NOTICE OF INACTIVATION
FOR NEW DESIGN

INCH-POUND

MIL-T-28690(YD)
NOTICE 1
8 July 1997

MILITARY SPECIFICATION

TRUCK, FIREFIGHTING, STRUCTURAL, 1,000 GPM, 4 BY 2 WITH 50 FOOT TELESCOPING BOOM ESCAPE LADDER AND WATER TOWER

This notice should be filed in front of MIL-T-28690(YD), dated 28 October 1991.

MIL-T-28690(YD) is inactive for new design and is no longer used, except for replacement purposes.

This specification will be maintained until acquisition of the product is no longer required, whereupon the specification will be canceled.

Preparing Activity:
Navy - YD1

(Project 4210-0510)

AMSC N/A

FSC 4210

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* NOT MEASUREMENT *
*   SENSITIVE   *

MIL-T-28690(YD)
28 October 1991

MILITARY SPECIFICATION

TRUCK, FIREFIGHTING, STRUCTURAL, 1,000 GPM, 4 BY 2 WITH 50 FOOT TELESCOPING BOOM ESCAPE LADDER AND WATER TOWER

This specification is approved for use by the Naval Facilities Engineering Command, Department of the Navy, and is available for use by all Departments and Agencies of the Department of Defense.

1. SCOPE

1.1 Scope. This specification covers a diesel-engine-driven, four-wheel, two-rear-wheel drive, 1,000 gallons per minute (gpm) pumping capacity, with 50 foot (ft) water tower, firefighting truck capable of fighting structural fires.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

SPECIFICATIONS

FEDERAL

W-B-131 - Battery, Storage, Vehicular, Ignition, Lighting, and Starting.

Beneficial comments (recommendations, additions, deletions) and any pertinent
*data which may be of use in improving this document should be addressed to: *
*Commanding Officer (Code 156), Naval Construction Battalion Center, Port   *
*Hueneme, CA 93043-5000, 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 4210

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

MILITARY

MIL-T-704 - Treatment and Painting of Material.
MIL-F-24385 - Fire Extinguishing Agent, Aqueous Film Forming Foam (AFFF) Liquid Concentrate, Three or Six Percent, for Fresh & Sea Water.
MIL-I-45208 - Inspection System Requirements.
MIL-V-62038 - Vehicle, Wheeled, Preparation For Shipment and Storage of.

STANDARDS

FEDERAL

FED-STD-H28 - Screw-Thread Standards for Federal Services.
FED-STD-297 - Rustproofing of Commercial (Nontactical) Vehicles.
FED-STD-595 - Colors.

MILITARY

MIL-STD-889 - Dissimilar Metals.
MIL-STD-1223 - Nontactical Wheeled Vehicles Treatment, Painting, Identification Marking & Data Plate Standards.

(Unless otherwise indicated, copies of federal and military specifications, standards, and handbooks are available from Standardization Documents Order Desk, Bldg. 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094)

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

DEPARTMENT OF TRANSPORTATION (DoT)

Federal Motor Vehicle Safety Standards and Regulations.
Federal Motor Carrier Safety Regulations.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

ENVIRONMENTAL PROTECTION AGENCY (EPA)

Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines: Certification and Test Procedures.
Interstate Motor Carrier Noise Emission Standards.
Motor Vehicle Air Pollution Standards.

(Application for copies should be addressed to the Public Affairs Office, Environmental Protection Agency, Rockville, MD 20852.)

2.2 Non-Government publications. The following document(s) 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 which are current on the date of the solicitation (see 6.2).

AMERICAN NATIONAL STANDARDS INSTITUTE, INC. (ANSI)

ANSI B 40.1 - Gauges, Pressure Indicating Dial Type - Elastic Element.

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 70 - National Electrical Code.
NFPA 1901 - Automotive Fire Apparatus.
NFPA 1931 - Fire Department Ground Ladders.

(Application for copies should be addressed to the National Fire Protection Association, Battery March Park, Quincy, MA 02269.)

SOCIETY OF AUTOMOTIVE ENGINEERS, INC. (SAE)

SAE Standards and Recommended Practices

SAE J534 - Lubrication.
SAE J537 - Storage Batteries (DoD adopted).
SAE J551 - Performance Levels and Methods of Measurement of Electromagnetic Radiation.

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

STATE OF CALIFORNIA

California Vehicle Code.

(Application for copies should be addressed to the Department of Motor Vehicles, 2570 24th Street, Sacramento, CA 95809.)

TIRE AND RIM ASSOCIATION, INC. (TRA)

TRA Yearbook.

(Application for copies should be addressed to the Tire and Rim Association, Inc., 3200 West Market Street, Suite 304, Akron, OH 44313.)

EUROPEAN TYRE AND RIM TECHNICAL ORGANIZATION (ETRO)

Standards Manual.

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

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

2.3 Order of Precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Description. The truck shall be four-wheel, two-axle, two-rear-wheel drive, diesel-engine-driven, with a four-door fully enclosed cab, and a chassis having a gross vehicle weight (gvw) rating of not less than 43,000 pounds (lb). The truck shall be equipped with a 1,000 gpm single-stage pump, mounted amidship and driven by the truck engine, a removable 500-gallon water tank, telescoping water tower, three transverse hose beds, a main hose bed, operator's control panel for the fire pump, a rear control panel for the water tower, equipment compartments, foam system, and such other equipment and accessories as are specified herein and in compliance with NFPA-1901.

3.2 First article. When specified (see 6.2), the contractor shall furnish a fire truck for first article inspection and approval (see 4.2.1 and 6.4).

3.2.1 Inspection system requirements. Quality assurance inspections and tests necessary to substantiate product conformance to contract specifications shall be in accordance with MIL-I-45208.

3.3 Standard fire truck, components, and accessories. Except as specified in 3.3.1 through 3.3.7, the fire truck, components, and accessories shall be standard or optional items which meet or exceed the requirements for this specification. All items shall be as represented and rated in the manufacturer's sales information, including special or mounted equipment. Sales information shall be limited to specifications and technical material, identical to that furnished to the authorized company representative for selection of fire truck models and components. The fire truck, components, and accessories to be provided hereunder are standard or optional commercial products for the purpose of this specification. Such items shall be construed as commercial motor vehicle products, and shall comply with all DoT Federal Motor Vehicle Safety Standards and Regulations applicable on the date of manufacture.

3.3.1 Heavy-duty cooling system. A heavy-duty cooling system shall be provided. The heavy-duty cooling system shall be of the pressurized type of sufficient capacity to maintain a cooling liquid temperature of not less than 180 degrees Fahrenheit (oF) and to provide proper cooling without overheating or loss of coolant when operated in an ambient temperature range of -20oF to +125oF during operating conditions of either stationary pumping or mobile performance as specified.

3.3.1.1 Heat exchanger. An auxiliary heat exchanger shall be provided, which shall permit delivery of water from the fire pump to heat exchanger for cooling of the engine liquid coolant without admixture. The heat exchanger may be separate from the radiator. The discharge water from the heat exchanger shall be piped into the suction side of the fire pump. The size of the heat exchanger discharge line shall be large enough to eliminate back pressure on the heat exchanger. The flow of water from the fire pump to the heat exchanger shall be controlled by a valve, with the valve control extended to the fire pump operator's control panel and specifically identified on that panel.

3.3.1.2 Drain valves. Water drain valves shall be installed at the low point of the cooling and heat exchanger systems and at any other points necessary to completely drain the systems. The drain valves shall be of a type that will remain closed under the most severe operating conditions to be encountered by the fire truck. Drain lines shall be furnished and shall discharge to the ground at a point not above the bottom of the chassis frame.

3.3.3 Coolant system and indicators. The coolant system shall include a deaeration system, a surge tank, or a coolant recovery reservoir of not less than 2-quart capacity. A high coolant temperature or low coolant level alarm buzzer and red indicator warning light shall be provided on the cab dash instrument panel and on the pump operator control panel. A radiator servicing access door shall be provided to allow verification of coolant level. The coolant system shall be filled to capacity with a clean solution of ethylene glycol and water in equal parts by volume. A warning tag shall be securely attached to the radiator filler neck with the information "COOLING SYSTEM FILLED WITH WATER AND ETHYLENE GLYCOL IN EQUAL PARTS BY VOLUME - DO NOT DRAIN."

3.3.4 Radio interference suppressors. The fire truck shall be suppressed to limit electromagnetic radiation in accordance with SAE J551. Any body equipment emitting electromagnetic radiation shall be suppressed to the same level as the vehicle chassis. Certification of compliance with SAE J551 shall be provided.

3.3.5 Sound level. The exterior sound level produced by the truck, except for trucks with California destinations, shall not exceed the noise limits established by the EPA. The exterior sound level produced by the trucks destined for California shall not exceed the noise limits established by the California Vehicle Code, Section 27220. The interior sound level shall be in accordance with DoT Federal Motor Carrier Safety Regulations, Section 393.94 and in compliance with NFPA-1901.

3.3.6 Air pollution control. Trucks shall comply with EPA Code of Federal Regulations governing Control of Air Pollution from New Motor Vehicles and New Motor Vehicle Engines in effect on the date of manufacture. Trucks shall also meet emission requirements at final destination, in addition to EPA standards, i.e., California.

3.3.7 Engine hour meter. An engine hour meter, having a totalizing mechanism of not less than 9,999 hours, shall be furnished for the truck chassis engine to register accurately the number of hours of operating time. The meter shall be of rugged construction to insure continuous trouble-free performance under severe operating conditions. Engine hour meter shall be mounted on the cab instrument panel.

3.4 Interchangeability. All units of the same classification furnished with similar options under a specific contract shall be identical to the extent necessary to insure interchangeability of component parts, assemblies, accessories, and spare parts.

3.5 Materials. Materials used shall be free from defects which would adversely affect the performance or maintainability of individual components or of the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in commercial practice. Unless otherwise specified herein, all equipment, material, and articles incorporated in the work covered by this specification are to be new and fabricated using materials produced from recovered materials to the maximum extent possible without jeopardizing the intended use. The term "recovered materials" means materials which have been collected or recovered from solid waste and reprocessed to become a source of raw materials, as opposed to virgin raw materials. None of the above shall be interpreted to mean that the use of used or rebuilt products are allowed under this specification unless otherwise specified.

3.5.1 Dissimilar metals. Unless protected against electrolytic corrosion, dissimilar metals shall not be used in intimate contact with each other. Dissimilar metals are defined in MIL-STD-889.

3.6 Performance. The fully equipped fire truck, loaded as specified in 3.8.1, shall be capable of the following:

a. The service brakes shall control and hold the truck on a 30 percent longitudinal grade. The service brakes shall be tested with the truck heading up-grade and also heading down-grade.
b. The service brakes shall stop the truck within 35 feet from a speed of 20 miles per hour (mph) on a dry, paved, smooth level surface, free from loose material.
c. The parking brakes shall hold the truck in a parked position on a 30 percent longitudinal grade with the truck heading up-grade and also heading down-grade.
d. The truck shall ascend a grade of not less than 30 percent in both forward and reverse gears.
e. The truck shall accelerate from a standing start to a speed of 35 mph in not more than 30 seconds. The test shall be conducted on a dry, level, paved roadway.
f. The truck shall accelerate from a standing start to a speed of 15 mph in not more than 200 feet on an eight percent grade. The roadway shall be dry and paved.
g. The truck shall maintain a minimum speed of not less than 60 mph on dry, level, paved roadway.
h. The truck shall be subjected to an endurance road test consisting of not less than 30 miles over paved roads at a maximum speed of not less than 60 mph, and not less than 10 miles over graded dirt roads at a maximum speed of not less than 25 mph. There shall be no evidence of body distortion, water leakage, tire and body contact, malfunction of components, or irregular chassis noise, resulting from the test.

3.7 Dimensions. The overall dimensions shall not exceed the following:

Length	364-inches
Width	96-inches
Height	138-inches
Wheelbase	192-inches

3.8 Chassis components.

3.8.1 Weight rating and distribution. The manufacturer's gvw rating for the fire truck chassis furnished shall be not less than 43,000 lb. The total gvw of the complete truck shall not exceed the manufacturer's gvw rating when fully equipped as specified herein, including all specified firefighting equipment, serviced with fuel, water, and lubricants, loaded with 500 gallons of water in the water tank, 100 gallons of foam in the foam tank, a 1,600 lb simulated load uniformly distributed in the main hose bed and a firefighting crew, or equivalent deadweight, in the cab having a combined weight of not less than 800 lb. Weight distribution ratio between the front and rear axles shall be such as to insure positive traction at the rear wheels and positive steering at the front wheels under all operating conditions specified herein. The percentage of gvw at front axle shall be not less than 25 percent of the vehicle in all phases of loading and shall at no time exceed the capacity rating of any of the front axle components. The application of weights to the chassis for the purpose of meeting the gvw distribution requirements between front and rear axle is not acceptable.

3.8.2 Engine. The fire truck engine shall be a diesel engine having not less than 300 gross horsepower, with torque and speed characteristics to meet satisfactorily all mobile and pumping performance requirements specified herein. The engine furnished in all trucks shall comply with Federal Regulations, and shall be the same make and model. The diesel engine shall have the necessary constant load and endurance characteristics for long pumping operations. The diesel engine shall be a liquid cooled, compression ignition, two or four cycle engine, with not less than six cylinders. The diesel engine shall achieve self-sustained combustion at the manufacturer's rated idle speed in less than five minutes in ambient temperature from -2oF to +125oF. The fire truck shall meet the mobile and pumping performance requirements specified herein utilizing diesel fuel. The engine shall be fitted with the engine manufacturer's standard or recommended fuel filter system. The engine manufacturer's standard "engine start-up" procedure (engine tune-up) shall be applied before delivery of the completed fire truck. The engine coolant system shall be fitted with silicone rubber hoses.

3.8.2.1 Governor. A governor shall be provided that will limit the engine to the maximum full load revolutions per minute (rpm) recommended by the engine manufacturer. The governor shall provide maximum effectiveness under all engine operating conditions and shall not restrict engine power output below governed full load rpm. An engine "fast idle" switch shall be installed in the cab and at the rear control panel to increase and hold an accelerated engine speed while operating the water tower turntable and boom. The fast idle shall automatically disengaged when the pump is engaged.

3.8.2.2 Power plant heater. When specified (see 6.2), an engine coolant heater shall be provided. The heater shall operate on 110 volt (V) alternating current (ac), 60 Hertz (Hz), and shall be wired through a junction block to a single three pronged (male) weatherproof slave receptacle for receiving external power and grounding vehicle. The receptacle shall be located near the engine at the driver's entrance of the cab. A three-wire connecting cable, 25 feet long, and of adequate capacity to supply power to the heater, shall be furnished. The connecting cable shall include a matching female connector at the vehicle end, and a standard three pronged male connector at the other end. Electrical apparatus shall conform to DoT Federal Motor Carrier Safety Regulations, Section 393.77. The electrical insulation of the connecting cable shall withstand normal operating stresses in low ambient temperatures (down to -50oF) without cracking or loss of dielectric capacity. All heater lead wires shall be installed without interfering with vehicle component operation and without loose excess wire. Provisions for stowage of the cable shall be provided in the vehicle cab. The heater furnished shall be as follows:

The coolant heater shall be installed in the engine block or lower coolant hose. The coolant heater shall be a 2,250 watt (W), 19.5 ampere (A), 115V, 115V, 60 Hz, ac, heater.

3.8.3 Fuel system. The fuel system shall conform to DoT Federal Motor Carrier Safety Regulations, Sections 393.65, 393.67, and as specified herein.

3.8.3.1 Air cleaner. Manufacturer's dry type air cleaner shall be furnished. The air cleaner shall be accessible and easily removed for replacement.

3.8.3.2 Fuel filter. The fuel system shall be provided with not less than two fuel filters; a primary and secondary design.

3.8.3.3 Fuel tank. The fuel tank shall not be less than 65-gallon capacity. The tank and fill piping shall be placed so as to be protected from mechanical injury. The fuel tank shall not project below the rear axle and shall have a drain plug. The fuel tank filler shall be located for ease in filling, shall not extend outside the body skin, shall provide a drain to the ground for any spillage, and shall be provided with a spring loaded, polished stainless steel access door, flush with the outer body skin and identified accordingly.

3.8.4 Exhaust system. The exhaust system shall conform to DoT Federal Motor Carrier Safety Regulations, Section 393.83. Where necessary, the exhaust pipe shall be insulated and shielded. The muffler and tailpipe shall be aluminized steel. The exhaust system discharge shall be directed away from the fire pump operator's control panel and any body panel, and the muffler shall not project below the truck axles.

3.8.5 Frame. The chassis frame shall provide a rigid platform and shall be of bolted construction. The chassis frame side rail(s) shall be one continuous piece with no notching allowed. The chassis frame material shall be of high strength, 110,000 psi, heat-treated alloy steel of sufficient width, depth, and thickness that will provide the required resistance bending moment to support the intended load. When operating the fully equipped and loaded fire truck under conditions specified herein, the frame shall show no evidence of permanent deformation or distortion.

3.8.6 Electrical equipment. The fire truck shall be provided with a complete starting and lighting system. Electrical equipment, including all truck lights and wiring, shall conform to DoT Federal Motor Carrier Safety Regulations, Sections 393.12, 393.19, 393.20, 393.22, 393,24, 393.25, 393.27 through 393.31 and 393.33, except as specified herein. Reflectors shall conform to DoT Federal Motor Carrier Safety Regulations, Section 393.26. Wiring shall be weatherproof, resistant to moisture and fungus, and color coded or numbered for ready identification. Wire identification shall be consistent throughout the truck. Two spare, single pole, 15A breakers shall be furnished for future radio use. The fire truck chassis electrical circuits and the fire truck body electrical circuits shall be separate circuits. The truck body electrical circuits, excluding truck chassis electrical circuits, shall be provided with circuit breaker type overload protection. A master electric module shall be provided. The module shall be located in the instrument panel in the cab. An access door to the master electrical module shall be located in the face of the instrument panel. The master electrical module shall consist of all necessary solenoids, relays, terminal blocks, and circuit breakers. All wiring shall be automatic circuit breaker protected, that is numbered or color coded. The inside of the master electrical compartment door shall have both a wiring layout printed on a metal plate and a complete index of all wiring. All electrical equipment shall comply with NFPA-1901.

3.8.6.1 Starting system. The manufacturer’s standard starting system shall be provided, complete with a keyless switch and pilot light.

3.8.6.2 Alternator. An alternator shall be furnished complete with a rectifier and regulator. The alternator shall be rated for not less than 160A.

3.8.6.3 Auxiliary generator. A 6,000 watt (6KW) auxiliary generator shall be installed in the left rear compartment. The generator shall provide single phase 120/240V, 26/13A, 60 cycle power. The following output receptacles shall be provided: Four 120V (two located on the pump panel and two located at the rear tailboard area), one 120V twist lock, and one 240V twist lock. The generator shall be powered by a diesel engine, equipped with a fuel pump and filter, an air cleaner, shutoff valve, and a low-tone muffler. The engine shall be air cooled and equipped with an automatic shut-down system for high temperature and low oil pressure conditions. The engine shall be fueled from the truck’s main fuel system and shall have an electric starting system energized from the main battery circuit. The generator start and stop switches shall be located in the cab, at the pump panel and at the generator. Circuitry shall be provided for the telescoping lights at the pump compartment (see 3.8.6.5j). The auxiliary generator system shall comply with the NFPA-1901, and all 120/240 volt components, equipment and installation procedures shall comply with the NFPA-70, National Electrical Code.

3.8.6.4 Battery system. A dual 12V battery system shall be furnished. Each battery in the system shall be 12V, maintenance free, with characteristics listed in W-B-131. Each battery shall be rated in terms of cold cranking power capacity at 0oF in accordance with SAE J537. The batteries shall be installed in "banks" and each bank shall have not less than the engine manufacturer’s recommendation of cold cranking ampere rating required at 0oF for the engine furnished. The battery compartment shall be provided as close as possible to the engine in order to reduce battery cable length for connection. Access shall be provided for ease in service and removal. The battery cables shall be

protected by use of grommets where the cables pass through metal bulkheads and shall be covered by a protection boot where the cables are attached under the vehicle frame to the electrical switches or connectors. The battery compartments shall be ventilated and treated against acid fumes and spillage. The battery compartment shall not be mounted on, or project onto, the side running boards when in the retracted (operating) position. The batteries shall be provided with a polarized receptacle(s) for station charging. The receptacle shall be located near the batteries at the driver's entrance to the cab. The charging receptacle shall be suitably identified. The receptacle shall be of the recessed male type with a spring loaded cover and provided with a matching female plug with protected prongs. The battery compartment cover(s) shall be easily raised/removed, not interfere with the servicing of batteries and not interfere with the battery terminal connections. Hinged type covers shall be capable of being supported in the open position. Battery circuits and switching systems shall be provided whereby:

a. Either battery or battery bank may be used:

    (1) For starting alone.
    (2) For starting and lighting.
    (3) For operation of priming pump.

b. Both batteries or battery banks may be used simultaneously in starting.
c. A battery master switch shall be provided, adjacent to and readily accessible to the operator, while seated in the driver's seat.

3.8.6.5 Lights. All lights shall be mounted in such a manner as to prevent being obscured by riding personnel or mounted equipment. All metal rims, shells, mounting arms, brackets, and bases of all exterior lights shall be chromium plated or stainless steel. Stoplights and taillights shall be flush mounted at the rear of the body. A removable panel shall be installed in the rear compartments to protect the lights and wiring from damage. All warning lights shall operate off a single switch mounted on the cab instrument panel and shall be marked to indicate function. The following additional lighting shall be furnished and shall be provided with overload protection (see 3.8.6) and shall conform to current DoT regulations:

a. Two automotive type, six-inch sealed beam, roof type spotlights shall be furnished. One spotlight shall be located near each front corner of the cab roof. Controls shall be extended inside the cab for on-off control and movement of lamp housing through a horizontal angle of at least 270 degrees, and a vertical angle of at least 90 degrees above and 35 degrees below horizontal.
b. Two adjustable, sealed beam, hose pickup lights, with weatherproof switches, mounted on rear handrail supports.
c. Two shielded, engine compartment lights, arranged to illuminate both sides of the engine, with switch located on cab dashboard.
d. Two automatic backup lights shall be flush mounted at rear of body. Two rear scene lights, not less than six inches in diameter, shall be provided and controlled by a switch in the cab.

e. Pump compartment light(s), arranged to provide non-glare illumination of the compartments and enclosed within a protective housing, with switch mounted on pump control panel.
f. Pump control panel lights (see 3.11.3i).
g. Two six-inch sealed beam, red alternating flashing warning lights shall be mounted on the rear handrail supports adjacent to the hose pickup lights. The lamps shall have a minimum output rating of 20 candlepower. The lights shall have a combined minimum flash rate of 80 flashes per minute.
h. Two red flashing lights shall be mounted on the front of the truck above the headlights on a horizontal plane through the centerline of the turn signals. The lights shall be sealed beam lamps, 6-inch diameter, and shall have a combined minimum flash rate of 80 flashes per minute.
i. A minimum of four halogen headlamps shall be provided and shall conform to DoT Federal Motor Vehicle Safety Regulations, Section 393.24.
j. Red flashing lights (intersection lights) shall be mounted at the two forward corners of the cab and controlled by a switch in the cab.
k. Two telescoping, 120 volt, 500 watt quartz lights shall be mounted in the area of the pump compartment, powered by the auxiliary generator and controlled by switches in the cab and at the pump panel (see 3.8.6.3).
l. Water tower control panel lights.
m. Two spotlights shall be installed on the top section of the boom and at the base section. Each light shall be equipped with an individual on/off switch connected to the tower master switch on the rear control panel.

3.8.6.6 Warning light. Two clear domed warning lights shall be mounted on the roof, one on either side of the water tower boom, set back from the leading edge of the cab not more than 12 inches. End rotor units shall have red bulbs, center rear blinkers shall be red, and inside oscillating units shall be white. A single, three-position control, shall be provided for the roof mounted warning lights and those warning lights described in paragraph 3.8.6.5g, h, and j.

3.8.6.7 Horn. Dual electric horns, controlled by button in the steering wheel, shall be furnished. Also, two chrome plated air horns of the studder tone type shall be provided and installed below the front surface of the cab and recessed through the front bumper, one horn on each side of the bumper. The air horns shall be controlled from one floor mounted, foot operated control device located on the fire officer’s side of the cab and a lanyard (pull type) control from the inside center of the cab.

3.8.6.8 Siren. An electronic siren with an output of not less than 150 watts shall be provided and activated by either firefighter seated in the front seat of the cab. The siren shall include two speakers, each with an output (watts) rating at least equal to the minimum output of the siren. The speakers shall be recessed in the front bumper.

3.8.7 Backup warning device. The fire truck shall be provided with an automatically activated, audible, pulsating, signaling warning device, mechanical or electrical, to caution personnel when the fire truck is in reverse

gear operation. The backup alarm signal shall be audible at a distance of 15 feet with self-adjusting volume that will maintain a minimum decibel output of five decibels above environmental noise.

3.8.8 Automatic transmission. The vehicle shall be provided with an automatic transmission of the fixed ratio type and shall provide continuous drive. The transmission shall include a hydraulic torque converter and not less than four forward gear ratios. Normal driving range selector position shall provide not less than four gear ratios without movement of the selector. The maximum net input torque capacity of the transmission shall be higher than the maximum net torque delivered by the engine. The transmission shall have a torque converter lockup feature in the two highest forward speeds. A means shall be provided to hold the truck transmission in the gear ratio used for pumping operations whenever the pump transmission is in the pump position (see 3.10). Any modification to the transmission shall be made or approved by the transmission manufacturer.

3.8.8.1 Torque converter temperature gauge. A transmission torque converter oil temperature gauge shall be furnished. The gauge shall be installed on the pump operator's control panel and inside the cab (see 3.11.3), complete with a flashing red light and an audible warning device. The warning light and audible device shall be activated when the converter oil temperature exceeds the transmission manufacturer's recommended safe operating temperatures. The gauge and warning light shall be suitably identified.

3.8.9 Drive line components. Drive line components shall have a continuous duty torque capacity of not less than the maximum torque delivered by the engine, as developed through the maximum gear train reduction. The drive line shall be dynamically balanced at a minimum of 500 rpm.

3.8.10 Axles. Axle ratings shall be at least equal to the load imposed on each axle, with the truck loaded to rated gvw. A single speed rear axle shall be furnished. The front axle hubs shall have an oil level view window.

3.8.11 Suspension. The truck's suspension system shall be equipped with components having a rated capacity at least equal to the load imposed on each member, measured at the ground, with the truck loaded to rated gvw. When suspension capacity is rated at the spring pads, unsprung weight shall be deducted. Double action, heavy-duty shock absorbers shall be provided at front wheels.

3.8.12 Wheels, rims, tires, and tubes. The truck shall have single front and dual rear wheels. Rim and tire ratings shall conform to TRA/ETRO recommendations. Tires shall be steel belted radial tube or tubeless type with highway tread. All tires shall be of the same size and ply rating (load range). The rated individual tire capacity at 60 mph highway conditions shall be not less than maximum wheel loading imposed with the truck loaded to rated gvw, as cited in 3.8.1. Wheel and tire assemblies shall be dynamically balanced at simulated speeds up to 60 mph; each assembly shall be balanced individually.

3.8.12.1 Inner tubes. For tube tires, inner tubes shall be of heavy-duty type, and shall be of proper size for the tires furnished. Tire flaps shall be provided for tube type tires in accordance with TRA/ETRO recommendations.

3.8.12.2 Spare wheel. When specified (see 6.2), a spare wheel or rim without spare tire shall be furnished and stowed in the hose bed for shipment.

3.8.13 Brakes. Brakes shall conform to DoT Federal Motor Carrier Safety Regulations, Sections 393.40 through 393.42, 393.43, 393.45 through 393.52 and as specified herein.

3.8.13.1 Service brakes. The service brakes shall be 4-wheel, automatic adjusting, air application type. Air filters shall prevent brake system contamination. Brake operation shall not be subject to excessive fading. Brakes shall be certified by the component manufacturer for gvw rating of the truck assembly.

3.8.13.1.1 Brake system air compressor. The capacity of the air compressor shall be sufficient for the intended service but shall be not less than 15.5 cubic feet per minute. The air compressor shall be equipped with a governor and the compressor intake shall be properly connected to an air cleaner. An air dryer shall be furnished and installed to remove moisture from the air. The moisture removed from the air by the air drying system shall be disposed of automatically, and the moisture collector shall be winterized to prevent freezing.

3.8.13.1.2 Brake system air storage reservoirs. In conformance with DoT requirements, air storage reservoirs with a buzzer-type low-pressure indicator and a safety relief valve, shall be provided. The system shall be of the quick-release buildup valve type with the air compressor connected to a small reservoir which is pressure-relieved into the larger reservoirs when the minimum pressure is reached for optimum operation of the brake system. The time required to reach operational pressure from zero pressure shall not exceed 30 seconds. If other than brake air supply requirements are to be supplied from the reservoirs, a priority system shall be installed to assure that an adequate supply of air is always available to operate the brake system. All wet tanks shall have an auto-moisture ejector.

3.8.13.2 Parking brakes. Parking brakes, conforming to DoT requirements, shall be provided. They shall be so mounted that they can be effective at all times. The operating controls of the parking brakes shall be independent of the operating controls of the service brakes. A warning light in the cab shall indicate when the parking brake is on/applied. The parking brake shall be capable of meeting the performance requirements specified in paragraph 3.6.

3.8.13.3 Air brake emergency system. An emergency brake system shall be furnished. The system shall be capable of being manually applied by the operator seated in the driver’s seat. A manual or mechanical means to release the brakes shall be provided when compressed air is not available to release the brakes. The emergency system shall also serve as a parking brake and shall conform to DoT Federal Motor Carrier Safety Regulations, Sections 393.41 and 393.52.

3.8.13.4 Brake system air inlet. An air inlet valve and coupling shall be installed on the pump operator’s control panel to allow an external air supply to be connected to the brake system.

3.8.14 Steering mechanism. The truck shall be equipped with a hydraulic power assist steering mechanism. The mechanism shall permit manual steering in the event of failure of the hydraulic system, and shall be properly effective at all truck speeds. The system shall be furnished complete with all necessary piping, valves, and accessories. The steering mechanism shall provide for controlling the direction of the fully loaded truck under all operating conditions. The cramping angle shall be the maximum permitted by the front axle manufacturer.

3.8.15 Front bumper and towing devices. A heavy duty, full width, front bumper, and two hooks shall be provided at the front of the truck. The bumper shall be polished stainless steel. A stainless steel grab rail, not less than 12 inches long, shall be provided on the cab front not more than four inches below the windshield to facilitate personnel stepping up onto the extended bumper. The front bumper shall extend out not less than 18 inches to provide a step at the front of the cab/truck. A trough shall be provided in the center of the bumper for storage of not less than 150 feet of 1-1/2 inch double jacket fire hose. The space between the front bumper and cab shall be decked with heavy gauge aluminum diamond plate. The two front tow hooks shall be mounted to the frame or rigid members which are attached to the frame. When access to the two front tow hooks are furnished through the front cab panel, access holes with hinged cover plates shall be provided. Two towing rings or comparable U-bolts, not less than 2-1/2 inch inside diameter (id), shall be provided at the rear of the truck and mounted directly to the chassis side rails.

3.9 Cab. The truck shall have a four-door fully enclosed cab. The cab roof shall have a removable weather-proof section over the engine area to allow for engine and transmission removal without having to dismantle the cab. The rear outside wall shall be covered with aluminum treadplate. The engine compartment cover shall be insulated against heat and noise and allow for readily accessible engine maintenance, servicing, and ventilation.

3.9.1 Cab construction. The cab shall be all aluminum, reinforced, welded construction. The cab interior width dimension shall be not less than 88 inches. With the driver’s seat in the rearmost position, cab width shall be measured at the floor on a transverse line through a vertical plane, six inches forward of the driver’s seat cushion. Aluminum sheet metal used in construction of the cab shall be at least 0.125 inch thick. The cab shall provide unobstructed seating and head room for a minimum of four persons fully clothed in firefighting gear. In the forward section of the cab, seats shall be provided for one passenger and a driver, and in the rear, two jump seats shall be furnished. The passenger seat is to be a jump seat designed to accommodate an air pack as described in 3.9.2. The cab doors shall be ample size for easy access and shall be equipped with roll-down windows and polished stainless steel 6-inch scuff plates at the bottom of each door. The doors shall be provided with locks and with at least the front curbside door equipped with an external key-operated lock. Grab handles shall be provided on each side of the fire truck at each cab door and inside the cab on the inside of the cab doors or at the end of the instrument panel. The outside grab handles shall be of a non-twist and nonslip design, polished stainless steel, and shall be not less than 1-1/4 inch id. A step shall be provided at each cab door and shall have an aluminum, nonslip tread surface. All steps shall sustain a minimum static load of 500 lb without deformation and shall have skid-resistant surfaces. Each step shall be of maximum width and depth to permit safe entry and exit for

firefighters wearing firefighting foot gear. The maximum stepping height of steps and platforms shall not exceed 18 inches with the exception of the ground to first step. Safety glass shall be provided throughout the cab. A dome light shall be provided in the front of the cab and above each jump seat in the rear. Each dome light shall have its own individual switch. Lights installed in the door well/step area shall be activated when the door is opened along with the front dome light. Rubber boots shall be provided for all floor board openings. Directional reading/map lights, each with their own switch, shall be installed on the forward cab overhead. Dual padded sun visors shall be provided. Sound absorbing headliners and dashboard shall be provided. Cab floors and walkways shall be of heavy gauge aluminum diamond plate. A full circular wheel well liner, with fenderette, shall be furnished to protect against dirt and water entry. A rubber or flexible material mud flap of sufficient size shall be furnished at the rear of each wheel well liner to protect against the splashing entry of dirt and water. The cab compartment shall meet the interior noise criteria of DoT Federal Motor Carrier Safety Regulations, Section 393.94 and NFPA-1901.

3.9.2 Seats. All seats, front and rear, shall be upholstered over deep air foam cushions with first-grade black vinyl covering, suitable for fire service. The driver's seat shall be a heavy-duty, four-way, adjustable air ride bucket type. The fire officer/passenger and the two rear facing seats (jump seats) shall be the Ziamatic Quick-Seat type and may be manufactured by the fire truck manufacturer. The fire officer/passenger seat shall not be less than 18 inches wide and at least 34 inches shall be provided for leg and knee room in the space measured from the front of the back rest, at the seat level, to the dash (instrument) panel. Each jump seat shall have a padded lower cushion of suitable width and depth to provide ample seating for firefighters wearing turn out gear and back strapped air packs. The back of each jump seat shall have an air breathing apparatus walk-away bracket. The bracket shall provide for mounting of the air breathing apparatus in the upright position. A series of pre-drilled holes shall be provided in jump seat backs for vertical adjustment of walk-away brackets. Each jump seat back shall be provided with padded flanges on each side and forward of the breathing apparatus. Retractable seat belts with shoulder straps shall be furnished and installed for the driver and for each seated position provided, and be of sufficient length to accommodate firemen wearing turn out gear. All passenger seats, front and rear, shall be equipped with head restraints. The rearward facing jump seats shall provide additional storage compartment(s) if available in the manufacturer's basic design. Mounting of the two jump seats in the rear section of the cab shall allow for breathing apparatus regulators.

3.9.3 Outside rearview mirrors. Outside rearview mirrors shall be mounted on each side of the cab. Combination (flat and convex) mirrors, secured by a common housing/support, shall be furnished. Each combination mirror shall have at least 50 square inches of flat reflective area and a convex surface having at least 20 square inches of reflective area.

3.9.4 Windshield wipers. Heavy-duty electric operated windshield wipers shall be mounted to facilitate clear vision. The wipers shall be of such capacity and coverage as to cleanse the windshield of rain, snow, ice, and agent when used in conjunction with the defrosting system or windshield washer mechanism. The wipers shall be the wet arm type. The wiper blades shall be of sufficient length to clear at least 75 percent of windshield area. Wiper

assemblies shall include features to permit speed control and return of the wiper blades to a retracted position out of the line of vision when not in use.

3.9.5 Windshield washers. Power operated windshield washers, equipped with a minimum of one-gallon capacity plastic container for cleaning fluid, shall be furnished.

3.9.6 Heater and defroster. The cab shall be equipped with a hot water type heater having fresh air intakes, and discharge outlets to the floor and side door windows, in both front and rear sections, and windshield defroster louvers. The heater shall be equipped with a 12V, electric motor-driven, multi-speed blower, controlled by a dash mounted, three-position switch. The heater shall not be positioned directly in front of any seat where it would interfere with the feet of the firefighters or in the space between the driver and the right side passenger seat.

3.9.6.1 Defrosting, anti-icing, and ventilating. A sufficient defrosting, anti-icing, and ventilating system shall be provided in the cab. This system shall have the capacity to effectively prevent formation of frost on the interior surface of all transparent areas of the cab and to prevent the formation of ice on the exterior of the vehicle windshield. The system shall also maintain clear vision over at least 75 percent of the area of all windows of the cab interior.

3.9.6.2 Controls. Variable controls shall be provided on air blowers and at least a high output setting shall be furnished on the cab heating system controls. Adequate operating instructions shall be provided at the heater system control point. The cab heater and defroster system control shall be mounted on the instrument panel.

3.9.7 Instrument panel. The cab instrument panel shall be complete with all equipment and accessories furnished as standard items by the manufacturer. The following minimum equipment shall be furnished and suitably identified:

a. Indirect panel lights (to illuminate all cab switches, instruments and controls).
b. Keyless starting switch and pilot light.
c. Ammeter.
d. Fuel gauge.
e. Oil pressure gauge with low pressure light and alarm.
f. Engine temperature gauge with high temperature light/alarm.
g. Speedometer with recording odometer.
h. Tachometer.
i. Brake air pressure gauge with warning light and alarm.
j. Brake quick buildup gauge with warning light and alarm.
k. Master warning light control switch.
l. Indicator light for safe pumping mode.
m. Pump and engine hour meter.
n. Transmission temperature gauge; high temperature light/alarm.

3.9.7.1 Audio/visual alarms. The following operating conditions shall be alarmed with both audio and visual alarm devices on the pump operator’s panel and with individual visual and single audio alarms on the driver’s instrument panel:

a. Fuel (less than 1/8 tank).
b. Loss of engine oil pressure.
c. Excessive engine coolant temperature.
d. Excessive pump transfer case temperature.

3.9.8 Controls and operating mechanisms. All controls and operating mechanisms shall be located for left hand drive. Controls shall be complete and conveniently operable by the driver. Lever controls shall be designed and located to permit easy entrance and exit of operator, to and from driver's compartment. Instruments and controls shall be identified as to their function and installed in a manner to facilitate removal and servicing. Instrument controls and wiring thereto shall be incorporated into modular design panels and shall be removable by quick disconnects for ease of maintenance.

3.10 Fire Pump. The fire pump shall be fitted with a gear drive or chain drive transmission, shall be midship mounted, include provisions for a front suction intake, and driven by the truck engine from the output shaft of the road transmission. The pump transmission system shall provide means for pump and road operation. The pump shift shall be the manufacturer's standard electric or air shift, with a spring loaded cover guard over the control switch or lever. A manual override shall be provided to permit mechanical shifting in the event of electrical or air shift failure. The manual override control shall be located on the pump operator control panel, or within reach of the pump operator, and shall be suitably identified. A means shall be provided to assure that the pump transmission is held in the pump position during pumping operations, and that when the pump transmission is in the pump position to cause the chassis transmission to be held in the proper ratio for pumping (see 3.8.8). A single stage pump of the centrifugal type shall be provided. The pump shall conform to NFPA-1901 requirements. An indicator light shall be mounted at the pump operator's panel and on the cab instrument panel, to indicate to the operator the pump control is properly engaged and it is safe to open the throttle and initiate pumping mode. Controls for changing from road transmission to pump transmission shall be operable from the driver's position and shall be identified as to function. Controls for single stage pump operation shall be the manufacturer's standard and shall be operable from the fire pump operator's control panel. The impeller shaft shall be of corrosion-resistant steel. The fire pump shall have the manufacturer's standard cast iron casing. The pump drive, gearing, and housing shall be such that at rated capacity and pressure, the temperature rise in the gear oil will not exceed the maximum temperature recommended by the pump manufacturer for continuous operation in an ambient temperature of 125oF. When required, oil cooling shall be provided by a water jacket or cooling coils in the gear case constructed so as not to be damaged by freezing. All shafts in the pump gear train shall turn in anti-friction bearings, except that the impeller shaft shall be provided with a minimum of two inboard anti-friction bearings and an outboard bearing of either the anti-friction or oil/water lubricated sleeve type. All pump-shaft glands or mechanical seals shall be adequate for service under operating conditions specified herein. The pump shall withstand a hydrostatic pressure of 350 pound-force per square inch (psig) for a period of 10 minutes. Push-pull type drain cocks, accessible at the pump operator's position and arranged so that the open and closed position is clearly indicated, shall be provided to drain the pump and all water carrying lines. Drain cocks shall be of the water service type and shall be equipped with positive stops. Pump drain lines shall be furnished and shall discharge to the ground at a point not above

the bottom of the chassis frame. All threaded connections shall conform to FED-STD-H28. The pump, when drafting at a minimum lift of 10 feet through 20 feet of five-inch suction hose, shall:

a. Deliver a minimum of 1,000 gpm at 150 psig net pump pressure at less than the manufacturer's recommended governed speed of the engine.
b. Deliver a minimum of 700 gpm at 200 psig net pump pressure at less than the manufacturer's recommended maximum governed speed of the engine.
c. Deliver a minimum of 500 gpm at 250 psig net pump pressure at less than the manufacturer's recommended maximum governed speed of the engine.
d. The pump, when dry, shall take suction and discharge water within 30 seconds, with a lift of 10 feet through 20 feet of five-inch suction hose.

The piping and valve arrangement shall be capable of delivering water to the pump at a minimum 500 gpm flow rate, while pumping at 150 psi net pressure.

3.10.1 Priming pump. The priming pump shall be of the rotary type, 12 VDC motor driven, complete with lubricating oil reservoir and necessary valves, operated from the pump control panel. The priming pump shall develop a vacuum of 22 inches of mercury (Hg) at an altitude of 1,000 feet above sea level in not more than 30 seconds.

3.10.2 Suction connections. The fire truck shall be provided with four suction connections. Each suction connection shall be equipped with a removable and accessible strainer. One five-inch suction connection shall be located at the operator's control panel and one five-inch connection directly opposite operator's control panel on the curbside of the truck and one five-inch connection on the right rear of the truck. One 2-1/2 inch suction connection shall be located on the fire pump operator's control panel. A quarter-turn butterfly type suction valve shall be installed in the five-inch rear suction and controlled by a chrome plated hand wheel at the pump panel. The five-inch suction connection on the left and right side and the suction valve on the rear of the truck shall provide a seat for suction hose connection hose gaskets and shall be threaded with American National standard hose coupling screw thread (NH). The 2-1/2 inch suction connection shall be gated and shall be a female swivel type with gasket, and equipped with a chromium plated rocker lug plug. The 2-1/2 inch suction connection shall be provided with a 3/4-inch drain valve and push-pull type controls. Valves shall be capable of being locked in any position and handles shall be provided. The valves shall be capable of holding 500 psi in either direction. The valve balls shall be trunnion mounted, corrosion-resistant, nonsticking type. The valve seats shall not require adjustment and shall be capable of holding a vacuum or pressure in either direction. The valve ball and seats shall be replaceable without disturbing the valve piping. The 2-1/2 inch suction valve shall be properly identified as to function and indicate when open or closed. An adjustable 2-1/2 inch or larger intake pressure relief system shall be permanently installed (per NFPA-1901). Shutoff valves or other means to disable the relief system shall not be permitted.

3.10.3 Discharge connections. The fire truck shall be provided with 11 bronze gated locking type discharge connections. Each discharge connection shall provide a seat for discharge gaskets and shall be threaded with NH threads. Each 2-1/2 inch discharge connection shall be provided with a rocker lug and chromium plated cap with gasket, chained to the valve body. Each discharge connection shall be provided with hose discharge digital flow meters on the fire pump operator's control panel. Two 2-1/2 inch discharge connections shall be located on the fire pump operator's control panel, and two 2-1/2 inch discharge connections shall be located directly opposite on the curbside of the fire truck along with one five-inch discharge connection. The five-inch connection shall be piped with a gated four-inch pipe and controlled by a chrome plated handwheel at the pump operator's control panel. One 2-1/2 inch discharge connection shall be located at the left rear (driver's side) of the truck, below the hose bed. Three 1-1/2 inch swivel type discharge connections shall be located in the transverse hose beds (see 3.11.2) and one 1-1/2 inch swivel discharge connection shall be located on the front bumper. One discharge connection shall be provided to the boom tip nozzle with appropriate piping to flow 1,250 gpm. Each discharge valve shall be the pump manufacturer's recommended valves. The valves shall be capable of holding 500 psi in either direction. The valve balls shall be the trunnion mounted, corrosion-resistant, nonsticking type. The valve seats shall not require adjustment and shall be capable of holding a vacuum or pressure in either direction. The valve ball and seats shall be replaceable without disturbing the valve piping. Each discharge connection shall be provided with a drain valve of at least 3/4 inch id for draining hose lines with the pump discharge gates closed. The push-pull type valves shall be of the water service type and shall be equipped with positive stops. Drain valve controls shall be located at the bottom of the control panel directly above the running board. Drain lines shall be concealed behind the pump compartment panels and shall discharge to the ground at a point below the bottom of the chassis frame. Each discharge connection, flow meter and drain(s) shall be identified by a related numbering system as well as function. Five, 30-degree or 45-degree downward turn male end discharge gates, shall be provided in lieu of straight connection discharge gates, on the 2-1/2 inch discharge connections. Two 1-1/2 inch or larger outlets supplied by at least two-inch piping and valving for preconnected hose lines shall be provided at the location of the hose storage area.

3.10.4 Relief valve. An automatic relief valve shall be provided for controlling the pressure from all outlets. The locating of the relief valve control shall be such that adjustment can readily be made by the operator when standing in normal position, without the use of tools, and in full view of the discharge pressure gauge. The relief valve shall be of such design that when set 10 psi higher than the pump working pressure, there will not be an increase in pump pressure greater than 30 psi when discharge lines are shut slowly. The relief valve shall perform satisfactorily when pumping rated capacity at any pump working pressure over 75 psi. A relief valve drain shall be provided and shall be in a readily accessible location. The relief valve drain line shall discharge to the ground at a point not above the bottom of the chassis frame.

3.11 Body. The fire truck shall be equipped with a body which shall incorporate a fire pump compartment, fire pump operator's control panel, removable water tank, three transverse hose beds, main hose bed, equipment compartments, rear platform, foam equipment, and firefighting equipment. The body and compartment construction structural members shall be aluminum alloy

having not less than 42,000 psi ultimate strength and 35,000 psi yield strength with thickness of not less than 0.125 inch. The body side panels and beavertail shall be integral. The body shall be reinforced at all stress concentration points where equipment and compartments are attached. Wheel well liners, with fenderettes and mud flaps, shall be furnished (front and rear) to protect against dirt and water entry. The body shall be of all welded construction and not exceed 96 inches in width.

3.11.1 Fire pump and foam tank compartment. The fire pump and foam tank shall be enclosed in an aluminum compartment at the forward section of the body and shall be self-supporting from the truck frame. An enclosure shall be provided to protect the back side of the instruments on the pump panel. This section shall have a hinged top, latch with operating handle or wing nuts for easy access, and a means of holding the panel section in a horizontal position when open for inspection. If the tank is positioned over the pump, the tank and tank supports must be removable to allow lifting of the pump intact without removing more than the pump suction and discharge fittings. The sides of the pump compartment shall be the same height as the sides of the main hose bed specified in 3.11.5. A removable deck plate (in equally divided sections) shall be provided over the pump compartment and shall be designed to support a 500 lb load. An adequate opening in the decking shall be provided for external filling of the foam tank from five-gallon foam containers. This opening to have a secured, but readily removable cover. The passenger or curbside panel of the pump compartment shall extend vertically from the running board to the bottom edge of the transverse hose bed and horizontally from the cab step rearward to the forward edge of the curbside compartment. This panel shall be removable and constructed of scratch and glare resistant black vinyl material and shall not be painted.

3.11.2 Transverse hose beds. Three transverse hose beds shall be provided side by side forward of main hose bed, no higher than 48 inches above the running board. Each bed shall have the capacity of stowing not less than 200 feet of 1-1/2 inch double jacketed, polyester rubber lined fire hose. Each hose bed shall have hose payout openings on the streetside and the curbside of the truck. The length of each transverse hose bed shall be full width of the pump compartment. The transverse hose beds shall be constructed of aluminum and shall have a sub-floor made from removable slatted aluminum. Each hose bed shall be provided with a center mount 1-1/2 inch swivel type discharge connection to permit hose to be removed from either side of the truck. There shall be adequate clearance for making connections to the swivel discharge outlets. Discharge gate controls for each hose bed shall be located at the pump operator’s control panel and shall be suitably identified. All hose payout openings shall be fitted with 1-1/4 inch polished stainless steel hose rollers on the bottom and sides of the openings. Plumbing to each hose bed shall be a minimum of two-inch hard pipe with adequate drains provided for each.

3.11.3 Fire pump operator’s control panel. The truck shall be equipped with a fire pump operator’s control panel located on the road/driver’s side of the truck. The pump operator’s control panel shall be removable and constructed of scratch and glare resistant black vinyl material and shall not be painted. Master pump intake and pump discharge gauges shall be provided and located close to each other with the intake gauge to the left of the pump discharge gauge. The gauges shall be the silicone liquid filled type, a minimum of 4-1/2 inches in diameter, with a range between 30 inches Hg vacuum to not less than 400 psi.

The accuracy of the gauges shall be a minimum of Grade 1A per ANSI B40.1. All valve opening handles and other controls shall be operable by personnel wearing heavy gloves. All extended controls and handles shall be non-interfering and firmly supported. The panel shall include at least the following:

a. Pump discharge gauge: 30 inches Hg (vacuum) to 400 psi.
b. Pump intake gauge: 30 inches Hg (vacuum) to 400 psi.
c. Engine tachometer: Not less than 3,500 rpm range with a provision in the panel to allow checking accuracy with a test revolution counter.
d. Throttle: Pull-type with latch and micro-adjustment.
e. Relief valve control.
f. All pump discharge valve controls.
g. Tank suction valve control.
h. Primer pump control.
i. Illumination: Minimum of three non-glare lights with one light being energized as the pump is engaged.
j. Engine coolant temperature gauge.
k. Engine oil pressure gauge and low oil warning device.
l. Heat exchanger valve control.
m. Eleven digital flow meters; meters shall be approved for fire service application and located near their respective control handles on the pump panel.
n. Water tank level gauge; electronic type.
o. All other pump panel mounted drains and controls mentioned herein.
p. Discharge valve and throttle handles shall be of black, extreme temperature resisting plastic or brass. All gauge rims and other exposed metal shall be chromium plated.
q. Plugged 1/4-inch standard pipe connection(s) with pipe or tubing for connection of vacuum and pressure test gauge(s) for testing pump pressure and suction gauges.
r. Instruction plates as specified in 3.16.
s. Foam system controls and valves specified in 3.11.7 through 3.11.7.4.
t. Torque converter temperature gauge, warning light, and audible warning device.
u. Indicator light for safe pumping mode.
v. Foam tank level indicator; electronic multiple light type.
w. Water tank fill valve.

All controls, valves, drains, and pressure gauges shall be identified as to their function and shall have a related identification number. All instruments and switches shall be identified as to their function. All identification plates shall be provided with lettering as large as possible and practical.

3.11.4 Water tank. A removable water tank of not less than 500-gallon capacity shall be provided at the rear of the fire pump compartment. The water tank shall not extend beyond the main hose bed sides. The water tank shall be constructed of 10 gauge (0.134 inch) mild steel and shall have double welded (external and internal) seams. The interior surfaces of the tank shall be cleaned by abrasive blasting (glass beaded) to provide the highest degree of cleanliness to accept epoxy coating. The interior surface shall be further prepared with an epoxy primer with a final two-coat system of two or three part epoxy resin. The total film thickness of primer and finish epoxy coats shall be the thickness necessary for protection from corrosion deterioration of the interior surface of the tank throughout its specified life (10 years). The

water tank shall be provided with a sacrificial anode system to neutralize the water condition and to protect the tank against corrosion. The water tank shall be the horizontal type with a flat top and a flat bottom, with a sump, and mounted on the truck frame as specified in paragraph 3.11.4.3. The tank top shall be removable, with gasket to prevent leakage, and shall support not less than 200 lb per square foot of surface area. A longitudinal and transverse surge partition shall be provided in the tank. A 2-1/2 inch NST connection shall be provided at the pump panel and piped directly to the tank by a 1-1/2 inch diameter pipe for use as a direct supply connection, and shall enter the tank or be piped inside the tank so as to not cause cavitation in the tank during pump discharge. A one-inch tank fill and re-circulating line, properly valved, shall be provided from the pump discharge directly to the water tank. The tank drain shall be located at the low point of the tank to provide complete drainage and the drain control valve shall be operated/controlled from the pump panel. The water tank drain shall discharge directly to the ground at a point below the bottom of the chassis frame. The tank shall have a nonsplash combination overflow and vent pipe of not less than four-inch National Pipe Size, directed to the ground at the rear of the rear axle, and extending below the bottom of the truck frame. The tank shall have a warranty for 10 years.

3.11.4.1 Tank filler opening. The tank shall have an accessibly located filler opening not less than five inches id and shall be provided with a tight, gasketed, hinged cap. The tank fill opening shall be provided with a removable strainer. The tank filler opening shall not project above the height of the side body sheet metal panels.

3.11.4.2 Tank piping. The piping from the tank to the fire pump, unless made of corrosion-resistant metal, shall be galvanized. The pipeline diameter between the tank and the pump shall be three inches to permit a flow rate of 500 gpm and shall incorporate a flexible, reinforced, noncollapsible connection(s) to take up any vibration. The tank piping shall provide for discharging the water in the tank through the fire pump discharge manifold. A quick-opening shutoff valve shall be provided with the control extended to the operator's control panel and a drain valve, located at the lowest point, with the control extended to the operator's control panel. The tank suction pipeline, valves, tank fill lines, and fittings shall withstand not less than 150 psi working pressure.

3.11.4.3 Tank mounting. The tank shall be supported on sills to cushion shock and transfer the load to the truck frame. The tank shall be so mounted and attached to the chassis that it can be removed without removing the truck body. The tank mounting device shall be designed as to allow for frame flexing without transferring stress forces to the water tank.

3.11.5 Main hose bed. The hose bed shall be provided with sufficient capacity for stowing not less than 1,200 feet of three-inch and 800 feet of 2-1/2 inch double gasketed, polyester, rubber lined, lightweight fire hose. The overall hose bed shall be equally divided lengthwise with a reinforced partition to form two individual hose beds. The hose bed floor shall be removable slatted aluminum. The interior of the hose bed shall be free from all projecting nuts, sharp angles, or brackets. Exposed bolt or rivet heads shall be of the oval type. The equipment holders shall be planned so as not to obstruct the loading or removal of fire hose.

3.11.6 Equipment compartments. All equipment compartments specified herein shall be made of aluminum with a minimum thickness of 0.090 inch, except when noted otherwise. Compartment doors shall be reinforced for strength and rigidity and be the flush-lap type. Stainless steel door handles shall be recessed in the door and shall be the "D" type handle construction operable with heavy gloved hands. All equipment compartments shall be designed for storage of items that require exposure protection from water and dirt. The doors shall be attached with full length stainless steel piano hinges (hinges are not to be painted). The doors shall be heavy-duty, reinforced, double panel type with exterior plate thickness to be not less than 0.090-inch aluminum, and the interior door panel to be constructed of not less than 0.090-inch aluminum. The compartment doors shall be fully gasketed with heat resistant, neoprene sponge type material to insure a watertight seal. The doors shall be equipped with a Cleveland style stainless steel spring type door hold-open device that will limit door opening but allow for easy one-hand release for closure. Door catches and latches shall be heavy-duty type and shall be corrosion-resistant. Each compartment shall be illuminated. The compartment lights shall be controlled by a master control switch with an indicator light, located on the pump instrument panel. Each compartment light shall have its own individual door switch that will energize the light when the door is opened. A red flashing warning light shall be mounted on the forward area of the cab overhead to warn the driver if there are any compartment doors open or ajar. Electrical connections/connection blocks located inside compartments shall have insulation protection against contact with items stored within the compartments. Provisions shall be incorporated into the compartment design to permit flushing and cleaning of the inside. Design of the compartment shall prevent entry of dirt and water with doors closed. Drip rails shall be provided over each compartment to allow water run-off to be directed away from door tops and sides. Compartment space shall not be compromised to accommodate piping/plumbing.

3.11.6.1 Side equipment compartments. Equipment compartments shall be provided on each side of the body, front and rear of the wheelhousing, approximately flush with the running boards and the wheel skirting. The width of the front side compartment shall be not less than 20 inches. The width of the rear side compartment shall be not less than 24 inches. The height of the front and rear compartments shall be from the running board to the top of the wheelhousing, but shall not be less than 24 inches. Two additional compartments, one on each side forward of the fire pump, shall be provided. These two compartments shall be a minimum of 20 inches wide and as high and deep as practical, with removable back panels to allow access to the pump and transmission. Each compartment, except for the generator compartment, shall be provided with an adjustable shelf located midway between the top and bottom of the compartment. The adjustable shelves shall have an upturned lip of not less than 3/4 inch at the front of the shelf. The left rear (driver's side) compartment shall be for the location of the auxiliary generator. The auxiliary generator compartment shall be ventilated and the method of ventilation shall not allow water or dirt to enter the compartment. The curbside compartment and wheelhousing tops shall be a continuous heavy-duty aluminum diamond plate surface, the same as furnished for the running boards and rear platform surfaces.

3.11.6.2 Air pack compartments. Two compartments shall be provided on the driver's side of the truck over the side equipment compartments and wheel well. The front compartment shall have two brackets, mounted as far forward as

possible, for securing two complete breathing units (self-contained breathing equipment). The brackets shall be identical to the brackets used on the back of the jump seats (see paragraph 3.9.2). Each compartment shall be provided with a door hinged at the top. The compartments shall be the same length as the side body equipment compartments (not less than 100 inches in length). The depth of the compartments shall be not less than 12 inches and shall be the same height as the hose bed (approximately 28 inches). The doors shall be extra heavy-duty and reinforced with cross bracing, and shall be the flush-lap type door. The top hinges of the doors shall be full length stainless steel and shall not be painted. The doors shall have polished stainless steel recessed "D" type handles operable with heavy gloved hands. Doors shall be of the slam shut design, controlled by an over-center, counter balanced spring of the Cleveland style for opening and closing. The compartment top shall be of the heavy-duty aluminum diamond plate surface, the same as furnished for running boards and rear platform surfaces. Two additional spare air bottle compartments shall be installed on each side, one forward and one aft of both rear wheel wells. Each compartment shall have room for one spare air bottle and have a latching flush-lap type door.

3.11.6.3 Rear beavertail/hose bed area. The entire rear section between the hose bed fairings/beavertails shall be heavy duty diamond plate except for the water tower control panel. Install a ladder inside each beavertail that will extend from the rear platform/tailboard to a level even with the bottom of the hose bed. Each ladder shall have two intermediate steps between the tailboard and the bottom of the hose bed. Each step will be approximately 12 inches wide, and five inches deep, not exceed 18 inches in height, support a 500 lb load and have a skid-resistant surface.

3.11.6.4 Engine enclosure. A rectangular shaped, insulated engine enclosure constructed of aluminum shall be provided. The enclosure shall be constructed of heavy-duty diamond plate. Access doors or a tilt-back hood cover shall be furnished to facilitate engine maintenance, service, and repair. When hood panels are provided, they shall be top hinged, fabricated of aluminum diamond plate, and fitted with full length stainless steel hinges. Two work lights with integral switches shall be furnished, one for each side of the engine compartment.

3.11.7 Foam equipment. The fire truck shall be provided with foam equipment as specified herein. The foam system shall be suitable for operation with AFFF, conforming to MIL-F-24385. The system shall be capable of discharging a foam solution of from one to six percent (-0/+1.0 percent) at all pump discharge outlets up to 500 gpm.

3.11.7.1 Foam proportioner. The foam proportioner shall be of the direct injection type meeting all applicable requirements of the NFPA-1901. The AFFF concentrate shall be inducted by venturi action into a line carrying a portion of the solution from the fire pump intake and shall mix with the main water flow. A metering valve shall be provided in the foam liquid line leading into the venturi for controlling the amount of foam liquid entering the venturi. The foam liquid metering valve shall be calibrated and provided with a dial and pointer to regulate the proportioning to discharge percentage of foam liquid to total solution. The dial and pointer shall not be on the bottom of the foam metering valve. The metering valve shall have provisions for adjustments in the field to accommodate for a one to six percent foam solution.

3.11.7.2 Foam controls. All controls for operating the foam system shall be chrome plated, grouped together, readily accessible to the operator and located on the fire pump operator's control panel. A foam metering chart reflecting visible settings from 0-500 gpm shall be provided and shall be mounted on the pump operator's control panel adjacent to the foam metering control device.

3.11.7.3 Foam liquid tank. A removable commercially available 100-gallon minimum capacity foam liquid tank shall be provided. The foam liquid tank shall be constructed of 12-gauge stainless steel. The foam liquid tank shall be located in the pump compartment above the pump. A 1-1/2 inch drain, with discharge at a point below the bottom of the truck frame and equipped with a valve control extended to the fire pump operator's control panel, shall be provided. Adequate provisions shall be made for filling the foam tank directly from individual five-gallon containers. The tank configuration and positioning shall provide for liquid level monitoring by dipstick through a filler hole or an additional capped hole in the top of the tank. A dipstick, accurately marked and calibrated shall be provided for checking the foam level. Stowage for the dipstick shall be provided near the foam tank. The tank shall have the filler opening located as not to interfere with monitor operation, and shall be provided with a tight, gasketed, hinged cap, having a spring type holddown catch. A removable strainer of not greater than No. 4 stainless steel mesh shall be provided in the tank fill opening to prevent entry of foreign matter. The foam tank shall include a minimum one-inch vent that will not permit spillage of foam when the truck is operated to verify performance requirements of paragraph 3.6 or when cornering the truck on a 90-degree turn both left and right, and the outlet shall be designed to prevent vortexing.

3.11.7.4 Foam system piping. All fittings, valves, and piping shall be of material that is fully compatible with the AFFF concentrate, water, and their admixtures. Quarter-turn ball valves shall be installed between the foam tank and metering valve and between the fire pump discharge and the eductor. A ball check valve shall be installed between the eductor and metering valve to prevent flow of water into the foam tank. A horizontal swing check valve shall be installed in the water tank suction line to prevent entry of foam solution into the water tank.

3.11.8 Rear platform and running boards. The fire truck shall be provided with a rear platform and running boards. Construction of the rear platform shall utilize the beavertail design. The beavertail shall be an integral part of the body side panels. The rear platform shall have a load-carrying capacity of not less than 700 lb. The rear platform length shall be equal to the width of the truck and not less than 18 inches in depth. The rear platform shall have rounded corners, and shall have a rear downward flange of at least two inches. The side running boards shall extend from the rear of the cab to the side equipment compartments and extend out to a point flush with the truck body and be equipped with six-inch high scuff plates all around. Each running board shall have a load-carrying capacity of not less than 500 lb. The rear platform and running boards shall have aluminum nonslip tread surfaces. The running boards and rear platform shall be located on the same horizontal plane of the truck cab and body. The rear platform and running boards shall be 22 inches (+2 or -2 inches) above ground level, with the truck loaded as specified in 3.8.1.

3.11.9 Handrails and grab rails. The rear platform shall be provided with two vertical grab rails, one at each side, to assist personnel in climbing onto the rear platform. A horizontal handrail shall be provided not more than six inches forward of the rear end of the hose bed and not more than 72 inches above the rear platform. A handrail shall be provided at the top of the right and left sides over the pump compartment and shall be the length of the pump compartment. The handrails and grab rails shall be 1-1/4 inch maximum diameter chromium plated brass or chromium plated steel. The handrails and grab rails shall be of the non-twist type and be provided with non-slip protection.

3.11.10 Personnel steps. Personnel steps, in accordance with NFPA-1901, shall be provided to assist personnel in gaining access to various firefighting body components. As a minimum, steps shall be provided on the forward end of the body, mounted on each side of the truck. Also, steps shall be provided at the rear of the truck, inboard of the beavertail, on each side of the rear platform for access to the hose bed. The maximum stepping height shall not exceed 18 inches with the exception of the ground to the first step. All steps shall sustain a static load of 500 lb, have skid-resistant surfaces, have a minimum area of 35 square inches and be arranged to provide a minimum eight-inch clearance between the front of the step and any obstruction.

3.11.11 Fire truck equipment. The following fire truck equipment shall be provided:

a. Two lengths of five-inch hard suction hose, each 10 feet long, with five-inch NH long handle couplers on female ends, and five-inch NH rocker lug couplers on male ends. The suction hose shall conform to the requirements of NFPA-1901. The couplers shall be made of lightweight material. The hard suction hose shall be packaged securely and shipped to the consignee with the truck.
b. One five-inch suction strainer, cylindrical, corrosion-resistant type, with NH female coupling. The suction strainer shall be made of lightweight material.
c. Quick-release fastening devices shall be provided on the right (curbside) of the truck, above the wheel well to securely mount the following complement of ladders and pike pole. All ladders shall conform to NFPA-1931 and shall be of aluminum alloy.

    (1) One 10-foot folding attic ladder.
    (2) One 12-foot roof ladder with folding hooks.
    (3) One 28-foot, three-section tongue and groove constructed ladder with a closed length not to exceed 15 feet.
    (4) One 10-foot fiberglass pike pole.

3.12 Water tower. A water tower, telescoping type, with not less than 50 feet attainable height shall be furnished. The water tower shall meet or exceed the requirements of NFPA 1901. A third party TEST and CERTIFICATION shall be provided after complete assembly of the tower/ladder on the chassis. The water tower shall be rear mounted, hydraulically operated and capable of delivering 1,000 gpm flow through a commercially available variable pattern water and foam nozzle. The water tower shall be constructed of aluminum in a box beam design and equipped with an escape ladder. The nozzle shall be hydraulically operated from both the boom tip and the main control panel at the rear of the fire apparatus. The water tower unit shall be equipped with telescoping stabilizing

outriggers which will allow the tower to deliver full rate horizontal flow rotated perpendicular to the longitudinal axis of the vehicle at full vertical extension.

3.12.1 Mainframe assembly. The mainframe assembly shall be a welded steel structure, pedestal type, providing a mounting base for the attachment of the telescopic water tower equipment to the truck chassis frame at the rear of the hose bed. The welded steel pedestal shall not exceed 20 inches in width and a 504 square inch area. All hydraulic valving, hydraulic filters, four-inch gear operated butterfly valve, and all controls for the telescopic water tower are to be mounted within the pedestal mainframe. The rear control panel on the pedestal mainframe is to be easily removable in order to service the above components.

3.12.2 Turntable assembly. The turntable assembly shall be a welded steel structure attached to the mainframe pedestal assembly on a shear ball turntable bearing. Three hundred and sixty degree continuous rotation in either direction shall be provided by a hydraulic motor. A motion control lock valve is to be provided in the rotation hydraulic circuit to provide positive control during rotation and cushioned stops in case of accidental rapid stop or reversals. A back-up system shall be provided to enable the operator to rotate the turntable in the event of a loss of power. Since the apparatus specified will be operated as a standard fire pumping engine, without use of the water tower, it is imperative that mounting dimensions and performance features of the water tower not interfere in any way with each and every normal function and operation of a standard pumping engine.

3.12.3 Stabilizing ground jacks or outriggers. Two hydraulically operated outriggers are to be provided for stabilizing the apparatus during operation of the water tower/aerial ladder. The outriggers shall be of the telescopic "A" frame type, located one on each side behind the rear wheels, in the area of the centerline of rotation of the turntable. They shall be placed so installation will least detract from the amount of space in standard compartments. Each outrigger leg shall be extended and retracted by a single hydraulic cylinder equipped with a pilot operated check valve to hold the outrigger in the operating position. Hydraulic cylinders shall be enclosed within the outrigger leg and housing to provide protection for the hydraulic cylinder rod. The electrically operated hydraulic control valve for the outriggers shall be installed within the pedestal mainframe with two electrical remote switches, one located on each side, so the operator can view each outrigger being extended or retracted. An outrigger/boom interlock system shall be provided to render the boom inoperative until both outriggers are extended, deployed, and sensing pressure. The outriggers shall be inoperable until the boom is returned to the nested position. The system shall have two indicating lights on the rear control panel; one light will indicate the outriggers are not set/deployed and the other light will indicate when the boom can be operated. An audible alarm shall sound whenever the outriggers are in motion. The stabilizer legs shall be painted or striped with reflective material. Two double-face red flashing warning lights shall be provided, one on each outrigger shoe, and connected to the water tower/aerial ladder master switch. Two 24" x 24" outrigger bearing pads, one mounted in a slide-out rack near each outrigger, shall be provided and mounted in holders.

3.12.4 Boom construction. To insure a high strength weight ratio, the boom shall be constructed of two high strength alloy aluminum members, one to telescope within the other. To assure close tolerances and interchangeability of booms, both boom members shall be constructed of two mated, one piece, extruded aluminum U-channels, securely welded together at the center of each side by continuous welding process. The U-channels are to be held in a rigid jig or fixture while being welded. After fabrication and prior to assembly, boom sections must be steam cleaned and properly prepared to provide good adhesion of primer and finish paint. The portion of the telescoping section of the boom that remains inside the base section of the boom will be primed and finish painted White, prior to assembly of the boom. A 14-foot long by 12-inch wide panel shall be affixed to each side of the base boom section, painted White and lettered with Black letters: U.S. NAVY. The inner extensible member of the boom shall ride on slide pads. The extension motion will be actuated by a hydraulic cylinder, enclosed within the boom to protect the cylinder and cylinder rod against accidental damage and exposure to the accumulation of dirt, ice, and/or other foreign material. The boom shall be raised and lowered by a single hydraulic cylinder. To provide the largest possible field of operation and maneuverability of the boom, it shall be capable of travel from at least 10 degrees below horizontal to 85 degrees vertical. Hydraulic holding valves shall be provided on the boom raising and extending cylinder to provide maximum control and safety. The valves shall lock the boom in position in the event of a loss of hydraulic pressure. The boom raising cylinder shall provide a smooth stop at maximum cylinder rod extension to prevent undue shock loads to the boom, turntable and mounting pedestal when the boom reaches its maximum 85 degree angle of elevation. The pin where the boom attaches to the turntable shall be plated for corrosion resistance and shall allow for the passage of water through the boom swivel joints. Adequate bearing capacity shall be provided.

3.12.5 Hydraulic system. Hydraulic power for all operations shall be supplied by a hydraulic pump driven by SAE power takeoff, with flow control provided to allow for operation of the water tower and midship pump simultaneously. A hot shift PTO shall be provided when the type of transmission being used requires it. The hydraulic system shall be of the load sensing type operating at 300 psi standby and 3000 psi maximum pressure. This system shall provide required power for simultaneous operation of all boom, turntable, and nozzle functions. Speed control shall be provided for all functions to allow for operation of the water tower and midship pump simultaneously. The secondary hydraulic system shall provide for all nozzle operations. An eight-gallon capacity hydraulic reservoir shall be furnished and installed. The filters for the hydraulic system shall consist of a sump strainer filter, installed inside the hydraulic oil reservoir, and a three-micron absolute filter for filtration of hydraulic oil on the pressure lines, installed inside the mounting pedestal so that it is accessible from underneath and/or by removal of a panel at the rear. The pressure line filter is to be equipped with a telltale warning system to indicate when the filter requires servicing. For continued operation in the event of a loss of hydraulic pressure from the SAE power takeoff hydraulic pump, an auxiliary hydraulic pump shall be furnished. The pump shall be powered by the two-volt battery system on the apparatus with an actuating switch at the rear platform control station for each set of batteries furnished.

3.12.6 Waterway system. The waterway system shall consist of the following: two quarter turn gated 2-1/2 inch inlet/outlet valves, with a female swivel and minimum 30-degree sweep elbows, conveniently located on each side at the rear of

the apparatus, piped into the waterway to serve as inlets for supplying the water tower from another pumper or source, and as pump discharge outlets when the water tower is not in use. Waterway passage from rear inlets shall be a four-inch vertical pipe through the mounting pedestal and turntable. There shall also be a four-inch waterway from the vertical pipe to the front of the mainframe, which shall be connected to a 3-1/2 inch valve on the pump discharge, with the valve control at the pump panel so the water tower can be supplied from the pump. An automatic relief valve shall be installed in the water piping from the pump to the four-inch front inlet pipe to the water tower waterway. A four-inch, gear-operated, butterfly valve shall be provided in the four-inch vertical pipe within the mainframe pedestal with a control wheel for adjustment or complete shut-off of water flow to the water tower when not in use. The water piping on each side of the boom base section shall be three-inch aluminum, and 2-1/2 inch hard anodized aluminum on the extensible section installed inside three-inch tubing on the base section with a leakproof self-lubricating slip joint seal. Waterways and slip joint(s) must be mounted externally on the boom to facilitate repair and replacement. A remotely controlled nozzle shall be attached to the outer end of the boom by a monitor mechanism whereby the nozzle can be elevated in a vertical plane with a maximum travel of 250 degrees and have a lateral sweep of 90 degrees (45 degrees either side of center). Functions of elevation and sweep shall be independent of each other and each controlled by a switch or lever so that the range of sweep, in a plane, is the same regardless of the position of the boom or elevation of the nozzle. Operation of the nozzle and monitor shall be arranged, and suitable stops provided, so that it is impossible for the nozzle to be placed in any position whereby the stream would endanger a person standing on the end of the ladder to operate the monitor. The stream pattern shall be variable from straight to full fog pattern. The nozzle shall provide for flow capacities varying from 300 gpm to 1,000 gpm with pressure automatically controlled within the nozzle so as to provide the most efficient stream possible with the flow capacity available. The functions of sweep, elevation and stream pattern are to be remotely controlled, independent of each other, by three individual switches conveniently located at the rear control station and by a duplicate set of three switches at the top of the boom. Stainless steel quick disconnects shall be provided in the nozzle pattern hydraulic lines to facilitate removal of the nozzle. The underside of the outer end of the boom shall be provided with a recess whereby the nozzle can be retracted into the recess when not in use and protected from damage.

3.12.7 Escape ladder. The boom shall be equipped with a permanently installed ladder to provide rescue capability and access to the tip of the boom whereby a fire fighter can control the nozzle functions with controls located there and have the advantage of being able to see that the stream is being directed properly. A two-section aluminum ladder shall be securely installed on top of the boom and permanently attached so the upper section extends and retracts with the extensible portion of the boom. The width of the ladder between rails shall not be less than 24 inches on the base section and 18 inches on the extensible section. Tubular aluminum hand rails of not less than 1-1/2 inch diameter shall be securely installed on top of the ladder on each side of both sections and will be not less than 12 inches above the ladder rungs. The rungs will be covered with corrugated rubber and be not less than seven inches above the boom measured from the centerline of the rung. The next to last rung on the extendable section of the ladder is to be angled downward approximately 12 degrees to provide a convenient access for personnel to get on and off the

ladder from structures when used as an aerial ladder. Fold down steps shall be installed on ladder rails, on each side, at the fifth rung from the top of the ladder, to provide a secure, comfortable place to stand for persons operating the nozzle, using the controls at the top of boom. The extensible section of the ladder shall extend and retract on slide pads and ladder guides. A rung alignment indicator shall be provided with the indicator light visible from the operator's control station. A panel with three switches, to control the nozzle elevation, sweep and stream pattern, shall be installed on the upper boom and located so that a person standing on the folding steps can control the nozzle from this vantage point.

3.12.8 Rear platform control panel. The rear control station shall be located at the rear of the mainframe mounting pedestal. The control panel shall be adequately lighted for night operation and easily removable for servicing hydraulic components within the mainframe pedestal. A minimum of a 30-inch deep rear step shall be provided for. An operator standing on the rear step shall be provided with the following controls, conveniently mounted on the control panel:

a. Master 12 volt electric switch.
b. Vernier throttle to control engine speed pump pressure.
c. Three control switches to operate the nozzle functions.
d. Pump vacuum gauge.
e. Hand-wheel with spinner to control four-inch butterfly valve.
f. Water pressure gauge connected to a four-inch pipe at the base of the center post to indicate inlet water pressure.
g. Two 12-volt switches to operate the emergency electric hydraulic pump on either A or B battery system.
h. Switch for accelerated idle control.
i. Outrigger/boom interlock system lights.
j. Hydraulic system pressure gauge.
k. Inclinometer for side to side leveling.
l. There shall be a single or closely grouped individual control to actuate all boom movements; lower, extend, retract and rotate right or left, so the operator has the other hand available to operate the switches for the nozzle movement simultaneously with the boom movements and to control the throttle. Individual boom controls must be capable of simultaneous operation. The controls shall be of the spring-loaded return to neutral type, mechanically connected to hydraulic valve(s) having fine metering qualities for precise movement of all boom functions.

3.12.9 Communication system. An intercom system shall be furnished and installed to provide three-way communication between the tower control station, top of the ladder, and pump panel station.

a. A transistorized 12-volt intercom system, weather resistant "push-to-talk" microphones and waterproof speakers shall be installed at the lower control station and pump panel station.
b. A transistorized 12-volt intercom station and waterproof speaker shall be mounted in a protected position at the tip of the ladder that will allow "hands-free" operation.
c. An individual volume control shall be provided at each intercom location.

3.12.10 Performance capabilities. The boom shall be so constructed and powered that it will be capable of performing all intended functions when the unit is operated on firm, level ground, with the outriggers completely extended and properly set:

a. The boom, fully extended, tip unsupported, shall support and resist the reaction of the nozzle in any normal position of operation, discharging up to 1,000 gpm with the boom at any angle from at least 10 degrees below horizontal.
b. At any angle between 45 degrees and 75 degrees, with boom fully extended, tip unsupported, the unit shall support the reaction of the nozzle discharging up to 1,000 gpm with a tip load of 300 lb or 600 lb evenly distributed.
c. With the ladder only in use, the boom fully extended between 0 degrees and 45 degrees (no water delivery) and tip unsupported, the boom shall support a tip load of 400 lb or 800 lb evenly distributed.
d. With the ladder only in use, with boom fully extended between 45 degrees and 75 degrees (no water delivery) and a tip unsupported, the boom shall support a tip load of 800 lb or 1,600 lb evenly distributed.

3.13 Cleaning, treatment and painting. All fire truck surfaces shall be cleaned and treated in accordance with MIL-T-704, Type A. The surfaces to be painted shall have a primer applied to a dry film thickness of 1.5 - 2.5 mils. The primer used shall be compatible with the final paint system. The finish paint shall be polyurethane enamel or equal, applied to a dry film thickness of not less than 2.5 mils. The finish color shall be Lime Yellow, number 13670 of FED-STD-595 and shall be applied to the exterior surfaces of the truck cab, chassis, body and hose beds. The roof and upper part of the cab, down to a line at the bottom of the windshield, shall be painted White, color chip No. 17886 of FED-STD-595. A white reflective glow, horizontal "accent" band 10 inches wide, shall be installed along the sides, the full length of the truck and in a plane with the headlights. The reflective band shall also be installed across the front of the cab if there is no metal trim installed. The interior surface of equipment compartments shall be painted with spatter type paint to reduce problems in repainting due to chipping from equipment storage. Running boards, compartment tops, steps, rear platform, scuff plates, and engine cover shall be bright, unpainted aluminum. The cab interior shall be primed and finish painted with two coats of Black Wrinkle paint. The disk wheels shall be painted the same as the exterior color. Rims, tire locking rings and lugnuts, treated with permaplate or other similar corrosion-resistant treatment, need not be painted.

3.14 Rustproofing. The fire truck cab, frame, wheel wells, and all exposed body components shall be protected against rust and oxidation in accordance with FED-STD-297.

3.15 Identification plate. Identification plates shall be furnished as specified in the procurement document for each fire truck. The contractor shall stamp all the necessary data in the blank spaces provided for that purpose and securely affix the plate to each fire truck on the forward inside wall of the cab, with nonferrous screws or bolts not less than 1/8 inch id. The following nomenclature shall be stamped on the identification plate: "TRUCK, FIREFIGHTING, 1,000 GPM, 4 X 2."

3.16 Identification marking. Identification markings and registration numbers for the fire truck shall be in accordance with MIL-STD-1223, as specified for the Navy. When the rear body surface warrants, the USN may be affixed upon a plate of sufficient size and attached to the raised license plate mounts.

3.17 Instruction plates. Plates shall be of nonferrous base alloy metal or stainless steel and secured to the truck with screws or rivets. The following plates shall be provided:

a. A plate indicating the fire pump delivery rate in gpm at 150, 200, and 250 psig pressure, with manufacturer's specified engine speeds, shall be affixed to the fire pump operator's control panel.
b. All pumping controls, valves, instruments, and such fire truck operating controls shall be provided with suitable instruction plates conspicuously marked to identify the lubricants and their temperature range.

3.18 Lubrication. Means for lubrication shall be in accordance with the manufacturer's standard practice. The lubricating points shall be easily visible and accessible. Hydraulic lubrication fittings shall be in accordance with SAE J534. Where use of high pressure lubricating equipment, 1,000 pound-force per square inch (psi) or higher, will damage grease seals or other parts, a suitable warning shall be affixed to the truck in a conspicuous location.

3.19 Servicing and adjusting. Prior to acceptance of the truck by the Government, the contractor shall service and adjust the truck for immediate operational use as required in the operator's manual. The servicing and adjusting shall include at least the following:

a. Inflation of all tires.
b. Adjustment of brakes.
c. Proper functioning of all lighting and electrical systems.
d. Wheel alignment.
e. Adjustment of engine to include tune-up.
f. Complete lubrication with grades of lubricants recommended for ambient temperature at the delivery point.
g. Cooling system filled to capacity with a clean solution of equal parts by volume of water and antifreeze (ethylene glycol).

3.20 Workmanship.

3.20.1 Metal fabrication. The metals used in fabrication shall be free from kinks, sharp bends, and other conditions which would be deleterious to the finished product. Manufacturing processes shall not reduce the strength of the metal to a value less than intended by the design. Manufacturing processes shall be done neatly and accurately. All bends shall be made by controlled means to insure uniformity of size and shape.

3.20.2 Bolted connections. Bolt holes shall be accurately punched or drilled and shall have the burrs removed. Washers or lockwashers shall be provided in accordance with good commercial practice and all bolts, nuts and screws shall be tight.

3.20.3 Riveted connections. Rivet holes shall be accurately punched or drilled and shall have the burrs removed. Rivets shall be driven with pressure tools and shall completely fill the holes. Rivet heads, when not countersunk or flattened, shall be of approved shape and of uniform size for the same diameter of rivet. Rivet heads shall be full, neatly made, concentric with the rivet holes and in full contact with the surface of the member.

3.20.4 Welding. Welding procedures shall be in accordance with a nationally recognized welding code. The surface of parts to be welded shall be free from rust, scale, paint, grease or other foreign matter. Welds shall be of sufficient size and shape to develop the full strength of the parts connected by the welds. Welds shall transmit stress without permanent deformation or failure when the parts connected by the weld are subjected to proof and service loadings.

3.20.5 Castings. All castings shall be sound and free from patching, misplaced coring, warping or any other defect which reduces the castings ability to perform its intended function.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection and test requirements, and will provide all test instruments and test site locations as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items must meet all requirements of Sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor’s overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of 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 accept defective material.

4.1.2 Component and material inspection. Components and materials shall be inspected in accordance with all the requirements specified herein and in applicable referenced documents.

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

a. First article inspection (see 4.2.1).
b. Quality conformance inspection (see 4.2.2).

4.2.1 First article inspection. The first article inspection shall be performed on one truck when a first article is required (see 3.2, 6.2, and 6.4). This inspection shall include the examination of 4.3 and the tests of 4.4. The first article may be either a first production item or a standard production item from the supplier's current inventory, provided the item meets the requirements of the specification and is representative of the design, construction and manufacturing technique applicable to the remaining trucks to be furnished under the contract.

4.2.2 Quality conformance inspection. The quality conformance inspection shall be performed as specified herein. This inspection shall include the examination of 4.3, the tests of 4.5 and the packaging inspection of 4.6.

4.3 Examination. Each truck shall be examined for compliance with the requirements specified in Section 3 of this specification. Any redesign or modification of the contractor's standard product to comply with specified requirements, or any necessary redesign or modification following failure to meet specified requirements shall receive particular attention for adequacy and suitability. This element of inspection shall encompass all visual examinations and dimensional measurements. Noncompliance with any specified requirements or presence of one or more defects preventing or lessening maximum efficiency shall constitute cause for rejection.

4.4 First article tests. When a first article is required, the first article shall be tested as specified in 4.4.1 through 4.4.4. The first article tests shall be performed by the contractor under the direction, and in the presence of Government representatives, and documented in accordance with DD Form 1423 requirements. Failure to pass any phase of the required tests shall be cause for rejection.

4.4.1 Operational tests. The fire truck shall be loaded as specified in 3.8.1 and operated to verify performance requirements of 3.6a through 3.6h. During these tests, the functioning of the engine, power train, brakes, steering, truck and body lighting systems, controls and instruments shall be observed for effective operation. A load distribution test shall be conducted to determine that the percentage of gvw at the front axle complies with 3.8.1. The steering mechanism shall be tested to verify conformance to the requirements of 3.8.14.

4.4.2 Fire pump tests. All tests specified in paragraphs 4.4.2.1 through 4.4.3.1 shall have all test results recorded on the Apparatus Pump/Service Test Report form with one copy included as part of First Article Test Report and one copy included with the fire truck manuals.

4.4.2.1 Pressure tests. The pump shall be tested hydrostatically at a pressure of 350 psig for 10 minutes to determine conformance to 3.10. The pump pressure tests may be performed by the pump manufacturer prior to installation on the truck.

4.4.2.2 Run-in test. A two-hour run-in test shall be performed by the pump manufacturer in accordance with NFPA 1901.

4.4.2.3 Capacity and component test. Tests shall be conducted by the truck manufacturer in accordance with the test procedures of NFPA 1901. All tests shall be performed with calibrated instruments. Copies of calibration certificates shall be included with the test report. The following tests shall be performed:

a. A vacuum test, using the priming pump, with a capped suction at least 20 feet long, shall develop 22 inches of vacuum and hold the vacuum with a drop of not more than 10 inches in 10 minutes. The primer shall not be used after the 10 minute test period has started. The capping device shall allow the hose interior to be observed under the suction tests. The discharge outlets of the pump shall be uncapped.
b. The pump, while drafting water with a minimum lift of 10 feet through 20 feet of five-inch suction hose, shall deliver, in a continuous operational test, a minimum of:

(1) 1,000 gpm at 150 psig net pump pressure for 2 hrs.
(2) 700 gpm at 200 psig net pump pressure for 1/2 hr.
(3) 500 gpm at 250 psig net pump pressure for 1/2 hr.

c. The pump, while drafting water with a minimum lift of 10 feet through 20 feet of five-inch suction hose, shall deliver, in a continuous operational test, a minimum of 1,000 gpm at 165 psig net pump pressure for 10 minutes.
d. A test shall be conducted to verify that the relief valve performs in accordance with 3.10.4.
e. The pump shall deliver a minimum of 500 gpm from the water tank to determine conformance to 3.10.

4.4.3 Foam system test. The foam system shall be tested using AFFF conforming to MIL-F-24385. The metering valve shall be set to deliver three percent of foam solution for not less than one minute while discharging 250 gpm through the rear 2-1/2 inch discharge with 100 feet of 2-1/2 inch hose and fog nozzle. Failure to use at least 15 gallons of foam liquid per minute, at three percent, shall constitute failure of this test.

4.4.3.1 Boom tip nozzle test. The boom tip nozzle shall be tested with AFFF for one minute at 500 gpm. At least 30 gallons of AFFF shall be used during the test. The nozzle shall be tested to verify a water flow rate of at least 1,000 gpm when drafting through the side suction connection.

4.4.4 Auxiliary generator test. A test shall be conducted to verify that the auxiliary generator conforms to the requirements of 3.8.6.3.

4.4.5 Production sample. Upon acceptance of the first article unit, it shall remain at the manufacturing facility as a production sample, and shall be the last fire truck shipped on the contract. The first article unit shall be reconditioned, including replacement of abnormally worn parts and paint touch-up or repainting, prior to delivery to enable it to be accepted as a contract item. The contractor shall maintain the first article in a serviceable condition for the duration of the contract.

4.5 Quality conformance tests. Each production truck, loaded as specified in 3.8.1, shall be operated and tested as follows:

a. Five miles over paved roads at maximum speed of not less than 60 mph.
b. Five miles over graded dirt roads at maximum speeds of not less than 25 mph.
c. Steering mechanism shall be tested to verify conformance to the requirements of 3.8.14.

During these tests, the functioning of the engine, power train, brakes, truck and body lighting systems, controls, and instruments shall be observed for effective operation.

4.5.2 Production truck fire pump tests. The fire pump on each production truck shall be tested in accordance with the requirements of 4.4.2.3. Meter readings of all tests performed shall have the results recorded on the Apparatus Pump/Service Test Report form and delivered in accordance with DD Form 1423 requirements.

4.5.3 Production truck foam system test. The foam and monitor system on each production truck shall be tested in accordance with 4.4.3 and 4.4.3.1, except water may be used in lieu of foam concentrate in the foam tank. All tests performed shall have the results recorded on the Apparatus Pump/Service Test Report form and delivered in accordance with DD Form 1423 requirements.

4.6 Packaging inspection. The preservation, packing, and marking of the truck shall be inspected to verify conformance to the requirements of Section 5.

5. PACKAGING

5.1 Vehicle processing. The equipment shall be preserved and packed in accordance with the contractor’s standard practice. When specified (see 6.2), equipment shall be preserved and packed in accordance with the mobile requirements of MIL-V-62038, with the level of preservation and packing as specified (see 6.2).

APPARATUS PUMP/SERVICE
TEST REPORT

EQUIPMENT DESCRIPTION		Test Date	Test Location
USN No.	Model No.	Ambient Temp.	Altitude
Contract No.	Manufacturer	Engine Mfg.	Engine Serial No
Pump Mfg.	Pump Model	Pump Capacity	Pump Type

TEST DATA AND RESULTS

Capacity Test 150 PSI 2 Hrs.

Coolant Temp. Min	Coolant Temp. Max	Oil Pressure Min	Oil Pressure Max	Max Vacuum Inches	Primer Time	Suction Size	Suction Hose Length	Suction Lift

Layout

	RPM		Pump Pressure				
Time	APPAR TACH.	TEST TACH.	APPAR GAGE	TEST GAGE	Pitot Reading	GPM	Net Pump Pres.

Overload Test - 10 Min.

Coolant Temp. Min	Coolant Temp. Max	Oil Pressure Min	Oil Pressure Max	Max Vacuum Inches	Primer Time	Suction Size	Suction Hose Length	Suction Lift

Layout

Nozzle Size

APPARATUS PUMP/SERVICE (cont'd)
TEST REPORT

Time	RPM APPAR TACH.	RPM TEST TACH.	Pump Pressure APPAR GAGE	Pump Pressure TEST GAGE	Pitot Reading	GPM	Net Pump Pres.

PRESSURE TEST 200 PSI - 30 MIN

Coolant Temp. Min	Coolant Temp. Max	Oil Pressure Min	Oil Pressure Max	Max Vacuum Inches	Primer Time	Suction Size	Suction Hose Length	Suction Lift
Layout								

Time	RPM APPAR TACH.	RPM TEST TACH.	Pump Pressure APPAR GAGE	Pump Pressure TEST GAGE	Pitot Reading	GPM	Net Pump Pres.

PRESSURE TEST 250 PSI - 30 MIN

Coolant Temp. Min	Coolant Temp. Max	Oil Pressure Min	Oil Pressure Max	Max Vacuum Inches	Primer Time	Suction Size	Suction Hose Length	Suction Lift
Layout						Nozzle Size		

APPARATUS PUMP/SERVICE
TEST REPORT (cont'd)

Time	RPM APPAR TACH.	RPM TEST TACH.	Pump Pressure APPAR GAGE	Pump Pressure TEST GAGE	Pitot Reading	GPM	Net Pump Pres.

Final Results

FUNCTION	CAPACITY (150 PSI)	200PSI	250PSI
Duration (time)			
Ave.Nozzle Pres			
Ave. Pump Pres			
GAGE			
Correction			
Corrected			
Pump Pres.			
GPM			
RPM Engine			
RPM Pump			

*Hydrostatic Test (350 PSI - 10 Min.)

*Relief Valve Test:
*Tank to Pump Test:
*Discharge Test (boom tip):
*Foam System Test:
*Dschrg Test(Hose):Rear 2-1/2"
*Cross Beds - 1-1/2" (Three)
*Flow Meter Calibration:
*Boom Tip - 1,000 GPM
*2-1/2"Dschrg Outlets 500 GPM:
*1-1/2"Dschrg Outlets 150 GPM:
*Witnessed By:

*Contractor ----------

*Government ----------

*Dschrg = Discharge

6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

6.1 Intended Use. The fire truck specified in this specification is intended to be used to suppress structural fires.

6.2 Acquisition Requirements. Acquisition documents should specify the following:

a. Title, number, and date of this specification.
b. 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).
c. When first article is required for inspection and approval (see 3.2, 4.2.1, and 6.4).
d. When engine coolant heater is required (see 3.8.2.2).
e. When a spare wheel or rim is required (see 3.8.12.2).
f. When MIL-V-62038 preservation is required, and the level of preservation and packing required (see 5.1).

6.3 Data requirements. When this specification is used in an acquisition and data are required to be delivered, the data requirements shall be developed as specified by an approved Data Item Description (DD Form 1664) and delivered in accordance with the approved Contract Data Requirements List (CDRL), incorporated into the contract. When the provisions of DoD Federal Acquisition Regulations (FAR) Supplement, Part 27, Sub-Part 27.475-1 (DD Form 1423) are invoked and the DD Form 1423 is not used, the data should be delivered by the contractor in accordance with the contract or purchase order requirements.

6.4 First article. When a first article inspection is required, the item will be tested and should be a first production item or it may be a standard production item from the contractor's current inventory as specified in 4.2.1. The first article should consist of one unit. The contracting officer should include specific instructions in acquisition documents regarding arrangements for examination, test and approval of the first article.

6.5 Subject term (key word) listing.

Diesel engine
Fire extinguishing truck
Performance

Preparing Activity:
Navy - YD

(Project 4210-N450)