NOT MEASUREMENT SENSITIVE

MIL-T-62735
20 March 1992
SUPERSEDING
SEE SECTION 6

MILITARY SPECIFICATION

TRUCKS AND TRUCK TRACTORS: MODIFIED COMMERCIAL, GENERAL SPECIFICATION FOR.

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

1. SCOPE

1.1 Scope. This specification covers general requirements for the classes, models and types of modified commercial trucks indicated in the specification title above and in 1.2 below. This specification is intended only as a document to be referenced in detail specification sheets that must, as a minimum, cover detailed truck body requirements and specify the model and class required from table I.

1.2 Classification. The vehicle shall be one of the combinations of model and class (gross vehicle weight) (GVW) shown in table I. as specified (see 6.2):

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: US Army Tank-Automotive Command, ATTN: AMSTA-UED, Warren, MI 48397-5000, by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 2320

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

TABLE I. Permissible combinations.

Model	GVW Kilograms	Class (GVW, 1,000 pounds)
4x2	4540	10
	6350	14
	8600	19
	9530	21
	10 900	24
	12 700	28
	14 500	32
4x4	4540	10
	6350	14
	10 900	24
	12 200	26.5
	15 400	34
	15 850	35
6x4	15 650	34.5
	17 900	39.5
	19 500	43
	20 200	44.5
	20 900	46
	22 700	50
	23 600	52
	28 100	62
	30 000	66
	34 900	77
6x6	16 350	36
	20 900	46
	23 100	51
	23 600	52
	27 200	60
	28 100	62
	30 000	66
8x4	34 000	75
	38 600	85
8x6	34 000	75
	38 600	85

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

A-A-2128	- Reflectors Set, Highway Warning, Triangular.
VV-F-800	- Fuel Oil, Diesel.

MILITARY

MIL-P-514	- Plates, Identification, Instruction and Marking, Blank.
MIL-T-5624	- Turbine Fuel, Aviation, Grades JP-4, JP-5 and JP-5/JP-8ST.
MIL-S-40626	- Sign Kit, Vehicle Glass.
MIL-B-46176	- Brake Fluid, Silicone, Automotive All Weather, Operational and Preservative, Metric.
MIL-T-83133	- Turbine Fuel, Aviation, Kerosene Type, NATO F-34 (JP-8) and NATO F-35.

STANDARDS

FEDERAL

FED-STD-297	- Rustproofing of Commercial (Nontactical) Vehicles.
FED-STD-595	- Colors Used in Government Procurement.

MILITARY

MIL-STD-209	- Slinging and Tiedown Provisions for Lifting and Tying Down Military Equipment.
MIL-STD-642	- Identification Marking of Combat and Tactical Transport Vehicles.
MIL-STD-810	- Environmental Test Methods and Engineering Guidelines.
MIL-STD-1223	- Nontactical Wheeled Vehicles Treatment, Painting, Identification Marking and Data Plate Standards.
MIL-STD-1366	- Material Transportation System Dimensional and Weight Constraints, Definition of.
MIL-STD-1472	- Human Engineering Design Criteria for Military Systems, Equipment and Facilities.

MIL-STD-1791	- Designing For Internal Aerial Delivery In Fixed Wing Aircraft.
MS 51118	- Pintle Assembly, Towing: 40,000 Lbs. Capacity, Manual Release.
MS 51317	- Light, Warning, Vehicular, Rotating, D.C.
MS 51335	- Pintle Assembly, Towing: 18,000 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.
MS 500048	- Towbar, Motor Vehicle: Light, Medium and Heavy Duty (For Vehicles 2-1/1 to 50 Tons and Heavier.

(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-1-11	- Air Transportability Handbook.

(Application for copies of the AFSC Design Handbook should be addressed to Wright-Patterson AFB, ASD/ENES, Wright-Patterson AFB, OH 45433-6503, telephone (513) 255-6295.)

ARMY DRAWINGS

11677011	- First Aid Kit.
12367024	- CARC for Exterior Aluminum Surfaces.
12369025	- CARC for Exterior Steel Surfaces.

(Copies of Army drawings required by manufacturers in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting offices.)

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 (FMCSR)
Federal Motor Vehicle Safety Standards (FMVSS).

(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 A 53	- 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

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

INTERNATIONAL ROAD FEDERATION
Limits of Motor Vehicle Sizes and Weights.

(Application of copies of International Road Federation publications should be addressed to International Road Federation, 525 School St., S.W., Washington, D.C. 20024.)

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, 60 Batterymarch Park, Quincy, MA 02289.)

NORTH ATLANTIC TREATY ORGANIZATION (NATO)
Allied Engineering Publication (AEP-5)
Part II NATO Standard Diesel and Spark Ignition Engines Laboratory Test, dated January 1984.

Standardization Agreement
(STANAG) 2832 Restrictions For The Transport of Military Equipment by Rail on European Railways.

(Application for copies of NATO publications should be addressed to North Atlantic Treaty Organization, Military Agency for Standardization, 1110 Brussels, Belgium.)

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.

J551	- Performance Levels and Methods of Measurement of Electromagnetic Radiation from Vehicles and Devices (30 - 1,000 MHz).
J560	- Seven-Conductor Electrical Connector for Truck-Trailer Jumper Cable
J598	- Sealed Lighting Units for Construction Industrial and Forest Machinery.
J682	- Rear Wheel Splash and Stone Throw Protection (DoD adopted).
J688	- Truck Ability Prediction Procedure (DoD adopted).
J700	- Upper Coupler Kingpin – Commercial Trailers and Semitrailers.
J704	- Openings for Six- and Eight-Bolt Truck.
J772	- Clearance Envelopes for Six- and Eight-Bolt Truck Transmission Mounted Power Take-Offs.
J844	- Nonmetallic Air Brake System Tubing (DoD adopted).
J848	- Fifth Wheel Kingpin, Heavy Duty Commercial Trailers and Semitrailers (DoD) adopted.
J931	- Hydraulic Power Circuit Filtration.
J1067	- Seven-Conductor Jacketed Cable for Truck Trailer Connections.

(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 information 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 Commercial vehicle requirements. The vehicle shall be a complete commercial vehicle as specified herein ready for its intended use (see 6.1). The cab and chassis shall be modified or added to only as expressly permitted herein. The chassis and cab (3.3), body (3.4), off-line chassis modifications (3.5, 3.6, 3.7, 3.8), military modifications (3.9), treatment, painting and marking (3.10), mounting and servicing and adjusting (3.11) and workmanship (3.12), shall include all features (operations, processes, procedures, practices, materials, parts, components, equipments, assemblies, inspections, etc.) contributing to the commercial acceptability of that product or service.

3.1.1 Federal Motor Vehicle Safety Standards. The vehicle, with all furnished attachments, accessories and equipment, shall comply with all Federal Motor Vehicle Safety Standards.

3.1.2 Air pollution control. The vehicle shall comply with EPA Regulations governing Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines. In addition, vehicles destined for California shall comply with State of California regulations governing air pollution control.

3.1.3 Sound level. The cab interior sound level shall be not greater than 84 db(A). The sound level shall be determined in accordance with Federal Motor Carrier Safety Regulation 393.94. The vehicle exterior sound level shall conform to EPA Noise Emission Standards for Transportation Equipment, Medium and Heavy Trucks.

3.1.4 OSHA and FMCSR regulation. The vehicle, with all furnished attachments, accessories and equipment, shall enable compliance by any user with all OSHA and FMCSR user regulations that are vehicle or vehicle equipment dependent. Regulations shall be those that are applicable to a commercial user of such a similar type, class and model for the same general use. See 6.1.

3.1.5 Curb weight. The curb weight shall include the weight of:

(a) The chassis and cab, with all attachments, accessories, and equipment;
(b) The body or fifth wheel (except for cab chassis only type); and equipment;
(c) A full complement of fuel, lubricants and coolant.

3.1.6. GVW. The GVW shall be the sum of:

(a) The curb weight
(b) The operator weight 80 kilograms (kg) (175 pounds) and
(c) A payload to provide not less than the GVW specified in table I for the applicable vehicle class.

3.1.7 Weight distribution. Except as specified in 3.1.7.2 and 3.1.7.3, the weight distribution for the purpose of establishing required suspension, axle and tire capacities shall be determined with the payload uniformly distributed over the load area (see 6.4). A vehicle with a crew (four-door) cab shall have the weight distribution determined with 240 kg (525 pounds) of the payload in the rear seat.

3.1.7.1 Truck tractor weight distribution. Truck tractors shall have the fifth wheel located so that with the truck tractor loaded to GVW, the load ratings of the chassis components are not exceeded (and also located to conform to 3.4.2.4 through 3.4.2.4.3). Truck tractors with a sliding fifth wheel shall have the weight distribution determined with the sliding fifth wheel located in its most forward position of adjustment.

3.1.7.2 Specified GAWR. The gross axle weight ratings (GAWR) shall be as determined and required by 3.1.7 and 3.1.7.1 except for the specified GAWR as follows:

(a) Class 32, model 4x2 - 4540 kg (10,000 pounds) front, 10 200 kg (22,500 pounds) rear.
(b) Class 50, model 6x4 - 5450 kg (12,000 pounds) front, 17 250 kg (38,000 pounds) rear.
(c) When specified (see 6.2), for any type, class and model, the front and rear GAWRs shall be as specified and 3.1.7 does not apply.

3.1.7.3 Snowplow weight provisions. When a snowplow is specified (see 3.7), or when specified (see 6.2) for future installation of a similar snowplow, components shall provide increased front GAWR.

3.1.7.3.1 Front GAWR snowplow provisions. The front GAWR shall be not less than the load imposed by the snowplow (or a 860 kg (1,900 pound) load 1520 millimeters (mm) (60 inches) forward of the centerline of the front axle when snowplow weight provisions but not a snowplow are specified) plus a payload uniformly distributed over the load area, both totaling a payload to provide not less than the specified GVW.

3.1.7.3.2 Rear GAWR snowplow provisions. The rear GAWR shall be not less than the load imposed without the snowplow by a payload uniformly distributed over the load area to provide not less than the specified GVW.

3.1.8 Truck tractor GCW. The gross combination weight (GCW) for truck tractors shall be the sum of:

(a) The truck tractor curb weight
(b) The operator weight 80kg (175 pounds), and
(c) The weight of a semitrailer, loaded to provide not less than the truck tractor GCW specified in table II.

3.1.9 Truck GCW. When specified (see 6.2), the GCW for trucks (other than truck tractors) shall be the sum of:

(a) The truck curb weight
(b) The trailer tongue load on the truck
(c) Operator weight 80 kg (175 pounds)
(d) Truck payload that with the trailer tongue load will provide not less than the truck GVW and
(e) The weight of a coupled trailer (less trailer tongue load), loaded to provide not less than the truck GCW specified in table II.

TABLE II. GCW.

Class	Truck tractor GCW, kg (pounds)	Truck GCW, kg (pounds)
19 to 20	13 360 (30,000)	11 350 (25,000)
21 to 23	15 850 (35,000)	12 700 (28,000)
24 to 27	18 150 (40,000)	14 500 (32,000)
28 to 31	20 400 (45,000)	16 350 (36,000)
32 to 36	24 950 (55,000)	18 150 (40,000)
37 to 39	24 950 (55,000)	20 900 (46,000)
39.5 to 44	29 500 (65,000)	24 500 (54,000)
44.5 to 45	36 300 (80,000)	26 300 (58,000)
46, 6x4	36 300 (80,000)	27 200 (60,000)
46, 6x6	32 650 (72,000)	27 200 (60,000)
50, 6x4	47 650 (105,000)	30 000 (66,000)
51, 6x6	As specified (see 6.2)	30 850 (68,000)
52, 6x4	As specified (see 6.2)	31 750 (70,000)
52, 6x6	As specified (see 6.2)	31 750 (70,000)
60, 6x6	As specified (see 6.2)	36 300 (80,000)
62, 6x4	As specified (see 6.2)	37 200 (82,000)
62, 6x6	As specified (see 6.2)	37 200 (82,000)
66, 6x6	As specified (see 6.2)	39 000 (86,000)
75, 8x4	58 950 (130,000)	39 000 (86,000)
75, 8x6	72 600 (160,000)	--
77, 6x4	72 600 (160,000)	--
85, 8x4	90 700 (200,000)	--
85, 8x6	90 700 (200,000)	--

3.1.10 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) or when specified (see 6.2), 2590 mm (102 inches). The width over the trees shall be not more than that specified in table III.

TABLE III. Width over tires.

Axle rating kg (pounds)	Maximum width mm (inches)
Single axle, up to 10 433 (23,001)	2540 (100)
Single axle, over 10 4333 (23,001)	2640 (104) [2590 (102) when 3.9.6 is specified]
Tandem axle, up to 20 866 (46,001)	2540 (100)
Tandem axle, over 20 866 (46,0001) and up to 26 309 (58,001)	2590 (102)
Tandem axle, 26 309 (58,001) and over	2640 (104)
Pusher axle, all	2590 (102)

3.1.11 Prohibited materials. Except as permitted in 3.3.15, asbestos materials shall not be present 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.

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

3.1.13 Electromagnetic radiation. Electromagnetic radiation from the vehicle shall be within the limits of SAE J551.

3.1.14 PRESTO. Requisitioners should note that Procurement Requests will be Expedited for Standard Truck Orders (PRESTO) that limit selection of options to one of the following option packages. Other additions and exceptions to the specification will slow up acquisition and are discouraged.

3.1.14.1. Army.

3.1.14.1.1 Army general NTV. When specified (see 6.2), the PRESTO Army general non-tactical vehicle (NTV) option package shall be furnished on the vehicle. The package shall include the following in full accordance with the paragraphs cited:

3.3.11.5	Automatic transmission, all 4x2 models
3.9.5	Vehicle class 24 or over, brake connections for towed vehicle brake control from a towing vehicle.
3.9.11	If the Vehicle is equipped with hydraulic brakes and if available from the chassis manufacturer, silicone brake fluid.
3.10.1	Treatment and painting for Army NTVs.
3.10.3	Marking for Army NTVs.
3.10.6	Rustproofing.

3.1.14.1.2 Army caution color NTV. When specified (see 6.2), the PRESTO Army caution color NTV option package shall be furnished on the vehicle. The package shall include the following in full accordance with the paragraphs cited:

3.3.11.5	Automatic transmission, all 4x2 models
3.9.5	Vehicle class 24 or over, brake connections or towed vehicle brake control from a towing vehicle.
3.9.11	If the vehicle is equipped with hydraulic brakes and if available from the chassis manufacturer, silicone brake fluid.
3.10.1	Treatment and painting for Army NTVs, except the exterior color shall be gloss yellow, matching color chip No.13538 of FED-STD-595.
3.10.3	Marking for Army yellow NTVs.
3.10.6	Rustproofing.

3.1.14.2 Navy.

3.1.14.2.1 Navy white (shore). When specified (see 6.2), the PRESTO Navy white option package shall be furnished on the vehicle. The package shall include the following in full accordance with the paragraphs cited:

3.3.1	Forward tilting hood and fenders or butterfly hood and bolt on fenders.
3.3.6	Fuel and water separator.
3.3.11.5	Automatic transmission.
3.3.14	Disc wheels.
3.3.14.5	Spare wheel or rim.
3.3.30	Tools.
3.5.15	Backup alarm.
3.10.1	Treatment and painting for Navy NTVs.
3.10.3	Marking for Navy NTVs.
3.10.6	Rustproofing.

3.1.14.2.2 Navy green (active). When specified (see 6.2), the PRESTO Navy green, option package shall be furnished on the vehicle. The package shall include the following in full accordance with the paragraphs cited:

3.3.1	Forward tilting hood and fenders or butterfly hood and bolt on fenders.
3.3.6	Fuel and water separator.
3.3.8	Silicone rubber hoses.
3.3.11.5	Automatic transmission.
3.3.13.1.	Oil lubricated bearings and axle spindles.
3.3.13.7.	Traction control, except truck tractors.
3.3.14	Disc wheels.
3.3.14.6	Spare tire assembly.
3.3.21	Gages in lieu of indicators.
3.3.21.1	Engine shutdown system.
3.3.30	Tools.
3.5.15	Backup alarm.
3.5.17	Spark arrester, except on turbocharged engines.
3.5.18	Trailer towing package.
3.10.1	Treatment and painting for Navy NTVs, except the exterior color shall be gloss green, matching color chip No.14064 of FED-STD-595.
3.10.3	Marking for Navy green NTVs.
3.10.6	Rustproofing.

3.1.14.3 Air Force.

3.1.14.3.1 Air Force blue. When specified (see 6.2), the PRESTO Air Force blue option package shall be furnished on the vehicle. The package shall include the following in full accordance with the paragraphs cited:

3.3.11.5	Automatic transmission.
3.3.14.6	Spare tire assembly.
3.3.30	Tools.
3.10.1	Treatment and painting for Air Force NTVs.
3.10.3	Marking for Air Force NTVs.

3.1.14.4 Marine Corps.

3.1.14.4.1 Marine Corps white. When specified (see 6.2), the PRESTO Marine Corps white option package shall be furnished on the vehicle. The package shall include the following in full accordance with the paragraphs cited:

3.3.1	Tilting hood and fender assembly or butterfly hood and bolt on fenders
3.3.6	Fuel and water separator.
3.3.11.5	Automatic transmission.

3.3.13.1	Oil lubricated wheel bearings and axle spindles.
3.3.14	Disc wheels.
3.3.14.4	Spare carrier, except truck tractors and dump trucks.
3.3.18	A 100 ampere alternator in lieu of the 85 ampere standard.
3.3.30	Tools.
3.10.1	Treatment and painting for Marine Corps NTVs.
3.10.3	Marking for Marine Corps NTVs.
3.10.6	Rustproofing.

3.2 Performance and durability requirements.

3.2.1 Speeds and gradeability. High and low speed requirements shall be met with truck tractors loaded to specified GVW and GCW and with all other trucks loaded to specified GVW and when specified (see 3.1.9) GCW.

3.2.2 High speed gradeability. The vehicle shall ascend the standard continuous grades specified in table IV at 80 kilometers per hours (km/h) (50 miles per hour (mph)) 69 km/h (43 mph) for 72 600 kg (160,000 pounds) GCW and larger. When specified (see 6.2), the vehicle shall ascend the optional continuous grades specified in table IV at these speeds. Gradeability requirements shall be met with the main transmission and auxiliary transmission, if furnished, in direct drive and, when a multispeed axle is furnished, with the axle in high speed range.

3.2.2.1 Gradeability calculations. Gradeability shall be calculated in accordance with SAE J688. (See 6.3 and use the 80 km/h (50 mph) factors or 69 km/h (43 mph) factors indicated, as applicable).

TABLE IV. Gradeability.

Gross weight kg (1,000 pounds) (GVW or GCW, whichever is greater)	Standard percent of grade	Optional percent of grade
4540 (10)	5.0	5.0
6350 (14)	4.0	4.0
8600 (19)	3.0	3.0
9530 (21)	3.0	3.0
10 900 (24)	2.5	2.5
11 350 (25)	2.3	2.5
12 000 (26.5)	2.2	2.4
12 700 (28)	2.0	2.3

TABLE IV. Gradeability. (continued).

Gross weight kg (1,000 pounds) (GVW or GCW, whichever is greater)	Standard percent of grade	Optional percent of grade
13 600 (30)	1.8	2.3
14 500 (32)	1.5	2.3
15 400 (34)	1.5	2.2
15 650 (34.5)	1.5	2.2
15 850 (35)	1.5	2.2
16 350 (36)	1.4	2.2
17 900 (39.5)	1.3	2.1
18 150 (40)	1.2	2.1
19 500 (43)	1.1	2.0
20 200 (44.5)	1.1	1.9
20 400 (45)	1.1	1.9
20 900 (46)	1.1	1.8
22 700 (50)	1.0	1.7
23 000 (51)	1.0	1.7
23 600 (52)	1.0	1.6
24 950 (55)	0.9	1.5
27 200 (60)	0.8	1.4
28 100 (62)	0.8	1.4
29 500 (65)	0.8	1.3
30 000 (66)	0.8	1.3
32 650 (72)	0.6	1.1
34 000 (75)	0.6	1.1
34 400 (77)	0.6	1.0
36 300 (80)	0.6	1.0
39 600 (85)	0.6	0.8
45 900 (100) and up	0.5	0.6

3.2.3 Maximum geared speed. Maximum geared speed at engine governed speed shall be not less than that specified in table V.

TABLE V. Maximum geared speed.

Model	Class	Maximum geared speed km/h (mph)
4x2	All	93 (58)
6x4	Up to 68	93 (58)
4x4	All	84 (52)
6x6	Up to 66	84 (52)
All	67 and up	69 (43)

3.2.4 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. Low vehicle speed shall not be more than that specified in table VI.

Table IV. Low speed.

No. of forward speeds	Max low speed km/h (mph)
4 or 5	7.2 (4.5)
7 or 8	4.8 (3.0)
9 or 10	4.0 (2.5)
13 to 20	4.0 (2.5)

3.3 Standard commercial cab and chassis requirements. The cab and chassis shall be produced from an established production line. The production line shall produce commercial truck cabs and chassis of the same model as furnished to the Government sufficient in quantity to support establishment of a factory authorized commercial dealer network. The dealer network shall be in place at the time of bid and shall have been in place for not less than the preceeding 5 years. Further, the manufacturer shall cause to be published and distributed to his dealers catalogs, service and detailed parts manuals fully describing his product line for the purposes of sales and service through the dealer network. All features listed in the subparagraphs of 3.3 and furnished to the Government shall be standard or optional from the cab-chassis manufacturer's production line facility and serviceable by that manufacturer's dealer network. The dealer network shall be capable of servicing, repairing, providing parts and performing warranty repairs for any and all items described in all subparagraphs of 3.3 and furnished to the Government. The dealer network shall consist of not less than 100 fully franchised, qualified dealers.

3.3.1 Cab style. Unless otherwise specified, the chassis manufacturer shall furnish any type of his standard or optional full width non-sleeper cab. When specified (see 6.2), the cab on class 19 and larger shall have a forward tilting hood and fender assembly; or a butterfly hood and bolt on fenders that can be removed or swung forward when unbolted. Tilting shall not interfere with present of future installation of additional equipment, such as a snowplow or a front mounted winch. When specified (see 6.2), class 24 through class 62 4x2, 4x4 and 6x4 models shall have a tilt cab. Tilt cabs shall have provisions to facilitate cleaning the windshield. Provisions shall include a bumper step, or bumper step cutouts, and a grab handle located under the windshield.

3.3.1.1 Cab access. The cab shall have secondary steps when cab entry step height otherwise exceeds 610 millimeters (mm) (24 inches). The cab on class 24 and larger trucks shall have safety grips or grab handles on each side to assist personnel in entering and leaving the cab.

All truck tractors, regardless of class, shall have safety grips or grab handles to assist personnel in climbing onto the truck tractor deck plate.

3.3.1.2 Seats. Unless otherwise specified, the cab shall have an upholstered, full-width, adjustable seat and back or an individual, adjustable driver's seat and an individual passenger seat. When specified (see 6.2), the driver's seat shall be individual, adjustable and of the Bostrum Viking T-bar type and an individual passenger seat shall be furnished. When specified for vehicles with air brakes (see 6.2), the driver's seat shall be an air ride suspension type. The color of the upholstery and the interior finish shall be compatible with the exterior color (see 3.10.1 and 3.10.2). Upholstery shall not be white. Outboard front seats shall have combination pelvic and upper torso restraint seat belts.

3.3.1.3 Special cab features. The cab shall have rubber fender extensions when the front tires extend beyond the normal cab fenders. The rubber fenders shall extend at least to the outside of the tire tread. When a snowplow or snowplow weight provision is specified, the cab shall have service hatches or access hoods. Hatches and hoods shall provide access for routine servicing (see 3.11) with a snowplow attached. When a maintenance truck with the optional equipment racks is specified, the cab shall have a sliding type rear window.

3.3.1.4 Crew cab. When specified for 4x2 and 4x4 vehicles and up to class 52 6x4 and class 46 6x6 (see 6.2), the vehicle shall have a four-door, full width cab. The cab shall have two full width seats and backs and seat belts, all according to 3.3.1.2. The front seat shall be adjustable fore and aft. There shall be three pairs of seat belts for both the front and rear seats. All cab doors shall have locks operable from inside the cab through mechanical linkage. Both front doors shall have external key-operated locks. Cab doors shall have windows with crank-operated window regulators. There shall be a rear window. The cab shall have interior lighting. The cab shall conform to 3.3.1.1 through 3.3.1.2.

3.3.1.5 Crew cab construction. The crew cab roof shall be of one piece or the roof shall give the appearance of one piece. Roof weld seams shall be continuous, waterproof, and free of visible bumps or protrusions. The cab shall have full length drip moldings above all doors.

3.3.1.6 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. There shall be a kick-space height of not less than 70 mm (2.75 inches) between the floor and the rear of the front seat in all positions of adjustment. Leg room and space forward of the front seat shall be equivalent to that provided ahead of the seat in a two-door standard cab.

3.3.1.7 Sleeper cab. When specified for class 24 and larger 4x2 and 6x4 models (see 6.2), in addition to the requirements of 3.3.1 through 3.3.1.3, the cab shall be of the sleeper type. The sleeper compartment shall be not less than 760 mm (30 inches) in depth. The sleeper compartment shall be fitted with a foam mattress and a sleeper occupant restraint system. The cab shall have a luggage compartment. The luggage compartment shall have locking access doors, or doors that can only be opened from inside, on both sides of the cab. The sleeping compartment shall have curtains and a domelight. The sleeper compartment shall have heating and air conditioning. Auxiliary air temperature controls or louvers shall be furnished in the sleeper compartment. The controls or louvers shall provide for remote regulation of both heating and air conditioning within the sleeper compartments.

3.3.2 Diesel engine. Unless otherwise specified (see 3.3.3), the vehicle shall be diesel engine driven. See 3.9.4.

3.3.2.1 Starting system. For diesel engine driven vehicles, engine starting equipment shall include an ether starting system, glow plug or electric grid heater.

3.3.2.2 Ether system. The ether system shall be of the measured shot type. The ether system shall be key operated or manually operated from the driver's compartment. The system shall be inoperative with the engine warm. There shall be complete provisions for a replaceable ether reservoir of not less than 355 milliliters (mL) (12 fluid ounces). A reservoir need not be furnished, but shall be readily available from the chassis manufacturer's dealers and other commercial sources.

3.3.3 Gasoline engine. When specified (see 6.2), model 4x2 shall be gasoline engine driven.

3.3.4 Oil filter. Engine equipment shall include a full flow or combination full flow and bypass oil filter.

3.3.5 Air cleaner. The engine shall have an air cleaner. When specified for diesel engine driven vehicles (see 6.2), the air cleaner shall have a service indicator (gage or warning light) visible to the seated driver.

3.3.6 Fuel and water separator. The fuel system shall have a fuel filter. When specified (see 6.2), the vehicle shall have a fuel and water separator. The separator shall include a water coalescer and a drain valve. When a separator is required, it may be a combination filter/separator.

3.3.7 Governor. For class 19 and larger vehicles, the engine shall have a governor. The governor shall be set and sealed to limit the engine to the engine manufacturer's maximum recommended operating speed.

3.3.8 Cooling system. The cooling system shall maintain the engine coolant at a temperature below the boiling point. This shall be accomplished with the vehicle loaded to GVW and GCW 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° Celsius (°C) (125 degrees Fahrenheit (°F)). Tilt cabs shall have a radiator servicing access door to permit the coolant level to be checked. When specified (see 6.2), radiator and heater hoses shall be of silicone rubber.

3.3.9 Fan clutch. The cooling system fan shall have a fan clutch.

3.3.10 Exhaust system. On class 36 and larger truck tractors, the exhaust shall be vertical. Vertical exhausts on truck tractors shall have a heat shield. On all other types of trucks, vertical exhausts shall have a heat shield if exhaust components are capable of being reached easily by personnel entering or leaving either side of the cab. Vertical exhausts shall have a hinged rain cap. See 3.5.17, 3.9.2.

3.3.11 Transmission. Unless otherwise specified (see 3.3.11.5), the vehicle shall have a manual transmission. The input torque capacity of all transmissions shall be at least equal to the maximum torque delivered by the engine. Gear ratios in the transmission and the axles shall provide a progressive shifting pattern throughout the complete range and shall provide performance as specified in of 3.2.1 through 3.2.4.

3.3.11.1 Manual transmission. The manual transmission in vehicles up to class 21 shall synchronize shift for at least the three highest forward speeds or, for class 21, may be of the constant mesh type. All other classes shall provide for maximum ease of shifting in all speeds. When more than five forward speeds are required, a multispeed transmission, auxiliary transmission, two speed axle (4x2 and 6x4 only) or two speed transfer case (4x4, 6x6 and 8x6 only) shall be provided. Auxiliary transmissions shall have air shift. The transmission and other gear train and axle equipment shall provide not less than the number of vehicle forward speeds specified in table VII.

TABLE VII. Vehicle forward speeds and transmission PTO openings.

Model	Class	Minimum number of vehicle forward speeds		PTO openings
		Dump truck and truck tractor	Truck	
4x2	Up to 20	8	4	1
4x2	21 to 23	8	5	2
4x2	24 to 30	7	5	2
4x2	31 and over	9	8	2

Table VII. Vehicle forward speeds and transmission PTO openings. (continued).

Model	Class	Minimum number of vehicle forward speeds		PTO openings
		Dump truck and truck tractor	Truck	
4x4	All	9 transmission speeds, 9 to 18 vehicle speeds	9	1
6x6	All	9 transmission speeds, 9 to 18 vehicle speeds	9	1
6x4	32 to 34	9	8	2
6x4	34.5 to 44	9	9	2
6x4	44.5 and over	13	13	2
8x4	All	13	13	2
8x6	All	9 transmission speeds, 18 vehicle speeds	9 transmission speeds, 18 vehicle speeds	1

3.3.11.2 Power takeoff (PTO) openings. Unless otherwise specified, the manual transmission shall have the number of PTO openings specified in table VII, all conforming to SAE J704. When specified (see 6.2), or when required to power PTO driven equipment, the PTO opening shall be of the heavy duty type. The clearance envelope for all transmission PTO openings shall conform to SAE J772.

3.3.11.3 Clutch. The clutch shall be the largest capacity clutch offered for the type, model and class of vehicle and engine. Clutch torque capacity shall exceed the maximum delivered engine torque. The clutch lining shall be asbestos free. The clutch on model 6x4, 6x6, 8x4 and 8x6 shall have spring dampening and a greaseable bearing.

3.3.11.4 Transfer case. Model 4x4, 6x6 and 8x6 shall have a transfer case. Unless otherwise specified or required by table VII, the transfer case may have one or two speeds. Unless the transfer case is equipped with devices which compensate for differential torque and speeds between the front and rear axles, the transfer case shall provide for the driver to select either rear wheel drive or front and rear wheel drive (except no drive is required for the pusher axle on 8x4 and 8x6 models). When furnished, inter-axle compensating devices shall provide for positive transfer of power to all driving axles.

3.3.11.4.1 Two speed transfer case. When specified (see 6.2) or when required in accordance with table VII, the transfer case shall have two forward speeds. The speedometer shall read accurate speed (km/h and mph) with the speed selector on two-speed transfer cases in both high and low range.

3.3.11.5 Automatic transmission. When specified (see 6.2), the vehicle shall have an automatic transmission. The transmission shall include a hydraulic torque converter and not less than the number of forward gear ratios specified in table VIII. Automatic transmissions with 4 or more forward gear ratios shall have a power takeoff opening.

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

Model	Class	Number of forward gear rations					
		No transfer case or single speed transfer case			Two-speed transfer case		
		Truck tractors	Dump trucks	All others	Truck tractors	Dump trucks	All others
4x2	10 to 18	-	-	3	-	-	-
4x4	10 to 18	-	-	3	-	-	3
4x2	19 to 23	4	4	4	-	-	-
4x2	23 to 33	5	5	4	-	-	-
4x2	34 and up	5	5	5	-	-	-
4x4	19 and up	5	5	5	4	4	4
6x4	All	5	5	5	-	-	-
6x6	36 to 46	5	5	5	4	4	4
6x6	47 and up	5	5	5	5	5	5
8x4	All	5	5	5	-	-	-
8x6	All	5	5	5	5	5	5

3.3.12 Suspension. Except as specified in 3.1.7.1 and 3.1.7.2, the suspension system components shall have a rated capacity at least equal to the load imposed on each member, measured at the ground, with the vehicle loaded to specified GVW. In addition, for model 8x4 and 8x6, the front and rear suspension system ratings shall be at least equal to the load imposed on each member, measured at the ground, with the pusher axle elevated off the ground and with the vehicle loaded to specified GVW. When specified (see 6.2), the vehicle shall have auxiliary rear springs.

3.3.12.1 Shock absorbers. Front axles shall have hydraulic, double-acting shock absorbers at the wheels, when the front axle rating is 5450 kg (12,000 pounds) or less.

3.3.12.2 Rear air suspension system. When specified for model 4x2, class 24 to 28, and model 6x4, class 39 and up (see 6.2), the rear axle(s), except on dump trucks, shall have an air suspension system. The suspension system shall have not less than 58 percent of the sprung weight on the air bags. The system shall have leveling valves with time delay to minimize constant air consumption. There shall be a hydraulic shock absorber near each air bag. The system shall have full provisions for lifting, towing and jacking the vehicle. Truck tractors shall have an air dump valve with in cab control within reach of the seated driver.

3.3.13 Axles. Except as specified in 3.1.7.1 and 3.1.7.2, axle ratings shall be at least equal to the load imposed on each axle, measured at the ground, with the vehicle loaded to specified GVW. In addition, for model 8x4 and 8x6, axle ratings shall be at least equal to the load imposed on each axle, measured at the ground, with the pusher axle up and the vehicle loaded to specified GVW.

3.3.13.1 Oil lubricated axles. When specified (see 6.2), the front and rear wheel bearings and axle spindles on 4x2, 6x4 and 8x4 models and the rear wheel bearings and axle spindles on 4x4, 6x6 and 8x6 models shall have oil lubrication. The hubcaps, except for driving axles, shall have a window or plug for visually determining the oil level. There shall be provisions for venting or withstanding internal pressure buildup and for replenishing the oil supply.

3.3.13.2 Rear bogie. Model 6x4, 6x6, 8x4 and 8x6 vehicles shall have a rear bogie. The rear bogie shall be of the four-wheel type, complete with axles, springs, torque rods and all other necessary parts. Axle gear ratios shall provide the performance specified in 3.2.1 through 3.2.4. The rear bogie rating on model 8x4 and 8x6 shall be at least equal to the total load imposed, measured at the ground, with the vehicle loaded to specified GVW and the pusher axle elevated off the ground.

3.3.13.3 Rear bogie differential action. The bogie shall permit differential action between the two axles. The bogie shall have a manual or automatic controlled lockout assuring equal power to each rear drive axle. The manual lockout control shall be in the cab accessible to the seated driver.

3.3.13.4 Front drive axle. The front axle on 4x4, 6x6 and 8x8 mode be shall be driven from a driveline in the powertrain. See 3.5.23.

3.3.13.5 Pusher axle, on line. Pusher axles on 8x4 and 8x6 vehicles shall conform to 3.5.22.

3.3.13.6 Two-speed axle. 4x2 truck tractors and 4x2 dump trucks, both up to class 23 with manual transmissions, or when specified (see 6.2), other 4x2 and 6x4 models shall have a two speed axle. The two speed axle shall have electric, vacuum, or air shift. The axle shall have

ratios which will permit proper gear splitting. The gear ratios shall provide the performance specified in 3.2.1 through 3.2.4.

3.3.13.7 Traction control. Dump trucks shall have traction control on one rear axle. When specified (see 6.2), other vehicle types, except truck tractors, shall have traction control on one rear axle.

3.3.14 Wheels, rime and tires. Unless wide base tires are specified, the vehicle shall have single front and dual rear wheels and tires. Multi-piece rims shall not be furnished, except:

(a) When tube type tires are specified in acquisition documents
(b) On front axles rated at over 6350 kg (14,000 pounds)
(c) On single rear axles rated at over 10 430 kg (23,000 pounds)
(d) On tandem rear axles rated at over 23 600 kg (52,000 pounds)
(e) On pusher rear axles rated at over 10 430 kg (23,000 pounds).

Rims and disc wheel size, tire size and tire load range (ply rating) shall be the same for all wheels, except:

(a) On 4x2 models, class 32 and larger
(b) On 6x4 models, class 50 and larger
(c) On 6x6 models, class 60 and larger
(d) On 8x4 models, class 75 and larger
(e) On 8x6 models, class 75 and larger
(f) On 4x4 models when a snowplow or snowplow provisions are required
(g) On 6x6 models when a snowplow or snowplow provisions are required.

When specified (see 6.2), front and rear axles shall have wide base tires and wheels in lieu of conventional front and dual rear wheels and tires. Wide base wheels shall be interchangeable without the use of an adapter, except:

(a) On 4x2 and 4x4 models, class 32 and larger
(b) On 6x4, 6x6, 8x4 and 8x6 models, class 50 and larger.

When specified (see 6.2), wheels shall be of the disc type

3.3.14.1 Tire ratings. Except as specified in 3.1.7.1 and 3.1.7.2, 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. In addition, on 8x4 and 8x6 models up to class 76, with the pusher axle up, the tire load rating for each tire on the vehicle, at 32 km/h (20 mph), shall be at least equal to the load imposed, measured at each wheel, at the ground, with the vehicle loaded to specified GVW.

3.3.14.2 Tire standards. All tires and tire ratings shall conform to the Tire and Rim Association or to the European Tyre and Rim Technical Organisation recommendations. Ratings shall be for vehicle speeds up to the vehicle's actual maximum geared speed (and in addition, up to a speed at 32 km/h (20 mph) with the pusher up for up to class 76, model 8x4 and 8x6).

3.3.14.3 Tire type. Unless otherwise specified (see 6.2), tires shall have highway tread on 4x2, 6x4 and 8x4 models and nondirectional mud and snow tread on 4x4, 6x6 and 8x6 models. Unless multi-piece rims are permitted (see 3.3.14), tires shall be of the tubeless type. Unless otherwise specified, tires may be of low standard or profile on 4x2, 6x4 and 8x4 models. Unless otherwise specified, tires shall be of standard profile on 4x4, 6x6 and 8x6 models. When specified (see 6.2), tires shall be of low profile. Tires shall be the steel belted radial type.

3.3.14.4 Carrier for spare tire assembly. When specified (see 6.2), the vehicle shall have a spare tire carrier. The carrier shall be in a readily accessible location. Threaded fasteners on the carrier shall be corrosion-resistant. The carrier design shall enable safe removal or mounting of a spare wheel assembly using only the tools specified in 3.3.30. 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 truck tractors or dump trucks, the carrier shall be vertical, behind the cab and above the chassis frame (CAUTION: See 6.5).

3.3.14.5 Spare wheel or rim. When specified (see 6.2) or when a spare tire assembly is furnished, a spare wheel or rim shall be installed in the spare carrier or, on vehicles without a carrier, stowed securely on the vehicle for shipment. The spare wheel or rim shall be the same size as those on the front axle.

3.3.14.6 Spare tire assembly. When specified (see 6.2), an inflated spare tire on a spare wheel or rim shall be installed in the spare carrier or, on vehicles without a carrier, stowed securely on the vehicle for shipment. The spare tire shall be of the same size, tread design and load range as those furnished on the front axle.

3.3.15 Brakes. The vehicle shall have brakes at all wheels. Brake linings shall be of nonasbestos material except on single rear axles rated at more than 10 430 kg (23,000 pounds) and on tandem rear axles rated at more than 20 900 kg (46,000 pounds).

3.3.15.1 Hydraulic brakes. Unless otherwise specified (see 3.3.15.2), class 21 and smaller vehicles shall have power hydraulic brakes, except for truck tractors and other trucks with a trailer brake control system, which shall have full air brakes.

3.3.15.2 Air brakes. When specified (see 6.2), other class 21 and smaller vehicles shall have full air brakes. All other vehicles shall have full air brakes. Model 8x4 and 8x6 vehicles shall meet FMVSS stopping distance requirements with the pusher axle up and with the pusher axle down, all while loaded to specified GVW and GCW. The air brake system shall be complete with all standard and necessary components and as required by safety regulations and standards, including the following:

(a) Air compressor rated capacity not less than as specified in table IX.
(b) Unless otherwise specified (see 6.2), an automatic moisture ejector
(c) Unless otherwise specified (see 6.2), for 4x2, 6x4 and 8x4 models, automatic slack adjusters on cam type brakes or internal self-adjusting brakes on wedge and disc type brakes; except these features shall not be on any axle on a vehicle when it is not available on all axles of the vehicle as follows:
    (1) A single rear axle vehicle with a rear axle rated at over 10 430 kg (23,000 pounds),
    (2) A tandem rear axle vehicle with a rear axle rated at over 20 900 kg (46,000 pounds).

TABLE IX. Air compressor capacity.

Class	Capacity L/min (ft^3/min)	
	Truck	Truck tractor
Up to 32	205 (7.25)	340 (12)
33 to 52	340 (12)	340 (12)
53 and up	510 (18)	510 (18)

3.3.15.3 Air dryer. The air brake system shall have a replaceable cartridge desiccant type air dryer. 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. The dryer shall have a thermostatically controlled heater to prevent icing of the purge valve.

3.3.15.4 Trailer brake control system. In addition to the components specified in 3.3.15 through 3.3.15.3, air brake vehicles shall be designed and produced to accommodate ready installation of a trailer brake control system conforming to 3.5.21. When a trailer brake control system is required, the vehicle shall have air brakes.

3.3.15.5 Service brake aid. When specified for diesel engine driven, class 32 and larger vehicles (see 6.2), the service brakes shall have aid by one of the following 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, 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 or
(d) As an additional option, when an automatic transmission is specified, a hydrodynamic retarder integral with the transmission.

3.3.15.5.1 Service brake aid control. The system shall have a switch on the cab instrument panel to activate, modulate, and cut out the service brake aid. The switch shall be marked to indicate its position in accordance with 3.10.5. When active, system control shall be by the conventional service brake foot control.

3.3.15.5.2 Brake aid performance. Each of the four systems shall provide the maximum retardation commercially available by use of such a system on a vehicle of the class (GVW) specified. For (b) and (c), above, the engine manufacturer shall approve the service brake aid application.

3.3.16 Frame. When specified for class 66, 75 and 85 (see 6.2), the frame resisting bending moment (RBM) shall be not less than that specified in table X. Otherwise, trucks with a hydraulic crane or body dump mechanism or when specified (see 6.2) other types, shall have a heavy duty frame or frame with reinforcements.

3.3.16.1 Heavy duty frame. The heavy duty frame shall have frame rails of greater section modulus than the manufacturer's standard for the vehicle class and shall provide structural strength at least equivalent to the reinforced frame specified herein.

3.3.16.2 Frame reinforcements. Reinforcements shall extend at least from the rear of the front suspension, rear hanger bracket to the front of the rear spring, front hanger bracket (for 4x2 and 4x4) or bogie trunnion mounting bracket (for 6x4, 6x6, 8x4 and 8x6). Reinforcements for stake dump trucks and dump trucks shall provide sufficient structural strength in the chassis frame, through increased RBM, to at least equal the loads imposed, with the truck loaded to provide specified GVW. Frame reinforcements for trucks with a crane or aerial device shall be in accordance with the crane or aerial device manufacturer's recommendations.

TABLE X. Optional RBM per frame rail.

Class	RBM Newton-meter (in.-lbs)
66	220 000 (1,950,000)
75	220 000 (1,950,000)
85	293 000 (2,590,000)

3.3.16.3 Usable CA or CT dimension. The vehicle, except truck tractors (see 3.4.2), shall have one of the usable cab-to-axle (CA) or cab-to-trunnion (CT) dimensions shown in table X, as specified or, if not specified, as required by the body type, class and size. Usable CA (CT) is defined as the distance from the most rearward vehicle obstruction that would interfere with body mounting to the centerline of the axle (trunnion). The chassis shall be suitable for subsequent mounting of the make and model or type and class of body specified in acquisition documents.

3.3.16.4 Frame alterations. The CA or CT shall conform to table XI. No one shall alter the chassis frame after the chassis leaves the chassis manufacturers production line to enable compliance with table XI.

TABLE XI. CA and CT dimensions.

Millimeters (inches), plus 100 mm minus 0 mm (plus 4 inches, minus 0), exceptions noted		Millimeters (inches), plus or minus 75mm (3 inches)				
Conventional 4x2	Tilt 4x2	Conventional 6x6	All 4x4	All 6x4	All 8x4	All 8x6
1520 (60)	2970 (117)	3050 (120)				
1830 (72)	3430 (135)	3300 (130)				
2130 (84)	3730 (147)	3500 (138)				
2590 (102)	4030 (159)	3660 (144)				
2740 (108)		3810 (150)	Chassis manufacturers production line standard			
3050 (120)		3960 (156)				
3810 (150) (+6-0)		4110 (162)				
4270 (168)						
4780 (188)						

3.3.17 Lighting system voltage. The vehicle lighting system voltage shall be 12-volts.

3.3.18 Alternator. Unless otherwise specified (see 6.2), the vehicle shall have an alternator with a rated capacity of not less than 85-amperes.

3.3.19 Batteries. Each battery shall be of 12-volt potential. The total reserve capacity ratings and the total cold cranking ratings at -18°C (0°F) shall be not less than specified in table XII. The batteries shall be of the maintenance-free type.

TABLE XII. Batteries.

Engine type	Reserve capacity (minutes)	Cold cranking (amperes)
Diesel, class 10 to 18	180	1,080
Diesel, 165 kilowatts (kW) gross (220 gross horsepower) or less, other than class 10 to 18	320	1,200
Diesel, 165 to 200 kW gross (220 to 270 gross horsepower)	480	1,875
Diesel, over 200 kW gross (270 gross horsepower)	160	2,500
Gasoline	100	450
Gasoline with electric tailgate	115	535

3.3.20 Fuel tank(s). Unless increased fuel capacity is specified (see 6.2), fuel tank(s) shall have not less than the total capacity specified in table XIII.

TABLE XIII. Fuel capacity - liters (gallons).

Class	Trucks		Truck tractors	
	All but California	California	All but California	California
10 to 18	76 (20)	76 (20)	- - - -	- - - -
19 to 22	189 (50)	163 (43)	189 (50)	163 (43)
23 to 49	189 (50)	163 (43)	378 (100)	322 (85)
50 to 78	435 (115)	409 (108)	435 (115)	409 (108)
76 and up	- - - -	- - - -	568 (150)	541 (143)

3.3.21 Accessories and equipment. Equipment shall be complete with all accessories furnished as standard and as required by safety regulations and standards. No manufacturer's

"delete option" shall be exercised in placing the factory order without the written consent of the Government procuring activity. In addition, the vehicle shall have:

(a) A high coolant temperature or low coolant level alarm buzzer, class 19 and larger
(b) Dual sunvisors
(c) A front door mounted armrest on driver's side on model 4x2 and 4x4
(d) A tachometer (for diesel engine driven vehicles).

When specified (see 6.2), the vehicle shall have an ammeter or voltmeter gage, oil pressure gage, and coolant temperature gage in lieu of indicators.

3.3.21.1 Engine shutdown system. When specified (see 6.2), the vehicle shall have an automatic engine shutdown system. The shutdown system shall include the foregoing gages and an engine coolant temperature, engine coolant level and engine oil pressure red indicator warning lights and alarm buzzers.

3.3.21.2 Engine shutdown. The warning light and buzzer actuation shall preceed engine shutdown. The system shall permit engine restart and run for approximately 30 seconds following automatic shutdown.

3.3.22 Steering. The vehicle shall have power steering.

3.3.23 Turn signals. Turn signals on vehicles up to and including class 24 shall be of the self-cancelling type.

3.3.24 Windshield washers. The vehicle shall have windshield washers.

3.3.25 Intermittent windshield wipers. When specified (see 6.2) and if electric motor wipers are furnished, intermittent wipers shall be furnished.

3.3.26 Rearview mirrors. The cab shall have outside rearview flat and convex mirrors on both sides. The flat mirrors shall have not less than 320 square centimeters (cm^2) (50 square inches) of reflective area. The convex mirrors shall have not less than 155 cm^2 (24 square inches) of reflective area. The convex radius of curvature shall be not less than 510 mm (20 inches). The convex mirrors shall attach to the lower mirror supporting arm.

3.3.26.1 Remote control mirror. When specified (see 6.2), the curbside flat mirror shall have a motor. A remote motor control shall be within reach of the driver. The mirror motor shall provide not less than 60 degrees horizontal rotational viewing range.

3.3.26.2 Wide rear view mirrors. When specified for truck tractors (see 6.2), all mirrors shall be suitable for viewing to the rear past a coupled semitrailer transporting a load 3660 mm (144 inches) wide.

3.3.26.3 Heated mirrors. When specified (see 6.2), the flat mirrors shall be electrically heated. Heating controls shall be within reach of the seated driver.

3.3.27 Horn. The vehicle shall have an electric horn. When specified (see 6.2), in addition, air brake vehicles shall have an air horn.

3.3.28 AM/FM radio. When specified (see 6.2), the vehicle shall have an AM/FM radio.

3.3.29 Air conditioning. Sleeper cabs shall have air conditioning. When specified (see 6.2), other cab types shall have air conditioning, with tinted windshield and tinted window glass.

3.3.30 Tools. When specified (see 6.2), the vehicle shall have tools required for exchanging a mounted tire assembly with the spare assembly, and shall include at least a jack (hydraulic jack for class 24 vehicles and larger), jack handle and wheelnut wrench.

3.3.31 Exhibit or display truck tractor package. When authorized by agency or departmental procurement documents and when specified (see 6.2), truck tractors shall have an exhibit or display package. The package shall include:

(a) A chrome plated or stainless steel exhaust shield
(b) Polished aluminum wheels
(c) Polished aluminum or polished stainless steel fuel tanks
(d) Polished aluminum, polished stainless steel or chrome front bumper and
(e) Polished aluminum or polished stainless steel rear quarter fenders.

3.3.32 Trailer lighting cable accommodations. The cab and chassis shall readily accommodate the installation of a semitrailer lighting cable (see 3.4.2.9) and a trailer lighting receptacle (see 3.5.18.3).

3.3.33 Engine hour meter. Vehicles with power takeoff driven equipment and when specified (see 6.2), other vehicles shall have a vehicle engine hour meter. The meter shall have a totalizing mechanism of 9,999 hours. The meter shall be in the cab or on the engine compartment in a readable location.

3.3.34 Tachograph. When specified (see 6.2), the vehicle shall have an eight day recording electronic tachograph that records engine speed in rpm and vehicle speed in mph.

3.3.35 Front bumper. The vehicle shall have a front bumper.

3.4 Standard commercial body requirements. The body manufacturer shall have production line facilities. The facilities shall produce commercial truck bodies of the same type and model as furnished to the Government for sales through a nationwide commercial dealer or distributor network. All features listed in subparagraphs of 3.4 and furnished to the Government shall be standard or optional from that production line facility and serviceable by that network. The body manufacturer's dealer network shall be capable of servicing, repairing, providing parts and performing warranty repairs for any and all items described in all subparagraphs of 3.4 and furnished to the Government.

3.4.1 Trucks. Truck body and additional truck details shall be in accordance with the detail truck specifications referencing this general specification.

3.4.2 Truck tractor. Truck tractors shall have an effective CA (CT) dimension not greater than that specified in table XIV. No one shall alter the chassis frame after the chassis leaves the chassis manufacturers production line to enable the compliance with table XIV.

TABLE XIV. Truck tractor CA and dimensions.

Model	Cab style	Effective CA or CT, millimeters (inches), maximum	
		w/o spare carrier	w/spare carrier
4x2	Standard	2180 (86)	2740 (108)
	Tilt	2410 (95)	3230 (127)
	Sleeper	2540 (100)	2800 (110)
6x4	Standard	2180 (86)	2820 (111)
	Tilt	2440 (96)	3200 (126)
	Sleeper	2240 (88)	3400 (134)
4x4 6x6 8x4 8x6	All	Manufacturer's production line standard, minimum suitable (see 3.4.2.4 through 3.4.2.4.3)	

3.4.2.1 Fifth wheel type. Truck tractors shall have a 910 mm (36-inch) diameter fifth wheel. The fifth wheel shall have forks and semiautomatic lock for a 50 mm (2 inch) SAE J700 kingpin or, when specified (see 6.2), a 89 mm (3-1/2 inch) SAE J848 heavy duty kingpin. Unless otherwise specified (see 6.2), model 4x2, 6x4 and 8x6 shall have a fore and aft rocking fifth wheel and model 4x4, 6x6 and 8x6 shall have a full oscillating fifth wheel. Side oscillation shall have a lockout.

3.4.2.2 Reserved.

3.4.2.3 Fifth wheel features. All fifth wheels shall have an uncoupling mechanism on the driver's aide of the vehicle. The uncoupling mechanism shall have a secondary lock, preventing operation of the primary lock until the secondary lock is manually released. The vertical load ratings and the drawbar pull ratings of the fifth wheel shall be not less than the loads imposed with the truck tractor loaded to specified GVW and GCW.

3.4.2.4 Fifth wheel location. In addition to the following, see 3.1.7.1 for weight distribution requirements on fifth wheel location.

3.4.2.4.1 Swing radius (SR). The clearance SR shall be not less than 1620 mm (64 inches). The clearance SR shall be measured from the centerline of the kingpin to the cab, or to the vertical spare tire assembly when furnished, or to the pogo-stick type hose tender. When additional equipment to be mounted behind the cab is specified, the SR clearance shall be measured to the rearmost point of a pogo stick that shall be mounted behind the additional equipment.

3.4.2.4.2 Landing wheel clearance (LWC). The LWC dimension shall be not more than 1620 mm (64 inches) on model 4x2 and 4x4 and 2030 mm (80 inches) on model 6x4, 6x6, 8x4 and 8x6. The LWC dimension shall be measured from the centerline of the kingpin to the rear tires, the chassis frame rails, the tail roller and the pintle.

3.4.2.4.3 Class 32 4x2. In addition to the foregoing, the centerline of the fifth wheel for class 32 4x2 tractors shall be not less than 360 mm (14 inches) forward of the centerline of the rear axle.

3.4.2.5 Fifth wheel mounting. Fifth wheel mounting shall conform to FMCSR 393.70(b).

3.4.2.6 Fifth wheel height. The unladen level height of the fifth wheel shall conform to table XV.

TABLE XV. Fifth wheel heights.

Class	Model	Fore and aft rocking millimeters (inches)	Full oscillating millimeters (inches)
Up to 32	4x2	1220 ± 25 (48 ± 1)	1345 ± 25 (53 ± 1)
23 to 32	4x2	1245 ± 25 (49 ± 1)	1370 ± 25 (54 ± 1)
33 to 53	6x4	1255 ± 38, -25 (49.5 +1.5,-1)	1370 ± 38, -25 (54 +1.5, -1)
54 and up	6x4	1255 ± 38, -25 (49.5 +1.5,-1)	1475 ± 38, -25 (58 +1.5, -1)
All	4x4	1400 ± 25 (55 ± 1)	1525 ± 25 (60 ± 1)
Up to 65	6x6	1400 ± 25 (55 ± 1)	1525 ± 25 (63 ± 1)
66 and up	6x6	1420 ± 25 (56 ± 1)	1625 ± 25 (64 ± 1)
All	8x4	1370 ± 25 (54 ± 1)	1625 ± 25 (64 ± 1)
All	8x6	1370 ± 25 (54 ± 1)	
All	All		For sliding fifth wheel base, add 3 inches

3.4.2.7 Approach ramps. Truck tractors with full oscillating fifth wheels shall have approach ramps. Approach ramps shall give support for the fifth wheel forks and a continuous incline for semitrailer approach. The ramps 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. Additional approach ramp details are specified in 3.4.2.16.4(c) and 3.4.2.21 for specialized truck tractors.

3.4.2.8 Deck plate. The tractor shall have a deck plate of self-cleaning grating. The deck plate shall be suitable for use by an operator in connecting air and electric lines between the truck tractor and a semitrailer. The deck plate shall extend across and shall be bolted to the frame rails. There shall be provisions to enable the operator to climb onto the deck plate. The grating shall have access openings for vehicle maintenance. The deck plate shall have no ragged or sharp exposed edges.

3.4.2.8.1 Deck plate location. The deck plate shall start from as close to the cab as possible and shall extend not less than 460 mm (18 inches) toward the rear of the vehicle. When a hydraulic or pneumatic fifth wheel is furnished or when a back-of-cab mounted winch or other rear mounted equipment is furnished, the deck plate shall extend further rearward, sufficient to provide a platform for access to such equipment.

3.4.2.9 Semitrailer lighting cable. The truck tractor shall have a semitrailer lighting cable installed. The cable shall conform to SAE J1067. The cable shall incorporate a connector conforming to SAE J560 on the semitrailer end. The cable shall be pre-coiled and shall have an extended length of not less than 2800 mm (110 inches) (but see 3.4.2.16 and 3.4.2.18).

The SAE J560 connector shall include a grip for withdrawing from a matching semitrailer receptacle.

3.4.2.10 Hose tender. The truck tractor shall have a pogo-stick type hose tender. The pogo stick shall be capable of securing and controlling the semitrailer lighting cable(s) and air brake hoses.

3.4.2.11 Truck tractor wind deflator. When specified (see 6.2), for standard cabs only a wind deflector shall be installed or shall be furnished with the vehicle for subsequent installation on the cab roof by the receiving activity. The deflector shall be of molded fiberglass reinforced plastic and shall be not less than 1600 mm (63 inches) wide. Unless otherwise specified (see 6.2), the deflector shall be of a height suitable for use with the cab furnished in combination with a semitrailer van having a level height of 3810 mm (12 feet 6 inches) at an upper fifth wheel height of 1220 mm (48 inches). The deflector, including all mounting and supporting hardware, support ribs and installation instructions, shall be securely stowed on the vehicle for shipment.

3.4.2.12 Sliding fifth wheel base air release). When specified (see 6.2), the fifth wheel shall have an adjustable sliding base. The slide locks shall be of the air release type with controls mounted in the cab, accessible to the seated driver. Controls shall have identification in accordance with 3.10.5. The fifth wheel shall have a longitudinal adjustment range of not less than 580 mm (23 inches), with adjustment increments of not more than 100 mm (4 inches). The truck tractor shall conform to 3.4.2 through 3.4.2.11 and all options therein specified in acquisition documents. All fifth wheel location requirements specified in 3.4.2.4 through 3.4.2.4.3 shall be met with the sliding fifth wheel in its forwardmost position of adjustment.

3.4.2.12.1 Sliding fifth wheel location. 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 rear axle (4x2 and 4x4) or the centerline of the bogie (6x4 or 6x6). Sliding positions to the rear of the rear axle (4x2 and 4x4) or to the rear of the trunnion between rear axles (6x4, 6x6, Bx4 and 8x6) may be blocked off.

3.4.2.13 Interchangeable top plate assemblies. When specified for model 50 and larger (see 6.2), the fifth wheel shall have two bolted on, inter- changeable top plate and kingpin jaw assemblies. One assembly shall be for an SAE J700 kingpin and the other for an SAE J848 kingpin. The truck tractor shall have provisions for stowing the plate and jaw assembly not in use. The replaceable assemblies shall be capable of being interchanged as a unit by one man, using a hoist, in not more than 15 minutes. The fifth wheel shall conform to 3.4.2 through 3.4.2.13 and all options therein specified in acquisition documents.

3.4.2.14 Hydraulic lift fifth wheel. When specified (see 6.2), model 4x2 and 6x4 shall have a hydraulic lift fifth wheel. The truck tractor shall conform to 3.4.2 through 3.4.2.13 and all options therein specified in acquisition documents. The hydraulic fifth wheel shall be designed, warranted and marketed for highway use. The unit shall include a hydraulic system to elevate the fifth wheel; a pneumatic system to open a semiautomatic lock for the kingpin; all controls in the cab, accessible to the seated driver; controls identified in accordance with 3.10.5; and all necessary components, such as pump, hoses and fittings. The fifth wheel shall have a manual locking device to lock out lifting capability. The cab instrument panel shall have a decal or plate conforming to 3.10.5 reading "LOCK DOWN FIFTH WHEEL FOR HIGHWAY USE." In addition, the vehicle shall be equipped with air brake-PTO interlocks, requiring the parking brakes to be set before the PTO can be powered. Opening the kingpin lock shall require simultaneous operation of two controls, spaced so as to require two hands by the operator.

3.4.2.14.1 Hydraulic lift capacity and range. The fifth wheel shall have a capacity of not lese than 22 100 kg (50,000 pounds) over a lifting range of at least 300 mm (12 inches). Full lifting range shall not cause the centerline of the fifth wheel to shift more than 180 mm (1 inches) longitudinally.

3.4.2.15 Air lift fifth wheel. When specified (see 6.2), the truck tractor shall have an air lift fifth wheel. The truck tractor shall conform to 3.4.2 through 3.4.2.13 and all options therein specified in acquisition documents. The air lift fifth wheel shall be designed, warranted and marketed for highway use. The fifth wheel shall have a manual locking device to lock out lifting capability. The cab instrument panel shall have a decal or plate conforming to 3.10.5 reading "LOCKDOWN FIFTH WHEEL FOR HIGHWAY USE." In addition, the vehicle shall be equipped with air brake-PTO interlocks, requiring the parking brakes to be set before the PTO can be powered.

3.4.2.15.1 Air lift capacity and range. The fifth wheel shall have a capacity of not less than 18 150 kg (40,000 pounds) over a lifting range of not less than 280 mm (11 inches). Full lifting range shall not cause the center of the kingpin lock to shift more than 75 mm (3 inches) measured longitudinally.

3.4.2.15.2 Air lift fifth wheel components. The air lift fifth wheel shall include:

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

(d) Three-way valve, for raising, lowering, or holding the fifth wheel in all desired positions. The valve shall be in the cab, accessible to the seated driver
(e) Snubbers to eliminate spring deflection
(f) Pneumatic system to open and to lock the kingpin jaws, with two linked controls in the cab, accessible to the seated driver. Simultaneous operation of both controls shall be required to open the kingpin jaws. The controls shall be spaced so simultaneous operation will require two hands.
(g) Controls identified in accordance with 3.10.5.

3.4.2.16 Truck tractor with near winch(es). When specified for class 66 and larger (see 6.2), the truck tractor shall be fully equipped for use with folding gooseneck semitrailers and for use in pulling disabled vehicles onto coupled semitrailers. The truck tractor shall include a rear winch(es), all accessories required to fulfil these winching functions and shall conform to 3.4.2.16.1 thru 3.4.2.16.7. The truck tractor and winch(es) shall conform to table XVI. Unless otherwise specified, a single 30,000 pound capacity winch shall be furnished. When specified (see 6.2), single or dual 45,000 pound capacity winches shall be furnished, as specified. Otherwise, the truck tractor shall conform to 3.4.2 through 3.4.2.13 and all options therein specified in acquisition documents. The lengths of the semitrailer lighting cable(s) and air hoses shall be the free lengths to the rear of the winch(es).

TABLE XVI Rear mounted winch(As) and their vehicle characteristics.

Winch capacity (each), kg (pounds)	Single or dual winches, winch type	Winch rope diameter mm (inches)	CT (max) mm (inches)	SR clearance mm (inches)	LWC dimension (max) mm (inches)
13 600 (30,000)	Single non-hydraulic or hydraulic	19 (0.75)	3050 (120)	1620 (64)	2030 (80)
20 400 (45,000)	Single hydraulic	25 (1.0)	3050 (120)	1620 (64)	2030 (80)
20 400 (45,000)	Dual hydraulic	35 (1.0)	Chassis mfgr. min. length production line std. suitable	940 (37) 1/ See 3.4.2.20	2620 (103) 1/ See 3.4.2.20

1/ NOTE: Truck tractors with the SR and LWC noted (1/) above are special purpose vehicles and are not compatible with any general purpose commercial semitrailer.

3.4.2.16.1 Rear winch(es). The winch assemblies shall be mounted on the chassis frame behind the cab. A PTO of the main transmission (or auxiliary transmissions, when furnished) shall drive the winches or winch hydraulic system. All winch controls shall be in the cab, accessible to the seated driver. Controls shall be marked in accordance with 3.10.5. Winch controls shall provide no interference with the entrance or exit of the driver. All exposed moving, reciprocating and rotating power transmission devices shall be guarded.

3.4.2.16.2 Winch details. Winches shall have an integral, adjustable, automatic safety brake. Each non-hydraulic winch shall have two forward speeds, a neutral position, and a reverse speed. Hydraulic winches shall have two infinitely variable forward speed ranges, a reverse speed range and a neutral position. Each winch shall have a single line pull capacity on the bare drum in accordance with table XVI. The winch(es) shall conform to SAE J706.

3.4.2.16.3 Winch wire core. Each winch shall be wound with not less than 46 m (50 feet) of improved plow steel, independent wire rope core (IWRC), regular lay wire rope, equipped with a full capacity clevis hitch and hook eye. Winch wire rope size shall conform to table XVI. Other vehicle and winch characteristics shall be in accordance with table XVI.

3.4.2.16.4 Rear-mounted accessories. Truck tractor equipment, complete with mounted accessories, shall include:

(a) Rear tail roller, 200 mm (8-inch) minimum diameter, with bearings and grease fittings. The installation of the winch drum(s) and tail roller shall provide a clearance of not less than 50 mm (2 inches) between the winch cable and the top of the fifth wheel with the cable extended down over the tail roller as in lifting operations;
(b) A cab protector sufficient to protect the back and roof of the cab from a winch cable whip-backlash accident;
(c) Approach ramps designed for lifting folding gooseneck semitrailers onto the fifth wheel with the winch, in addition to the requirements of 3.4.2.7;
(d) Fifth wheel tilt limit devices to assure the fifth wheel will be slightly higher than the top of the approach ramps during loading, unloading, coupling and uncoupling operations.

3.4.2.16.5 Hydraulic winches. Hydraulic winches shall be hydraulically driven without the use of chains or other non-hydraulic, non-gear driven mechanical devices. The winches shall have two speed ranges and shall use either a worm or planetary gear reduction system. The low range low speed shall be not less than 3960 mm (13 feet) per minute at full load on the first layer of the winch drum. The no load speeds in high range shall be at least twice as fast as those in the low speed range. Dual winches shall be mounted to enable both winches to be used simultaneously to load and unload a coupled semitrailer. Each hydraulic winch shall have a

hydraulic relief valve, set at 110 percent of rated winch capacity. Winch mounting shall enable full capacity pulls without damage to the truck tractor frame, winch(es) or any other component.

3.4.2.16.6 Dual winches. When specified (see 6.2), dual winches shall have outboard mounting to provide compatibility with M747 tactical semitrailer outboard mounted cable roller guides. When dual winches are required, the power takeoff shall be of a capacity to operate the two winches simultaneously. The power takeoff shall have an output rating of not less than 67 kW (90 horsepower). Dual winches shall be capable of operating simultaneously at full load in high and low speed modes without exceeding the hydraulic system or power takeoff system rated capacities.

3.4.2.16.7 Hydraulic reservoir. When a hydraulic winch(es) is furnished, the vehicle shall have a hydraulic reservoir of the capacity recommended by the winch manufacturer. The reservoir shall be capable of withstanding the shock and vibration of off highway travel. The reservoir shall have not less than the following:

(a) Filter(s), readily accessible for cleaning and replacement without draining the reservoir
(b) Baffles to prevent foaming and return of hot oil to the pump suction port
(c) Dip stick and vented, captive filler cap
(d) Cleanout opening of a size to permit manual cleaning of the reservoir
(e) Hydraulic fluid rated to meet the climatic conditions at the vehicle delivery point.

3.4.2.16.8 External hydraulic connections. The hydraulic system shall have provisions for future operation of other hydraulic equipment external to the truck tractor. The provisions shall include a control valve or valves for diverting the hydraulic flow to either the winch system or to external hydraulic equipment. The external side of this control valve(s) shall have points of attachment for connecting the hydraulic lines (pressure and return) of such external equipment. The provisions shall be adequate for future operation of equipment requiring a pressure of 13.8 mega-Pascals (MPa) (2,000 pounds per square inch (psi)), at a flow rate equivalent to that required by the winch system. (The hydraulic lines on the external equipment will have the same size fittings as the winch hydraulic lines). The external system hydraulic ports shall have removable but captive caps or plugs to prevent dirt or other foreign objects from contaminating the system.

3.4.2.17 Truck tractor for use with bottom dump semitrailers. When specified for class 50 and larger (see 6.2), the truck tractor shall be fully equipped for use with solenoid operated bottom dump semitrailers and shall include an electrical control system and a skid plate. Otherwise, the truck tractor shall conform to 3.4.2 through 3.4.2.13 and all options therein specified in acquisition documents.

3.4.2.17.1 Electrical control system for bottom dump semitrailer solenoids. The semitrailer bottom dump gates are solenoid operated, solenoids shall be capable of being activated by switches in the truck tractor cab. The electrical system shall include the following:

(a) Two toggle switches with guards, mounted in the cab, accessible to the seated driver. Switches and guards shall be Cole-Hersee Part Number (No.) 5582 and Cutler-Hammer Part No. 8497-K1, respectively. The first switch shall be marked "FRONT GATE CONTROL" and the second switch shall be marked "REAR GATE CONTROL." Each switch shall have not less than a 15-ampere rating.
(b) Two circuit breakers in accessible locations. The circuit breakers shall be between the switches and the current supply. The circuit breaker's rating shall be 15 amperes.
(c) No. 12 wires, one from the circuit breaker to a terminal on the first switch and one from the first switch to a terminal on the second switch.
(d) A three-wire conductor cable, Carol Part No. 14-3SJ. The conductor cable shall have a green, black and white wires. One end of the conductor wires shall be attached as follows: (1) green wire to the second terminal of the first switch; (2) black wire to the second terminal on the second switch; (3) white wire to the ground on the truck tractor.
The other end of the three-wire conductor shall be attached to a four-way socket mounted on the back of the cab.
(e) The four-way socket shall be Pollack Part No. 11-410, with spring loaded cover. The socket, viewed from the exterior rear of the cab with keyed slot at the top, shall be connected to the three-wire cable as follows: 2 o'clock pin - green (front gate); 5 o'clock pin - black (rear gate); 8 o'clock pin - white (ground); 11 o'clock pin (dead).
(f) The four-way socket shall be at the rear of the cab in a location accessible for connecting a matching plug on the end of a four-wire semitrailer cable.
(g) A four-conductor semitrailer cable not less than 3050 mm (10 feet) in length. Each end of the cable shall have a four-connector plug, Pollack Part No. 11-409, for connecting a four-way female socket. Pollack Part No. 11-410, on a semitrailer and the four-way socket on the truck tractor. Each end of the cable shall have a grip for withdrawing the plug from the socket.
(h) The truck tractor pogo stick shall have means for suspending the four-conductor, 3050 m (10 foot) cable, between a four-way socket at the back of the cab and a four-way socket at the front of a bottom dump semitrailer.
(i) Switch markings shall conform to 3.10.5.

3.4.2.17.2 Heavy duty skid plate. Truck tractors for use with bottom dump semitrailers shall have a heavy duty skid plate protecting the radiator, crankcase, and transmission from ground contact. The skid plate shall be demountable for servicing the engine and transmission. The skid plate shall have openings to enable draining the transmission and servicing the underside of the engine.

3.4.2.18 Increased swing radius. When needed for additional equipment to be mounted behind the cab and when specified (see 6.2) the SR as detailed in 3.4.2.4.1 shall be increased from 1620 mm (64 inches) by the amount specified (see 6.2). Maximum wheelbase, CA and CT dimensions may be increased (on line) by the chassis manufacturer by a similar amount. The lengths of the semitrailer lighting cable(s) and the air hoses shall be the free lengths to the rear of the equipment to be mounted.

3.4.2.18.1 Weight distribution with increased swing radius. When specified (see 6.2), the weight distribution for the purpose of establishing suspension, axle and tire capacities (see 3.1.7) shall be determined with the additional load specified (see 6.2) distributed evenly in the added space behind the cab.

3.4.2.19 MIL-VAN tactical semitrailer compatibility. When specified for vehicles up to class 50 (see 6.2), the truck tractor shall conform to the following in lieu of the LWC specified in 3.4.2.4.2. Further, the LWC from the centerline of the fifth wheel to the rear tires shall be not more than 1780 mm (70 inches). The longitudinal distance from the center line of the fifth wheel to a vertical plane at the rear of the chassis frame rails shall be not more than 1270 mm (50 inches). The fifth wheel shall be located forward of the centerline of the bogie.

3.4.2.19.1 Coupling to MIL-VAN. The truck tractor shall be capable of coupling to MIL-VAN tactical semitrailer vans by backing straight rearward and then raising and positioning the MIL-VAN folding landing gear into their horizontal position with MIL-VAN semitrailer dimensions, in mm (inches), as follows:

a	Kingpin to front of semitrailer:	600 (23.625)
b.	Kingpin to transverse plane at front of landing legs:	1290 (50.875)
c.	Transverse distance between landing legs:	1780 (70)
d.	LWC from kingpin to leading edge of landing legs/wheels:	1550 (61)
e.	Fifth wheel plate height, measured from ground level at centerline of kingpin:	1190 (47)

In addition to the requirements of 3.5.4 through 3.5.4.2, the mud flap mounting shall be at a slight angle to the vertical and as close as practicable to the rear of the rear wheels to provide maximum clearance for the MIL-VAN semitrailer.

3.4.2.20 Approach ramps for M747 semitrailer compatibility. When specified (see 6.2), in addition to all other requirements herein, the approach ramps, SR, LWC, and other features of the truck tractor shall be suitable for use with the tactical M747 semitrailer. The approach ramps shall be in a V shape to guide a semitrailer kingpin to the fifth wheel forks. The rear opening of the V shall not exceed 460 mm (18 inches). The SR and LWC shall conform to the TVES, class 76 and up requirements of table XVI in lieu of 3.4.2.4. In addition, there shall be no potential obstruction to a coupled semitrailer to the rear of a transverse line 940 mm (37 inches) forward of the centerline of the fifth wheel.

3.5 Body mounting, chassis and body accessories and permissible modifications.

3.5.1 Chassis frame alterations. The chassis frame rails shall not project beyond the rear end of the body. The end of the frame rails shall be properly cut off as necessary. On truck tractors, the chassis frame rails shall be cut off immediately to the rear of the rear spring rear hanger brackets or the frame crossmember closest to the rear of these brackets. These and all other chassis frame alterations whatsoever shall be made only in strict accordance with written guidance from and approval of the chassis manufacturer's engineering department. Chassis manufacturer's body builders guidance publications are an acceptable proof of such approval.

3.5.2 Accessibility. The design of the vehicle and optional and mounted 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.

3.5.3 Body mounting. Unless otherwise specified in the detail body specification sheet referencing this general specification, bodies shall be secured with U-bolts, twin studs or brackets and shall include a wood breaker strip, except dump trucks shall have full length rivet pads or a full length subframe, tapered up at the front on the top of the chassis frame rails. The dump body pads or subframe rails shall prevent the dump body longitudinal sills from contacting and chafing against the chassis frame rails. Shifting of any body on the chassis shall not be acceptable under any conditions.

3.5.3.1 U-bolts or twin studs. When U-bolts or twin studs are used, there shall be not less than three U-bolts or twin studs per side on model 4x2 and 4x4 and four per side on model 6x4 and 6x6. Each shall have a 14.3 mm (0.563 inch) minimum diameter with 16 mm (0.625 inch) minimum thread diameter. Tie-plates shall be at least 13 mm (0.500 inch) thick. A slight deformation of tie-plates upon assembly is permissible. The vehicle chassis frame shall have braces, using wood blocks at each mounting point unless the mounting point is located at a full depth chassis frame crossmember. Blocks shall incorporate a keeper strap or groove for the mounting bolt. Blocks shall be of a width and thickness to assure retention. There shall be two

tie-back straps, one bolted to each side of the rear portion of the body subframe. Tie-back straps shall maintain body alinement on the vehicle chassis. Forward body mounting bolts shall be to the rear of the tapered portion of the breaker strips (see 3.5.3.3).

3.5.3.2 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. Provisions shall be made to prevent lateral shifting of the breaker stripe. When additional holes are required to secure mounting brackets to the chassis frame rails, they shall be made in the frame in areas designated as safe for drilling in accordance with the chassis manufacturer's body builder's layouts.

3.5.3.3 Breaker strips. The vehicle chassis frame shall have hardwood or dense southern yellow pine breaker strips, not less than 75 mm (3/4 inch) finished thickness, between the body longitudinal sills and the chassis frame rails. The minimum thickness specified shall be increased as may be required to provide adequate tire chain-to-body clearance. Breaker strips shall have a taper of not less than 13 mm (1/2 inch) in 410 to 460 mm (16 to 18 inches) at the forward end. The taper shall face the chassis frame.

3.5.4 Wheel splash and stone throw protection. Stake, dump, van, and refrigerator van trucks shall have rigid splash shields ahead of the rear wheels and rubber mud flaps to the rear of the rear wheels. 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. The quarter fenders need extend down only to the height of the centerline of the rear axle.

3.5.4.1 Splash shield and mud flap installation. All splash shield and mud flap installations, front and rear, shall conform to the rear wheel splash and stone throw protection provisions of SAE J682. Truck tractor mud flaps and their extension supports shall be readily removable, to increase landing wheel clearance, without the use of hand tools.

3.5.4.2 Splash shield and mud flap mounting. Mud flaps shall be mounted with a metal strip not less than 3.2 mm (0.125 inch) thick and not less than 25 mm (1 inch) wide. The metal strip shall extend the entire width of the mud flap, to prevent the bolt heads or halt nuts from damaging the mud flap. As an alternate method of attachment, the mud flaps shall have tabs or clips with minimum surface contact dimensions of 25 mm (1 inch) high by 32 mm (1.250 inch) wide by 2.4 mm (0.094 inch) thick at each bolt.

3.5.5 Rear end underride protection. The vehicle shall have rear end underride protection in accordance with FMCSR 393.86, except for truck tractors and dump trucks. There shall be a rear bumper as specified herein or in referencing documents for the various vehicle types.

3.5.6 PTO. When a PTO is required by mounted equipment, it shall be of a rated capacity to operate that powered equipment. Controls to operate the PTO shall be in the truck cab, accessible to the seated driver. There shall be a caution decal or plate near the PTO controls, complying with 3.10.5, reading "DO NOT OPERATE VEHICLE AT HIGHWAY SPEEDS WITH POWER TAKEOFF ENGAGED." Angles at PTO driveline universal joints shall be not more than 16 degrees.

3.5.7 Wood treatment. Wood in stake and van bodies, except for the breaker strip, shall have wood treatment as specified in MIL-STD-1223.

3.5.8 Brushguard. Model 4x4, 6x6 and 8x6 vehicles shall have a radiator and head 1 amp brushguard. When the headlamps are recessed in and protected by the front bumper, a headlamp brushguard is not required.

3.5.9 Tool box. When specified (see 6.2), the vehicle shall have a tool box. Minimum dimensions shall be 560 mm (22 inches) by 560 mm (22 inches) by 300 mm (12 inches). The door opening shall be not less than 510 mm (20 inches) by 250 mm (10 inches) in size. The tool box shall be made of not less than 2.657 mm (12 gage) (0.1046 inch) steel or of equivalent strength aluminum. The box shall be weatherproof and shall provide for locking with a padlock.

3.5.9.1 Tool box location. The tool box shall be to the immediate rear of the cab, on the curbside of the vehicle. The tool box shall not reduce the ground clearance or ramp breakover angle of the vehicle, as found before the tool box is mounted.

3.5.10 Amber warning light. When specified (see 6.2), an amber rotating warning light, conforming to MS 51317-4 shall be mounted with reinforcement on the cab roof centerline. The light shall provide 360-degree visibility. The light shall have a separate switch and a red indicator light on the instrument panel. The light and switch shall be marked in accordance with 3.10.5 to indicate their function.

3.5.11 Floodlights. When specified (see 6.2), four sealed-beam 12-volt floodlights shall be provided. The lights shall conform to SAE J598. The floodlights shall be not less than 100 mm (4 inches) in diameter with a rating of not less than 1500 candela (1500 candlepower) each.

3.5.11.1 Swivel flood lights. Two floodlights shall be of the swivel type, mounted at the rear of the cab, near the roof. A single on/off switch for these two lights, marked in accordance with 3.10.5 to indicate the function and the position of the switch, shall be mounted in the cab, accessible to the seated driver.

3.5.11.2 Portable floodlights. Two floodlights shall be portable for use as work lamps. Plug in lamp cords for each lamp shall be of sufficient length to enable illumination of all areas of the vehicle from a lamp-to-vehicle distance of not more than 300 mm (1 foot). Each portable lamp shall have a switch.

3.5.11.3 Lamp outlet. There shall be two auxiliary lamp plug outlets, one on each side of the vehicle. Each outlet shall have a captive cover for protection when the outlet is not in use.

3.5.12 Water cask. When specified (see 6.2), a 18.9 L (5-gallon), insulated, potable water cask shall be furnished. The inside liner shall be stainless steel or nontoxic poly material. The outside shell shall be galvanized steel or equivalent. The throat size shall be of sufficient area to allow for cleaning the interior of the water cask. The cask shall have a brass, chrome-plated, or nylon spigot, flush mounted to prevent damage. Lugs and mounting bracket(s) shall be provided to securely mount the cask in an accessible, vertical position on the vehicle, from which it can be readily removed.

3.5.13 Hydraulic tailgate (stake, van and refrigerator van trucks only). When specified (see 6.2), the vehicle shall be have an electric motor driven hydraulic tailgate. Unless otherwise specified (see 6.2), the tailgate shall have a rated capacity of not less than 910 kg (2,000 pounds). All hydraulic cylinders shall have flow restrictors in the down port of the cylinders to prevent the tailgate from falling rapidly in the event of hydraulic system failure. (A hydraulic tailgate is not available with rear towing devices, 3.5.14).

3.5.13.1 Tailgate platform. The tailgate platform shall be the ramping type. The platform shall have a depth of not less than 810 mm (32 inches) exclusive of the ramp. The ramp shall taper down to ground level to facilitate loading with wheeled hand carts. The platform loading area shall be of non-skid sheet steel. The tailgate shall have devices for holding the platform in stowed position for vehicle travel.

3.5.13.2 Tailgate location. When the tailgate is in loading position, the clearance between the rear edge of the vehicle and the tailgate shall be not more than 19 mm (0.750 inch) and the tailgate shall be on the same level as the body floor.

3.5.13.3 Tailgate controls. Tailgate controls shall be outside the body on the curbside of the vehicle. The vehicle ignition switch or a separate switch in the driver's compartment shall allow the driver to disconnect the power source to the tailgate. There shall be a decal or plate in accordance with 3.10.5, describing operation of the hydraulic tailgate, in close proximity to the hydraulic tailgate controls.

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

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

3.5.13.6 Rail lift tailgate (vans and refrigerator van trucks only). When specified (see 6.2), the tailgate shall be a body mount rail lift type conforming to 3.5.13.1 through 3.5.13.3. There shall be rear end underride protection. (A rail lift tailgate is available only on vans and only with a van roll-up rear door.)

3.5.14 Towing devices. The front of the vehicle shall have towing devices. Towing devices shall consist of two hooks, loops, eyes or pins or the chassis manufacturer's standard single center mounted eye or pin. When specified, except for maintenance trucks and refrigerator vans, (see 6.2), in addition, the rear of the vehicle shall have towing devices. All towing devices shall have frame rail mountings or shall be reinforced back to each frame rail. (Rear towing devices are not available with 3.5.13, hydraulic tailgate.)

3.5.15 Back-up alarm. Dump trucks and other truck types frequently employed at construction sites and when specified (see 6.2) other vehicle types, shall have an audible, pulsating, signaling device (electric or mechanical) to caution personnel when the vehicle is in reverse gear operation.

3.5.16 Magnetic drain plugs. Drain plugs installed in manual transmissions, drive axles and in the transfer case (on model 4x4, 6x6 and 8x8) shall be of the permanent magnet type.

3.5.17 Spark arrester. Truck tractors and when specified (see 6.2), other vehicle types shall have a spark arrester, except when the engine is turbocharged. The spark arrester shall have an 80 percent arresting efficiency when rated in accordance with SAE J350.

3.5.18 Trailer towing package. When specified (see 6.2), except for stake dump trucks, the vehicle shall have a trailer towing package. The trailer towing package shall consist of a pintle, safety chain attachment devices, a lighting receptacle and associated reinforcements and wiring, and shall be installed on the rear of the vehicle. Vehicles of 10 900 kg (24,000 pounds) GVW and over that are equipped with a trailer towing package shall have a trailer brake control system conforming to 3.5.21.

3.5.18.1 Pintle. The pintle shall be of the rotating type conforming to table XVIII. The pintle shall have reinforcements to transfer directly to the chassis frame rails a vertical tongue load and a horizontal drawbar load not less than that specified in table XVIII. Except for truck tractors, the rearmost portion of the pintle shall be forward, but no more than 100 mm (four inches) forward, of the rearmost part of the vehicle. See 3.5.1.

TABLE XVIII. Pintle.

Vehicle class	Pintle design	Vertical tongue load kg (pounds)	Horizontal tongue load kg (pounds)
Up to 18	MS 51335-1	815 (1,800)	8150 (18,000)
19 to 40	MS 51118-1	1815 (4,000)	18 150 (40,000)
41 and up	MS 51118-1	1815 (4,000)	18 150 (40,000)

3.5.18.2 Safety chain attachment devices. There shall be two trailer safety chain attachment devices, one adjacent to each side of the pintle. Each attachment device shall provide an ultimate strength at least equal to that specified in table XIX. The attachment devices shall be capable of accommodating a standard grab hook conforming to table XIX. See 3.5.1.

TABLE XIX. Pintle safety chain attachments.

Vehicle class	Attachment device ultimate strength kg (pounds)	Grab hook mm (inches)			
		Size	Width	Thickness	Throat
Up to 24	Equal to GVW	9.5 (3/8)	56 (2-3/16)	18.7 (47/64)	12.3 (31/64)
24 and up	19 900 (24,000)	16 (5/8)	115 (4-9/16)	30 (1-3/16)	19.8 (25/32)

3.5.18.3 Lighting receptacles. The lighting receptacle, conforming to SAE J580 with its conductors connected and color-coded as specified therein, or number coded, shall be in a readily accessible location near the pintle. Dump truck lighting receptacle location shall be such as to prevent damage during dumping of the truck cargo.

3.5.18.4 Pintle height. When specified (see 6.2), the pintle height, measured to the centerline of the pintle, shall be 510 mm, plus 125 minus 0 (20 inches, plus 5 minus 0). The installation shall have reinforcements to transfer pintle loads directly to the chassis frame rails. The installation shall withstand a towed load equal to the GVW of the truck or 18 150 kg (40,000 pounds) (whichever is less) without permanent deformation.

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

3.5.20 Electric trailer brake controller. When specified (see 6.2), the vehicle shall have an electric trailer brake controller, with control in the cab, accessible to the seated driver. Wiring shall be through the SAE J560 lighting receptacle. The controller shall include load control, a hand lever and all necessary accessories. The control shall be identified in accordance with 3.10.5.

3.5.21 Trailer brake control system. A trailer brake control system shall be furnished on truck tractors and when required as a part of the trailer towing package (see 3.5.18). The trailer brake control system shall include:

(a) Coincident control of trailer brakes with prime mover foot control
(b) Independent hand control for trailer brakes
(c) Prime mover protection valve with cab instrument panel control accessible to the seated driver and an automatic breakaway feature
(d) Trailer stoplight control operable with the foot brake and with a hand control for trailer brakes
(e) Two SAE J844 pre-coiled air hoses, not less than 2800 mm (110inches) long, with SAE J318 gladhand couplers on both ends of the hoses (not required for truck tractors, unless a trailer towing package is specified). The hoses shall be stowed in the vehicle for shipment
(f) Air connectors for trailer with SAE J318 gladhand couplers mounted at the rear of the vehicle, located to prevent interference with a coupled trailer (not required for truck tractors, unless a trailer towing package is specified). Air connectors and gladhands on dump trucks shall be located to prevent damage during dumping of the truck cargo
(g) Two SAE J844 pre-coiled connecting air hoses, not lese than 2800 mm (110 inches) in length (but see 3.4.2.16 and 3.4.2.18), equipped with coiled spring hose guards, and SAE J318 gladhand quick connector on the trailer end of the hoses (truck tractors only).

(h) Supports on a pogo stick type hose tender with SAE J318 dummy gladhand connectors to retain hoses when not in use (truck tractors only).
(i) SAE J318 dummy gladhand couplers with security chains on cables (not required for truck tractors, unless a trailer towing package is specified).
(j) Prime mover only parking brake valve to permit prime mover parking brakes to be applied while charging the trailer air brake system.
(k) Identification of emergency and service lines in accordance with 3.10.5.

3.5.22 Pusher axle off line. On model 8x4 and 8x6 vehicles, the second axle from the front shall be of the pusher type. The pusher axle shall be ahead of the rear bogie and shall be of the non-driving type. The axle shall have a suspension system, wheels, tires and air brakes conforming to the requirements specified herein.

3.5.22.1 Pusher axle loads and rating. When the pusher axle is on the ground and the vehicle is loaded to specified GVW, the axle loads on the last 3 axles shall be as equal as practicable. The pusher axle shall have a GAWR of not less than 9070 mm (20,000 pounds).

3.5.22.2 Pusher axle air control. The pusher axle shall be capable of being lifted off the ground not less than 150 mm (6 inches) by the operation of an air control selector switch accessible to the seated driver. The switch shall be identified in accordance with 3.10.5. An air regulator control valve (with air pressure gage and loading chart in accordance with see 3.10.5) shall be provided in the cab, accessible to the seated driver. The control shall provide for adjustment of the pusher axle air suspension pressure for varying the load distribution in the various axles.

3.5.23 Front wheel drive conversion, off line. Except for TVES, the chassis manufacturer's standard rear wheel drive only vehicle may be modified to add front wheel drive. Modifications shall be as follows:

(a) The conversion axle manufacturer’s engineering department shall specifically approve and certify 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 production line installed front axle shall have the same load rating as the conversion axle to be installed.
(c) Components used in the front wheel drive conversion shall be of current production.

(d) All components used in the front wheel drive conversion shall be approved for the conversion application by that component manufacturer doing the conversion.
(e) The converted vehicle shall be certified to conform to FMVSS's No. 108 and 121, by the intermediate or final manufacturer doing the conversion.
(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 FMVSS No. 108. Replacement headlights shall be equivalent in mounting, protection, and range and precision of adjustment to the chassis manufacturer's original production line standard headlights.
(g) Unused headlight cavities shall be 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 3.10.6.
(h) Complete installation drawings shall be available to the procuring activity.
(i) The provisions of 3.5.1 shall not be violated.

3.5.24 Power plant heaters (PPHs). When specified (see 6.2), a coolant heater, an engine oil heater, and fuel warmers (diesel engine driven vehicles only) shall be provided. Heaters shall operate on 110 volt alternating current (ac). Heaters 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 for grounding the vehicle. The receptacle shall be on the driver's side of the vehicle, as near the cab door as practicable.

3.5.24.1 PPH connecting cable. The system shall have a three-wire connecting cable, not less than 7600 mm (25 feet) long. The cable shall be of adequate line capacity to supply power for all heater units simultaneously. The 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. 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. The vehicle cab shall have provisions for stowage of the cable.

3.5.24.2 PPH electrical installation. The electrical installation shall conform to FMCSR 393.77(c)(7). Heater lead wires shall not interfere with vehicle component operation and shall have no loose excess wire.

3.5.24.3 Heaters. Heaters shall be as follows:

(a) The engine block or the lower coolant inlet hose shall have a coolant heater, 1,000-watt (W) minimum rating on trucks up to class 22 and 1,500-watt minimum rating for larger trucks. An engine thermostat with an operating range of 77°C to 90°C (170°F to 195°F) shall be installed.
(b) The oil pan shall have a heater of the permanent external surface mount, permanent in-pan mount, or immersion type that meets the following requirements:
  (1) Not less than 16 W/L (16 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) Diesel engines shall have a fuel warmer to prevent clogging of fuel filters due to wax crystallization in the fuel. The fuel warmer shall use engine coolant to transfer sufficient heat to the diesel fuel to heat it from an inlet temperature of -40° (-40°F) to an outlet temperature of -13°C (+9°F), with a fuel flow rate not less than the maximum fuel demand of the engine fuel system. The system shall include a coolant shutoff valve for the coolant inlet side of the fuel warmer unit. The system shall not cause heating of the fuel above 27°C (80°F) under any possible condition.
(d) Diesel engines shall have an in-tank fuel warmer. The warmer 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 3.1.1 or any Federal Motor Carrier Safety Regulation. A coolant shut off valve shall be included. The units required by 3.5.24.2(c) and (d) may be combined.

3.5.25 Fuel fired engine preheater. When specified (see 6.2), for diesel engine driven vehicles, the vehicles shall have a diesel fuel fired engine water heater to preheat the engine and the fuel. The heater shall include a timer, a thermostat, a circulating pump and connection into the engine coolant system. The heater shall be capable of starting and operating at -51°C (-60°F). The heater shall heat the engine from -51°C (-50°F) to 4°C (+40°F) in not more than 1 hour.

3.5.25.1 Preheater controls and indicator light. The system shall have a starter on/off switch, accessible to the seated driver. The system shall include fuel warmers in accordance with 3.5.24.2(c) and (d). The system shall be have an indicator light, visible to the seated driver, to indicate that the preheater is operating. The purpose of the switch and light shall be indicated by marking in accordance with 3.10.5.

3.5.26 Special equipment. When specified (see 6.2), the following equipment shall be furnished:

(a) Warning devices, highway, triangular, reflective, set of 3, with container, conforming to A-A-2128.
(b) Utility chain, steel alloy, single leg, minimum 19 mm (3/4 inch) nominal diameter links, not less than 4270 mm (14 feet) long with one full capacity grab hook and 2 full capacity coupling links, all with sufficient strength for vehicle recovery.
(c) Fire extinguisher, 1-1/4 kg (2-3/4 pound) capacity, mounted in the rear of the cab on the street side, complying with FMCSR 393.95.
(d) Tire pressure gage, self-contained, 70 to 830 kPa (10 to 120 psi), suitable for checking tire inflation pressure.
(e) Fitting on the air brake system reservoir to accommodate a quick disconnect air hose fitting.
(f) Pneumatic hose, tire inflator, not less than 12.2 m (40 feet) long, with quick disconnect coupling matching (e) above and necessary fittings for inflating tires.
(g) Electrical jumper cables, not less than 6100 mm (20 feet) long, of not less than 2 gage AWG (American Wire Gauge) for slave starting from another vehicle.
(h) Tire chains for the outside tires of the rear, dual driving wheels.
(i) First aid kit, general purpose, 12 unit, conforming to Drawing 11677011.

3.6 Front mounted winch. When specified (see 6.2), the vehicle shall have a front mounted winch assembly. The winch shall be driven by a PTO or a hydraulic system. The winch shall conform to SAE J706. The winch shall be of the single drum type. The winch shall have one forward and one reverse speed or, for hydraulic winches, one forward and one reverse infinitely, variable speed ranges. The winch shall have an integral, adjustable, automatic safety brake. The winch shall have a roller guide.

3.6.1 Winch rating and speed. The winch shall have a rated single line pull capacity of not less than 9070 kg (20,000 pounds) pull on the bare drum. The PTO gear ratio shall drive the winch (or hydraulic pump) such that the winch shall have a line speed on the bare drum between 4570 to 9140 mm (15 and 30 feet) per minute at an engine speed equal to 50 percent of engine governed speed.

3.6.2 Winch controls. All winch controls shall be in the cab, identified in accordance with 3.10.5. Winch controls shall not interfere with the entrance or exit of the driver.

3.6.3 Wire rope. 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) and shall have a full capacity end chain and hook.

3.6.4 Winch drum guard. The winch shall include a winch drum guard. 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, nominal 9.5 mm (3/8 inch) by 32 mm (1-1/4 inches) shall be welded to the vertical side plates. Three bars shall be on the top, spaced equally on the top radius, and three bars shall be on the bottom, spaced equally on the bottom radius. The vertical distance between the vertical aide plates and the drum flanges shall be not more than half the specified cable diameter.

3.6.5 Front bumper with a front winch. When a front mounted winch is specified, the front bumper shall be forward of the winch. The bumper shall be either a channel or a pipe type. When the pipe type, the nominal diameter shall be not less than three inches, and the wall thickness shall be not less than that specified in Schedule 40 of ASTM A53. The pipe type front bumper shall have half-round ball ends.

3.6.6 Combination step plate and gravel guard. A combination step plate and gravel guard shall cover the open area on either side of the winch. The step plate gravel guard shall be made of not less than 1.897 mm (14 gage) (0.0747 inch) steel tread plate, exclusive of projections. Not less than 6.4 mm (1/4 inch) nor not more than 9.5 mm (3/8 inch) of space shall be left between the front bumper and the guard and the guard and the cab. Rubber flaps may be employed to achieve these dimensions and shall be employed when required by tilting hood/fender vehicles for unrestricted tilting. The step plate shall support 14.4 kilo newtons on any square meter (300 pounds on any square foot) of area. The step plate shall not deflect more than 3.2 mm (1/8 inch) under such loads.

3.7 Snowplow. When specified (see 6.2), the vehicle shall be equipped with a hydraulic or electro-hydraulic snowplow. The snowplow shall be complete with a truck mounted hitch, push frame assembly, moldboard, snow deflector, tripping device, hydraulic lifting mechanism, snow deflector and all other necessary mounting and operating apparatus. (Increased front GAWR is required by 3.1.7.2.)

3.7.1 Snowplow type. 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) at a blade angle of 35 degrees plus 2 degrees, minus 0 degrees. The one-way snowplow shall have a minimum of two angle adjustments. Raising either type of plow, at all angles the plow is capable of attaining, shall not interfere with any part of the truck.

3.7.2 Moldboard, reversible plow. The moldboard of the reversible type snowplow, exclusive of the snow deflector, shall have a vertical height of not leas than 810 mm (32 inches). The moldboard 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).

3.7.3 Moldboard, one-way plow. 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) and 1370 mm (54 inches) on the right side (curbside).

3.7.4 Moldboard material. The moldboard shall be of not less than 4.554 mm (7 gage) (0.1793 inch) high tensile steel or a one-piece unspliced sheet of 9.5 mm (0.375 inch) nominal thickness polyethylene material. The polyethylene material shall not embrittle in temperatures as low as -54°C (-55°F), shall not corrode and shall have an abrasion resistance factor at least equivalent to steel.

3.7.5 Snow deflector. The top of the moldboard shall have a snow deflector. The snow deflector shall prevent snow from topping the snowplow.

3.7.6 Moldboard supports. The snowplow shall have two heavy duty, cast steel, full swivel, shoes or wheels. Wheels shall be of the caster type. Both the caster wheels and shoes shall be adjustable. The caster wheels shall have roller or ball bearings. Bearings shall be shielded to prevent the entrance of water and foreign matter. Bearings shall have lubrication fittings.

3.7.7 Push-frame assembly. The push-frame assembly shall attach to the moldboard and the hitch in a manner to provide ample road clearance and permit sufficient oscillation for the snowplow to follow road contour and clear snow evenly.

3.7.8 Positioning of reversible plow. Unless otherwise specified, the positioning of the snowplow moldboard to the right and to the left shall be manual, 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.

3.7.8.1 Snowplow shear pin. A shear pin shall lock the snowplow in any of the specified five plowing positions. Under normal plowing conditions, the shear pin shall minimize damage to the snowplow and vehicle should the snowplow's leading edge contact a fixed object.

3.7.8.2 Snowplow power angling. When specified (see 6.2), the moldboard shall have power angle capability with controls located in the cab, accessible to the seated driver. Controls shall be identified in accordance with 3.10.5.

3.7.9 Snowplow hitch. The hitch shall be of the push-frame type to attach to the truck and transmit the entire plowing thrust to the truck chassis frame so no plowing thrust is absorbed by the front axle. Front axle hitch supports, when used, shall attach in a manner to prevent

chafing and other damage. Size, bracing and reinforcements for the hitch mainframe members and the lift frame vertical and horizontal members shall sustain the loads imposed under severe loading conditions. The hitch shall be removable from the truck.

3.7.10 Snowplow hydraulic system. The hydraulic system shall include a pump, a hydraulic fluid reservoir under the hood or integral with the hoist, controls, cylinder(s), hoses, piping, and all other parts needed for operation. The system shall incorporate pressure relief to prevent buildup of pressures exceeding the rating of any component.

3.7.11 Snowplow pump. Controls for the pump shall be operable by the seated driver. Controls shall be identified in accordance with 3.10.5. The hydraulic pump shall be driven by the engine fan belt, an electric motor or by the engine crankshaft. Belt driven systems shall have application approval by the chassis manufacturer. Belt and crankshaft driven pump ratings shall be adequate for continuous duty. The hydraulic fluid reservoir capacity shall be not less than 110 percent of the capacity required to fully operate the system.

3.7.12 Snowplow hoist cylinder. The hoist cylinder shall hoist the plow to provide not less than 200 mm (8 inches) road clearance. The hoisting mechanism, hoist cylinder, and hydraulic system shall hold 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).

3.7.13 Snowplow markers. Snowplow markers shall be provided for the street side and the curbside of the snowplow. The markers shall be removable. The markers shall eliminate snowplow position blind spots.

3.7.14 Snowplow hydraulic hoses. Hydraulic lines for the hydraulic cylinder and the pump shall have quick disconnect hose couplings. Hose caps, pump caps and hydraulic cylinder caps or other self-contained means to prevent entrance of contaminants in the hydraulic system shall be provided. Caps shall have a corrosion-resistant security device to prevent loss.

3.7.14.1 Snowplow hydraulic standards. Hydraulic hose shall be single wire braid or double wire braid, rubber covered, conforming to SAE J517. Hose fittings shall conform to SAE J516. The hydraulic system shall incorporate a filtration system conforming to SAE J931.

3.7.15 Snowplow auxiliary lights. The snowplow shall include a set of raised auxiliary dual beam headlights, parking lights, and turn signal lights. Parking and turn signal lights shall use a single light bulb. The lights shall have mounts, adapters and appropriate wiring harness. The system shall have quick disconnect, weatherproof plugs and receptacles. A high beam indicator light shall be provided, readily visible to the seated driver.

3.8 Crane. When specified for class 23 to 29 stake trucks (see 6.2), the vehicle shall have a frame mounted one man operated, fully hydraulic articulated boom type crane, between the cab and the stake body. The boom shall have an upper and lower section and a hydraulically operated extendable jib.

3.8.1 Crane capacity. The crane shall be capable of lifting a minimum load of 2720 kg (6,000 pounds) when the load is located at a radius of 1520 mm (5 feet); and 1130 kg (2,500 pounds) when the load is located at a radius of 3960 mm (13 feet), without causing the vehicle to become unstable. The vehicle shall be deemed unstable when anyone of the vehicle wheels lifts off the ground.

3.8.2 Range of crane movement. The jib shall be capable of extending not less than 840 mm (33 inches). The boom, when fully extended, shall have a normal lifting range of 7600 kg (25 feet) above ground level. The boom shall fold to a nestable travel height, between the truck body and the cab, not more than 2130 mm (84 inches) above the truck chassis frame.

3.8.3 Crane outriggers. The crane shall have double-acting hydraulic outriggers independently controlled and integrally mounted to the crane base. Each outrigger landing pad shall be not less than 900 cm^2 (140 square inches) in area.

3.8.4 Crane check valves. The boom and outriggers shall have a check valve type locking system to prevent the load from dropping or the outriggers from retracting due to hydraulic or power failure.

3.8.5 Crane controls. Both sides of the vehicle shall have a full set of crane controls, and an outrigger control for the outrigger on that side of the vehicle. The crane and outrigger controls shall be accessible from ground level. Controls shall be of the self-centering, fail-safe type with hydraulic bypass overload valves. Crane controls shall have fine metering qualities for variable raising, lowering and rotating rates of motion of the crane boom.

3.8.6 Crane hydraulic system. The crane shall have a PTO driven hydraulic pump with PTO controls in the cab, identified in accordance with 3.10.5. The pump shall be of the positive displacement type. The pump shall provide a working pressure of not less than 12.4 Mpa (1,800 psi). The crane hydraulic system shall contain the following minimum safety features:

(a) Check valve system in the boom and outrigger systems to prevent load drop due to hydraulic system failure.
(b) Flow valve in hydraulic lines or the cylinder to prevent boom damage due to sudden load-lowering stops.
(c) Cushioning valves in the boom rotating hydraulic system of rack- and-pinion mounted cranes to prevent damage due to sudden stops.

(d) Pressure relief valve to prevent loading beyond lifting capacity.
(e) Devices to limit vertical creep of the boom to not more than 25 mm (one inch) per hour.
(f) Signs with 25 mm (l-inch) lettering visible to the operator at both sets of controls: OUTRIGGERS MUST BE IN PLACE BEFORE LIFT IS MADE. Signs shall conform to 3.10.5.
(g) Full control identification and instructions in accordance with 3.10.5.

3.9 Military modification requirements. Military modifications shall be made in full compliance with the human engineering design criteria of MIL-STD-1472 and without compromise of any other requirement in this specification or the contract.

3.9.1 Brake lights and four-way flasher. 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 FMVSS or FMCSR. On truck tractors, the brake lights need to override the four-way flasher only when coupled to a semitrailer.

3.9.2 Horizontal exhaust system fuel shield. All horizontal portions of the exhaust system on truck tractors which project to the rear of the cab shall have a corrosion-resistant cover plate that forms a shield to shed fluids, preventing fuel spilled from a coupled semitrailer from coming into contact with the exhaust system.

3.9.3 Brake connection for towed vehicle brake control from a towing vehicle. When specified (see 6.2), vehicles with air brakes shall have a system for controlling its brakes from a towing vehicle (wrecker). The installation shall be complete with SAE J318 gladhand couplers, relay emergency valve with no-bleed-back feature (except when a spring applied emergency brake is furnished), additional air lines and fittings. See 3.9.

3.9.3.1 Gladhand couplers. The service and emergency couplers shall be on the front in a protected position providing for ready attachment of matching air hose couplers from a towing vehicle. Identification of the service and emergency couplers shall be in accordance with 3.10.5. The system shall have SAE J318 dummy gladhand couplers with security chains or cables.

3.9.4 Special fuel requirements. Diesel engines (see 3.3.2) 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(s) shall operate satisfactorily on grade JP-4 and grade JP-5 fuel conforming to MIL-T-5624 under emergency, short duration conditions and on grade JP-8 fuel conforming to MIL-T-83133 under normal conditions. A power loss when operating on JP-4, JP-5 or JP-8 is acceptable.

3.9.4.1 Test report. When specified (see 6.2), an engine test report shall be available showing that a representative engine of the same model has been tested and certified to meet the requirements of NATO AEP-5 (400 hour dynamometer test using JP-8). Again, a power loss is acceptable.

3.9.5 Auxiliary 24-volt system with trailer receptacle. When specified (see 6.2), the vehicle shall have 24-volt trailer receptacle conforming to MS 75021-2, with a captive cover assembly, all in a functional location. The 24-volt receptacle shall be connected through appropriate lighting controls to terminals B, D, E, J and L of MS 75021-2. On truck tractors, the pogo-stick type hose tender shall accommodate and secure the 24-volt cable. Electrical power for the 24-volt system shall be provided on the vehicle by a 12 to 24-volt converter(s) conforming to 3.9.5.2 or a 24-volt alternator conforming to 3.9.5.3.

3.9.5.1 Twelve conductor cable. The auxiliary 24-volt system shall have a twelve-conductor 24-volt conductor cable, not less than 2800 mm (110 inches) long (but see 3.4.2.16 and 3.4.2.18), with the ends of the cable equipped with connectors conforming to MS 75020-1 and MS 75020-2. The cable shall be stowed in the vehicle.

3.9.5.2 Converter type 24-volt system. The 12- to 24-volt converter(s) shall operate from the 12-volt vehicle battery. The total output capacity shall be not less than 24 amperes, 24-volts. More than one converter may be provided to supply a total of 24 amperes, 24 volts.

3.9.5.3 Alternator type 24-volt system. The alternator type 24-volt system shall be completely independent of the chassis 12-volt system and shall include:

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

3.9.6 Highway transportability. When specified (see 6.2), the vehicle shall not exceed the legal size and weight limits imposed by the North Atlantic Treaty Organization (NATO) countries in the International Road Federation (IRF), Limits of Motor Vehicle Sizes and Weights.

3.9.7 Air transportability. When specified (see 6.2), except for van trucks, vehicles up to and including class 46, shall be air transportable in C-130, C-141 and C-5A aircraft. When air transportability in C-130 aircraft is required, the width over the tires shall not exceed 2590 mm

(102 inches), the provisions of 3.1.10 not withstanding. When specified (see 6.2) vehicles larger than class 46 shall be air transportable in C-5A aircraft.

3.9.7.1 Air transportability requirements. Air transportability shall be in accordance with the requirements of MIL-STD-1791 and AFSC Design Handbook DH-1-11. The vehicle shall be air transportable without any special restrictions and without approach shoring or any other shoring. The provisions of 3.5.1 shall not be violated in accommodating any of air transportability provision.

3.9.7.2 Reduced configuration. 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. The vehicle shall have tiedowns for removed or relocated equipment. The vehicle shall not be delivered to the Government in its reduced configuration.

3.9.7.3 Weight restrictions. The curb weight of the vehicle shall not exceed 4540 kg (10,000 pounds) on the front axle and 4540 kg (10,000 pounds) on single and pusher rear axles and 9070 kg (20,000 pounds) on tandem rear axles. In addition to the requirements of 3.1.7 thru 3.1.7.3, 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.

3.9.7.4 Government approval. Drawings and data to verify air transportability 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. See 4.4.3.

3.9.8 Rail transportability. When specified (see 6.2), the vehicle, when loaded on a 1270 mm (50-inch) high railcar, shall meet the dimensional requirements of the Association of American Railroads (AAR) Outline Diagram for Single Loads, Without End Overhang, on Open-Top Cars (see the figure by that title in MIL-STD-1366) and the Gabarit International de Chargement (GIC) gauge shown in STANAG 2832, which apply to standard-gauge rail lines in the Continental United States (CONUS) and European countries. The vehicle shall withstand the rail impact test specified in MIL-STD-810 without degradation or damage.

3.9.9 Water transportability. When specified (see 6.2), the vehicle shall be transportable on breakbulk (general cargo), roll-on/roll-off (RORO), and barge-carrying (LASH) and (SEABEE) ships. Some disassembly may be required for the larger vehicles.

3.9.10 Lifting and tiedown attachments. When air or rail transportability is specified or when specified (see 6.2), the vehicle shall have lifting and tiedown attachments. Lifting and tiedown attachments shall be in accordance with class 1 and 2 or in accordance with class 3 of MIL-STD-209. Lifting and tiedown attachments shall conform to type II or type III of MIL-STD-209. In MIL-STD-209G, dated 4 October 1986, replace "maximum shipping weight (MSW)" wherever it appears with "curb weight." The provisions of 3.5.1 shall not be violated in installing lifting or tiedown provisions.

3.9.10.1 Tiedown identification. 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.

3.9.10.2 Transportation plate. Lifting and tiedown provisions shall include a transportation plate conforming to composition A (class l or 2) or composition C of MIL-P-514. The transportation plate shall be have a diagram showing the lifting attachments and proposed lifting slings, the capacity of each attachment, and the required length and size of each sling cable. The transportation plate shall have a silhouette of the vehicle showing the center of gravity.

3.9.11 Silicone brake fluid. When specified for vehicles with hydraulic brakes (see 6.2), and if available as the manufacturer's standard or optional brake fluid, the brake fluid shall conform to MIL-B-46176. See 3.3.15. There shall be a plate in accordance with 3.10.5 near the master cylinder reading: "CAUTION: USE SILICONE BRAKE FLUID ONLY, MIL-B-46176."

3.9.12 Military tow bar provisions. When specified (see 6.2), all towing devices required by 3.5.14 shall be such that the vehicle can be towed with the medium duty towbar conforming to MS 500048. Each towing device and its mountings shall withstand a load of not less than 34 000 kg (75,000 pounds) without failure or permanent deformation when the load is applied at any and all angles up to 45 degrees from the longitudinal axis.

3.9.13 Vehicle class sign kit. When specified (see 6.2), the vehicle shall have a weight classification sign kit. The sign kit shall conform to MIL-S-40626. The sign shall be mounted on the front. The sign kit shall be behind the front bumper in a location that does not interfere with any vehicle function. Unless specific markings to be applied to the sign are specified (see 6.2), the sign shall be furnished blank.

3.9.14 Military lubricants. When specified (see 6.2), the vehicle shall be operable with standard military lubricants without adverse effect on vehicle components or reduction in the warranty. The lubrication intervals shall be only as originally required by the component manufacturer using commercial lubricants. All lubricants shall be limited to types approved by

the component manufacturers. Hydraulic oils shall be approved by the hydraulic pump and hydraulic system manufacturers for severe service.

3.9.14.1 Lubrication chart. When operation with military lubricants is specified, the vehicle shall have a lubrication chart (plate) conforming to 3.10.5. The chart shall identify the interchangeable military and commercial lubricants.

3.9.15. Common locks and keys. When specified (see 6.2), the same key that fits the cab door locks shall fit the starting (ignition) lock. This same key shall fit the door locks and starting locks on all vehicles under contract. Two such interchangeable keys shall be furnished with each vehicle.

3.9.16 Light shut-off switch. When specified (see 6.2) a single switch, in addition to and not in place of the normal light switches, shall extinguish all vehicle exterior lights and the cab interior light, as well as any and all body lights. The switch shall be identified in accordance with 3.10.5.

3.10 Treatment, painting and marking.

3.10.1 Treatment and painting. The complete 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. See MIL-STD-1223 for special painting requirements for vehicles in semigloss and lusterless colors.

3.10.2 CARC. When specified (see 6.2), in addition to the requirements of 3.10.1, chemical agent resistant coating (CARC) in accordance with Army Drawings 12369024 and 12369025 shall be provided.

3.10.3 Markings and data plates. As specified by the procuring activity for the appropriate military service (see 6.2), identification markings and data plates shall be in accordance with MIL-STD-1223.

3.10.4. Hydraulic fluid identification plate. When a body hydraulic system is furnished and the hydraulic system required fluid replenishment, the vehicle shall have a decal or plate in accordance with 3.10.5 near the filler cap to identify the type of hydraulic fluid to be used.

3.10.5 Additional decals and plates. Loading charts, operating instructions, switch and control identification marking and caution notices and warnings and all other equipment markings specified herein shall be a standard or optional feature with the original equipment manufacturer (OEM) of that equipment and shall be furnished by that OEM or shall conform to composition A (class 1 or 2) or composition C of MIL-P-514.

3.10.6 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.

3.11 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. Such servicing and adjustment shall include at least:

(a) Alinement of lights;
(b) Adjustment of engine and brake systems;
(c) Filling and charging of batteries;
(d) Alinement of front wheels;
(e) Inflation of all tires;
(f) Complete lubrication servicing of chassis, engine and running gear with grades of lubricants recommended for the ambient air temperature at the delivery point;
(g) Servicing of the cooling system in accordance with 3.11.1;
(h) Servicing of the windshield washer reservoir with water and appropriate additives.

3.11.1 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).

3.12 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 applicable industry segment (see 4.3 through 4.3.8). Workmanship shall be equivalent to that furnished to the manufacturer's or mounter's standard commercial customers

3.12.1 Correction of imperfections. All imperfections that the manufacturer's or mounter's dealer or distributor network or other authorized agent would reasonably be expected to correct prior to delivery or under warranty after delivery for a most favored customer shall be corrected. Such imperfections shall be corrected prior to shipment of the vehicle.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspections. Unless otherwise specified in the contract, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract, the contractor may use

his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to 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 operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

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

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

4.3.1 Vehicle weight. The first production vehicle shall be weighed to determine the curb weight and distribution of the curb weight on the front and rear axles. The total imposed loads 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 3.1.7.1, the calculated imposed loads on the front and rear axles, shall be compared to their suspension, axle and tire load capacity ratings to determine if these components are of adequate capacity to meet contractual requirements. See 6.4.

4.3.2 Road test. The vehicle, for rear wheel drive models and models built with front wheel drive while on the chassis manufacturer's production line, need not be road tested by the contractor. The vehicle for models with front wheel drive qualifying under 3.5.23, shall be road tested without payload and with two different distributions of payload.

4.3.2.1 Front wheel drive coversion road test. Payload shall be distributed first, so that the front axle is loaded to GAWR and the vehicle is loaded to specified GVW (and GCW) and second, with the rear axle loaded to GAWR and the vehicle loaded to specified GVW and GCW).

4.3.2.1.1 Road test conditions. The road test for each of the three conditions shall be for not less than 48 km (30 miles) at speeds up to maximum geared speed. The test shall be 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 both front and rear wheel drive.

4.3.2.1.2 Brake application. During the loaded and empty portions of the road test, the brakes shall be applied firmly, bringing the vehicle to a sudden stop no less than 5 times during each of the three portions of the road test.

4.3.2.2 Road test observations. 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 making contact with frame stops except under the most extreme cross country conditions shall be cause for rejection. Operational or mechanical failure or evidence of operation detrimental to any component shall be cause for rejection. Rejection shall be for permanent deformation as well as breakage.

4.3.3 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. Acceptance shall be withheld until the contractor presents written verification that the data has been approved by the procuring activity. As a minimum, the following angles, dimensions and descriptions shall be checked against the Government approved contractor's drawings and data:

(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 tandem rear suspension, unloaded, each axle (curb weight)
(k) Rear axle spacing(s) (tandem and pusher)
(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
(0) 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 aircraft ramp slope.

4.3.4 Lifting and tiedown test. To determine conformance to 3.9.10, lifting and tiedown provisions, markings, and the connecting structural members of the vehicle shall be inspected for conformance with MIL-STD-209. All lifting and tiedown provisions and the connecting structural members shall meet the criteria of MIL-STD-209. Test results that show the provisions do not meet the criteria of MIL-STD-209 shall constitute failure of this test.

4.3.5 Rail impact test. The vehicle shall be tested in accordance with 4.3.4 prior to the rail impact test. To determine conformance to 3.9.8, the vehicle shall be inspected for agreement with the dimensions of the AAR and GIC diagrams referenced in 3.9.8 and shall be subjected to the rail impact test of MIL-STD-810. The vehicle shall be inspected for spillage of lubricants, fuel, or water and structural damage after each impact. Electrical shorts and normal operations and performance shall be checked and tested following completion of the test. Performance degradation or permanent deformation of any part is considered a deficiency and a failure. Spillage of lubricants, fuel or water; structural damage; or electrical shorts shall also constitute failure of this test.

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

4.5 Inspection of production vehicles. The contractor's inspection system shall as a minimum assure that the vehicle is complete and conforms to the physical, dimensional and rating requirements specified herein and found in the manufacturer's non-government products. The inspection system shall assure the vehicle is capable of meeting the performance requirements specified herein and found in the manufacturer's non-government products for similar use (see 6.1).

4.5.1 Servicing and adjustment records. 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 3.11 have been accomplished.

5. PACKAGING

5.1 Vehicle processing. Vehicle processing for shipment, from the manufacturer's plant to the initial receiving activity, shall be 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 and cargo; for use in performance of maintenance tasks; or for the mounting of special bodies or equipment. Dump trucks may be employed at construction sites.

6.2 Ordering data. Acquisition documents should specify the following:

(a) Title, number and date of this specification.
(b) Type, class and model 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) Snowplow weight provisions, if required (see 3.1.7.3).
(e) GCW, if other than as specified (see 3.1.9).
(f) GCW required for classes 51, 52, 60, 62 and 66 tractors (see 3.1.9, table II).
(g) Increased overall width, if required (see 3.1.10).
(h) Army general NTV PRESTO package, if required (see 3.1.14.1.1).
(i) Army caution color NTV PRESTO package, if required (see 3.1.14.1.2).
(j) Navy white (shore) NTV PRESTO package, if required (see 3.1.14.2.1).
(k) Navy green (active) NTV PRESO package, if required (see 3.1.14.2.2).
(1) Air Force blue PRESTO package, if required (see 3.1.14.3.1).
(m) Marine Corps white PRESTO package, if required (see 3.1.14.4.1).
(n) Other options specified herein, if required (see the full text of the options herein and review them carefully to avoid ordering options in conflict with each other and the vehicle type, class and model ordered).
(o) Except for truck tractors, detailed specification sheet, purchase description or other document specifying required chassis CA (CT) dimension and fully detailing body requirements and integrating those requirements into the general specifications herein.

6.3 Performance prediction. SAE Truck Ability Prediction Procedure calculations and calculations for low speed and maximum geared speed will be required by the contract. The SAE Work Sheet Item 1 should include the chassis manufacturer's model number, engine model number, drive axle(s) model number and gear ratio(s), tire size, and vehicle type, class and model.

6.3.1 Conditions and factors used in calculations. Unless other conditions are cited in the contract, calculations 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 3.2.2) are established as follows for the corresponding SAE Truck Ability Prediction Procedure Tables:

80 km/h (50 mph) performance requirements:

Table 1	- Tire Factor. This factor must relate to the size of tires furnished by the contractor in accordance with this specification.
Table 2	- Altitude Factor. 1.00
Table 3	- Rolling Factor. 1.613
Table 4	- Area Factor. For truck tractor, use factor 0.223; for all other trucks, use factor 0.173.
Table 5	- Velocity Factor. 250.0
Table 6	- Altitude Factor. 1.00
Table 7	- Chassis Friction Horsepower. Use applicable power unit GVW (to nearest, higher, 454 kg (1,000 pounds)) and the engine speed (to nearest 100 rpm) which is required for 80 km/h (50 mph) geared speed. For GVW and engine speed beyond range of this table, factors shall be extrapolated.
Table 8	- Grade Factor. 0.75
Table 8A	- Correction Factor. Not required.
Table 9	- Road Factor. 0.0

69 km/h (43 mph) performance requirements:

Table 1	- Tire Factor. This factor must relate to the size of the tires furnished by the contractor in accordance with this specification.
Table 2	- Altitude Factor. 1.00
Table 3	- Rolling Factor. 1.315
Table 4	- Area Factor. For truck tractor, use factor 0.225; for all other trucks, use factor 0.173.
Table 5	- Velocity Factor. 159.0
Table 6	- Altitude Factor. 1.00

Table 7	- Chassis Friction Horsepower. Use applicable power unit GVW (to nearest higher, 454 kg (1,000 pounds)) and the engine speed (to nearest 100 rpm) which is required for 69 km/h (43 mph) geared speed. For GVW and engine speed beyond the range of this table, factors shall be extrapolated.
Table 8	- Grade Factor. 0.75
Table 8A	- Correction Factor. Not required.
Table 9	- Road Factor. 0.0

6.4 Weight distribution, GAWRs and specified GVW vs GVWR. All users of this specification are cautioned that the provisions of 3.1.7 make it highly likely that a vehicle with a gross vehicle weight rating (GVWR as opposed to the GVW specified herein) equal to the GVW specified herein will NOT meet this specification unless front and rear GVWRs are specified under 3.1.7.1 and, thus, 3.1.7 does not apply. The Government intends to load vehicles to specified GVW with a uniformly distributed payload. Thus, unless an ideal (and highly unlikely) relationship between the center of gravity of the load and the front and rear curb weights and GVWR exists, such a vehicle inevitably will be overloaded on the front or rear and will not conform to contract requirements.

6.5 Spare tire carriers. Requisitioners, users and procuring activities should note that a spare tire carrier on truck tractors and 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.

6.6 Subject term (key word) listing.

Chassis, truck
Commercial vehicle
Modified commercial vehicle
Non-tactical vehicle (NTV)
NTV
Truck, commercial
Truck tractor.

6.7 Supersession information. This document supersedes the following part, for military use:

KKK-T-2107M, dated September 15, 1991	Trucks and Truck Tractors: Commercial, Diesel or Gasoline Engine Driven, 6350 to 9530 Kilograms (14,000 to 21,000 Pounds) GVW, 4x2
KKK-T-2108M, dated September 15, 1991	Trucks and Truck Tractors: Commercial, Diesel or Gasoline Engine Driven, 10 900 to 14 500 Kilograms (24,000 to 32,000 Pounds) GVW, 4X2
KKK-T-2109M, dated September 15, 1991	Trucks and Truck Tractors: Commercial, Diesel Engine Driven, 15 650 to 30 000 Kilograms (34,500 to 66,000 Pounds) GVW, 6x4
KKK-T-2110M, dated September 15, 1991	Trucks and Truck Tractors: Commercial, Diesel or Gasoline Engine Driven, 10 900 to 15 850 Kilograms (24,000 to 35,000 Pounds) GVW, 4x4
KKK-T-2111M, dated September 15, 1991	Trucks and Truck Tractors: Commercial, Diesel Engine Driven, 16 350 to 28 100 Kilograms (36,000 to 62,000 Pounds) GVW, 6x6

Custodians:
Army – AT
Navy – YD
Air Force – 99

Review Activities:
Navy – MC
Air Force – 84

Preparing Activity:
Army – AT

US Army Tank Automotive Command
ATTN: AMSTA-UED
Warren, MI 48937-5000

Project No. 2320-0570