vehicle is in reverse gear operation.

* 3.4.24 AM/FM radio. For civil agency contracts and when specified (see 6.2) for military contracts, the manufacturer's standard AM/FM radio shall be provided.

* 3.4.25 Air conditioning. Sleeper cabs, including the sleeper compartment, shall be air conditioned. When specified for other cab types (see 6.2), the vehicle shall be equipped with the manufacturer's standard air conditioning system. The air conditioning system shall include tinted windshield and tinted glass.

* 3.4.26 Servicing and adjusting. Prior to acceptance of the vehicle by the Government inspector, the contractor shall service and adjust each vehicle and its mounted equipment for operational use including at least the following: alinement of lights, adjustment of the engine and brake systems; filling and charging of batteries; alinement of front wheels; inflation of all tires; complete lubrication of chassis, engine and running gear with grades of lubricants recommended for the ambient air temperature at the delivery point; servicing of the cooling system in accordance with 3.4.26.1; and servicing of the windshield washer reservoir with water and appropriate additives.

* 3.4.26.1 Engine coolant. The engine coolant shall be a solution of ethylene glycol antifreeze and water or propylene glycol antifreeze and water, in equal parts of antifreeze and water by volume. Ethylene glycol antifreeze shall conform to ASTM D-4985 with not more than 250 parts per million silicates. Propylene glycol antifreeze shall be in the specific formulation approved by the engine and cooling system manufacturers. When specified (see 6.2), the percentage of antifreeze in the cooling system shall be increased to provide protection against freezing down to -54°C (-65°F).

3.5 Vehicle types. The cab-to-axle dimension specified for the various vehicle types may be reduced by not more than 50 mm (two inches) when the vehicle is furnished with tilt type cab (see 3.4.12).

3.5.1 Type I (chassis, with cab). Type I vehicles shall have one of the usable cab-to-axle (CA) dimensions shown in table VII, as specified (see 6.2). Usable cab-to-axle is defined as the distance from the most rearward vehicle obstruction that would interfere with body mounting to the centerline of the axle. Load area for the purpose of determining weight distribution (see 3.2.6) shall be as specified (see 6.2). Chassis shall be suitable for subsequent mounting of the make, model and type of body specified (see 6.2).

TABLE VII. Type I chassis usable CA dimensions.

	Standard cab CA dimensions, mm, plus 100, minus 0 (inches, plus 4, minus 0), except as noted										
mm	1520	1830	2130	2590	2740	3050	3500	3810	(plus 150, minus 0)	4270	4780
inches	60	72	84	102	108	120	138	150	(plus 6, minus 0)	168	188

Tilt cab CA dimensions mm (plus 100, minus 0) (inches, plus 4, minus 0)

mm	2970	3430	3730	4030
inches	117	135	147	159

3.5.2 Type II (truck tractor). When a hydraulic lift fifth wheel is specified, type II truck tractor shall conform to 3.5.2.9 through 3.5.2.9.3. When an air operated lift fifth wheel is specified, type II vehicle shall conform to 3.5.2.10 through 3.5.2.10.4. Otherwise, type II truck tractor shall conform to 3.5.2.1 through 3.5.2.6; when specified 3.5.2.7 and 3.5.2.8; and the following. Type II truck tractor shall have an effective cab-to-axle (CA) dimensions not greater than that specified in table VIII for vehicles furnished with corresponding equipment. Unless otherwise specified, type II truck tractor shall be equipped with a fore and aft rocking, 910 mm (36-inch) diameter fifth wheel with forks and semiautomatic lock for SAE J700 kingpin. When specified (see 6.2), type II truck tractor shall be equipped with a full oscillating, 910 mm (36-inch) diameter fifth wheel with forks and semiautomatic lock for SAE J700 kingpin and shall be provided with lockout for locking out side oscillation. The fifth wheel shall be capable of being uncoupled by the operator standing on the driver's side of the vehicle. Uncoupling action shall be protected by a secondary manual lock, preventing movement of the uncoupling lever until the secondary lock is manually released. The vertical load capacity and the drawbar pull capacity of the fifth wheel shall be not less than the loads imposed with the vehicle loaded to the required GVW and GCW.

TABLE VIII. Type II truck tractor maximum dimensions.

Cab style	Effective CA, maximum	
	w/o spare carrier	w/spare carrier
Standard cab	2180 mm (86 inches)	2740 mm (108 inches)
Tilt cab	2410 mm (95 inches)	3230 mm (127 inches)
Sleeper cab	2540 mm (100 inches)	3000 mm (118 inches)

3.5.2.1 Fifth wheel location. The clearance from the centerline of the kingpin to the cab, or to the vertical spare tire assembly when furnished, or pogo stick type hose tender when furnished, shall be not less than 1620 mm (64 inches). When additional equipment to be mounted behind the cab is specified by the procuring activity, the 1620 mm (64 inches) shall be measured to the rearmost point of a pogo stick to be mounted behind the additional equipment. The CA may be increased. The landing wheel clearance from the centerline of the kingpin to the rear tires and chassis frame rails shall be not more than 1620 mm (64 inches). The centerline of the fifth wheel for class C tractors shall be not less than 360 mm (14 inches) forward of the rear axle centerline.

3.5.2.2 Fifth wheel mounting. Fifth wheel mounting shall conform to Federal Motor Carrier Safety Regulation 393.70(b).

* 3.5.2.3 Fifth wheel height. The unladen level height of the fifth wheel shall be 1250 mm (49 inches), plus or minus 25 mm (1 inch), above ground level for a fore and aft rocking fifth wheel and 1400 mm (55 inches), plus or minus 25 mm (1 inch), for a full oscillating fifth wheel.

3.5.2.4 Approach ramps. When a full oscillating fifth wheel is provided, approach ramps or plates shall be furnished to give support for fifth wheel forks and a continuous incline for semitrailer approach. The ramps or plates shall extend from the rear of the chassis frame to the fifth wheel forks. The forward (highest) edges of the approach ramps shall be rounded and smooth.

3.5.2.5 Deck plate. Unless otherwise specified (see 6.2), a self-cleaning grating of sufficient structural strength for use by the operator in connecting air and electric lines between the tractor and a semitrailer shall be installed. The grating shall extend across and shall be bolted to the frame rails. Provisions to allow access to personnel climbing onto the deck plate shall be furnished. The grating shall be located as close to the cab as possible and shall extend not less than 610 mm (24 inches) toward the rear of the vehicle. When a back-of-cab mounted winch is furnished, the deck plate shall extend further rearward to provide a platform for the winch operator. Access through the grating for maintenance of fittings and other equipment shall be furnished. The deck plate shall be free of ragged or sharp exposed edges.

3.5.2.6 Hose tender. When a tilt cab is furnished, a pogo stick type hose tender shall be provided behind the cab to accommodate and secure the semitrailer lighting cable and air hoses. A pogo stick shall be provided on all types of cabs and mounted rearward when a rear mounted spare carrier or a rear mounted winch is furnished. When a conventional cab is furnished without a rear mounted spare carrier and without a rear mounted winch, a cab mounted tender as specified in 3.4.2.6 may be provided in lieu of a pogo stick. The pogo stick type hose tender shall be mounted on the truck tractor deck plate or chassis members.

3.5.2.7 Sliding fifth wheel (air release). When specified (see 6.2), the fifth wheel shall be mounted on an adjustable sliding base. The slide locks shall be of the air release type with controls mounted on the instrument panel. The fifth wheel shall have an adjustment range of not less than 580 mm (23 inches) with adjustment increments of not more than 100 mm (4 inches). The fifth wheel shall conform to 3.5.2 through 3.5.2.6 and all options therein specified in procurement documents. All clearance requirements specified in 3.5.2.1 shall be met with the sliding fifth wheel in its most forward position of adjustment. With the sliding fifth wheel in its most forward position of adjustment, the centerline of the kingpin shall not be less than 380 mm (15 inches) forward of the centerline of the axle. Sliding positions to the rear of the rear axle may be blocked off.

* 3.5.2.8 Truck tractor wind deflector. When specified (see 6.2), for standard cabs only, a wind deflector shall be installed or shall be furnished with the vehicle for subsequent installation on the cab roof by the receiving activity. The deflector shall be of molded fiberglass reinforced plastic; shall be not less than 1600 mm (63 inches) wide; and, unless otherwise specified (see 6.2), shall be of a height suitable for use with the vehicle cab furnished in combination with semitrailer vans having a level height of 3810 mm (12 feet 6 inches) at an upper fifth wheel height of 1220 mm (48 inches). Mounting and support ribs and any other components that require installation from the inside of the cab shall be installed by the cab manufacturer. Installation openings shall be sealed to prevent air and water from entering the cab. The deflector, including exterior mounting and supporting hardware, support ribs and the installation instructions, shall be securely stowed on the vehicle for shipment.

3.5.2.9 Hydraulic lift fifth wheel. When specified (see 6.2), type II truck tractor shall be equipped with a hydraulic lift fifth wheel. The vehicle shall conform to the following requirements in lieu of all requirements specified in 3.5.2 through 3.5.2.4. The cab-to-axle dimension shall be in accordance with table VIII. The hydraulic fifth wheel shall be designed, warranted and marketed for highway use. The fifth wheel shall be self-contained, of all-steel, with a capacity to lift and support a load of not less than 22 700 kg (50,000 pounds) over a lifting range of at least 300 mm (12 inches) from the lowest to the highest position. Actuation through the full lifting range shall not cause the centerline of the fifth wheel to shift more than 180 mm (7 inches) measured along the longitudinal centerline of the vehicle. The fifth wheel shall be of the bolt-on type. The fifth wheel unit shall include a hydraulic system to actuate an elevating platform equipped with the fifth wheel; shall incorporate a pneumatic system to open a semiautomatic lock for an SAE J700 kingpin; shall include remote controls to permit all operations from within the vehicle cab; and shall include all necessary components, such as pump, hose and fittings. A manual locking device shall be furnished to lock out lifting capability. A decal or plate conforming to 3.1.1.13 reading "LOCK DOWN FIFTH WHEEL FOR HIGHWAY USE" shall be provided.

3.5.2.9.1 Hydraulic lift fifth wheel type. The hydraulic lift fifth wheel shall be of the fore and aft rocking type with a 910 mm (36-inch) diameter steel coupler plate supplied with beveled approach forks. The fifth wheel mounting shall conform to Federal Motor Carrier Safety Regulation 393.70(b).

3.5.2.9.2 Hydraulic lift fifth wheel clearances, height and location. The clearance from the centerline of the kingpin to the cab or vertical spare tire assembly, when furnished, or pogo stick type hose tender, with the fifth wheel at all elevated positions, shall be not less than 1520 mm (60 inches). The landing wheel clearance from the centerline of the kingpin to the rear tires and chassis frame rails, with the fifth wheel in its lowest position, shall be not more than 1520 mm (60 inches). The unladen level height from the ground to the top of the coupler plate of the installed fifth wheel unit with the unit in its lowest position shall be 1370 mm (54 inches), plus or minus 25 mm (1 inch). With the fifth wheel in its lowest position, the vertical centerline of the fifth wheel shall be not less than 200 mm (8 inches) forward of the centerline of the rear axle.

3.5.2.9.3 Deck plate and hose tender for hydraulic lift fifth wheel. A deck plate shall be furnished as specified in 3.5.2.5, except the grating shall extend from as close to the cab to as far to the rear as possible. A hose tender or pogo stick type hose tender shall be furnished as specified in 3.5.2.6.

3.5.2.10 Air lift fifth wheel. When specified (see 6.2), type II truck tractor shall be equipped with an air lift fifth wheel. The vehicle shall conform to the following requirements in lieu of all requirements specified in 3.5.2 through 3.5.2.4. The cab-to-axle dimension shall be in accordance with table VIII. The air-lift fifth wheel shall be designed, warranted and marketed for highway use. The fifth wheel shall be of all-steel, with a capacity to lift and support a load of not less than 18 150 kg (40,000 pounds) over a lifting range of not less than 280 mm (11 inches), from the lowest to the highest position. Actuation through the full lifting range shall not cause the center of the kingpin lock to shift more than 75 mm (3 inches) measured along the longitudinal centerline of the vehicle. The fifth wheel unit shall be of the bolt on type. A manual locking device shall be furnished to lock out lifting capability. A decal or plate conforming to 3.1.1.13 reading "LOCK DOWN FIFTH WHEEL FOR HIGHWAY USE" shall be provided.

3.5.2.10.1 Air lift fifth wheel components. The air lift fifth wheel shall include the following:

(a) Additional air reservoir tank(s), not less than 210 L (7.4 cubic feet) total capacity, equipped with drain, safety and check valves between compressor and tank
(b) Automatic moisture ejection valve
(c) Two air starter valves to emit and expel air from the reservoir tank to the air bellows

(d) Three-way valve, for raising, lowering, or holding the fifth wheel in all desired positions. The valve shall be mounted on the truck tractor instrument panel in a location accessible to the seated driver driving
(e) Snubbers to eliminate spring deflection
(f) Pneumatic system to open and lock the SAE J700 kingpin, operable from the truck tractor instrument panel.

3.5.2.10.2 Air lift fifth wheel type. The air lift fifth wheel shall be of the fore and aft rocking type, with a 910 mm (36-inch) diameter cast steel coupler plate with beveled approach forks. The fifth wheel mounting shall conform to Federal Motor Carrier Safety Regulation 393.70(b).

3.5.2.10.3 Air lift fifth wheel clearances, height and location. The air lift fifth wheel clearance, measured from the centerline of the kingpin to the cab or pogo stick, shall be not less than 1620 mm (64 inches). The landing wheel clearance to the vertical plane at the outside edge of the rearmost tire and the chassis frame rail, with the fifth wheel in its lowest position, shall be not more than 1620 mm (64 inches) for classes A, B and C vehicles, and also not less than 1400 mm (55 inches) for class C truck tractor. The unladen level height from ground level to the top of the fifth wheel plate shall be 1370 mm (54 inches) plus or minus 25 mm (1 inch). With the fifth wheel in its lowest position, the vertical centerline of the fifth wheel shall be not less than 200 mm (8 inches) forward of the centerline of the rear axle.

3.5.2.10.4 Deck plate and hose tender for air lift fifth wheel. A deck plate shall be furnished as specified in 3.5.2.5, except the grating shall extend from as close to the cab to as far to the rear as possible. A hose tender shall be furnished as specified in 3.5.2.6.

3.5.3 Type III (stake). Type III stake trucks shall have rear-of-cab to rear-axle and body dimensions specified in table IX. Rear bumper shall be furnished. When specified (see 6.2), the center racks on both sides shall be the manufacturer's standard swing type, for easy side loading.

TABLE IX. Type III stake truck dimensions.

Dimension	Vehicle class	
	A and B	C
Cab-axle dimension, without crane, minimum	3050 mm (120 inches)	3050 mm (120 inches)
Cab-axle dimension, with crane, minimum	3500 mm (138 inches)	-- --
Overall platform length, minimum	4880 mm (192 inches)	4880 mm (192 inches)
Overall platform width, minimum	2340 mm (92 inches)	2440 mm (96 inches)
Rack height, minimum	1020 mm (40 inches)	1020 mm (40 inches)

3.5.3.1 Stake body. The body shall be provided with steel subframe, wood or steel platform, and side and end racks. When a hydraulic crane is furnished (see 3.5.3.8), the body shall be mounted to provide a space back of cab-to-body of not more than 810 mm (32 inches) for mounting the crane.

3.5.3.2 Stake body frame. Body framing shall be a completely welded structure with members of minimum gage thickness specified in table X for carbon steel; high tensile steel may be furnished in two gages lighter weight in accordance with US Standard gage sizes. There shall be not less than 12 full width crossmembers, including ends and stub crossmembers as required for proper spacing over axle. Crossmembers shall be of full channel construction, reinforced by gusset plates or brackets at points of attachment to longitudinal sills, and contact edges of welded reinforcements shall be welded for not less than 50 percent of the edge length. Longitudinal sills shall be constructed of structural steel channel or formed channels. Formed channel sills shall be reinforced within the sill, at each crossmember or body mounting point, with formed channel reinforcements.

TABLE X. Framing gages for stake bodies.

Framing member	US Standard gage number	Equivalent millimeter	Equivalent inches
Crossmembers	10	3.416	0.1345
Side and end rails	10	3.416	0.1345
Longitudinal sills	8	4.176	0.1644
Reinforcements	8	4.176	0.1644
Rack posts	11	3.038	0.1196
Rack posts with reinforced lower section	12	2.657	0.1046

3.5.3.3 Stake body flooring. The platform shall be floored with wood or steel, at the manufacturer's option. Wood parts shall be treated in accordance with 3.1.1.5.

3.5.3.4 Stake body wood floors. Wood platforms shall be floored longitudinally with either ship-lap or tongue-and-groove joints. Wood flooring shall be of hardwood or dense southern yellow pine not less than 33 mm (1-5/16 inches thick (finished dimension).

3.5.3.5 Stake body steel floors. Steel floors shall be 3.2 mm (1/8 inch) thick, one or two-piece diamond tread with additional lateral support provided at the wheelwells. Two-piece floors shall be spliced longitudinally and completely welded the full length of the splice. One completely welded lateral steel floor splice is acceptable on bodies over 4880 mm (16 feet) in length.

3.5.3.6 Side and end racks. A full width front rack section, not less than three removable rack sections on each side, and two removable rack sections across the rear shall be provided. Each rack shall be equipped with a locking device to lock the rack to the body. Body hardware shall be attached to the rack slats with not less than 75 mm (3 inches) total weld for each fastener or bolted with not less than four bolts for each fastener. Upright posts shall be steel sections. Rack slats shall be of steel sections not less than 16 gage (1.519 mm) (0.0598 inch) thick with not less than 3 reinforcing ribs. The width of individual slats shall be manufacturer's standard, providing that total of slat widths is not less than 60 percent of total rack height. Not less than four slats per rack shall be provided. Slat edges and end corners shall be rounded or enclosed to protect cargo and personnel from sharp edges. Slats shall be riveted, bolted or welded to the inside (loadside) of the upright posts, with rivet or bolt heads against the slats. When welded construction is used, not less than 4 welds shall be applied at each upright post and slat intersection. The front rack section shall be capable of withstanding a horizontal static load equal to one-half the payload capacity of the vehicle without permanent distortion of the rack section or its mountings. When a hydraulic tailgate of the type that folds against the rear side racks is furnished (see 3.1.1.11.1), the two removable rack sections across the rear of body are not required and each side rack section at the rear of body shall be provided with draw-down type of fastening equipped with a locking nut to secure the side racks in place. When a hydraulic crane is furnished (see 3.5.3.8), the front rack section shall be removable without interference with the crane. The rack height specified in table IX shall be reduced as necessary to avoid interference with the crane operations.

* 3.5.3.7 Body mounting. Body shall be secured with U-bolts, twin studs, or brackets, and shall include a wood breaker strip.

3.5.3.7.1 U-bolts or twin studs. When U-bolts or twin studs are used, there shall be not less than four U-bolts or twin studs per side, each having 14 mm (0.563-inch) body diameter with 16 mm (0.625-inch) minimum thread diameter. Tie-plates shall be at least 13 mm (0.50 inch) thick and a slight deformation upon assembly is permissible. The vehicle chassis frame shall be braced using wood blocks at each mounting point unless the mounting point is located at a full depth frame crossmember. Blocks shall incorporate a keeper strap or groove for the mounting bolt, and shall be of a width and thickness to assure retention. Two tie-back straps shall be provided, one bolted to each side of the rear portion of the body subframe, to maintain body alinement on the vehicle chassis. Forward body mounting bolts shall be located to the rear of the tapered portion of the breaker strips (see 3.5.3.7.4).

3.5.3.7.2 Brackets. When brackets are used, they shall be bolted to the web of the chassis frame rails. The body mounting brackets shall provide means for drawing down the body on the chassis rails, and provisions shall be made to prevent lateral shifting of the breaker strips. When additional holes are required to secure the mounting brackets to the chassis frame rails, they must be located within the area of the rail which is designated as being safe for drilling in accordance with the chassis manufacturer's body builders layouts. Attachments shall neither interfere with nor obstruct chassis components.

* 3.5.3.7.3 Breaker strips. A hardwood or dense southern yellow pine breaker strip of not less than 19 mm (3/4 inch) finished thickness shall be installed between the longitudinal sills and the vehicle chassis frame. The minimum thickness specified shall be increased as may be required to provide adequate tire chain-to-body clearance. Breaker strips shall have a taper of not less than 13 mm (1/2 inch) in 410 to 460 mm (16 to 18 inches) at the forward end. The breaker strip taper shall face the chassis frame (not the body frame).

3.5.3.8 Crane. When specified (see 6.2), the vehicle shall be furnished with a one-man operated, fully hydraulic, articulated boom type crane, mounted on the truck frame between the cab and the platform (see 3.5.3.1). The boom shall consist of an upper and lower section and a hydraulically operated extendable jib capable of extending not less than 840 mm (33 inches). Double-acting hydraulic outriggers independently controlled and integrally mounted to the crane base shall be furnished. With the outriggers in the down position, the crane shall be capable of lifting a minimum load of 2720 kg (6,000 pounds) when the load is located at a radius of 1520 mm (5 feet); and 1130 kg (2,500 pounds) when the load is located at a radius of 3960 mm (13 feet), without causing the vehicle to become unstable. Vehicle shall be deemed unstable when any one of the vehicle wheels lifts off the ground. The boom, when fully extended, shall have a normal lifting range of 7600 mm (25 feet) above ground level and shall fold to a nestable travel height, between the stake body and the truck cab, not more than 2130 mm (84 inches) above the truck chassis frame. Crane controls shall be provided on each side of the vehicle. Crane and outrigger controls shall be accessible from ground level. Each outrigger control shall be located on the same side of the vehicle as the outrigger. Each outrigger landing pad shall be not less than 900 cm^2 (140 square inches).

3.5.3.8.1 Crane hydraulic system. A hydraulic pump driven from a power takeoff controlled from inside the truck cab shall be provided to furnish power for the crane. The pump shall be of the positive displacement type and shall provide a working pressure of not less than 12.4 megapascals (MPa) (1,800 psi). Controls shall be of the self-centering, fail-safe type with hydraulic bypass overload valves, and a check valve type locking system in boom and outriggers to prevent the load dropping due to hydraulic or power failure. Controls shall have fine metering qualities to provide variable

raising, lowering and rotating motions of the crane boom. The crane hydraulic system shall contain the following minimum safety features:

(a) Check valve system in boom and outrigger system to prevent load drop due to hydraulic system failure.
(b) Flow valve in hydraulic lines or cylinder to prevent boom damage due to sudden load-lowering stops.
(c) Cushioning valves in boom rotating hydraulic system for rack-and-pinion mounted cranes to prevent damage due to sudden stops.
(d) Pressure relief valve to prevent loading beyond lifting capacity.
(e) Devices to limit vertical creep of the boom to not more than 25 mm (1 inch) per hour.
(f) Signs with 25 mm (1-inch) lettering visible to the operator at both sets of controls: OUTRIGGERS MUST BE IN PLACE BEFORE LIFT IS MADE.

3.5.3.9 Dump stake and platform. When specified (see 6.2), a dump stake and platform body shall be provided. The stake and platform body shall be as specified in 3.5.3 through 3.5.3.6 for the vehicle class furnished, except the rear end racks shall be the manufacturer's standard swing type, hinged to each side rack. The stake and platform body shall be adequately reinforced to provide support for an evenly distributed payload (GVW minus curb weight and operator weight). The body shall be mounted to a hydraulic hoist unit. Locking devices shall be provided near the center of the rear racks to lock the racks closed and to lock the racks to the body. All locking devices shall be operable from the ground. A rear bumper is not required. When a steel floor is furnished on dump stakes, it shall have a smooth finish.

3.5.3.9.1 Dump stake and platform body mounting on hoist. The body shall be mounted to the hoist unit in accordance with the hoist manufacturer's recommendations and shall be reinforced, when necessary, for added strength on hoist operations. Rear body mounting shall include hinges securely welded to the body longitudinal sills, a connecting cross shaft, and a plate securely bolted to the chassis main frame rails.

3.5.3.9.2 Hydraulic hoist for dump stake and platform. A hydraulic conversion type hoist shall be furnished. Unless otherwise specified (see 6.2), the conversion hoist shall have a minimum lifting capacity rating of class E for classes A and B vehicles and class F for class C vehicles in accordance with the National Truck Equipment Association Conversion Hoist Chart. The hoist shall be a double-acting type with an internal bypass system. Hoist hydraulic cylinders shall be chrome plated. The hoist shall lift the body to a minimum dumping angle of 45 degrees from the top of the truck chassis frame. The hoist shall be capable of lowering the raised body by gravity when the pump is disabled. The power takeoff, pump, and valve shall be the manufacturer's standard for the hoist model furnished. The valve and power takeoff controls shall be located in the truck cab and shall be accessible from the driver's seat. The location of the controls shall not interfere with the entry and exit of the driver.

3.5.3.9.3 Safety lock. A mechanical safety lock, permanently affixed to the body or hoist, shall be furnished. The safety lock shall provide positive retention of the body in the up position for servicing or repair. The safety lock mechanism shall not interfere with the operation of the body under any operating conditions.

3.5.4 Type IV (dump). Type IV vehicles shall have a hydraulic hoist operated dump body. The rear-of-cab to rear-axle dimension shall be not less than 1750 mm (69 inches). A rear bumper is not required. Unless otherwise specified (see 6.2), the body shall have a water level capacity of not less than 3.1 m^3 (4 cubic yards) (minus 5 percent) for class A vehicles and not less than 3.8 m^3 (5 cubic yards) (minus 5 percent) for classes B and C vehicles. When specified for light duty service (see 6.2), class A body shall have a water level capacity of not less than 4.6 m^3 (6 cubic yards) (minus 5 percent). Inside length shall be not less than 2740 mm (108 inches). Inside width shall be not less than 2130 mm (84 inches).

3.5.4.1 Dump body construction. Body floor, sides, and front head shall be of not less than 8 gage (4.176 mm) (0.1644 inch) steel, or 10 gage (3.416 mm) (0.1345 inch) high tensile 345 MPa (50,000 pounds per square inch (psi)) yield strength steel. The front head shall be capable of withstanding a horizontal static load equal to one-half the payload capacity of the vehicle without permanent distortion. When the body floor is constructed in two or more pieces, a continuous seam weld, having full penetration, shall be provided. Full length, formed rub rail of minimum width to cover rear dual tire treads shall be provided. Not less than three triangular or box-section side braces per side, of not less than 10 gage (3.416 mm) (0.1345 inch) steel, shall be equally spaced between body front head and full box type rear corner posts and welded to side plates. One horizontal brace (per side) running the entire length of the body, tied into the front and rear corner pillars is acceptable in lieu of vertical braces. They shall be sloped and continuously welded. Front head sheet shall be formed or reinforced for rigidity. Front head and tailgate shall be not less than 200 mm (8 inches) higher than the sides. Sides shall have pockets provided at each end for insertion of side boards. The interior of the body shell and side reinforcements shall be welded with continuous welds. The top rail, sides and tailgate shall be completely boxed and continuously welded. The body shall have sloping running boards and sloping horizontal tailgate braces to minimize the buildup of dirt. Wiring across the rear apron shall be enclosed in conduit.

* 3.5.4.2 Cab protector. A cab protector shall be attached to the front end of the body. The cab protector shall extend the full width of the cab. The cab protector shall extend not less than 580 mm (23 inches) forward from the front of the dump body. The cab protector shall be not less than 8 gage (4.176 mm) (0.1644 inch) steel or 10 gage (3.416 mm) (0.1345 inch) high tensile, 345 MPa (50,000 psi) yield strength steel. The cab protector shall be capable of supporting an evenly distributed load of not less than 680 kg

(1,500 pounds). The cab protector is not intended to be used for additional payload capacity. When specified (see 6.2), and for overseas destinations, even if not specified, the cab protector shall be removable and shall be secured in the dump body for shipment. Fasteners and components shall be packaged, boxed, marked and secured in the vehicle.

3.5.4.3 Dump body tailgate. The tailgate panel shall be not less than 8 gage (4.176 mm) (0.1644 inch) steel or 10 gage (3.416 mm) (0.1345 inch) high tensile, 345 MPa (50,000 psi) yield strength steel. The tailgate shall be double-acting, opening from top and bottom. The tailgate shall have heavy duty hardware, heavy duty support chains, and heavy duty tailgate latch operable by a control at the left front corner of the vehicle body. The tailgate shall be reinforced to prevent deformation under load.

3.5.4.4 Dump body understructure. The dump body understructure shall conform to 3.5.4.4.1 or 3.5.4.4.2, at the manufacturer's option.

3.5.4.4.1 I beam understructure. Body longitudinal sills, each having a minimum section modulus equivalent to that provided by a 125 mm (5-inch), 14.9 kg/m (10 pounds-per-foot) I-beam, shall be provided to support hoist load. Not less than eight crossmembers, each having a minimum section modulus equivalent to that provided by a 100 mm (4-inch), 8.0 kg/m (5.4 pounds-per-foot) channel, shall be provided to support an evenly distributed load of not less than 9070 kg (20,000 pounds) for class A, and 10 900 kg (24,000 pounds) for class B body. Not less than 10 crossmembers, each having a minimum section modulus equivalent to that provided by a 100 mm (4-inch), 11.5 kg/m (7.7 pounds-per-foot) I-beam, shall be provided to support an evenly distributed load of not less than 1800 m^2 (370 pounds per square foot) of floor area throughout the full lift range for class C vehicles. Crossmembers shall be welded to the body shell with not less than 100 mm (4-inch) lengths of weld, front and rear of both ends of each crossmember, and with staggered intermittent welds on not more than 300 mm (12-inch) centers. Contact edges of crossmembers with longitudinal sills and contact edges of welded reinforcements shall be welded for not less than 50 percent of the edge length.

3.5.4.4.2 Tubular understructure. Body longitudinal sills, each being a formed trapezoidal tubular section, shall be provided. Longitudinal sills shall extend to the floor of the dump body and shall support the floor between crossmembers. Longitudinal sills shall be capable of supporting the hoist load. Longitudinals shall have a RBM of not less than 78 800 N·m (697,000 inch pounds). Crossmembers shall provide support under the floor every 300 mm (12 inches) or less. Crossmembers shall be self-cleaning, closed, inverted hat sections, approximately 230 mm (9 inches) wide at the top and 100 mm (4 inches) wide at the bottom. Each crossmember shall pass through the longitudinals and be shall be securely welded to longitudinals. Crossmembers shall have a RBM of not less than 12 300 N·m (109,000 inch pounds). Crossmembers shall be capable of supporting an evenly distributed

load of not less than 9070 kg (20,000 pounds) for class A, 10 900 kg (24,000 pounds) for class B body and 1800 kg/m (370 pounds per square foot) of floor area for class C bodies. Longitudinals and crossmembers shall be welded for not less than 50 percent of the contact edges to the body floor. Longitudinals shall be welded for not less than 50 percent of contact edges with the body ends. Crossmembers shall be welded for not less than 50 percent at the contact edges with the body side rubrails.

3.5.4.5 Hydraulic hoist. Unless otherwise specified (see 6.2), the hoist shall have a minimum lifting capacity rating of class 40 for classes A and B vehicles, and class 50 for class C vehicles, in accordance with the National Truck Equipment Association Dump Body Hoist Chart. The hoist shall be a double-acting type with an internal bypass system. Hoist cylinders shall be chrome plated. The hoist shall lift the body to a minimum dumping angle of 50 degrees from the top of the truck chassis frame. The hoist shall be capable of lowering the raised body by gravity when the pump is disabled. The power takeoff, pump and valve shall be the manufacturer's standard for the hoist model furnished. When specified (see 6.2), a two-position lever or a two-speed hoist lowering valve to provide "feather down" capability shall be provided. Controls and levers shall be located in the cab.

3.5.4.6 Safety lock. A mechanical safety lock permanently affixed to the dump body or hoist shall be furnished. The safety lock shall provide positive retention of the dump body with the body in the up position for servicing or repair. The safety lock mechanism shall not interfere with operation of the body under any operating conditions.

3.5.4.7 Dump body mounting. Full length rivet pads or a full length subframe, tapered up at the front, shall be attached to the top of the chassis frame rails. The pads or subframe shall prevent the body longitudinal sills from contacting and chafing against the chassis frame rails.

* 3.5.4.8 Snowplow. When specified (see 6.2), a hydraulically or electro-hydraulically operated snowplow shall be furnished. The snowplow shall be complete with a moldboard, a tripping device, a hitch, a hydraulically operated lifting mechanism, a set of auxiliary lights, a snow deflector and all other necessary mounting and operating apparatus. Increased front GAWR is required (see 3.2.6.2). Unless otherwise specified, the snowplow shall be of the reversible type. When specified (see 6.2), the plow shall be of the one-way type with a cut of not less than 2440 mm (96 inches) with a blade angle of 35 degrees plus 2 degrees, minus 0 degrees. The actual length of the moldboard shall be not less than 3050 mm (10 feet). The moldboard of the one-way snowplow, exclusive of the snow deflector, shall have a vertical height of not less than 760 mm (30 inches) on the left side (street-side), 1370 mm (54 inches) on the right side (curbside). The one-way snowplow shall have a minimum of two angle adjustments.

3.5.4.8.1 Moldboard. The moldboard assembly of the reversible type snowplow, exclusive of the snow deflector, shall have a vertical height of not less than 810 mm (32 inches), and shall be capable of clearing a path of not less than 2620 mm (8 feet and 7 inches) at a blade angle of 30 degrees, plus 2 degrees, minus 0 degrees. The actual length of the moldboard shall be not less than 3050 mm (10 feet). The moldboard shall be of not less than 7 gage (4.554 mm) (0.1793 inch) high tensile steel or a one piece unspliced sheet of 9.5 mm (0.375 inch) thick polyethylene material. The polyethylene material shall not embrittle in temperatures as low as -54°C (-65°F), shall not corrode, and shall have an abrasion resistance factor at least equivalent to steel.

3.5.4.8.2 Snow deflector. A snow deflector shall be provided the full length of the top of the moldboard. The snow deflector shall be of the manufacturer's standard design to prevent snow from topping the snowplow.

3.5.4.8.3 Moldboard supports. The snowplow shall be equipped with two heavy duty steel casting, full swivel shoes or two caster wheels. Both the caster wheels and swivel shoes shall be adjustable. The caster wheels shall be roller or ball bearing mounted, shall be of the shielded type to prevent entrance of water and foreign matter, and shall have lubrication fittings.

3.5.4.8.4 Moldboard push-frame assembly. The push-frame assembly shall attach to the moldboard and hitch in a manner to provide ample road clearance of the assembly and permit sufficient oscillation for the snowplow to follow road contour and clear snow evenly. Unless otherwise specified, the positioning of the snowplow moldboard to the right and to the left shall be of the manual angling type and shall be capable of being accomplished by one man without the use of tools. The snowplow shall have a minimum of two angle adjustments both to right hand cast and left hand cast. A shear pin shall be used to lock the snowplow in any of its five plowing positions. Under normal plowing conditions, the shear pin shall be designed to minimize damage to the snowplow and vehicle should the snowplow's leading edge come into contact with an immovable object. When specified (see 6.2), the moldboard shall have a power angle capability, with controls located in the cab.

3.5.4.8.5 Hitch. The plow hitch shall be of the push-frame type designed to be attached to and transmit the entire plowing thrust to the truck frame in such a manner that no plowing thrust shall be absorbed by the truck front axle. Front axle hitch supports, when used, shall be attached in a manner to prevent chafing or other damage. Hitch main frame members and lift frame vertical and horizontal members shall be of adequate size, properly braced, and reinforced to sustain the loads imposed under severe operating conditions. The hitch shall be removable.

* 3.5.4.8.6 Hydraulic system. The hydraulic system shall consist of a power operated pumping unit, an under the hood hydraulic fluid reservoir or a reservoir integral with the hoist, controls, cylinder, hoses, piping, and all other parts essential for normal operation.
The system shall incorporate a pressure relief device to prevent buildup of pressures exceeding the rating of any component. Hydraulic hose shall be single wire braid or double wire braid, rubber covered, conforming to SAE J517, and hose fittings shall conform to SAE J516. The hydraulic system shall incorporate a filtration system conforming to SAE J931.

3.5.4.8.7 Pumping unit. Controls to the pumping unit shall be operable by the truck driver in his normal operating position and shall not interfere with the operation of any truck controls. The hydraulic pump shall be powered by the engine fan belt, an electric motor, or by the engine crankshaft. Belt driven systems shall be approved by the chassis manufacturer. Fan belt driven and crankshaft driven hydraulic pumps shall be rated for continuous duty. The hydraulic fluid reservoir shall have a capacity of not less than 110 percent of the capacity required to operate the system.

* 3.5.4.8.8 Hoist cylinder. The snowplow hoist cylinder shall have sufficient travel to hoist the plow to not less than 200 mm (8 inches) ground clearance. The hoisting mechanism, hoist cylinder and hydraulic system shall be capable of holding the snowplow in the fully raised position while the truck is driven over secondary gravel roads at speeds up to 48 km/h (30 mph).

3.5.4.8.9 Snowplow markers. Snowplow markers shall be provided for the streetside and the curbside of the snowplow. The markers shall be removable when not in use. The markers shall eliminate guesswork as to position of the snowplow caused by blind spots.

3.5.4.8.10 Hydraulic hoses. Hydraulic lines to the hydraulic cylinder and the pump shall be provided with quick disconnect hose couplers. Hose caps, pump caps and hydraulic cylinder caps shall be provided if no other protection system is provided. Caps shall be secured with a corrosion-resistant security device to prevent loss. Caps shall prevent entrance of contaminants into the hydraulic system.

3.5.4.8.11 Snowplow auxiliary lights. A set of raised auxiliary dual beam headlights, parking, and turn signal lights shall be provided for use with the snowplow. Parking and turn signal lights shall use a single light bulb. Mounts, adapters and an appropriate wiring harness shall be provided. Quick disconnect plugs and receptacles shall be provided and shall be weatherproof, or shall be located in a weatherproof location. A high beam indicator light shall be provided and shall be readily visible to the driver when in the driving position.

3.5.4.9 Sand and salt spreader. When specified (see 6.2), a sand and salt spreader tailgate shall be furnished in addition to the standard tailgate specified herein. When specified (see 6.2), a skid mounted sand and salt spreader with a material hopper of not less than 2.3 m^3 (three cubic yards) capacity shall be furnished in lieu of a tailgate type. The sand and salt material feed auger and spreader shall be hydraulically driven by the snowplow hydraulic system when a snowplow is furnished; by the chassis engine fan belt; by a crankshaft driven hydraulic pump; or by its own auxiliary engine driven hydraulic pump. Controls shall be located in the cab. The hose and hose connections shall be as specified in 3.5.4.8.10. Fan belt driven and crankshaft driven hydraulic pumps shall be rated for continuous duty.

3.5.5 Type V (wrecker). By interagency and interservice agreement in June 1987, type V wrecker has been deleted from this specification. For a mechanical wrecker, see type II, in MIL-T-62491.

3.5.6 Type VI (maintenance). Government requisitioners, users and procuring activities, should note that hydraulic A-frame derricks as previously covered by this specification are obsolete and no longer available. Refer to MIL-T-62110 and select a modern rotating hydraulic derrick from that specification. Type II, model 4x2, class A 12 700 kg (28,000 GVW), size 70 of MIL-T-62110 would be most similar. The type selections from MIL-T-62110 are summarized as follows:

Type I	- Rear of cab derrick, no equipment racks above cabinets and no body roof.
Type II	- Rear corner mounted derrick, equipment racks above cabinets, telescoping body roof.
Type III	- Center rear derrick, no equipment racks above cabinets and no body roof.

3.5.7 Type VII (van). Type VII vehicles shall have an overall height of not more than 3810 mm (150 inches) and the minimum dimensions specified in table XI.

TABLE XI. Type VII van dimensions.

Minimum dimensions	mm	inches
Rear-of-cab to rear axle	2900	114
Length (outside)	4880	192
Width (inside)	2260	89
Height (inside)	2130	84

3.5.7.1 Van body. The body subframe, rear corner posts, rear header, rear crossmember, rear bumper and dock bumper shall be constructed of steel. Body side posts, front posts, roof panels, rub rails or buffer sheets and, unless FRP/plywood panels are specified (see 3.5.7.1.1), side and front wall panels shall be constructed of aluminum. Roof bows shall be aluminum or steel (see 3.5.7.4). The steel used shall be of the minimum gages specified for carbon steel; high tensile steel used may be two gages lighter weight in accordance with US Standard gages. Effective means shall be taken to prevent electrolytic action between dissimilar metals.

3.5.7.1.1 FRP/plywood panels. When specified (see 6.2), FRP/plywood side and end panels shall be furnished. FRP/plywood panels shall be fabricated of one-piece plywood core laminate with fiberglass reinforced plastic. The plywood furnished shall equal or exceed U.S. Department of Commerce Standard No. 1, C-D (plugged) with exterior glue and with all plies group 1 species or better. Core material shall be butted, scarfed or finger-joined with joint gaps not greater than 3.2 mm (0.125 inch). The fiberglass reinforced plastic (FRP) shall contain not less than 0.51 kg (18 ounces) fiberglass woven roving material. The plastic shall be of the thermoset polyester family of resins. The plastic shall be fully cured under heat and pressure to ensure that the resins form an integral bond to the plywood core. The exterior surfaces shall consist of a gelcoat of 0.38 mm ± 0.08 mm (.015 inch ± .003 inch). The gelcoat shall be pigmented manufacturer's standard white. Panels shall have an overall finished panel thickness of not less than 16 mm (0.625 inch). Finished panels shall exhibit a smooth vehicle exterior surface with no evidence of discontinuity.

3.5.7.1.2 FRP/plywood panel installation. The FRP/plywood panels shall be installed with extruded aluminum corner posts, top rails, bottom rails and side door frames. Panels shall be one-piece. Vertical intermediate body posts shall not be used. Posts, rails and side door frames shall have channel type receiving edges providing attachment to panels with fasteners in a double shear and shall have a grip range of not less than 64 mm (2.5 inches). Posts, rails and door framing shall extend not more than 13 mm (0.50 inch) beyond the outer panel skin. Panel edges shall be sealed with waterproof mastic prior to installation. Installed panels shall be sealed with a high performance silicone caulking compound on all enclosing edges. Panels shall be secured to posts and rails using through-fasteners with a head diameter of not less than 13 mm (0.50 inch). All fastener installations shall be double shear and shall be waterproof.

3.5.7.1.3 Van body wind deflection. Unless otherwise specified herein, an aerodynamically streamlined body front shall be incorporated into the design of the body to direct airflow around the sides and over the top of the van body. The construction shall be integral with the van body front wall, sidewalls and roof, giving a curved front radius. When specified (see 6.2), for vehicles with standard cabs only, a wind deflector fairing shall be

attached to the upper front face of the van body. The deflector shall have an aerodynamic fairing shape to direct airflow around the sides and over the top of the van body. The deflector fairing shall have a rounded nose with a convex profile in both side and top views, forming a smooth compound curved surface blending into the rectangular body cross-section. The nose of the fairing shall project forward sufficiently to achieve a significant drag reduction at low yaw angles, and shall have a large enough radius to produce minimal flow separation at yaw angles of up to 20 degrees. In no case shall the forward portion of the fairing be less than 560 mm (22 inches) from the front face of the van body. The lower edge of the fairing shall be located as required to minimize drag due to turbulent airflow from the cab. The fairing construction material shall be molded fiberglass. Design operational limits shall include forward vehicle speeds of 97 km/h (60 mph) during wind gusts of 97 km/h (60 mph) from any direction.

3.5.7.2 Van body subframing. Van body subframing shall be of welded construction, braced at all points of stress. There shall be not less than 12 full width crossmembers, including ends, of full channel or equivalent section, steel construction, attached to longitudinal sills by welds. When subframing is a welded assembly, angle gussets (when used), crossmembers, longitudinal sills, and welded reinforcements (when used) shall be joined by weld for not less than 50 percent of the length of the contact edge(s). Spacing of crossmembers shall be equal, ahead of, and to the rear of the wheels. Longitudinal sills shall be constructed of structural steel channels, structural steel I-beams, formed steel channels or form rolled steel I-beams. Formed channel sills shall be reinforced with formed channel reinforcements within the sill. Formed channel reinforcements shall be provided at each subframe crossmember attachment point and at each chassis mounting point. Form rolled I-beam sills shall be high tensile 345 MPa (50,000 psi) yield steel, not less than 100 mm (4 inches) high and not less than 4.75 kg/m (3.190 pounds per foot). Formed channel crossmembers, gussets, formed channel longitudinal sills and reinforcements shall be of not less than 10 gage (3.416 mm) (0.1345 inch) steel. Extruded aluminum or steel side and front rails shall be furnished. When steel side and front rails (out-rails) are furnished they shall be of not less than 12 gage (2.657 mm) (0.1046 inch) steel. Design of the subframe shall permit low floor height, while providing tire chain clearance, and shall permit vehicle operation at speeds up to 88 km/h (55 mph) over improved roads, when loaded with an evenly distributed payload to the rated GVW, without evidence of permanent deformation.

3.5.7.3 Van body framing. Side and front post construction of aluminum bodies shall be extruded aluminum and shall be not less than 30 mm (1.187 inches) in depth and 0.49 kg/m (0.330 pound per foot) when side and front wall posts are spaced on 460 mm (18-inch) maximum centers. Side and front post construction shall be extruded aluminum and shall be not less than 32 mm (1.26 inches) in depth and 0.64 kg/m (0.43 pound per foot) when side and front wall posts are spaced on 610 mm (24-inch) maximum centers. Front

corner posts, when used, shall be extruded aluminum and shall be not less than 25 mm (1 inch) in depth and 0.72 kg/m (0.482 pound per foot). When front radius corners without front corner posts are used, the radius corners shall be of not less than 1.8 mm (0.071 inch) aluminum or 0.94 mm (0.037 inch) stainless steel, attached to the nearest side and front posts. The front structure shall be capable of withstanding a horizontal static load equal to 0.4 times the payload capacity of the vehicle without permanent distortion. Rear corner posts shall be provided and shall be of not less than 12 gage (2.657 mm) (0.1046 inch) steel or 14 gage (1.897 mm) (0.0747 inch) stainless steel.

3.5.7.4 Van body exterior. The roof assembly shall be standard for the vehicle, and shall be constructed to ensure drainage. Roof support bow construction shall be extruded aluminum, or not less than 18 gage (1.214 mm) (0.0478 inch) galvanized steel, not less than 35 mm (1.38 inches) in depth. When aluminum roof support bows are spaced on 610 mm (24-inch) maximum centers, the roof bows shall be not less than 25 mm (1 inch) in depth and 0.54 kg/m (0.36 pound per foot), and the roof panel shall be not less than 0.81 mm (0.032-inch) aluminum alloy. When aluminum roof support bows are spaced on 460 mm (18-inch) maximum centers, the roof bows shall be not less than 25 mm (1 inch) in depth and 0.57 kg/m (0.38 pound per foot), and the roof panel shall be not less than 0.64 mm (0.025-inch) aluminum alloy. When steel roof support bows are used, they shall be spaced on not more than 610 mm (24-inch) centers and the roof panel shall be not less than 1.0 mm (0.040-inch) thick aluminum alloy. Unless FRP/plywood panels are specified (see 3.5.7.1.1), body side panels shall be not less than 0.81 mm (0.032 inch) prepainted aluminum alloy. Unless otherwise specified (see 6.2), and except as follows, the color of the prepainted side panels shall be the manufacturer's standard white. When a semigloss or lusterless vehicle exterior color is specified (see 3.1.1.1), the side panels shall be painted to match that exterior color (see MIL-STD-1223). Body side panels shall be removable to facilitate body repair. All roof and body seams and joints shall be weatherproof. The body front posts and top front rail shall have a radius of not less than 115 mm (4.5 inches). All body and rubrails shall be extruded aluminum. Rub rails or buffer sheets extending outwards beyond the body skin shall be provided on both sides of the body. The rub rails or buffer sheets shall be permanently attached, or shall be an integral part of the exterior of the body at the floor line.

* 3.5.7.5 Van body interior. Two interior domelights shall be furnished. Two three-way domelight switches, both controlling both lights, shall be furnished. One switch shall be located on the rear of the curbside wall recessed to prevent damage by cargo or equipment and shall be accessible by an operator standing on the ground at the curbside. The other switch shall be located in the cab with an indicator light. When aluminum side walls are required, the interior of the body walls shall be lined with not less than 6.4 mm (1/4-inch) exterior grade plywood on the side walls and not less than 13 mm (1/2-inch) exterior grade plywood on the front wall, all full height.

When front corner posts are not used, interior radius corners shall be lined with aluminum or 3.2 mm (1/8-inch) thick fiberglass material and the scuff plate shall extend completely around the front radius corners. When steel roof bows are furnished, an isolating material shall be installed between the roof skin and the roof bows to prevent electrolytic action.

* 3.5.7.6 Scuff plate. A 300 mm (12-inch) high, 12 gage (2.657 mm) (0.1046 inch), smooth steel scuff plate, or an aluminum scuff plate of a thickness, providing an equivalent resistance to puncture, shall be installed on the front and side walls at the floor level. The entire scuff plate shall be treated or coated to resist corrosion (for steel) and need not be painted. The scuff plate shall be installed with corrosion-resistant countersunk screws, rivets or low profile round head screws. The scuff plate shall be screwed, riveted, or welded to formed corner plates.

3.5.7.7 Interior rope ties. When specified (see 6.2), interior rope ties, either fold-down lashing rings, rope cleats, or rod type, shall be installed and secured to wall frame members. When FRP/plywood panels are specified (see 3.5.7.1.1), interior rope ties shall be installed using through fasteners with a head diameter of not less than 13 mm (0.50 inch). FRP/plywood fasteners installation shall be waterproofed and exposed fasteners shall be painted to match the vehicle exterior. A minimum of 36 rope ties shall be arranged in three evenly spaced tiers, four rope ties per tier on each wall, including the front wall. The first tier shall be located just above the scuff plate, the second tier at 1/3 of the wall height, and the third tier at 2/3 of the wall height. Rope ties shall project not more than 9.5 mm (0.375 inch) into the cargo area beyond the wall lining. Rope tie protrusions shall be rounded and constructed to prevent injury to personnel and snagging of payload inside the cargo area.

* 3.5.7.8 Interior cargo control tracks. When specified (see 6.2), interior cargo control tracks shall be installed. Tracks shall be attached to side posts through full length side post wood fillers. Tracks shall be attached between posts through full length wood fillers, to the side wall lining, or not more than 150 mm (6 inch) centers. The cargo control tracks shall be mounted in two tiers, horizontally on each sidewall. The first tier shall be located just above the scuff plate, the second tier at 2/3 of the wall height. Each cargo control track shall be the full length of the van body interior. The track fitting holes or slots shall be on approximately 64 mm (2-1/2 inch) centers. The cargo control tracks shall be fabricated of steel with a thickness of not less than 12 gage (2.657 mm) (1.046 inch). Two cargo control track bars shall be provided. The tracks and cargo control bars shall be capable of withstanding a rearward static load of 17.8 kN (4,000 pounds) without permanent deformation.

3.5.7.9 Van body floor. The floor shall be of laminated hardwood not less than 29 mm (1-1/8 inches) thick or, when specified (see 6.2), shall be not less than 3.2 mm (1/8-inch) diamond tread aluminum with not less than a

29 mm (1-1/8 inch) laminated hardwood underlay. Wood parts shall be treated in accordance with 3.1.1.5. Wood floorboards shall be attached to the subframe at crossmembers with self-tapping, countersunk, corrosion-resistant screws.

3.5.7.10 Van body roll-up overhead rear door. Unless otherwise specified (see 3.5.7.11), a roll-up overhead door shall be provided. The door shall provide a clear opening of not less than 2030 mm (80 inches) in width and not less than 1800 mm (71 inches) in height. The door shall be of the sectional type having not less than five sections. Door sections shall incorporate joints of the tapered tongue and groove type or of ship-lap type. The door shall be plastic- covered or aluminum-covered 19 mm (3/4-inch) marine plywood construction. Door section corrosion-resistant hinges shall be mounted on the inside of the door, not less than four hinges at each section joint. The door track shall be manufacturer's standard corrosion-resistant type equipped with a positive stop at the end of the track. Door rollers, counterbalance unit and cables of corrosion-resistant construction shall be the manufacturer's standard. The door shall be weathertight. A heavy duty, corrosion-resistant, cam operated, lever type lock shall be provided, equipped with provisions for the use of a padlock. One heavy duty, corrosion-resistant grab handle, closed type, shall be provided on the outside bottom of the door. One nylon double-loop pull-down strap, not less than 50 mm (two inches) wide and 300 mm (12 inches) in length, shall be provided and located adjacent to the door lock.

3.5.7.11 Van body double rear doors. When specified (see 6.2), double rear doors shall be provided, full width and height, with bracing to prevent sagging, and equipped with three cast steel, or equal, hinges per door. The door locking devices shall include not less than three bolts or latches, located at top, bottom and center of the door. Cam type locking devices may be furnished at the top and bottom of the door. The center locking device shall be provided with an operating handle and shall be installed to ensure positive closing under all operating conditions. Provisions for the use of a padlock shall be furnished. The van body shall be equipped at the sides with catches for holding the doors in the fully open position. Hardware shall be the manufacturer's standard.

3.5.7.12 Van body rear dock and drop bumpers. A channel type rear dock bumper of not less than 10 gage (3.416 mm) (0.1345 inch) steel and not less than 75 mm (three inches) in height shall be provided. The dock bumper shall be integral with the body and located not less than 25 mm (1 inch) below the rear door(s). The dock bumper shall be the full width of the body. A drop bumper with crossbar shall be provided in addition to the dock bumper.

3.5.7.13 Van body mounting. Mounting of the van body shall be as specified in 3.5.3.7 through 3.5.3.7.3.

3.5.7.14 Lighting. All lighting requirements shall be in accordance with Federal Motor Vehicle Safety Standard No. 108.

3.5.8 Type VIII (refrigerator van). Type VIII vehicle shall have a maximum overall height of 3810 mm (150 inches) and the minimum cab-to-axle and other dimensions specified in table XII.

TABLE XII. Type VIII refrigerator van dimensions.

Minimum dimensions	mm	inches
Rear-of-cab to rear-axle	2900	114
Inside dimensions, minimum:		
Length	4420	174
Width	2080	82
Height	2030	80

3.5.8.1 Refrigerator van performance. The refrigeration unit cooling capacity shall reduce the air temperature in the van body from 38°C (100°F) to -18°C (0°F) in not more than five hours while the vehicle is in an ambient air temperature of not less than 38°C (100°F). The unit shall maintain -23°C (-10°F) in the van body under normal service conditions. The temperature shall be thermostatically controlled by means of a calibrated, manually adjustable device which shall maintain any selected temperature, within ±2°C (4°F), from +2°C (+35°F) to -23°C (-10°F). The refrigerator unit shall also have the heating capability to maintain the interior of the refrigerator van at 2°F (35°F), when the ambient air temperature is -32°C (-25°F), at a road speed of 88 km/h (55 mph).

* 3.5.8.2 Refrigerator van body. The body shall be constructed as specified in 3.5.7.1 through 3.5.7.4 for type VII vehicle. Vertical members that support the outer panels and the inner panels may have fiberglass transverse spacers to prevent heat transfer. Inner panels shall be secured to the inner vertical members.

* 3.5.8.2.1 Insulation. Insulation required for refrigerator van conformance to 3.5.8.1 shall be furnished. Insulation shall be of the foam-in-place type. The insulation shall have a K-factor of not more than 2.16 W/m²/°C/cm) (0.15 Btu per square foot per degree Fahrenheit per hour per inch) of thickness. Insulation shall be installed to prevent sagging and shall be free of all voids. Insulation shall not shrink or swell during the life of the body. The insulation shall be of cellular structure with closed cells. Insulation shall be nonhygroscopic, resistant to fungus growth and vermin retention, and shall be resistant to the passage of air and absorbtion of water. Insulation shall be self-extinguishing.

3.5.8.2.2 Refrigerator van inner panels. Inner panels including the roof panels, shall be ribbed or flat fiberglass sheet, a nominal 2.4 mm (3/32 (0.09 minimum) inches) thick.

3.5.8.2.3 Refrigerator van floor. The floor shall be of extruded aluminum alloy sections having equally spaced longitudinal corrugations not less than 25 mm (1 inch) in height and approximately 25 mm (1 inch) in width. Floor sections, with corrugations lengthwise of body, shall overlap and shall be sealed or shall be welded full length to prevent leakage of moisture through floor to the insulation. The floor surface of the corrugations shall have extruded longitudinal ribs approximately 3.2 mm (0.125 inch) high and 3.2 mm (0.125 inch) wide, and spaced on 4.8 mm (0.188-inch) centers. The ribs shall be knurled or serrated on approximately 4.8 (0.188-inch) centers to provide an anti-skid surface. When full width rear doors are specified (see 3.5.8.2.5), the floor shall be reinforced to withstand concentrated loads imposed by forklifts having a 6350 kg (14,000 pound) axle load supported by 180 mm (7-inch) wide tires spaced 760 mm (30 inches) apart on the tire centerline. Sides and front of floor shall have an inverted skirt extending upwards for a distance of not less than 125 mm (five inches) and shall be fitted between insulation and the inner panels. Floor design shall permit vehicle operation at speeds up to and including 88 km/h (55 mph), over improved roads, with a concentrated load of not less than 975 kg/m^2 (200 pounds on any square foot) of floor area.

3.5.8.2.4 Refrigerator van rear bumper. Rear dock and drop bumpers conforming to 3.5.7.11 shall be provided. Unless a hydraulic tailgate is specified, the drop bumper shall be of the shelf, step type, extending not less than 230 mm (9 inches) to the rear. The step surface shall be of self-cleaning grating. The corners shall have a radius of not less than 25 mm (1 inch). All edges of the grating shall be enclosed and free of ragged or sharp edges. A vertical closure plate with cutouts for lights shall extend from the body down to the shelf step. The load carrying capacity of the bumper step shall be not less than 410 kg (900 pounds) applied vertically and uniformly distributed over any two, 125 mm (5 inch) increments of step width (see Federal Motor Carrier Safety Regulation 399.207(5)).

3.5.8.2.5 Refrigerator van rear doors. Unless a roll-up door is specified, two rear doors shall be provided. Doors shall be insulated so that body insulating efficiency will not be reduced. A door gasket shall be installed to insure a seal. A door locking device, with operating handle, shall be installed to provide positive closing action and shall have provisions for use of a padlock. The door shall be capable of being opened from inside when locked. Unless full width rear doors are specified, the doors shall provide an opening for access to the body not less than 1270 mm (50 inches) wide and 1730 mm (68 inches) high. When full width rear doors are specified (see 6.2), the rear doors shall provide an opening within 100 mm (4 inches) of the full width and the full height of the body interior. The doors also shall conform to 3.5.7.10.

3.5.8.2.6 Refrigerator van roll-up overhead rear door. When specified (see 6.2), a roll-up overhead rear door shall be provided. Unless a full-width door is specified, the door shall provide a clear opening of not less than 1270 mm (50 inches) in width and not less than 1730 mm (68 inches) in height. The door shall be of the sectional type having not less than five sections. Door sections shall be not less than 29 mm (1.125 inch) thick pultruded fiberglass filled with polyurethane foam with molded plastic end caps, or equal. Door insulation shall maintain body insulating efficiency. Door gaskets shall be installed and shall be designed to ensure a positive seal. A door locking device, with operating handle, shall be installed to provide positive closing action and shall have provisions for the use of a padlock. The door shall be capable of being opened from inside when locked. Door section corrosion-resistant hinges shall be mounted on the inside of the door, not less than four hinges at each section joint. Door track shall be the manufacturer's standard corrosion-resistant type equipped with a positive stop at the end of the track. Door rollers, counterbalance unit, and cables of corrosion-resistant construction shall be the manufacturer's standard. The door shall be weathertight. One heavy duty corrosion-resistant grab handle, closed type, shall be provided on the outside bottom of the door. One nylon double-loop pull-down strap, not less than 38 mm (1.5 inches) wide and 300 mm (12 inches) in length, shall be provided and located adjacent to the door lock. When specified (see 6.2), the door opening shall be within 125 mm (five inches) of the full width and within 230 mm (nine inches) of the full height of the body interior.

* 3.5.8.2.7 Refrigerator van interior light. Two interior domelights shall be provided. A recessed control switch controlling both lights shall be located near the rear door, accessible to an operator standing on the ground at the curbside. A circuit opening switch controlling both lights, shall be operated by closing the door. Fixtures, switches and wiring shall be moistureproof and shall be accessible for repairs.

3.5.8.2.8 Refrigerator van access steps. Access steps and grab handle(s) shall be provided on the front of the body leading up to the refrigeration unit. Steps shall be spaced vertically on not more than 380 mm (15-inch) centers. A platform for servicing the refrigeration unit shall be provided above the cab roof. The platform shall be of aluminum tread plate or open grating, not less than 280 mm (11 inches) deep, not less than the width of the refrigeration unit, and shall be readily accessible from the access steps.

3.5.8.2.9 Refrigerator van wind deflection. An aerodynamically streamlined body front shall be incorporated into the design of the body. The construction shall be integral with the van body front wall, sidewalls and roof, giving a curved front radius.

3.5.8.2.10 Refrigerator van body mounting. Mounting of the body shall be as specified in 3.5.3.7 through 3.5.3.7.3.

* 3.5.8.3 Refrigeration unit. The refrigeration unit shall contain all components, equipment and accessories normally furnished on the manufacturer's standard unit for comparable commercial applications and shall include all components and features specified herein. The refrigerating capacity shall be adequate to efficiently obtain the performance requirements specified herein. Applicable components of the refrigeration unit shall be mounted on a frame attached to the front of the van exterior. The unit shall incorporate lifting eyes to facilitate removal or installation. The unit shall be enclosed with quick removable metal panels. The unit shall extend into, but occupy a minimum of, cubage within the van. All components and assemblies shall withstand vibration encountered in normal vehicle operation. The refrigerant shall be:

(a) R22-chlorodifluoromethane; or
(b) R502 [azeotrope of R22-chlorodifluoromethane ($CHClF_2$) and R115-chloropentafluoroethane (C_2ClF_5)]; or
(c) R134A-tetrafluoroethane (CH_2FCF_3).

The unit shall be designed for use with both the primary and secondary power units (see 3.5.8.3.3 and 3.5.8.3.4) with means for rapid conversion from one to the other. Components requiring lubrication with grease shall be provided with pressure type grease fittings with flush type check ball. Radio interference suppression (see 3.4.2.8) shall be furnished.

3.5.8.3.1 Temperature control system. The temperature control system shall provide regulation of the refrigerator temperature.

3.5.8.3.2 Compressor. A piston type compressor, with adequate performance characteristics for the specified requirements, shall be installed.

* 3.5.8.3.3 Primary power source. An air-cooled or water-cooled auxiliary engine with horsepower and torque capacity for maximum compressor requirements shall be installed for use while the vehicle is moving and at rest. Engine accessories shall include a starter (with a device to prevent the engine from driving the starter), a generator or alternator, and a battery. For gasoline engines, a choke and resistor type spark plugs shall be provided. Provision shall be made to permit starting the engine under no compressor load. Unless otherwise specified, for gasoline engine driven vehicles, the auxiliary engine shall operate on diesel fuel and shall be equipped with its own fuel tank. When specified for gasoline engine driven vehicles (see 6.2) and when heating of the refrigerated body is not required in cold weather, the auxiliary engine shall operate on the same type of fuel as the truck engine. For diesel engine driven vehicles, the auxiliary engine shall operate on the same type of fuel as the truck engine. When the auxiliary engine operates on the same type of fuel as the truck engine, fuel to operate the auxiliary engine shall be supplied form the truck's main fuel tank(s). When two main fuel tanks are furnished on the truck, both shall be

connected to the auxiliary engine in a manner ensuring continued operation of the auxiliary engine with either one of the tanks empty. An accessible fuel shut-off valve shall be provided. The system shall conform to Federal Motor Carrier Safety Regulations 393.65 and 393.67. When a water-cooled auxiliary engine is furnished, visual means of checking the coolant level shall be provided and the cooling system shall be serviced in accordance with 3.4.26.1.

3.5.8.3.4 Secondary power source. An auxiliary 208-volt, 3-phase, 60 hertz ac electric motor, with adequate horsepower and torque capacity for maximum compressor requirements, shall be installed for use when the vehicle is at rest. A slave receptacle, wired to the motor, shall be mounted on the van body or on the refrigeration unit control panel to accommodate an outside power source. All electrical materials and workmanship shall conform to the requirements of the National Electrical Code (NFPA No. 70).

3.5.8.3.5 Condenser. A condenser, designed and built according to best current commercial practice and adequate for the requirements specified herein, shall be provided.

3.5.8.3.6 Receiver. A receiver of adequate strength and capacity, constructed of welded steel, shall be furnished.

3.5.8.3.7 Evaporator. A coil type or plate type evaporator, designed and built according to best current commercial practice and adequate for the requirements specified herein, shall be provided. The evaporator shall incorporate an evaporator fan and a defroster.

3.5.8.3.8 Defroster. Means shall be provided to bypass, when desired, refrigerant from the compressor discharge line directly through the evaporator to defrost the unit. A separate switch shall control the bypass valve and the discharge air duct damper.

3.5.8.3.9 Dehydrator. A dehydrator, with sufficient dehydrating capacity for the system, shall be installed in the refrigerant line. Means shall be provided to prevent the dehydrator from contaminating the refrigerant.

3.5.8.3.10 Strainer. A strainer shall be installed in the liquid line between the dehydrator and the expansion valve.

3.5.8.3.11 Expansion valve. The expansion valve shall automatically control refrigerant flow by thermostatic means, or equal. Thermostatic expansion valves shall incorporate a superheat adjustment.

3.5.8.3.12 Thermometer. A thermometer that registers the inside temperature of the van shall be furnished. The thermometer shall be visible to the driver from the normal driving position. Mirrors may be furnished to

provide visibility for thermometer reading by the driver. If a column type thermometer is furnished, a guard shall be provided to protect the column and shall be so located as not to obscure the reading.

3.6 Workmanship. Defective components or parts and assemblies which have been repaired or modified to overcome deficiencies shall not be furnished. Welded, bolted, and riveted construction utilized shall be in accordance with the highest standards of the industry.

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 (examination and tests) 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 ensure supplies and services conform to prescribed requirements.

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

4.2 Government verification. Quality assurance operations performed by the contractor will be subject to Government verification at unscheduled intervals. Verification will consist of observation of the operations to determine that practices, methods and procedures of the contractor's inspection are being properly applied. Failure of the contractor to promptly correct product deficiencies discovered shall be cause for suspension of acceptance until correction has been made or until conformance of product to specification criteria has been demonstrated.

4.3 First production vehicle inspection. For military services, the first vehicle produced under the contract shall be inspected by the contractor at his plant under the direction and in the presence of Government representatives. The purpose of the inspection shall be to determine vehicle conformance to the contract. Acceptance of the first production vehicle shall not constitute a waiver by the Government of its rights under the provisions of the contract.

4.3.1 Vehicle weight. The first production vehicle shall be weighed to determine the curb weight and distribution of the curb weight on front and rear axles. The total imposed loads on front and rear axles shall be computed by the contractor and verified by the Government, using the curb weight, the operator weight at 80 kg (175 pounds) and the payload required to provide the specified GVW. Except as specified in 3.2.6.1, the calculated imposed loads on the front and rear axles shall be compared to the suspension, axle and tire load capacity ratings to determine if these components are of adequate capacity to meet contractual requirements.

4.3.2 Road test. The first production vehicle shall be road tested by the contractor without payload. The road test shall be for not less than 16 km (10 miles) at speeds up to 88 km/h (55 mph).

4.3.3 Truck body treatment and painting. A certification regarding the body cleaning, treating, prime painting and salt spray resistance testing, as required by MIL-STD-1223, shall be made to the Government representatives at the first production vehicle inspection.

4.3.4 Type VIII refrigeration unit tests. To determine conformance to 3.5.8.1, the following tests shall be conducted.

4.3.4.1 Cooling test. The entire body, without payload and with the rear doors open, shall be soaked for four hours in an ambient air temperature of not less than 38°C (100°F). The cooling capability of the van shall then be determined to verify conformance to 3.5.8.1. The vehicle body shall be continuously exposed to the 38°C (100°F) ambient air temperature during the test.

* 4.3.4.2 Heating test. When a diesel powered refrigeration unit is required, (see 3.5.8.3.3), the vehicle, without payload, shall be exposed for four hours to the ambient air temperature at the time of the test. The body heating system shall be operated and the inside temperature shall be raised until a temperature differential between the inside and outside air reaches 33°C (60°F). With the heating system operating, the vehicle shall be driven for 30 minutes at a road speed of 88 km/h (55 mph) to test the capability of the system to maintain the 33°C (60°F) temperature differential. In the event outside air temperature is such that the required 33°C (60°F) temperature differential may cause damage to the body or equipment, certification from the body supplier may be accepted. Certification shall be based on test data or calculations.

4.3.5 Heater certification. For civil agencies only, the contractor shall certify that the heater conforms to the power requirements of 3.4.17.

4.3.6 Wood treatment certification. For military services only, the manufacturer's records shall be available to verify that all wood requiring treatment in accordance with MIL-STD-1223 has been treated.

4.3.7 Production sample. Upon acceptance of the first production vehicle, it shall remain at the manufacturing facility as a production sample, and shall be the last vehicle shipped on the contract. The contractor shall maintain the vehicle in a serviceable condition for the duration of the contract.

4.4 Failure. Failure of the first production vehicle to meet requirements of the contract shall be cause for the Government to refuse acceptance of all vehicles under contract until corrective action has been taken.

4.5 Inspection of production vehicles. The contractor's inspection system shall as a minimum assure that the vehicle conforms to the physical and dimensional requirements and is capable of meeting performance requirements specified herein. For each vehicle under contract, the contractor shall make available to the Government, at the point of final acceptance, records acceptable to the Government indicating that the servicing and adjusting required by 3.4.26 have been accomplished. For civilian agencies, GSA Form 1455 or an approved equivalent form shall be used.

5. PACKAGING

5.1 Vehicle processing. The vehicle shall be processed for shipment, from the manufacturer's plant to the initial receiving activity, in accordance with the manufacturer's standard commercial practice.

6. NOTES

6.1 Intended use. The vehicles covered by this specification are intended for general non-tactical use by the Government in transporting personnel or cargo; for use in performance of the maintenance and construction tasks indicated; or for the mounting of special bodies or equipment. Civil agencies shall specify (see 6.2) unusual operating conditions, items and exceptions not specified herein.

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

(a) Title, number and date of this specification.
(b) Type and class of vehicle required (see 1.2).
(c) Issue of DODISS to be cited in the solicitation and if required, the specific issue of individual documents referenced (see 2.1.1. and 2.2).
(d) Identification of appropriate military service for painting (see 3.1.1.1).
(e) Exterior color, if other than as specified, (see 3.1.1.1).
(f) Exterior color selection after contract award, if required (see 3.1.1.1).

(g) Identification of appropriate military service for marking (see 3.1.1.2).
(h) Concealed military markings, if required (see 3.1.1.2).
(i) Rustproofing, if required (see 3.1.1.3).
(j) Tropical rustproofing, if required (see 3.1.1.3).
(k) Towing devices, if required on rear in addition to front (see 3.1.1.6) (not available with types VI maintenance truck or VIII refrigerator van truck or with 3.1.1.11).
(l) Trailer towing package (pintle, etc.), if required (see 3.1.1.8) (not available with 3.1.1.11).
(m) Trailer lighting cable, if required (see 3.1.1.9).
(n) Hydraulic tailgate, if required for type III stake, VII van or VIII refrigerator van (see 3.1.1.11) (not available with 3.1.1.6 or 3.1.1.8).
(o) Hydraulic tailgate capacity, if not 910 kg (2,000 pounds) (see 3.1.1.11).
(p) Fold-under type hydraulic tailgate, if required (see 3.1.1.11.2).
(q) Rail lift type hydraulic tailgate, if required (see 3.1.1.11.3). (Available with type VII van with roll-up door only).
(r) Gross axle weight ratings, if specific ratings are required (see 3.2.6.1).
(s) Snowplow weight provisions, if required (see 3.2.6.2).
* (t) Optional, increased vehicle performance, if required (see 3.3.1.1).
(u) Operation on JP-4, JP-5 and JP-8 fuels, if required (see 3.4.1.1).
(v) Gasoline engine, if required (see 3.4.1.2).
(w) Silicone rubber hoses, if required (see 3.4.1.8).
* (x) Power plant heaters and fuel warmers, if required (see 3.4.1.9).
(y) Fuel fired engine preheater for diesel engine driven vehicles, if required (see 3.4.1.10).
* (z) Vernier throttle control, if required (see 3.4.1.11).
* (aa) Starting motor circuit breaker, if required (see 3.4.2.1).
(ab) Alternator capacity, if other than as specified (see 3.4.2.3).
* (ac) Type II truck tractor electrical and brake connector hookup at lower streetside of cab, if required (see 3.4.2.6 and 3.4.11.2(i)).
(ad) Auxiliary 24-volt system with trailer receptacle, if required (see 3.4.2.8).
(ae) If radio interference suppression is not required, civil agencies only, (see 3.4.2.9).
* (af) Dry type air cleaner with service indicator, if required (see 3.4.3.1).
(ag) Fuel capacity, if other than as specified (see 3.4.3.2).
(ah) Fuel and water separator, if required (see 3.4.3.3).
(ai) Spark arrester, if required (see 3.4.4.1).
* (aj) Manual transmission, if required in lieu of automatic (see 3.4.5).
(ak) Heavy duty frame reinforcement, if required (see 3.4.7).
* (al) Extended, tapered rear frame rails on type II truck tractor, if required (see 3.4.7).
(am) Auxiliary rear springs, if required (see 3.4.8).
(an) Rear air suspension for class A or B, if required (see 3.4.8.1). (Not available on type I chassis and type IV dump.)

(ao) Two-speed axle, if required (see 3.4.9.1).
(ap) Traction control, if required (see 3.4.9.2) (not available on type II truck tractor).
(aq) Wide base tires and wheels, if required (see 3.4.10).
(ar) Disc type wheels, if required (see 3.4.10).
* (as) If other than highway tread rear tires are required (see 3.4.10.1).
(at) Bias ply or low profile tires, if required (see 3.4.10.1).
(au) Spare tire carrier, if required (see 3.4.10.3 and 6.3).
(av) Spare wheel or rim, if required (see 3.4.10.4).
* (aw) Spare tire assembly for front axle, if required (see 3.4.10.5).
* (ax) Spare tire assembly for rear axle, if required (see 3.4.10.5).
* (ay) Two spare tire assemblies, one for the front and one for the rear axle, if required (see 3.4.10.5).
* (az) Straight in lieu of precoiled air brake hoses, if required (see 3.4.11.2(f) and (h)).
(ba) Brake controls for use from a towing vehicle, if required (see 3.4.11.3).
(bb) Increased braking capability, if required (see 3.4.11.4).
(bc) Tilting hood and fender assembly, if required (see 3.4.12).
(bd) Tilt cab, if required (see 3.4.12).
(be) Individual driver and passenger seats, if required (see 3.4.12.1).
(bf) Air ride driver's seat, if required (see 3.4.12.1).
(bg) Crew cab, if required (see 3.4.12.2).
(bh) Sleeper cab, if required (see 3.4.12.4).
* (bi) Intermittent windshield wipers, if required (see 3.4.14).
(bj) Spare tire changing tools, if required (see 3.4.16.1).
* (bk) Gages and an engine shutdown system, if required in lieu of indicators (see 3.4.19).
* (bl) Remote control curbside rearview mirror, if required (see 3.4.20).
* (bm) Heated rearview mirrors, if required (see 3.4.20).
(bn) Air horn, in addition, if required (see 3.4.21).
(bo) Engine hour meter, if required (see 3.4.22).
(bp) Back-up alarm, if required (see 3.4.23).
(bq) AM/FM radio, if required (see 3.4.24).
(br) Air conditioning, if required (see 3.4.25).
* (bs) Cooling system protection down to -54°C (-65°F), if required (see 3.4.26.1).

CHASSIS:

(bt) Dimensional requirements for type I chassis (see 3.5.1).
(bu) Load area and body mounting requirements for type I chassis (see 3.5.1).

TRUCK TRACTORS:

(bv) Truck tractor full oscillating fifth wheel, if required (see 3.5.2).
(bw) If a truck tractor deck plate is not required (see 3.5.2.5).
(bx) Truck tractor sliding fifth wheel, if required (see 3.5.2.7).
(by) Truck tractor wind deflector, if required (see 3.5.2.8).

(bz) Semitrailer van height for truck tractor wind deflector, if not as specified (see 3.5.2.8).
(ca) Truck tractor hydraulic lift fifth wheel, if required (see 3.5.2.9) (not available with 3.5.2.7).
(cb) Truck tractor air lift fifth wheel, if required (see 3.5.2.10) (not available with 3.5.2.7).

STAKE TRUCKS:

(cc) Stake truck swing center side racks, if required (see 3.5.3).
(cd) Stake truck hydraulic crane, if required (see 3.5.3.8).

DUMP STAKE TRUCKS:

(ce) Dump stake and platform body, if required (see 3.5.3.9).
(cf) Dump stake hoist capacity rating, if not as specified (see 3.5.3.9.2).

DUMP TRUCKS:

(cg) Dump truck, light duty service 4.6 m^3 (6 cubic yard) body for class A, if required (see 3.5.4).
(ch) Dump truck cab protector dimension, if different (see 3.5.4.2).
(ci) Dump truck cab protector stowed in dump body, if required (see 3.5.4.2).
(cj) Dump truck hoist capacity rating, if not as specified (see 3.5.4.5).
(ck) Dump truck hoist 2-position or 2-speed, if required (see 3.5.4.5).
(cl) Reversible snowplow, if required (see 3.5.4.8).
(cm) One-way snowplow, if required (see 3.5.4.8).
(cn) Snowplow power angle moldboard, if required (see 3.5.4.8.4).
(co) Dump truck sand and salt spreader tailgate, if required (see 3.5.4.9).
(cp) Dump truck skid mounted sand and salt spreader, if required (see 3.5.4.9).

VAN TRUCKS:

(cq) Van body FRP/plywood side and end panels, if required (see 3.5.7.1.1).
(cr) Van body color of prepainted panels, if not white (see 3.5.7.4).
(cs) Van body interior rope ties, if required (see 3.5.7.7).
(ct) Van body interior cargo control tracks, if required (see 3.5.7.8).
(cu) Van body aluminum floor, if required in addition to wood (see 3.5.7.9).
(cv) Van body double rear doors, if required (see 3.5.7.11).

REFRIGERATOR VAN TRUCKS:

(cw) Refrigerator van full width rear doors, if required (see 3.5.8.2.5).
(cx) Refrigerator van roll-up doors, if required (see 3.5.8.2.6).
(cy) Refrigerator van full width roll-up doors, if required (see 3.5.8.2.6).
* (cz) Gasoline in lieu of diesel engine driven refrigeration unit (furnished without cargo heating capability), if required for gasoline engine driven trucks (see 3.5.8.3.3).

MISCELLANEOUS

(da) Unusual operating conditions, civil agencies only (see 6.1).
(db) Parts list and shop repair manual(s), if required, civil agencies only (see 6.6).

6.3 Performance prediction. SAE Truck Ability Prediction Procedure computations and computations for low speed and maximum geared speed will be required by the contract. The SAE Work Sheet Item 1 should include vehicle model number, engine model number, and vehicle type and class. Unless other conditions are cited in the contract, computations should be made for normal atmospheric pressure, normal ambient air temperature, and still, dry air. The factors to be used in predicting truck ability (see 3.3.1.1) are established as follows for the corresponding SAE Truck Ability Prediction Procedure Tables:

Table 1	- Tire Factor. This factor must relate to the size of tires furnished by the contractor in accordance with this specification.
Table 2	- Altitude Factor. 1.00
Table 3	- Rolling Factor. 1.613
Table 4	- Area Factor. For truck tractor, use factor 0.225; for all other trucks, use factor 0.173.
Table 5	- Velocity Factor. 250.0
Table 6	- Altitude Factor. 1.00
Table 7	- Chassis Friction Horsepower. Use applicable power unit GVW (to nearest, higher, 454 kg (1,000 pounds) and the engine rpm (to nearest 100 revolutions) which is required for 80 km/h (50 mph) geared speed. For GVW and engine speed beyond the range of this table, factors shall be extrapolated.
Table 8	- Grade Factor. 0.75
Table 8A	- Correction Factor. Not required.
Table 9	- Road Factor. 0.0

6.4 Subject term (key word) listing.

Chassis, truck
Non-tactical truck
Non-tactical vehicle (NTV)
Truck, commercial
Truck, dump
Truck, maintenance and construction
Truck, refrigerator van
Truck, stake
Truck tractor
Truck, van
4x2.

6.5 Warranty (civil agency contracts only).

6.5.1 Warranty coverage. The contractor shall warrant the vehicle and furnished equipment against parts failure or malfunction due to design, construction or installation errors, defective workmanship, and missing or incorrect parts (6.5.4 exceptions) for a minimum period of 12 months, and 15 months for vehicles outside the contiguous (48) United States and District of Columbia, from date of acceptance 1/ or 19 300 km (12,000 miles) of operation, exclusive of any authorized accumulated driveaway mileage, whichever occurs first. If the contractor receives from any supplier or subcontractor additional warranty on the whole or any component of the vehicle, in the form of time or mileage, including any pro rata arrangements, or the contractor generally extends to his commercial customers a greater or extended warranty coverage, the Government shall receive corresponding warranty benefits.

6.5.2 Domestic use. When vehicles are used within the fifty States of the United States, the District of Columbia, Puerto Rico, and the Virgin Islands, the warranty shall include the furnishing, without cost to the Government (FOB contractor's nearest dealer or branch to vehicle's location or station), of new parts and assemblies to replace any that failed or malfunctioned within the warranty period. In addition, when the Government elects to have the work performed at the contractor's plant, branch, dealership, or with the contractor's approval (i) to correct the supplies itself; or (ii) to have them corrected by a commercial garage facility; the cost of the labor involved in the replacement of the failed or malfunctioned parts or assemblies shall be borne by the contractor.

6.5.3 Foreign use. When vehicles are used outside the fifty States of the United States, the District of Columbia, Puerto Rico, and the Virgin Islands, the warranty shall include the furnishing of new parts or assemblies to replace any returned to the contractor by the Government which failed or malfunctioned within the warranty period. The replacement parts or assemblies shall be delivered by the contractor to the port of embarkation in the United States designated by the Government. The contractor will not be required to bear the cost of the labor involved in correcting defects in vehicles operated in foreign countries.

6.5.4 Warranty exceptions. Unless within the additional coverage under 6.5.1, the following items are considered normal maintenance and repair for which the contractor need not assume liability for reimbursing the Government regardless of the vehicle age or mileage.

1/ The warranty begins when the Government accepts the vehicle from the contractor FOB point or origin/destination.

(a) Abuse, negligence, or unapproved alteration of original parts
(b) Damage from accidents
(c) Brake and standard clutch adjustments
(d) General tightening, headlamp adjustments
(e) Wheel alinement or tire balancing
(f) Tires and batteries (if warranted by their manufacturers)
(g) Miscellaneous expenses such as fuel, towing, telephone, travel, lodging, or loss of personal property.

6.6 Operators, servicing and parts manuals (civil agencies only). The successful bidder shall furnish at least one operator's and maintenance handbook, including a handbook(s) for any furnished special equipment. When specified (see 6.2), parts list or book and shop repair manual(s) for the vehicle and equipment furnished shall be provided.

6.7 Repair parts and service (civil agencies only). As continuous operation of the vehicle described by this specification is of utmost importance, it is necessary that the successful bidder be in a position to render prompt service and to furnish replacement parts. Accordingly, bidders shall indicate the extent of their ability to render prompt service by furnishing a list of branch offices or agencies where complete stocks of repair parts are maintained and can be secured within a reasonable time after ordering by part number from the manufacturer's parts book and at such discount as may be quoted from year to year by the manufacturer of the vehicle produced under this specification.

6.8 Statement of origin or bill of sale (civil agencies only). A manufacturer's statement of origin or bill of sale showing the applicable purchase order number is required for each vehicle procured under this specification. Unless otherwise specified, such documents shall be forwarded to the consignee.

6.9 Spare tire carriers. Requisitioners, users and procuring activities should note that a spare tire carrier on type II tractors and type IV dump trucks of necessity increases the wheelbase of the vehicle to what many consider an unacceptable length. It is recommended that truck tractors be procured without a spare tire carrier, with the spare carried on or in the semitrailer the truck tractor will be pulling. On dump trucks (and dump stakes), it is recommended that the spare be stowed on the dump for shipment, and when needed after the dump truck is placed in use, that a wrecker be dispatched to the disabled dump, carrying the proper spare.

NOTICE - The margins of this document are marked with asterisks (*) to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these

notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content regardless of the marginal notations and relationship to the previous issue.

MILITARY INTEREST:
Army - AT
Navy - YD, MC
Air Force - 84, 99

CIVIL AGENCY COORDINATING ACTIVITIES:
D. C. GOVT - DCG
DOT - FHW, MVP
GSA - FSS
INTERIOR - BPA
USDA - AFS, ARS, SCS

Preparing activity:
Army - AT

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