

NOT MEASUREMENT SENSITIVE

KKK-T-2111M
 September 15, 1991
 SUPERSEDING
 KKK-T-2111L
 August 1, 1990

FEDERAL SPECIFICATION

TRUCKS AND TRUCK TRACTORS:
 COMMERCIAL, DIESEL ENGINE DRIVEN,
 16 350 TO 28 100 KILOGRAMS (36,000 TO 62,000 POUNDS) GVW, 6x6

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 engine driven, six-wheel, six-wheel drive, commercial truck chassis, trucks, and truck tractors having minimum gross vehicle weights (GVW) of 16 350 to 28 100 kilograms (kg) (36,000 to 62,000 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 vehicle 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 D
II	Truck Tractor, with Cab (see 3.5.2).	A B C D
* III	Truck, Stake, with Cab (see 3.5.3).	- B C -
* IV	Truck, Dump, with Cab (see 3.5.4).	- B C D
V	Truck, Wrecker, with Cab (see 3.5.5 and MIL-T-62491).	- - - -

AMSC N/A

FSC 2320

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

KKK-T-2111M

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

	<u>Military services</u>	<u>Civil agencies</u>
Class A -	16 350 kg (36,000 pounds)	N/A
Class B -	20 900 kg (46,000 pounds)	20 900 kg (46,000 pounds)
Class C -	23 100 kg (51,000 pounds)	23 600 kg (52,000 pounds)
Class D -	27 200 kg (60,000 pounds)	28 100 kg (62,000 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.
- CCC-C-419 - Cloth, Duck, Cotton, Unbleached, Flied Yarns, Army and Numbered.

MILITARY

- MIL-P-514 - Plates, Identification, Instruction and Marking, Blank.
- MIL-T-5824 - Turbine Fuel, Aviation, Grades JP-4 and JP-5.
- MIL-M-43719 - Marking Materials and Markers, Adhesive, Elastomeric, Pigmented, General Specification for.
- MIL-T-82491 - 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-3.

STANDARDS

FEDERAL

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

KKK-T-2111M

MILITARY

- MIL-STD-209 - Slings and Tiedown Provisions for Lifting and Tying Down Military Equipment.
- MIL-STD-1223 - Nontactical Wheeled Vehicles Treatment, Painting, Identification Marking and Data Plate Standards.
- MIL-STD-1791 - Designing For Internal Aerial Delivery In Fixed Wing Aircraft.

(Application for copies of MIL-STD-1791 should be addressed to Wright-Patterson AFB, ASD/ENESS, Mr. Scott Kuhnen, Wright-Patterson AFB, OH 45433, telephone (513) 255-6281.)

- MS 51118 - 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 document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

AFSC DESIGN HANDBOOK
DH-i-11

- Air Transportability Handbook.

(Application for copies of the AFSC Design Handbook should be addressed to Wright-Patterson AFB, ASD/ENESS, Mr. Rod Wright, Wright-Patterson AFB, OH 45433, telephone (513) 255-6281.)

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.

KKK-T-2111M

(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 cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (see 6.2).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- ASTM A53 - Pipe, Steel, Black and Hot-Dipped Zinc-Coated Welded and Seamless, for Ordinary Uses (DoD adopted);
- 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 the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

THE EUROPEAN TYRE AND RIM TECHNICAL ORGANISATION (ETRTO)

Standards Manual

KKK-T-2111M

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

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.
J683	- 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.
J706	- Rating of Winches.
J844	- Nonmetallic Air Brake System Tubing (DoD adopted).

KKK-T-2111M

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 3.1.1.17, 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 3.1.1.17, 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 the 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.

KKK-T-2111M

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 agency contracts, the manufacturer's standard treatment and painting is acceptable. For civil agency contracts, 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, nonmetallic 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 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, transfer case and rear axle shall be of the permanent magnet type.

3.1.1.5 Wood treatment. As specified herein (see 3.5.3.3) 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 manufacturer's single center mounted eye or pin shall be mounted on the front of the vehicle. When specified (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 and type IV dumps shall have rigid splash shields ahead of the rear wheels and rubber mud flaps to the rear of the rear wheels. Type II truck 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 a minimum surface contract dimensions of 25 mm (1 inch) high by 32 mm (1.25 inch) wide by 2.4 mm (0.094

KKK-T-2111M

inch) thick shall be furnished at each bolt. All splash shield and mud flap installations, front and rear, shall conform to the rear wheel splash and stone throw protection provisions of SAE J622, except the quarter fenders on tractors need extend down only to the height of the centerline of the rear axles.

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 ME 51118. The pintle shall be installed on the chassis frame with reinforcements to transfer a vertical tongue load of not less than 1315 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 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 of not less than 178 kN (40,000 pounds). 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, 19.5 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 therein, 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 precoiled and shall be not less than 2800 mm (110 inches) long. 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.

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 Brushguard. The vehicle shall be equipped with a radiator and headlamp brushguard. When the headlamps are recessed in and protected by the front bumper, a headlamp brushguard is not required.

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

KKK-T-2111M

* 3.1.1.13 Decals and data plates. 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 6x6 conversion. The chassis manufacturer's standard 6x4 truck chassis may be modified to provide all wheel drive conforming to the requirements specified herein if:

- (a) The conversion axle manufacturer's engineering department specifically approves and certifies that all such modifications meet the design requirements and standards of the conversion axle manufacturer. Certification shall be based on both design analysis and proving ground test reports which shall be made available to the engineering and quality assurance offices of the procuring activity.
- (b) The chassis manufacturer's front axle before conversion has the same load rating as the conversion axle to be installed.
- (c) Components used in the all wheel drive conversion are of current production.
- (d) Components used in the all wheel drive conversion are approved for the conversion application by the component manufacturers.
- (e) The converted vehicle is certified to conform to Federal Motor Vehicle Safety Standard No. 121, by the intermediate or final manufacturer.
- (f) Replacement headlights, if required to be added, shall meet the height requirement of not less than 560 mm (22 inches) and not more than 1370 mm (54 inches), measured above the road surface, in conformance with Federal Motor Vehicle Safety Standard No. 108. Replacement headlights shall be equivalent in mounting, protection, and range and precision of adjustment to the chassis manufacturer's original standard headlights.
- (g) Unused headlight cavities are covered in a neat workmanlike manner, treated and painted to match the chassis cab color with treatment and painting equivalent to the chassis cab manufacturer's process for the remainder of the chassis cab. Cavities and their covers shall be rustproofed in accordance with 3.1.1.3.
- (h) Complete installation drawings are available to the procuring activity.

3.1.1.15 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

KKK-T-2111M

lights shall be selected from the chassis manufacturer's standard matching hardware. On truck tractors, the brake lights need override the four-way emergency flasher only when coupled to a semitrailer.

3.1.1.16 Air transportability. When specified for classes A, B and C (see 6.2), the vehicle shall be air transportable in C-130, C-141 and C-5A aircraft in accordance with the requirements of MIL-STD-1791 and AFSC Design Handbook DH-1-11. Removal or relocation of mechanically attached (nonwelded, nonriveted, etc.) components with common hand tools, requiring not more than 1 manhour total to remove, relocate and tiedown; and not more than 1 manhour total to return the vehicle to its original, as opposed to reduced, configuration; shall be acceptable. The self-mobility of the vehicle shall not be affected by reducing its configuration. Tiedowns for removed or relocated equipment shall be furnished. The curb weight of the vehicle shall not exceed 4540 kg (10,000 pounds) on the front axle and 9070 kg (20,000 pounds) on the rear tandem axle. In addition to the requirements of 3.2.6 or 3.2.6.1, as applicable, the rated capacity of the axles and suspension system shall be not less than 1-1/4 times the load imposed on each by the curb weight of the vehicle. The vehicle shall be air transportable as described above without any other special provisions and without any shoring. The vehicle shall not be delivered to the Government in its reduced configuration. Drawings and data will be required to be submitted by the contractor. Government approval of the data (120 days) and then comparison of the vehicle to the approved data will be required before acceptance of the vehicle.

* 3.1.1.17 Lifting and tiedown attachments. When air transportability is specified or when specified (see 6.2), the vehicle shall be equipped with lifting and tiedown attachments. Lifting and tiedown attachments shall conform to type II or type III of MIL-STD-209. In MIL-STD-209G, replace "maximum shipping weight (MSW)" wherever it appears with "curb weight." A transportation plate conforming to composition A (class 1 or 2) or composition C of MIL-P-514 shall be provided. The transportation plate shall be inscribed with a diagram showing the lifting attachments and lifting slings, the capacity of each attachment, and the required length and size of each sling cable. A silhouette of the vehicle showing the center of gravity shall be provided on the transportation plate. Tiedown attachments shall be identified by stenciling or other suitable marking. Tiedown markings shall clearly indicate that the attachments are intended for the tiedown of the equipment on the carrier.

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.

KKK-T-2111M

3.2.2 Air pollution control. The vehicle shall comply with the EPA 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 84 db(A) when measured in accordance with Federal Motor Carrier Safety Regulation 393.94. The vehicle exterior sound level shall conform to the EPA 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.

3.2.6.1 Specified GAWR. When specified (see 6.2), front and rear gross axle weight ratings (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 950 kg (2,100 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.

KXX-T-2111M

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)
	Military contracts	Civil agency contracts	
A	16 350 (36,000)	N/A	24 950 (55,000)
B	20 900 (46,000)	20 900 (46,000)	29 500 (65,000)
C	23 100 (51,000)	23 600 (52,000)	As specified (see 6.2)
D	27 200 (60,000)	28 100 (62,000)	As specified (see 6.2)

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:

- (a) not more than 2540 mm (100 inches) for axles rated at up to and including 20 900 kg (46,000 pounds)
- (b) not more than 2590 mm (102 inches) for axles rated at over 20 900 kg (46,000 pounds) and up to and including 26 300 kg (58,000 pounds)
- (c) not more than 2640 mm (104 inches) for axles rated at over 26 300 kg (58,000 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 microcurie 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. Performance requirements shall be met with front wheel drive disengaged, except that vehicles equipped with interaxle compensating devices shall meet performance with front wheel drive engaged.

KKK-T-2111M

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 and auxiliary transmission, if furnished, in direct drive. Gradeability shall be verified with calculations in accordance with SAE J638 (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
16 350 (36,000)	-- --	1.4	--	2.5	--
20 900 (46,000)	20 900 (46,000)	1.1	1.1	2.1	2.1
23 100 (51,000)	-- --	1.0	--	2.0	--
23 600 (52,000)	-- --	1.0	--	2.0	--
-- --	24 950 (55,000)	--	0.9	--	1.8
27 200 (60,000)	-- --	0.8	--	1.8	--
28 100 (62,000)	-- --	0.8	--	1.6	--
-- --	29 500 (65,000)	--	0.8	--	1.5

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 a vehicle speed of not more than 4.8 km/h (three mph).

3.3.1.3 Maximum geared speed. Maximum geared speed at engine governed speed shall be not less than 88 km/h (55 mph) for class A vehicles. For all other classes, the maximum geared speed shall be not less than 84 km/h (52 mph). Conformance to geared speeds 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

KKK-T-2111M

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. 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 used in performance prediction calculations shall be determined in accordance with SAE J1349. For military contracts only, the engine shall demonstrate the performance characteristics 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 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 Oil filter. A full flow or combination full flow and bypass oil filter with replaceable element shall be furnished.

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

* 3.4.1.4 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 3.4.27.1.

3.4.1.5 Coolant temperature control. Thermostatic control of engine coolant temperature shall be provided. Control shall include complete thermostatic control of all coolant flow through the radiator.

3.4.1.6 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.

KKK-T-2111M

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

* 3.4.1.8 Power plant heaters and fuel warmer. When specified (see 6.2), a coolant heater, an engine oil heater, and fuel warmers shall be provided. Heaters shall operate on 110 volts alternating current (ac), and shall be wired through a junction block, including a 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, 1000-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 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 ($+9^{\circ}\text{F}$), 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.

KKK-T-2111M

* (d) An in-tank fuel warmer or preheater unit shall be provided. 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.

* 3.4.1.9 Fuel fired engine preheater. When specified (see 6.2), 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).

* 3.4.1.10 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. A 12- or 24-volt direct current (dc) starting system, with a 12-volt 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), the starting 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 Alternator. Unless otherwise specified (see 6.2), a minimum 75-ampere alternator shall be furnished. The alternator output with the engine at idle speed shall be not less than 45 amperes.

3.4.2.3 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

KKK-T-2111M

with 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.

* 3.4.2.4 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. Turn signal operating units shall have a visible flash indicator. Temporary mounting for rear signal unit shall be provided on type I chassis models.

* 3.4.2.5 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; or
- (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.

3.4.2.6 Batteries. Each battery shall be of 12-volt potential. The total reserve capacity rating and the total cold cranking rating at -18°C (0°F) measured in accordance with SAE J537 shall be in accordance with table IV. The batteries shall be of the maintenance-free type, having the maintenance-free characteristics listed in W-B-131.

KKK-T-2111M

TABLE IV. Batteries.

Engine type	Reserve capacity (minutes)	Cold cranking (amperes)
Diesel, 200 kilowatts (kW) gross (270 gross horsepower) or less	480	1,875
Diesel, over 200 kW gross (270 gross horsepower)	640	2,500

3.4.2.7 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 3.4.2.7.1) or an alternator type (see 3.4.2.7.2) 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 of the vehicle. A twelve-conductor truck tractor lighting 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 circuits shall be connected through appropriate lighting controls to terminals B, D, E, J and L of MS 75021-2. On type II truck tractor, a peg-stick type hose tender shall be provided behind the cab to accommodate and secure the 24-volt cable.

* 3.4.2.7.1 Converter type 24-volt system. The 12- to 24-volt converter(s) shall operate from the 12-volt battery supply (see 3.4.2.6). The output capacity shall be not less than 24 amperes. More than one converter may be provided to furnish a total of 24 amperes.

3.4.2.7.2 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 seven 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) An ammeter for the 24-volt system, mounted on the instrument panel.

3.4.2.8 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.

KKK-T-2111M

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, single or two-stage air cleaner with dash mounted service indicator shall be furnished.

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 have 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 tank is furnished, means shall be provided to assure an equalized 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. On type II truck tractors the tailpipe shall be vertically mounted at the rear of the cab and shall be provided with a heat shield. 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.

3.4.4.1 Spark arrester. For military contracts, a spark arrester shall be furnished on type II tractors, except for vehicles with turbocharged engines. 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 Gear train.

3.4.5.1 Manual transmission. Unless otherwise specified, a manually shifted transmission shall be provided. The input torque capacity of the transmission shall be at least equal to the maximum torque delivered by the engine. Gear ratios in the transmission and the axles shall be matched to provide a progressive shifting pattern throughout the complete range, and shall provide the vehicle performance required by 3.3.1 through 3.3.1.3. The transmission shall be provided with power takeoff opening(s) conforming to SAE J704. The transmission shall provide for maximum ease of shifting in all speeds. The transmission shall provide the vehicle with not less than 9

KKK-T-2111M

forward speeds for all vehicles except class C and D truck tractors. For class C and D truck tractors, the transmission shall have not less than 9 forward speeds, providing 9 to 18 vehicle forward vehicle speeds, depending on the transfer case. A multispeed transmission or an auxiliary transmission shall be provided.

* 3.4.5.2 Transfer case. Unless otherwise specified, either a one- or a two-speed transfer case shall be provided. Unless the transfer case is equipped with devices which compensate for differential torque and speeds between front and rear axles, the transfer case shall provide for driver selection of either four-wheel or six-wheel drive. When furnished, interaxle compensating devices shall provide for positive transfer of power to all driving axles. When specified (see 6.2), a two-speed transfer case shall be furnished. When a two-speed transfer case is furnished, the speedometer shall read accurate vehicle speed with the transfer case speed selector in high and in low range.

* 3.4.5.3 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. The clutch shall be equipped with spring dampening and a greaseable bearing.

* 3.4.5.4 Automatic transmission. When specified (see 6.2), the vehicle shall be provided with an automatic transmission. The transmission shall include a hydraulic torque converter and not less than the number of forward gear ratios specified in table V. Five speed automatic transmission shall be of the deep ratio or wide ratio types. Normal driving range selector position shall provide not less than four gear ratios without movement of the selector. The transmission shall have a power takeoff opening. The input torque capacity of the transmission shall be at least equal to the maximum torque delivered by the engine.

TABLE V. Automatic transmission, number of forward gear ratios.

Class	Truck tractors and dump trucks		All other trucks	
	Single speed transfer case	Two speed transfer case	Single speed transfer case	Two speed transfer case
A, B	5	4	5	4
C, D	5	5	5	5

3.4.5.5 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 3.4.1.10. A caution decal or 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.)

KKK-T-2111M

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.

* 3.4.7 Frame. The chassis frame shall be the manufacturer's standard for the type and class vehicle furnished. For type III stake dump, type IV dump, and when specified for other vehicle types (see 6.2), a heavy duty main frame or frame with reinforcement extending at least from the rear of the front suspension rear hanger bracket to the bogie trunnion mounting bracket shall be furnished. 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 frames specified herein for the type vehicle furnished. Reinforcement for type I chassis, type III stake dump, and type IV dump truck shall provide sufficient structural strength in the chassis frame, through increased resisting bending moment (RBM), to at least equal the loads imposed, with vehicle loaded to specified GVW. Chassis frame rails shall not project beyond the rear end of the body. Unless otherwise specified, on type II tractor, the chassis frame rails shall be cut off immediately to the rear of the rear spring hanger bracket or the frame crossmember closest to the rear of this bracket. When specified (see 6.2), the frame rails shall extend and shall taper from maximum position cutoff so as to assist in coupling 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 spring capacity is rated at the spring pads, unsprung weight shall be deducted. Class A and B vehicles shall be equipped with hydraulic double-acting shock absorbers at the front wheels.

* 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 vehicle loaded to specified GVW. At least the rear wheel bearings and axle spindles shall be oil lubricated. Provisions for venting or withstanding internal pressure buildup and for replenishing the oil supply shall be provided.

3.4.9.1 Rear bogie. A rear bogie of the four-wheel type, complete with axles, springs, torque rods, and all other necessary parts, shall be provided. The bogie shall be provided with means permitting differential action between the two axles, and a manually or automatically controlled lockout assuring equal power to each rear axle. Manual lockout control shall be located in the truck cab. The gear ratios shall provide the performance specified in 3.3.1 through 3.3.1.3.

KKK-T-2111M

3.4.9.2 Traction control. A traction control shall be furnished for type IV dump truck or when specified (see 6.2) for other vehicle types except type II truck tractor. The traction control may be on either rear axle and 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 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, multi-piece rims shall not be furnished on front axles rated at 6350 kg (14,000 pounds) or less and on rear tandem axles rated at 23 600 kg (52,000 pounds) or less. Tire and rim sizes shall be the same for all wheels on each vehicle except for class D vehicles and trucks furnished with a snowplow or snowplow provisions. 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. Wide base wheels shall be inter-changeable without the use of an adapter. When specified (see 6.2), 10-stud disc type wheels shall be furnished.

* 3.4.10.1 Tires. Tires shall be steel belted radial or, when specified (see 6.2), bias ply. Tires shall have nondirectional mud and snow tread. Unless otherwise specified, standard profile tires shall be furnished. When specified (see 6.2), low profile tires shall be furnished. Tires shall be of the tubeless type or, for axles where multi-piece rims are permitted (see 3.4.10), may be of the tube type. When tube type tires are permitted herein or specified, multi-piece 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 Tire and Rim Association or to the European Tyre and Rim Technical Organisation recommendations.

* 3.4.10.2 Inner tubes. When tube 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

KKK-T-2111M

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 tractor 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 without a carrier, it shall be stowed securely on the vehicle for shipment. When a spare wheel or rim is furnished for class D vehicles or vehicles with a snowplow or snowplow provisions, 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 a 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 shall include an inflated spare tire(s) mounted on a 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 393.42(b), 393.43 and 393.45 through 393.52. Brake linings shall be of nonasbestos material on front axles and on rear tandem axles rated at 20 900 kg (46,000 pounds) or less.

3.4.11.1 Service brakes. The vehicle shall be equipped with full air brakes. Brakes shall be furnished on all wheels. 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))
- (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.

KKK-T-2111M

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, or 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 break-away 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 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 trailers with SAE J318 gladhand couplers mounted at the rear of the vehicle, located to prevent interference with the trailer (not required for type II truck tractor unless a 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 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 prime mover parking brake to be applied while charging the trailer air brake system.

KKK-T-2111M

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 security chains or cables. 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 (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 tractor 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; or a vehicle with a butterfly hood and with bolt or fenders capable of being removed or swinging forward when unbolted; shall be furnished. Tilting shall not interfere with present or future installation of additional equipment, such as a snowplow or a front mounted winch. Both cab doors shall be equipped with locks, operable from inside the cab through mechanical linkage, and 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 cab to assist personnel in entering and leaving the cab, and on type II vehicle to assist personnel in climbing onto

KKK-T-2111M

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. When step height into the cab exceeds 610 mm (24 inches), a secondary step shall be provided. Vehicle with a height from the ground to the top of the windshield of more than 2030 mm (80 inches) shall include provisions to facilitate cleaning the windshield. Provisions shall consist 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 of the 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), class A and B vehicles shall be equipped with a four-door, full width cab 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. Outboard front 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 linkage, 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 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 (2-3/4 inches) shall be maintained between the floor and the rear of the

KKK-T-2111M

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.

3.4.13 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 shall be operated by 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 the vehicle cab, a channel type front bumper shall be provided, unless a front mounted winch is specified.

3.4.15.1 Rear end protection. Except for type I chassis, type II truck tractor and type IV dump truck, 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), warning flares and reflectors 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 inside the cab. When stowage space for these tools is located outside of 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 the 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 the wheel and tire assembly.

3.4.17 Heater and defroster. A hot water heater shall be provided. The heater shall have fresh air intakes. Discharge outlets shall be provided to direct heated air to the floor and to 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) (Btu/hr) capacity.

KKK-T-2111M

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. Instrument and controls shall be identified as to their function and installed in a manner to facilitate removal and servicing. 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 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 (see 3.4.5.2)
- (h) Ash receptacle
- (i) Dual sunvisors
- (j) Driver's compartment ventilator other than window
- (k) Tachometer.

For civil agency contracts or when specified for military contracts, (see 6.2), an ammeter or voltmeter gage, oil pressure gage, 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 alarm 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 (cm²) (50 square inches) of reflective area. The convex portion shall have not less than 155 cm² (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.

KKK-T-2111M

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 furnished.

3.4.22 Engine hour meter. When specified (see 6.2), an engine hour meter having a totalizing mechanism of not less than 9,999 hours shall be furnished 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. When specified (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 Front mounted winch. When specified (see 6.2), a winch assembly, mounted on the front of the vehicle and powered by a power takeoff, or powered hydraulically shall be provided. The winch shall conform to SAE J706. The winch shall be of the single drum type and shall have one forward and one reverse speed. All winch controls shall be mounted inside the cab. Winch controls shall be located so as to provide no interference with the entrance or exit of the driver. The winch shall have a rated single line pull capacity of not less than 89 kN (20,000 pounds) pull on the bare drum. The winch line speed on the bare drum shall be between 4.6 m/min and 9.1 m/min (15 and 30 feet per minute) at an engine speed equal to 35 percent of engine governed speed. The winch shall be wound with not less than 56 m (185 feet) of 16 mm (5/8-inch) diameter, preformed 6x37, improved plow steel, independent wire rope core (IWRC). The wire rope shall be equipped with end chain and hook. An integral, adjustable, automatic safety brake shall be provided. The winch shall be equipped with a roller guide. Angles of the winch driveline U-joints shall be not more than 16-1/2 degrees.

3.4.26.1 Winch drum guard. A winch drum guard shall be furnished. The guard shall confine the cable to the area between the drum flanges. The guard shall consist of not less than 6.4 mm (1/4-inch) vertical side plates, conforming to the outside radius of the drum flanges. Six bars, 9.5 mm (3/8 inch) by 32 mm (1-1/4 inch), shall be welded to the vertical side plates. Three bars shall be located on the top and spaced equally on the top radius, and three bars shall be located on the bottom and spaced equally on the

KKK-T-2111M

bottom radius. The vertical distance between the vertical side plates and the drum flanges shall be not more than half the specified cable diameter.

3.4.26.2 Front bumper. When a front mounted winch is furnished, the bumper shall be mounted forward of the winch. The bumper shall be either a channel (see 3.4.15) or a pipe type. When a pipe type front bumper is furnished, the nominal diameter shall be not less than 75 mm (three inches), and shall have a wall thickness of not less than that specified in schedule 40 of ASTM A53. The pipe type front bumper shall have half-round ball ends.

3.4.26.3 Combination step plate and gravel guard. When a front mounted winch is furnished, the open area on either side of the winch shall be covered with a combination step plate and gravel guard. The step plate shall be fabricated of not less than 14 gage (1.897 mm) (0.0747 inch) steel tread plate exclusive of projections. The step plate shall be secured to the front bumper and shall be not less than 6.4 mm (1/4 inch), or not more than 9.5 mm (3/8 inch) from the cab sheet metal. The step plate shall be capable of supporting 1460 kg/m² (300 pounds per square foot). The step plate shall not deflect more than 3.2 mm (1/8 inch) under the loads imposed.

* 3.4.27 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.

* 3.4.27.1 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.

3.5.1 Type I (chassis, truck, with cab). Type I chassis shall have one of the usable cab-to-trunnion (CT) dimensions shown in table VI, as specified (see 6.2). Usable cab-to-trunnion is defined as the distance from the most rearward vehicle obstruction that would interfere with body mounting to the centerline of the trunnion between the rear axles. Load area for the purpose of determining weight distribution (see 3.2.6) shall be as specified (see

KKK-T-2111M

6.2). Chassis shall be suitable for subsequent mounting of the make, model, and type of body specified (see 6.2).

TABLE VI. Type I chassis CT dimensions:

	CT dimensions, mm, plus 100, minus 0 (inches, plus 4, minus 0),						
mm	3050	3300	3500	3660	3810	3960	4110
inches	120	130	138	144	150	156	162

3.5.2 Type II (truck tractor). 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. Lock-out for locking out side oscillation shall be furnished. The fifth wheel shall be capable of being uncoupled by the operator while 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 required GVW and GCW.

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 landing wheel clearance from the centerline of the kingpin to the rear tires and chassis frame rails shall be not more than 2030 mm (80 inches).

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. Unless otherwise specified (see 6.2), the unladen level height of the fifth wheel shall be not more than 1520 mm (60 inches).

* 3.5.2.4 Approach ramps. Approach ramps or plates shall be furnished to give support for fifth wheel forks and provide a continuous incline for semitrailer approach. The ramps or plates shall taper 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 an operator in connecting air and electric lines between the truck tractor and a semitrailer shall be installed. The grating shall extend across and shall be bolted to

KKK-T-2111M

the frame rails. 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. Provisions to allow access to personnel climbing onto the deck plate shall be furnished. Access through grating for maintenance of fittings and other equipment shall be provided. The deck plate shall be free of ragged or sharp exposed edges.

3.5.2.6 Hose tender. When a tilt cab or a rear mounted spare tire carrier is furnished, a pogo stick type hose tender shall be provided to accommodate and secure the semitrailer lighting cable and air hoses. The pogo stick shall be mounted rearward on the truck tractor deck plate or chassis members. When a conventional cab is furnished without a rear mounted spare carrier, a cab mounted tender, specified in 3.4.2.5, may be furnished in lieu of a pogo stick.

* 3.5.2.7 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 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 all exterior mounting and supporting hardware, support ribs and the installation instructions, shall be securely stowed on the vehicle for shipment.

3.5.2.8 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 forwardmost position of adjustment. With the sliding fifth wheel in its forwardmost position of adjustment, the centerline of the kingpin shall be not less than 380 mm (15 inches) forward of the centerline of the bogie. Sliding positions to the rear of the trunnion between rear axles may be blocked off.

3.5.3 Type III (stake). Unless otherwise specified, type III stake trucks shall have the dimensions specified in table VII. When specified (see 6.2), other platform lengths, with corresponding changes in the

KKK-T-2111M

cab-to-trunnion dimension and the number of crossmembers, shall be furnished. Rear bumper or bumperettes shall be furnished. When specified (see 6.2), the center racks on both sides shall be the manufacturer's standard swing type for easy loading.

TABLE VII. Type III stake dimensions.

Dimension	Vehicle class			
	B and C		B Optional (see 3.5.3.9)	
	mm	inches	mm	inches
Cab-to-trunnion (not less than), inches	3050	120	3430	135
Overall platform length (not less than), inches	5500	216	6100	240
Overall platform width (not less than), inches	2410	95	2410	95
Rack height (not less than), inches	1020	40	--	see 3.5.3.9.1

3.5.3.1 Stake body. The body shall be provided with a steel subframe, a wood or steel platform, and side and end racks.

* 3.5.3.2 Stake body frame. Body framing shall be a completely welded structure with members of minimum gage thickness specified in table VIII for carbon steel. High tensile steel may be furnished in two gages lighter weight in accordance with U.S. Standard gage sizes. There shall be not less than 13 full width crossmembers on class B and C vehicle and not less than 14 full width crossmembers on optional class B vehicle, including ends and stub crossmembers as required for proper spacing over axles. Not less than five additional full width crossmembers on class B and C vehicle and not less than six additional full width crossmembers on class B optional vehicle shall be provided in the area of the rear bogie. The additional crossmembers may be joined by welding to the normally located crossmembers in the rear bogie area. Crossmembers shall be of full channel construction, reinforced by gusset plates or brackets at points of attachment to longitudinal sills. 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. Longitudinal sills shall be constructed of structural steel channels or formed channels. Formed channel sills shall be reinforced within the sill, at each crossmember or body mounting point, with formed channel reinforcements.

KKK-T-2111M

TABLE VIII. Framing gages for stake bodies.

Designation	US Standard gage number	Equivalent millimeters	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 not less than 4.8 mm (3/16 inch) thick, one or two-piece diamond tread with additional lateral supports provided at the wheelwells. Two-piece floors shall be spliced longitudinally and completely welded the full length of the splice. One completely welded lateral floor splice is acceptable.

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 three reinforcing ribs. Width of individual slat width 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 four 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.

KKK-T-2111M

* 3.5.3.7 Body mounting. The 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 four U-bolts or twin studs per side, each having 14 mm (0.563 inch) minimum body diameter with 16 mm (0.625 inch) minimum thread diameter, or other equivalent method(s). Tieplates 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 alignment on 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 mounting brackets to 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 builder's layouts. Attachments shall neither interfere with nor obstruct existing chassis components.

* 3.5.3.7.3 Breaker strips. A hardwood or dense southern yellow pine breaker strip, 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 mm 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 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.

KKK-T-2111M

3.5.3.8.1 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 during 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.

3.5.3.8.2 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 G in accordance with the National Truck Equipment Association Conversion Hoist Chart. The hoist shall be a telescopic type. Hoist 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 entrance and exit of the driver.

3.5.3.8.3 Safety lock. A mechanical safety lock, permanently affixed to the body, 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.

3.5.3.9 Stake body, class B optional, racks, tarpaulins, bows, ladder, securement devices and cab guard. When specified (see 6.2), in lieu of conforming to 3.5.3.6, the type III class B stake truck shall be furnished with a 6100 mm (20 foot) (240-inch) stake body, in accordance with the B optional requirements of table VI and with removable racks convertible to seats, a fitted tarpaulin, knockdown type bows, tarpaulin tiedown devices, a ladder at the rear of the body, International Standardization Organization (ISO) securement devices and a cab guard.

3.5.3.9.1 Racks. Removable racks shall run the full length of the body on each side. The height of the racks shall be not less than 1220 mm (48 inches) measured from the floor or shall be the height of the top of the cab, whichever is less. Steel upright posts shall be formed into box-section pockets to take top bows. Posts shall have provisions for drainage. Rack slats shall be oak of not less than 19 mm (3/4-inch) finished thickness. Width of individual slats shall be a nominal 75 mm (3 inches). All slat edges shall be beveled or rounded. The top section of the racks shall have the appropriate number of slats with approximately 25 mm (1-inch) spacing between slats, from 430 mm (17 inches) above the floor to the top of the racks. At least two slats shall be located and evenly spaced on the racks below the 430 mm (17-inch) level above the floor. Each rack shall be equipped with devices to lock the rack to the body and at each top corner to lock the racks together.

KKK-T-2111M

3.5.3.9.2 Seats. A seat frame system in two nominal 3050 mm (10-foot) sections on each side, hinging at the 430 mm (17-inch), plus or minus 25 mm (1-inch) level above the floor, which forms fold-down seats utilizing three or four of the slats above the hinge shall be incorporated into the side racks. When in folded down position, the height of the seats shall be 430 mm (17 inches), plus or minus 25 mm (1 inch), measured from the floor at the front edge of the seat. The seats shall be level, or shall slope down towards the seat back, and shall be supported by folding braces. The seats shall have provisions for locking in the "up" position.

3.5.3.9.3 Front and rear racks. The front rack section shall be of the same basic construction as the side racks, except without the fold-down seats. The front rack section shall be capable of withstanding a horizontal static load equal to half the payload capacity of the vehicle without permanent distortion of the rack section or its mountings. Two removable rack sections, of the same type of construction as the front section, shall be furnished at the rear of the body.

3.5.3.9.4 Upright posts. The upright posts and the stake pockets shall be of adequate size and strength to ensure rigid and secure support for the seats and seat backs with twelve 115 kg (250-pound) personnel sitting on each side of the vehicle.

3.5.3.9.5 Tarpaulin, bows and tiedown devices. Eight removable bows shall be installed, evenly spaced the length of the body, and shall provide not less than 1780 mm (70 inches) inside height between the floor and the tarpaulin cover at the longitudinal center of the body. The tarpaulin shall be fabricated of number 10 cotton duck conforming to type I of CCC-C-419. The tarpaulin material shall be water-repellent and fire-resistant. The tarpaulin color shall be dark forest green. The rear curtain shall be of the roll-up type. The front curtain shall have a window which shall be not less than 300 mm by 610 mm (12 by 24 inches) in size and shall align with the rear window of the vehicle cab. Grommets with rope ties shall be located at the lower edges of the sides and end flaps of the tarpaulin for securing to a tiedown device. Rope ties shall have a free length of not less than 610 mm (24 inches). Tarpaulin tiedown devices on each side of body shall consist of a round steel bar attached to the body crossmembers approximately 100 mm (4 inches) inward from the outer edge of the body. The steel bar shall be the full length of the body. The front and rear tiedown devices shall consist of hooks located under the body which do not project beyond the front and rear of the body.

3.5.3.9.6 Ladder. An aluminum ladder shall be furnished at the rear of the truck. The ladder shall be of sufficient height for personnel to ascend into and descend from the stake body. The ladder shall stow away in a pocket section at the rear of the stake body between the subframe rails. A lock or latch mechanism shall be furnished to secure the ladder in the stowed position. A stop device shall be furnished which secures the ladder top to the rear of the stowage pocket in operating position and which prevents complete removal of the ladder from the vehicle.

KKK-T-2111M

3.5.3.9.7 Container securement devices. The stake body platform shall have shipment container securement devices incorporated into each corner. The securement devices shall be of the retractable type which will provide for a flat platform when retracted and not in use. Four securement devices (one at each corner) shall be provided. Securement devices shall be located for the alignment and securement of one ISO freight container, "1 C" Designator, 6100 mm x 2440 mm x 2440 mm (20 feet x 8 feet x 8 feet), as specified in ISO 668, with freight container corner fittings conforming to ISO 1161. The securement devices shall be mounted with reinforcements so as to meet or exceed all the requirements of Federal Motor Carrier Safety Regulation 393.100(e).

3.5.3.9.8 Cab guard. A cab guard shall be mounted at the forward end of the body to protect the cab from damage during a crane lift of a 6100 mm (20-foot) ISO container weighing 11 350 kg (25,000 pounds). The protection is required if inadvertent swinging of the container occurs during loading and unloading of the truck. The cab guard mounting shall be to the front of the body or to the chassis frame with brackets and mounting hardware and shall be removable to facilitate repair or replacement. The cab guard shall be fitted with hand holds and lifting eyes to facilitate installation and removal. The cab guard shall extend to a height no greater than cab height and no less than cab height minus 50 mm (2 inches) and shall be not less than the width of the cab. The cab guard shall not interfere with any cab or chassis component, ISO container transport or lift and tiedown system. The cab guard shall be capable of sustaining a static 1350 N (300 pound) minimum horizontal force applied at any point along its top edge, in the direction of the front of the truck. The force shall not cause permanent deformation. The drivers view shall not be obscured out of the back window due to design of the cab protector.

3.5.4 Type IV (dump). Type IV vehicle shall have a hydraulic hoist operated dump body conforming to requirements and minimum dimensions in table IX. Capacities listed in table IX shall be water level capacities, without sideboards. Inside width shall be 2130 mm (84 inches) minimum with overall width not exceeding 2440 mm (96 inches). A rear bumper is not required.

TABLE IX. Type IV dump truck requirements.

Vehicle class	B	B	C	C	D
	(Civil)	(Military)	(Civil)	(Military)	
Cab trunnion mm (inches)	3050 (120)	3050 (120)	3050 (120)	3050 (120)	3050 (120)
Hoist class	70	70	70	70	90
Capacity m ³ (cubic yards)	6.1 (8)	7.6 (10)	7.6 (10)	6.1 (8)	9.2 (12)
Body length mm (inches)	3960 (156)	3810 (150)	4270 (168)	3810 (150)	4270 (168)
Number of crossmembers	10	10	12	10	12
Vertical braces per side	4	4	4	4	4

KKK-T-2111M

3.5.4.1 Dump body construction. Body floor, sides, and front head shall be constructed from 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 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. For military services and when specified for civil agencies (see 6.2), the body floor shall be provided with 6.4 mm (1/4-inch) steel wear plate and a one-inch hardwood cushion. Wear plate shall be welded water-tight. Full length, formed rub rail of minimum width to cover rear dual tire treads shall be provided. Triangular or box-section side braces, of the minimum quantities specified in table VIII for the respective body length and vehicle class, shall be constructed of not less than 10 gage (3.416 mm) (0.1345 inch) steel. 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. Side braces shall be equally spaced, on each side of the body, between the head sheet and full box type rear corner posts, and welded to the body side plates. Front head sheet shall be formed or reinforced for rigidity. Head sheet and tailgate shall be not less than eight 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. Unless otherwise specified (see 6.2), the cab protector shall extend not less than 1020 mm (40 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) steel. The cab protector shall be capable of supporting an evenly distributed load of not less than 910 kg (2,000 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 and stowed in the vehicle 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) steel. The tailgate shall be double-acting, opening from top or 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.

KKK-T-2111M

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 (five-inch), 14.9 kg/m (10 pounds-per-foot) I-beam, shall be provided to support hoist load. The minimum number of crossmembers specified in table VIII for respective body size shall be provided. Each crossmember shall have a minimum section modulus equivalent to that provided by a 100 mm (four-inch), 11.5 kg/m (7.7 pounds-per-foot) I-beam. Construction shall provide a body structure capable of supporting a uniformly distributed load of not less than 1800 kg/m² (370 pounds per square foot) of floor area, throughout the full lift range. Crossmembers shall be welded to the body shell with not less than 100 mm (four-inch) lengths of weld, front and rear of both ends of each crossmember, and with staggered, intermittent welds of not less than 100 mm (four-inch) lengths 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. Longitudinals shall be capable of supporting the hoist load. Longitudinals shall have a REM 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 longitudinal and shall be securely welded to longitudinals. Crossmembers shall have a REM of not less than 12 300 N·m (109,000 inch pounds). Crossmembers shall be capable of supporting a uniformly distributed distributed load of not less than 1800 kg/m² (370 pounds per square foot) of floor area throughout the full lift range. Longitudinals and crossmembers shall be welded for not less than 50 percent of the contact edges to the floor. Longitudinals shall be welded for not less than 50 percent of the 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 as indicated in table IX for the respective vehicle class. The hoist class shall be in accordance with the National Truck Equipment Association Dump Body Hoist Chart. The hoist shall be a telescopic type. The hoist hydraulic cylinder 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 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.

KKK-T-2111M

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. Safety lock mechanism shall not interfere with the 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. The pivot point shall be 300 mm (12 inches), plus or minus 25 mm (1 inch), from the rear of the body.

* 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 (streetside), 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 not less than 2620 mm (8 feet 7 inches) wide 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 one-piece unspliced sheet of 9.5 mm (3/8 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 abrasive 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.

KKK-T-2111M

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

KKK-T-2111M

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 the 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.

3.5.4.6.11 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 bulb. Mounts, adapters and 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 cu.m (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 of MIL-T-62491.

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

KKK-T-2111M

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

4.1.1 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 operation, 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 agencies, 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 vehicle shall be weighed to determine the curb weight and distribution of the curb weight on the front and rear axles. The total imposed loading on the 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.

KKK-T-2111M

4.3.2 Road test. The vehicle, for models built to all wheel drive while on the chassis manufacturer's production line, 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) for class A and 84 km/h (52 mph) for all other classes. The vehicle, for all wheel drive models qualifying under 3.1.1.14, shall be road tested with and without payload. Payload shall be distributed first, so that the front axle is loaded to GAWR and the vehicle is loaded to GVW (and GCW) and second, with the rear axle loaded to GAWR and the vehicle loaded to GVW (and GCW). The road test for each of the three conditions shall be for not less than 48 km (30 miles) at speeds up to 80 km/h (50 mph) over highways and gravel roads and for not less than 8 km (5 miles) at speeds up to 24 km/h (15 mph) over cross country terrain with ground and grade requiring all wheel drive. During the loaded and empty portions of the road test, the brakes shall be applied firmly, bringing the vehicle to a sudden stop not less than 5 times during each portion of the road test. During the road test, the front and rear suspension and the drivetrain shall be periodically inspected for interference and contact with other vehicle components. Abnormal contact of the drivetrain or suspension components with other components shall be cause for rejection. Front spring bumpers shall not make contact with frame stops except under the most extreme cross country conditions. Operational or mechanical failures of vehicle components during the road test shall be cause for rejection. Failure includes permanent deformation as well as breakage.

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 Government representatives at the first production vehicle inspection.

4.3.4 Heater certification. For civil agency contracts, the contractor shall certify that the heater conforms to the power requirement of 3.4.17.

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

4.3.6 ISO container. When ISO container securement devices are required, the contractor shall make available, during the inspection, an ISO container. The contractor shall demonstrate the alignment and securement of the container on the truck.

4.3.7 Air transportability verification. When air transportability is specified, the vehicle shall be inspected to determine that it conforms to the contractor's air transportability drawings and data as submitted to the Government for transportability approval. As a minimum, the following angles, dimensions and descriptions shall be checked against the Government approved contractor's drawings and data:

KKK-T-2111M

- (a) Angle of approach
- (b) Ramp breakover angle
- (c) Angle of departure
- (d) Height, longitudinal location and identification of highest component on truck
- (e) Dimensions and locations of any significant projections on truck
- (f) Load on each axle (curb weight)
- (g) Wheelbase
- (h) Front overhang
- (i) Rear overhang
- (j) Articulation of rear suspension, unloaded, each axle (curb weight)
- (k) Rear axle spacing
- (l) Axle rating, front, and comparison to 1-1/4 times (curb weight) load
- (m) Axle rating, rear, and comparison to 1-1/4 times (curb weight) load
- (n) Suspension rating, front, and comparison to 1-1/4 times (curb weight) load
- (o) Suspension rating, rear, and comparison to 1-1/4 times (curb weight) load
- (p) If axle stops are to be removed for ramp loading on aircraft, verification that the driveline remains intact when cresting maximum ramp slope.

4.3.8 Cab guard test. A test shall be performed to determine conformance to the requirements of 3.5.3.9.8.

* 4.3.9 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 an as new 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 vehicle. 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 3.4.27 have been accomplished. For civilian agencies, GSA Form 1455 or an approved equivalent form shall be used.

KKK-T-2111M

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 the performance of the maintenance and construction tasks indicated, or for the mounting of special bodies or equipment. Civil agency contracts 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).
- (l) Trailer towing package (pintle, etc.), if required (see 3.1.1.8).
- (m) Trailer lighting cable, if required (see 3.1.1.9).
- (n) Air transportability, if required (see 3.1.1.16).
- (o) Lifting and tiedown attachments, if required (see 3.1.1.17).
- (p) Gross axle weight ratings, if specific ratings are required (see 3.2.6.1).
- (q) Snowplow weight provisions, if required (see 3.2.6.2).
- (r) GCW required for type II, class C and D tractors (see 3.2.8, table II).
- (s) Operation on JP-4, JP-5 and JP-8 fuels, if required (see 3.4.1.1).
- (t) Silicone rubber hoses, if required (see 3.4.1.7).
- (u) Power plant heaters and fuel warmer, if required (see 3.4.1.8).
- (v) Fuel fired engine preheater, if required (see 3.4.1.9).
- * (w) Vernier throttle control, if required (see 3.4.1.10).

KKK-T-2111M

- * (x) Starting motor circuit breaker, if required (see 3.4.2.1).
- (y) Alternator capacity, if other than as specified (see 3.4.2.2).
- * (z) Type II truck tractor electrical and brake connector hook up at lower streetside of cab, if required (see 3.4.2.6 and 3.4.11.2(i)).
- (aa) Auxiliary 24-volt system with trailer receptacle, if required (see 3.4.2.7).
- (ab) If radio interference suppression is not required, civil agencies only (see 3.4.2.8).
- (ac) Dry type air cleaner with service indicator, if required (see 3.4.3.1).
- (ad) Fuel capacity, if other than as specified (see 3.4.3.2).
- (ae) Fuel and water separator, if required (see 3.4.3.3).
- (af) Spark arrester, if required (see 3.4.4.1).
- (ag) Two-speed transfer case, if required (see 3.4.5.2).
- (ah) Automatic transmission, if required (see 3.4.5.4).
- (ai) Heavy duty frame or frame reinforcement, if required (see 3.4.7).
- * (aj) Extended, tapered frame rails on type II truck tractor, if required (see 3.4.7).
- (ak) Traction control, if required (see 3.4.9.2) (not available on type II truck tractor).
- (al) Wide base front and rear tires and wheels, if required (see 3.4.10).
- (am) Disc type wheels, if required (see 3.4.10).
- (an) Bias ply, low profile or other type tires, if required (see 3.4.10.1).
- (ao) Spare tire carrier, if required (see 3.4.10.3 and 6.10).
- (ap) Spare wheel or rim, if required (see 3.4.10.4).
- * (aq) Spare tire assembly for front axle, if required (see 3.4.10.5).
- * (ar) Spare tire assembly for rear axle, if required (see 3.4.10.5).
- * (as) Two spare tire assemblies, one for the front and one for the rear axle, if required (see 3.4.10.5).
- * (at) Straight in lieu of precoiled air brake hoses, if required (see 3.4.11.2(f) and (h)).
- (au) Brake controls for use from a towing vehicle, if required (see 3.4.11.3).
- (av) Increased braking capability, if required (see 3.4.11.4).
- (aw) Tilting hood and fender assembly or butterfly hood and bolt on fenders, if required (see 3.4.12).
- (ax) Individual driver and passenger seats, if required (see 3.4.12.1).
- (ay) Air ride driver's seat, if required (see 3.4.12.1).
- (az) Crew cab, if required (see 3.4.12.2).
- * (ba) Intermittent windshield wipers, if required (see 3.4.14).
- (bb) Spare tire changing tools, if required (see 3.4.16.1).
- (bc) Gages and engine shutdown system, if required in lieu of indicators (see 3.4.19).
- * (bd) Remote control curbside rearview mirror, if required (see 3.4.20).
- * (be) Heated rearview mirrors, if required (see 3.4.20).
- (bf) Air operated horn, in addition, if required (see 3.4.21).
- (bg) Engine hour meter, if required (see 3.4.22).

KKK-T-2111M

- (bh) Back-up alarm, if required (see 3.4.23).
- (bi) AM/FM radio, if required (see 3.4.24).
- (bj) Air conditioning, if required (see 3.4.25).
- (bk) Front mounted winch, if required (see 3.4.26).
- (bl) Cooling system protection down to -54°C (-65°F), if required (see 3.4.22).

CHASSIS:

- (bm) Dimensional requirements for type I chassis (see 3.5.1).
- (bn) Load area and mounting requirements for type I chassis (see 3.5.1).

TRUCK TRACTORS:

- (bo) Truck tractor fifth wheel height, if other than as specified (see 3.5.2.3).
- (bp) If a truck tractor deck plate is not required (see 3.5.2.5).
- (bq) Truck tractor wind deflector, if required (see 3.5.2.7).
- (br) Semitrailer van height for truck tractor wind deflector, if not as specified (see 3.5.2.7).
- (bs) Truck tractor sliding fifth wheel, if required (see 3.5.2.8).

STAKE TRUCKS:

- (bt) Overall platform length and cab-to-trunnion dimensions, if other than as specified (see 3.5.3).
- (bu) Swing center side racks, if required (see 3.5.3).
- (bv) Dump stake and platform body, if required (see 3.5.3.8).
- (bw) Dump stake and platform body conversion hoist capacity, if not as specified (see 3.5.3.8.2).
- (bx) Twenty foot body and racks, tarpaulin, bows, ladder, securement devices and cab guard for class B stake truck, if required (see 3.5.3.9).

DUMP TRUCKS:

- (by) Dump body floor wear plate and cushion, if required, civil agency contracts only (see 3.5.4.1).
- (bz) Dump truck cab protector dimension, if different (see 3.5.4.2).
- (ca) If dump truck cab protector is not to be installed (see 3.5.4.2).
- (cb) Dump truck hoist class, if not as specified (see 3.5.4.5).
- (cc) Dump truck hoist, 2-position or 2-speed, if required (see 3.5.4.5).
- (cd) Reversible snowplow, if required (see 3.5.4.8).
- (ce) One-way snowplow, if required (see 3.5.4.8).
- (cf) Snowplow power angle moldboard, if required (see 3.5.4.8.4).
- (cg) Dump truck sand and salt spreader tailgate, if required (see 3.5.4.9).
- (ch) Dump truck skid mounted sand and salt spreader, if required (see 3.5.4.9).

MISCELLANEOUS:

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

KKK-T-2111M

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	- <u>Tire Factor.</u> This factor must relate to the size of the tires furnished by the contractor in accordance with this specification
Table 2	- <u>Altitude Factor.</u> 1.00
Table 3	- <u>Rolling Factor.</u> 1.613
Table 4	- <u>Area Factor.</u> For truck tractor, use factor 0.225; for all other trucks, use factor 0.173
Table 5	- <u>Velocity Factor.</u> 250.0
Table 6	- <u>Altitude Factor.</u> 1.00
Table 7	- <u>Chassis Friction Horsepower.</u> 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	- <u>Grade Factor.</u> 0.75
Table 8A	- <u>Correction Factor.</u> Not required
Table 9	- <u>Road Factor.</u> 0.0

6.4 Subject term (key word) listing.

Chassis, truck
 Non-tactical truck
 Non-tactical vehicle (NTV)
 Truck, commercial
 Truck, dump
 Truck, stake
 Truck tractor
 Truck, wrecker
 6x6.

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

KKK-T-2111M

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. Warranty repairs and nonwarranty parts and service for the all wheel drive conversion shall be available through the original equipment manufacturer chassis dealer nearest the vehicle destination.

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:

- (a) Abuse, negligence, or unapproved alteration of original parts
- (b) Damage from accidents
- (c) Brake and standard clutch adjustments
- (d) General tightening, headlamp adjustments

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

KKK-T-2111M

- (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 truck for shipment, and when needed after the dump truck is placed in use, that a wrecker be dispatched to the disabled dump truck, 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.

KKK-T-2111M

MILITARY INTEREST:

Custodians:

Army - AT
Navy - YD, MC
Air Force - 84, 99

Preparing Activity:

Army - AT

CIVIL AGENCY COORDINATING ACTIVITIES:

DOT - FHW, MVP
GSA - FSS
USDA - AFS
VA - DMS

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