

*HQ-610C*

# GUIDE SPECIFICATION FOR 2,000-GALLON TANK TRUCK



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DEPARTMENT OF TRANSPORTATION  
FEDERAL AVIATION ADMINISTRATION

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# ADVISORY CIRCULAR

## DEPARTMENT OF TRANSPORTATION FEDERAL AVIATION ADMINISTRATION

**SUBJECT:** GUIDE SPECIFICATION FOR 2,000-GALLON TANK TRUCK

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1. PURPOSE. The guide specification was developed by the Federal Aviation Administration (FAA) to assist airport management in the development of local procurement specifications. It is not addressed to any regulatory requirement of FAA but is promulgated for general use. The word "shall" is not to be construed as a mandatory requirement of FAA. It is specifically included so that portions of this guide specification may be copied verbatim by local specification writers.
  2. GENERAL.
    - a. The vehicle is primarily intended for use in resupplying the crash fire and rescue trucks during aircraft firefighting operations at a ground emergency. The vehicle may also be used for other fire protection assignments necessary in airport operations.
    - b. The guide specification describes a vehicle possessing the minimum performance capabilities recommended for an acceptable tanker vehicle. This vehicle is capable of carrying 2,000 gallons of water and the necessary auxiliary equipment to resupply a crash fire and rescue vehicle. The pump is capable of discharging 800 gallons per minute (GPM) of water at 150 pounds per square inch (PSI) net pump pressure when drafting from the vehicle tank.
    - c. This specification may be modified, as desired, to require additional vehicle capabilities, trim, or accessories. So that purchaser may select certain components with characteristics which better meet individual requirements, alternates have been included in the specification. Accordingly, it will be necessary to specify which of the production options specified in paragraph 7 are desired.
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- d. In Publication No. 414, "Aircraft Rescue and Fire Fighting Vehicles," the National Fire Protection Association describes the vehicle characteristics and components which, when properly selected and assembled in a procurement document, will permit purchase of a tank truck that should satisfy predetermined requirements. This guide specification has been developed to describe a complete tank truck which, when used in combination with a water/foam truck(s), will be capable of supplying the quantities of water recommended for airports serving aircraft having en route segments of 1,000 to 2,600 miles. Trucks built to this specification will permit an orderly progression with a minimum economic burden in providing a reasonable degree of fire and rescue protection as aeronautical operations increase at an airport.
3. HOW TO OBTAIN THIS PUBLICATION. Additional copies of this publication, AC 150/5220-8, Guide Specification for 2,000-Gallon Tank Truck, may be obtained from the Department of Transportation, Distribution Unit, TAD-484.3, Washington, D.C. 20590.



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1. SCOPE. This specification covers an all-wheel drive, gasoline or diesel engine-driven, heavy-duty, high-mobility tank truck having a pump to be used in dispensing water.
2. APPLICABLE SPECIFICATION AND STANDARDS AND SOURCE OF SUPPLY. Only the applicable portions of the referenced paragraphs of the following specification and standards form a part of this specification. These standards and specification may be obtained from the addresses listed below:
  - a. Specification for Motor Fire Apparatus, Publication No. 19 - National Fire Protection Association, 60 Batterymarch Street, Boston, Massachusetts 02110.
  - b. Federal Standard No. 595, Color - Specifications Activity Printed Materials Supply Division, Building 197, Naval Weapons Plant, Washington, D.C. 20407.
  - c. Motor Carrier Safety Regulations - Federal Highway Administration, Washington, D.C. 20590.
  - d. Tire and Rim Association Yearbook - Tire and Rim Association, Inc., 2001 First National Tower, Akron, Ohio 44308.
  - e. Standard for Mill Products - The Aluminum Association, 420 Lexington Avenue, New York, New York 10017.
3. REQUIREMENTS.
  - a. Vehicle. The vehicle shall consist essentially of a gasoline or diesel engine-driven chassis of the enclosed cab type and a water storage and pumping system mounted on the chassis. This system shall consist of a tank for 2,000 gallons of water, a pump capable of delivering 800 GPM at 150 PSI net pump pressure, hose lines, and all necessary valves and controls for the efficient operation of the system.
  - b. Materials. Material shall be as specified herein. Materials not definitely specified shall be of the best quality used for the purpose in commercial practice. Materials shall be free from all defects and imperfections that might affect the serviceability of the finished product.

- c. Design. The design of the equipment shall be in accordance with the best engineering practices. The equipment design and accessory installations shall permit accessibility for use, maintenance, and service. All components and assemblies shall be free of hazardous protrusions, sharp edges, cracks, or other elements which might cause injury to personnel or equipment. All oil, hydraulic, and air tubing lines and electric wiring shall be located in protective positions, properly clipped to the frame or body structure and shall have protective loom or grommets at each point where they pass through structural members, except where a through-frame connector is necessary. Design of the vehicle shall incorporate the necessary clearances to permit the satisfactory use of tire chains on all wheels when traversing adverse terrain.
- (1) Gross Vehicle Weight. The gross vehicle weight (GVW), including weight of the complete chassis and cab, with all attachments, accessories, and equipment required by this specification; body; rated payload; and full complement of fuel, lubricants, coolant, and operating personnel (525 pounds), shall be not less than 38,000 nor more than 45,000 pounds. The gross vehicle weight rating shall not exceed the sum of the axle manufacturer's certified load ratings for the axles used. The manufacturer's advertised gross vehicle weight rating shall not be arbitrarily raised to meet the requirements of this specification.
- (2) Weight Distribution. The weight of the vehicle shall be distributed so that the actual load is evenly distributed over all tires under all conditions of loading (both loaded and empty). The heaviest load on any tire shall not exceed 110 percent of the lightest load on any tire. Center of gravity shall be kept as low as possible under all conditions of loading. The vehicle shall be capable of resting on a side slope equivalent to a 30 percent grade without danger of overturning.

NOTE: The weight distribution for various chassis designs shall be as follows:

Chassis 4 wheel, 4-wheel drive (4x4), single tires,  
50 percent front axle, 50 percent rear axle.

Chassis 6 wheel, 6-wheel drive (6x6), single tires,  
33 percent front axle, 67 percent rear bogie.

Chassis 4 wheel, 4-wheel drive (4x4), dual rear tires,  
33 percent front axle, 67 percent rear axle.

Chassis 6 wheel, 6-wheel drive (6x6), dual rear tires,  
20 percent front axle, 80 percent rear bogie.

- d. Construction. The vehicle shall be constructed so that no part can work loose in service. The vehicle shall be built to withstand the strains, jars, vibrations, and other conditions incident to service intended.
- e. Performance. The vehicle fully equipped and provided with fuel, lubricants, operating personnel, and extinguishing agents shall be designed to possess capabilities for:
- (1) Accelerating from a standing start to a speed of 50 miles per hour (MPH) in 60 seconds on a dry level pavement, free from loose materials, having a friction coefficient of 0.6.
  - (2) Maintaining a cruising speed of not less than 50 MPH when operating on dry paved roadway having grades not in excess of 1.5 percent.
  - (3) Maintaining speed on dry paved roadway of not more than 2.5 MPH at an engine speed that does not result in rough, irregular operation.
  - (4) Ascending a dry paved incline having an 8 percent grade for a distance of one-quarter mile at a speed of not less than 20 MPH.
  - (5) Ascending a dry hard surface incline having a 50 percent grade at not less than 2.5 MPH.
  - (6) Operating on side slopes, right or left, up to 20 percent and longitudinal slopes up or down to 50 percent.
  - (7) Operating continuously for 25 miles at speeds up to 15 MPH over all types of terrain encountered in cross-country travel, including surfaced and unsurfaced roads, and on grades normally encountered in this type of operation. During this performance requirement, the vehicle shall be operated in all-wheel drive. At least 5 miles of this operation shall be cross-country travel.

- (8) Bringing the fully loaded vehicle, using the service brakes, to 5 complete successive stops within 30 feet from a speed of 20 MPH on dry hard pavement free from loose materials and controlling the vehicle on all grades encountered in cross-country operation.
- (9) Bringing the fully loaded vehicle, using the hand brake, to a complete stop on a level road and holding the vehicle on the grades encountered (up to 30 percent) in cross-country operation.
- (10) Negotiating muddy and sandy terrain as usually required of wheeled vehicles designed for off-highway use.
- (11) Operating over rough roads and adverse terrain at speeds up to 15 MPH without exposing operating personnel to injury or causing damage to the vehicle or firefighting equipment.
- (12) Exerting a ground pressure on any wheel of not greater than 45 PSI based on the gross contact area of the tires at zero penetration.

f. Details of Chassis Design and Components.

- (1) Vehicle Chassis. The vehicle chassis, complete with cab, shall be of the 4x4 or 6x6 type front wheel steer, gasoline or diesel engine-driven. Parts and accessories necessary for the safe operation of the vehicle shall be provided as required by, and shall conform to, applicable provisions of the Federal Highway Administration (FHWA) Motor Carrier Safety Regulations, Part 293. The vehicle and all components shall be new and unused.
- (2) Vehicle Dimensions and Clearances. The vehicle shall conform to the following dimensions and clearances:
  - (a) The overall height shall not exceed 144 inches.
  - (b) The overall length shall be held to a minimum but shall not exceed 360 inches.
  - (c) The basic vehicle width shall not exceed 96 inches.
  - (d) The wheelbase shall be held to a minimum but shall not exceed 192 inches.



- (e) The angle of approach shall be not less than 30°.
  - (f) The angle of departure shall be not less than 30°.
  - (g) The under chassis clearance shall be not less than 18 inches.
  - (h) The under axle clearance shall be not less than 12 inches.
  - (i) The diameter of the outside tire centerline track shall be not greater than three times the overall length of the vehicle, and the maximum cramping angle shall be at least 24°.
- (3) Engine and Components.
- (a) The vehicle engine shall be of the internal combustion four-stroke cycle, liquid cooled, gasoline or diesel type, having not less than six cylinders. The vehicle engine shall develop the torque and horsepower to provide the speed and gradability of the vehicle as specified in paragraphs 3e(1) through 3e(7) without the engine exceeding a "no load" governed speed at the peak of a certified gross brake horsepower (BHP) curve. The engine shall operate satisfactorily and shall be capable of demonstrating the performance characteristics specified herein with fuel conforming to regular commercial grade.
  - (b) Cooling systems of the circulating water type shall maintain a cooling water temperature of not more than 210°F nor less than 140°F when operated in ambient temperatures of -20°F to 125°F. The system shall be provided with a bypass to permit coolant circulation in the engine block, with thermostat closed, until normal operating temperature is reached. A 160°F thermostat of good commercial quality having a temperature range as recommended by engine manufacturer shall be provided. The cooling system shall be capable of withstanding an internal pressure of 7 PSI. Drain cocks shall be installed at the low point of the cooling system and at such other points as may be necessary to completely drain the system. A coolant temperature indicator shall be provided on the cab instrument panel.

- (c) The engine fuel system shall be complete and so installed as to include: a carburetor(s) or injector(s), manual or automatic choke, fuel strainer, oil bath air cleaner(s), all necessary piping, valves, fittings, fuel lines, and all other accessories. Gasoline fuel systems shall include dual fuel pumps (one mechanically and one electrically powered or two electrically powered), parallel piped so each system will be capable of supplying the fuel required for full engine operation. The fuel tank shall have a minimum capacity of 50 gallons. The tank shall be equipped with an accessible drain plug. The filler pipe opening shall be accessibly located outside the cab or body. The tank shall be mounted so that it will not be damaged by distortion of the chassis and will not be affected by heat from the engine exhaust. The fuel tank shall conform to FHWA requirements.
  - (d) An engine governor which will not adversely affect engine performance shall be provided and set to limit engine speed so that it shall not exceed the maximum RPM's recommended by the engine manufacturer for the intended service.
  - (e) The engine and chassis lubricating systems shall be the manufacturer's current standard productions. The engine's oil filter shall be full-flow type or bypass type with replaceable element.
  - (f) The vehicle shall be equipped with an efficient exhaust system and muffler. The tailpipe shall be of such a size as to avoid undue increase in back pressure and shall be located in such a manner that entrance of exhaust gases into the cab shall be minimized under all conditions of operation and so that the exhaust does not disperse the foam blanket. The muffler shall be aluminized or ceramic coated.
- (4) Drive Line Components.
- (a) The clutch shall be the manufacturer's standard for the size engine used and shall be certified as being suitable for use with the specific engine by the clutch manufacturer.

- (b) The transmission shall be of the interrupted, constant mesh or synchromesh, selective sliding gear type providing for maximum ease of shifting in all speeds. Input torque capacity shall be at least equal to the maximum net torque delivered by the engine. Gears shall be heat treated and properly finished to insure quiet operation and long life. The transmission shall provide at least four speeds forward and one speed in reverse with manual control shift. The top three gears shall be constant mesh type. The transmission shall be certified as suitable for use in this vehicle by the transmission manufacturer.
- (c) The transfer case shall be of a single- or two-speed type as required to meet the performance requirements specified in paragraph 3e(5). The transfer case shall be equipped with a manual front axle disconnect, a center differential with manual or automatic lockout or an overriding clutch to compensate for difference in travel between front and rear wheels. The case may be a unit with the transmission or a separate unit mounted independently and shall be certified as suitable for use in this vehicle by the transfer case manufacturer.
- (d) The axles furnished shall be certified as being suitable for use in this vehicle by the axle manufacturer. Axle manufacturer's published rating shall not be raised to conform to the requirements of this specification and shall be at least equal to the load imposed at the ground when vehicle is loaded to its rated gross vehicle weight; each axle to be provided with no spin or other retarding type differential lock to assure a torque transfer to each wheel retaining traction. If manual lockout is required, the lockout control shall be located in the vehicle cab. The rear bogie on all 6x6 vehicles shall be of the 4-wheel type complete with axles, springs, torque rods, and all other necessary parts. The bogie shall be provided with means permitting differential action between the two axles.
- (e) A braking system which meets the FHWA requirements for similar type vehicles shall be furnished complete with all necessary equipment to safely control the fully equipped and loaded or unloaded vehicle under all operating conditions. The brake mechanism shall be readily accessible for external adjustment.

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1 The service brakes of the full-air or air-over-hydraulic type shall be provided with an air compressor designed to prevent a buildup of excessive air pressure in the system when the compressor is not in operation. It shall be engine-driven having a capacity sufficient for the intended service but of not less than 12 cubic feet per minute capacity. The compressor intake shall be provided with a suitable air cleaner. An adequate air storage reservoir shall be furnished and provided with a low pressure indicator of the buzzer type. The system shall be of the quick pressure buildup type with the air compressor connected to a small reservoir having a minimum 800 cubic-inch capacity which is pressure relieved into the larger reservoir(s) when the minimum pressure is reached for maximum operation of the brake system. The total cubic storage capacity of the reservoir shall be not less than 13 times the volume of the brake actuating chambers.

2 A parking brake operated by a control readily accessible to the driver shall be provided.

- (f) The vehicle chassis shall be equipped with a standard hydraulic power assist steering mechanism operable from the driver's seat. Means shall be provided for rapid and easy adjustment of lost motion in the steering gear. The steering mechanism shall be capable of easily controlling the direction of the fully loaded vehicle under all operating conditions.
- (g) Vehicles shall be equipped with manufacturer's current suspension system having a rated capacity at least equal to the imposed load, measured at the ground, with vehicle loaded to its rated GVW. When spring capacity is rated at the spring pads, unsprung weight shall be deducted. Ratings shall not be raised to conform to the requirements of this specification, and suspension shall evidence no overload or permanent set.
- (h) The wheels shall be either disc or spoke type as currently furnished by the vehicle manufacturer.
- (i) Rim contours and size shall conform to the current practices of the Tire and Rim Association, Inc., as recommended for use in the design of new vehicles.

- (j) Each tire, at 45 PSI inflation pressure, shall have a rated carrying capacity at least equal to the gross load normally imposed on it by the fully loaded vehicle. The load rating capacity of the tires should be in conformance with the Tire and Rim Association, Inc., practices. Use of single tires is normally recommended; however, the use of dual tires is permissible. Tires, including spare, shall be interchangeable and of the same size. An aggressive tire tread of the military or lug type with center rib is recommended for general service. Tires and tubes shall meet the firstline commercial grade requirements.
- (k) A spare wheel or rim with tire and tube included shall be provided; however, provisions shall not be made to mount the wheel or rim on the vehicle.
- (5) Frame. The chassis frame shall be of riveted, bolted, or welded construction and shall be provided with adequate cross members, exclusive of engine supports, so designed and constructed to support gross weight of the body and load, powerplant, pump, filled water tank, and all other equipment under operating conditions specified herein. No alterations shall be made to the frame which shall reduce its designated strength. Two towing hooks or eyes shall be attached directly to the chassis frame at the front and one or two on the rear of the vehicle.
- (6) Cab. The cab shall be the manufacturer's standard. The cab roof, floorboards, and partition separating the vehicle engine from the cab shall be fully insulated.
  - (a) Cabs of the forward type configuration shall have all work areas provided with four-way safety plate.
  - (b) A cab heater and windshield defroster shall be provided which shall be capable of maintaining a cab temperature of 50°F at ambient temperatures of -20°F.
  - (c) Seating shall be provided for at least two men including the driver. The driver's seat shall have a contour back and be easily adjustable up and down, fore and aft a minimum of three inches. Seats shall be fully upholstered with a good quality plastic-type upholstery.

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- (d) Two approved, properly installed, seat belts, one each for the driver and passenger, shall be provided.
  - (e) A windshield washer of the one-gallon size shall be provided and properly installed.
  - (f) Two sunvisors shall be provided and installed.
  - (g) The windshield shall be equipped with dual, two-speed electric or air operated wipers which shall sweep a clear view for both the driver and the passengers.
  - (h) Two outside rear view mirrors, of the extension arm "westcoast" type having an area of not less than 60 square inches, shall be provided, one mounted on each side of the cab.
  - (i) Windshield glass shall be of the safety plate type, free of all imperfections which would affect visibility. All other glass may be of the safety type.
  - (j) The cab instrument panel or board shall include, but not be limited to: panel lights; speedometer, with recording odometer; engine heat indicator; carburetor choke, when required; ammeter; lighting switches; fuel, oil pressure, and air pressure gauges; ignition switch; and a tachometer having engine hour meter or engine revolution counter.
- (7) Electrical System. The vehicle shall be provided with a complete and good commercial quality electrical starting, lighting, and ignition system in accordance with Article 220 of the National Fire Protection Association's Publication No. 19. The electrical system shall have a 12-volt potential with not less than 100-ampere alternator and two 12-volt or four 6-volt storage batteries with a capacity of not less than 150 amperes each at a 20-hour rate. Batteries shall carry a 24-month guarantee and be wired to permit selective use in accordance with criteria contained in paragraph 2230 of the referenced publication.
- (a) The ignition system shall be keyless or have key permanently secured to the ignition switch. All switches shall be within easy and convenient reach of the operator.

- (b) A weatherproof polarized male plug for charging connection to the battery shall be provided and mounted on the rear of the vehicle complete with matching female receptacle.
- (c) The lighting system, including reflectors and clearance lights, shall be the manufacturer's current standard provided the equipment shall meet the FHWA Motor Carrier Safety Regulations and local highway requirements and include:
  - 1 Two or more sealed-beam headlights with upper and lower driving beams and a foot-controlled switch for beam selection.
  - 2 Dual taillights and dual stoplights.
  - 3 Turn signals, front and rear, conforming to Society of Automotive Engineers' (SAE) Turn Signal Units, Type 1, Class A, having self-cancelling control with a visual and audible indicator and switch to flash all lights.
  - 4 Six-inch spotlight on both left and right sides of the windshield, hand adjustable type, with controls for beam adjustment inside the vehicle cab.
  - 5 Two swivel, 6-inch, sealed-beam pickup lights, with weatherproof switches, mounted at the rear.
  - 6 Reflectors, markers, and clearance lights of the commercial fire truck type installed in conformance with FHWA Motor Carrier Safety Regulations.
  - 7 Engine compartment lights, two or more arranged to adequately illuminate both sides of the engine, with switches located in the engine compartment.
  - 8 Pump compartment light(s) with shields to prevent glare. Control switches shall be mounted on pump panel.
  - 9 At least one 8-inch backup light installed at the rear of the body. Light shall automatically light up when transmission is shifted into reverse.

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10 A rotating, flashing, 4-bulb, red or alternating red-and-white beacon, not less than 10 inches in diameter, suitably installed away from operating components. Control switch shall be installed on the instrument panel for control of the beacon.

(8) Siren. Siren shall be installed with foot-operated switch located for use by the truck driver and crewman.

g. Details of Sheet Metal Components.

- (1) Body. Body shall be fabricated from aluminum or steel designed to provide the lightest weight consistent with the strength necessary for operation over rough terrain. Body shall fully enclose pump and tank. Self-tapping bolts shall not be used in construction of the apparatus body.
- (2) Steps and Running Boards. Steps and running boards located on each side, at the cab, and at the rear shall be provided as required for ascending or descending from the vehicle. All steps and running boards shall be of four-way safety tread plate.
- (3) Walkways. All walkways shall be similarly constructed of four-way safety tread plate.
- (4) Handrails. Rigidly attached handrails or guardrails of suitable metal tubing not less than 1½ inches in diameter shall be provided as required for personnel safety at all steps, walkways, and stations.
- (5) Compartments. The body shall have built-in compartments that are of dustproof and rainproof construction equipped with doors having continuous piano-type hinges with brass pins and snap-type locks with semiflush handles.
  - (a) At least one equipment compartment, to the extent the design shall permit, on each side of the vehicle.
  - (b) One two-way radio compartment.



h. Details of Firefighting Equipment and Components.

- (1) Pump. The pump shall be of centrifugal type designed to provide both the capacity and high-pressure discharge required. When operating from the water tank, the pump shall be capable of discharging 800 GPM of water at 150 PSI minimum net pressure.
- (2) Pump Drive. The pump shall be driven by a full torque power take-off which shall permit the operation of both the pump and the vehicle. A momentary loss of pump pressure is acceptable when transmission gears are shifted.
- (3) Pump Connections.
  - (a) Suction. At least one outside  $4\frac{1}{2}$ -inch National Standard Fire Hose Thread (NSFHT) suction inlet with a strainer, cap, and suction connection to the water tank shall be provided.
  - (b) Discharge. The pump shall be provided with a *minimum* of two discharge gates with  $2\frac{1}{2}$ -inch NSFHT adapters and caps.
- (4) Pump and Engine Controls.
  - (a) Control Panel. The pump control panel shall be located on the forward portion of the body at the suction intake immediately to the rear of the cab. This panel shall include the discharge gate controls, governor, primer, cooler, water tank valve controls, and the following pumping unit instruments and controls:

Pump pressure gauge	Coolant temperature gauge
Pump compound gauge	Oil pressure gauge
Throttle (Vernier style)	Water tank level gauge
Tachometer	
  - (b) Pressure Regulator. The automatic pressure regulator shall be adjustable to maintain working pressures from 75 to 250 PSI with an adjustment control located on the control panel.

- (c) Priming Device. The priming device to exhaust air from the pumps and the suction hose for operating at draft shall be of the positive displacement type.
- (5) Water Tank. The water tank shall have a 2,000-gallon capacity. The tank shall be of welded construction, using metal best suited to provide minimum weight to gallonage ratio, or glass fiber reinforced plastic and baffled so that capacity of each compartment shall not exceed 100 gallons. If steel is used, the interior surface shall be treated with an anticorrosive coating. If any aluminum alloy is used, it shall be the Aluminum Association No. 5052-H34 or equal.
- (a) The construction and connections shall be made to prevent the possibility of chemical corrosion of dissimilar metals.
- (b) The tank shall be equipped with removable manhole covers or a removable top to permit access within each baffled compartment of the tank. It shall also have a deep sump with an antiscwirl baffle, a 2½-inch drain valve, and two filler openings with gasketed caps. Filler opening diameters shall not be less than 4 inches.
- (c) The tank outlet and the suction piping to the pump shall be 5 inches in diameter to allow a flow of 800 GPM to the pump. The control valve installed in the line between tank and pump shall be of the quick-acting, quarter-turn type capable of operation from the pump operator's station.
- (d) The tank shall be mounted in a manner which limits transfer of the torsional strains of off-pavement driving from the chassis frame to the tank. The tank shall be separate and distinct from the body and easily removable as a unit.
- (e) The tank shall be provided with overflow connection(s) which shall prevent excess pressure being applied to the tank during filling operations. The overflow shall discharge to the rear of the rear wheels.

- (6) Tank Filler Connection. A 3½-inch tank filler connection shall be provided at the rear of the apparatus in a position where it can be reached from the ground. It shall include an automatic valve means for shutting off the flow of water when the tank is 75 to 80 percent full and for reopening the valve as the tank empties. The connection shall be so constructed that water shall not be lost from the tank when connection or disconnection is made. It shall terminate in a 2½-inch NSFHT swivel female hose connection. All water fill openings shall be provided with strainers.
- i. Radio Interference Suppression. The vehicle shall be adequately radio interference suppressed to permit positive understandable voice radio communications under all operating conditions.
- j. Treating and Painting.
- (1) All parts of the vehicle shall be cleaned, treated, and primed prior to assembly.
- (2) After the vehicle is completely assembled, except for bright trim parts, the entire unit shall be primed, puttied, water sanded, and painted with not less than three coats of red enamel (Red No. 11136 of Federal Standard No. 595).
- (3) The finished paint shall be free from "orange peel" (pebbly finish), runs, and other imperfections which detract from the vehicle's appearance.
- k. Tools. Any tools peculiar to the servicing of the vehicle, the fire suppression system, and any of the auxiliary equipment shall be furnished with the vehicle.
- l. Nameplates and Instruction Plates. All nameplates and instruction plates shall be metal or plastic with the information engraved, stamped or etched thereon. If metal, they shall be made of a noncorrosive material, chrome plated or nickel silvered. These plates shall be attached with screws, bolts, or rivets. Each plate shall be mounted in a conspicuous place.

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- (1) Plastic plates shall not be used in exposed positions where they are subject to weathering.
  - (2) Nameplates shall show make, model, serial number, and such other data as to positively identify the item.
  - (3) Instruction plates shall be on each handle (exclusive of door handles), valves, or component parts which necessitate actuation or identification or important instructions to be followed in operating or servicing the vehicle or equipment. These instruction plates shall include warnings or cautions and shall be so located and of sufficient size to be effective.
- m. Lubrication and Hydraulic Fluids. All moving parts requiring lubrication shall have means provided for such lubrication. Pressure lubrication fittings shall not be provided where their normal use would damage grease seals or other parts. Prior to delivery, the vehicle shall be lubricated with lubricants suitable for use in the temperature ranges where the vehicle is to be placed in service. All hydraulic systems shall be filled to the proper operating level with the correct grade of hydraulic fluid for the same temperature range.
- n. Technical Publications. The contractor shall furnish two sets of the following publications in accordance with standard commercial practices applicable to the vehicle (including body and special equipment) furnished under the contract. Each set shall be composed of one copy each of:
- (1) Operator's Manual with Lubrication Charts.
  - (2) Parts Manual.
  - (3) Maintenance and Service Manual.
- o. Quality Assurance Provisions. The contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified, the contractor may utilize his own or any other inspection facilities and services. Records of inspections and tests shall be maintained by the contractor. Copies of these records shall be provided the purchaser. The purchaser reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure contractor compliance with the specification requirements.

4. INSPECTION AND TEST PROCEDURES. (To be conducted at purchaser's location by the vehicle manufacturer's delivery engineer.)

a. Operational Tests. The vehicle shall be fully loaded as to its rated GVW as specified in 3c(1) and shall be operated as follows:

- (1) Twenty miles over hard surfaced roads at maximum speeds not less than 40 MPH.
- (2) Ten miles over dirt surfaced roads at maximum road speeds up to 25 MPH.
- (3) Ten miles off highway at speeds up to 15 MPH with ground and grade conditions requiring all-wheel drive.
- (4) One hour at not more than 3 MPH over all types of terrain encountered in cross-country travel.
- (5) Accelerate from 0 to 50 MPH in 60 seconds on dry level pavement free from loose material.

During this test the functioning of the engine, power train, hydraulic system, brakes, steering, lighting system, controls, and instruments shall be noted; and questionable or erratic operation of any of these features shall be corrected prior to final acceptance.

b. Pump Tests. The pump shall be tested to determine conformance with paragraph 3h(1) at approximately 10-foot suction lifts. Capacity of the pump shall be measured with calibrated instruments. Copies of official pump test report, certified by the inspector, shall be included with the technical publications supplied with the vehicle.

c. Gradability.

- (1) Negotiate an 8 percent grade at a speed of not less than 20 MPH. The purchaser may elect to accept a certified performance chart from the contractor showing the vehicle performance in all gear ratios at all engine RPM's above 1,000 RPM.
- (2) The loaded vehicle shall negotiate side slopes left and right of 20 percent grade.

d. Brake Tests.

- (1) Bring the fully loaded vehicle to 5 complete, successive stops within 30 feet from 20 MPH, using service brakes only, on dry hard pavement free from loose materials.
- (2) Bring the fully loaded vehicle to a complete stop from 20 MPH and hold the vehicle on the maximum grades up to 30 percent at the airport, using parking brake only.

e. Radio Interference. Tests for radio interference suppression shall be conducted on the vehicle. All testing equipment, instruments, personnel for making the tests, the test location (which shall be reasonably free from radiated and conducted interference), and other necessary facilities shall be furnished by the contractor.

5. PREPARATION FOR DELIVERY.

- a. Domestic Shipment. The vehicle and its accessories, spare parts, and tools shall be packed in such a manner as to insure acceptance and safe delivery to the designated point.
- b. Overseas Shipment. When specified in the invitation-to-bid, the packing for shipment overseas shall be in accordance with the instructions issued by the purchaser.
- c. Marking. Marking for shipment shall be in accordance with instructions issued by the purchaser.

6. WARRANTY. The contractor shall warrant each new apparatus manufactured or assembled by him to be free from defects in material and workmanship under normal use and service. His obligation under this Warranty is limited to making good at his factory any part or parts thereof, including all equipment or trade accessories (except tires, storage batteries, electric lamps, and other devices subject to normal deterioration) supplied by him. Parts developing defects within one year after making delivery of such vehicle to the original purchaser must be returned to contractor with transportation charges prepaid and which on examination by the manufacturer shall disclose to his satisfaction to have been thus defective.

7. PRODUCTION OPTIONS. Alternate production options and components which purchasers may wish to consider are described below. These options are written so that the descriptive material may be added to or substituted for the applicable paragraph of the specification.
- a. Add to paragraph 3f(4)(a), "The clutch shall be actuated by a power assist throwout mechanism."
  - b. Add to paragraph 3f(4)(b), "The transmission shift shall be provided with a power assist mechanism."
  - c. Substitute for paragraphs 3f(4)(a) and (b), "The transmission shall be of the continuous drive type and shall include a torque converter providing forward and reverse ranges and a suitable torque ratio to stall. The design shall include a lock-up clutch for direct mechanical drive. The hydraulic system shall include oil pumps, easy service oil filter and screens, hydraulic control system, retarder, and an oil cooling system. The transmission control shall include a range selector lever with reverse, neutral, and forward positions, all clearly identified. The transmission shall operate efficiently and without detrimental effects to any components with lubrication in accordance with recommendations of the transmission manufacturer. The continuous drive transmission shall be certified as suitable for use in this vehicle by the transmission manufacturer. (If desired, the purchaser may add the following sentence to the above paragraph: The continuous drive transmission shall be equipped with a constant mesh planetary gear train providing forward and reverse ranges, power operated hydraulic clutches, power shift in all forward speed ranges, and manual selection of the hydraulic clutch engaging reverse drive.)."
  - d. Add to paragraph 3j as paragraph 3j(4), "The vehicle shall be undercoated with a fibrous reinforced asphaltic compound of the manufacturers standard sandless commercial material. The coating shall be 1/16 to 1/8-inch thick and applied to all clean dry surfaces; except engine, transmission, drive shafts, axles, brakes, and steering and suspension components."

- e. Add as last sentence to paragraph 3a, "The following auxiliary equipment shall be provided properly mounted on the vehicle or secured in a compartment:
- (1) Two 10-foot lengths of  $4\frac{1}{2}$ -inch hard suction hose having one male and one female coupling with  $4\frac{1}{2}$ -inch NSFHT.
  - (2) One suction strainer,  $4\frac{1}{2}$ -inch barrel type, with  $4\frac{1}{2}$ -inch NSFHT.
  - (3) Two electric hand lanterns, 6V battery, to throw 1,000-foot beam.
  - (4) Two axes, fire pickhead, 6-pound, with serrated blade.
  - (5) One suction hose coupling, double female,  $4\frac{1}{2}$ -inch NSFHT to local hydrant thread.
  - (6) Ten 50-foot sections of  $2\frac{1}{2}$ -inch double jacket rubber-lined hose.
  - (7) Two  $2\frac{1}{2}$ -inch nozzles with NSFHT. Each nozzle to include playpipe shutoff valve, and 3 smooth bore tips (tips to be 1, 1-1/8, and 1-1/4 inches).
  - (8) One adjustable hydrant wrench.
  - (9) One  $2\frac{1}{2}$ -inch double female connection, NSFHT.
  - (10) One  $2\frac{1}{2}$ -inch double male connection, NSFHT.
  - (11) Two  $2\frac{1}{2}$ -inch spanner wrenches."



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