United States Department of Agriculture

Model 328/348
Type 3H Fire Engine Body Only Specification

Issue Date: May 2025

Supersedes: March 2023

Forest Service

National Technology and Development Program

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Record of Revisions

Date	Revision summary
April 2009	• Initial Release
March 2018	• Revised Chapter 1 in its entirety • Revised pump cooler/pump bypass in its entirety • Amended rear view backup camera • Added tire pressure monitoring system • Amended tires and wheels • Added NFPA speed limitation requirement • Amended AM/FM radio • Amended compartmentation requirements • Amended body design requirements • Amended compartment door requirements • Amended body construction requirements • Amended body subframe requirements • Amended electronic siren and controller • Amended traffic warning system requirements • Amended battery master switch • Revised key portions of Chapter 5 • Revised numerous sections of Chapter 6 • Amended forward upper zone a/b/d lightbar

Date	Revision summary
	• Amended zone C warning lights • Amended scene lights • Amended rear side cab step storage • Revised pump general info • Revised pump shaft • Revised pump impeller • Revised pump body and seals • Revised pump drive unit construction • Revised Addendum A
March 2020	• Updated specification title • Revised diesel engine • Revised fuel tank • Removed pressure relief valve
October 2020	• Amended electronic siren controller requirements • Amended traffic warning system requirements • Amended taillight and turn signal requirements • Amended directional light bar requirements
January 2022	• Added connected diagnostics • Updated radio to Bluetooth • Added number of shelves to be included • Added shelf construction • Added number and placement of shelves • Added compartment dimensions • Revised backup alarm requirements • Added do not move apparatus warning • Revised transmission control requirements • Added valve labeling requirement • Amended vehicle markings • Added door decal • Amended chassis requirement to include both model 328 and 348
October 2022	• Revised Tire Pressure Monitor System (TPMS)
March 2023	• Revised back up alarm • Changed NFPA 1906 to NFPA 1900

Date	Revision summary
	• Revised hose reel compartments
May 2025	• Changed section 2 to reference only • Revised auxiliary light
[Future revisions]	• This space is reserved for future revisions.

1 — General

1.1 General

1.1.1 The intent of this specification is to provide a four-door 37,000 lb. GVWR, crew cab fire engine with 750 gallons of usable water. This specification shall be for the two-wheel drive model (Model 328) and the four-wheel drive model (Model 348).

1.2 NFPA 1900 Compliance

1.2.1 The apparatus described in this specification shall be compliant with the requirements of NFPA 1900, latest edition, except where noted. Any deviations from NFPA 1900 shall be noted in this specification or shall be approved in writing by the Government.

1.3 Weight Requirement

1.3.1 The in-service weight shall not exceed 90% of the front axle GAWR and 20,000 lbs. on the rear axle when:

- fully loaded with water, foam, and fuel
- with 250 pounds per seat, and
- 2300 pounds of equipment evenly distributed in the storage compartments

1.4 Height Requirement

1.4.1 Apparatus body height shall not exceed the chassis height. Completed apparatus height shall not exceed 125 inches, including the exhaust stack and light bar, unless approved by the Government.

1.5 Tilt Test

1.5.1 The apparatus shall pass a tilt test at the estimated in-service weight in accordance with NFPA 1900 tilt test criteria prior to acceptance by the Government.

1.6 Ramp Break-Over Angle

1.6.1 The ramp break-over angle shall be maintained with the installation of the fire package.

1.7 Apparatus Body Height

1.7.1 The apparatus body height shall be closely matched to the chassis height.

1.8 In-Service Weights and Center of Gravity

1.8.1 The apparatus builder shall submit estimated in-service weights (minus equipment) for the completed apparatus, including the front axle, rear axle, and combined weight.

1.8.2 The apparatus builder shall submit estimated horizontal and vertical center-of-gravity for the completed apparatus.

1.8.3 The apparatus builder shall submit estimated front axle and rear axle weight distribution percentages, including front to rear axle ratio.

1.9 Specification Deviations

1.9.1 Deviation from the chassis or apparatus body specifications shall not be allowed without prior written approval. Any requested deviations must be submitted in writing to the Government. Verbal requests will not be considered.

1.10 Brand Name or Equivalent Products

1.10.1 Products equivalent to the brand name components specified herein may be approved by the Government. Equivalent products shall not be used unless approved in writing by the Government prior to contract award and documented in the resultant contract. After the contract award, approvals for equivalent products may be considered, and if approved, shall be documented in writing by the Government.

2 — Chassis Requirements (Reference Only)

2.1 Wheelbase

2.1.1 The wheelbase shall be approximately 196”

2.2 Cab to Axle

2.2.1 The cab to axle dimension shall be 83”

2.3 Power train

2.3.1 300 Horsepower and 1000 foot-pounds torque minimum

2.4 Front Axle

2.4.1 Model 328 and 348 - 14,000-pound capacity

2.5 Rear Axle

2.5.1 Model 328 and 348 – 24,000-pound capacity

3 — Chassis Electrical Requirements

3.1 Chassis Electrical Additional Equipment and Modifications

3.1.1 The apparatus chassis shall be equipped with a heavy-duty 12-volt direct current (VDC) negative ground electrical system. The electrical system shall include all parts, components, switches, relays, wiring, and other devices required to assure complete, consistent, and proper operation of the completed apparatus. Wiring shall be routed and/or protected to eliminate exposure to moving parts or debris.

3.1.2 All lights are required to comply with Federal Government Codes for vehicles of this size and design shall be provided and installed. These lights shall include headlamps and front turn signals with hazard switch, cab marker and clearance lights, back up lights, stop-turn-tail and license plate lights.

3.1.3 All switches for the warning lights and other electrical equipment shall be mounted on a separate switch panel located in the cab on a master electrical console mounted between the two front seats. The switches shall be functionally laid out, properly identified and illuminated so it's identifiable, but not a problem for driver visibility, and shall be located within easy reach of both the driver and the officer. The warning light system shall have a "master" switch, which shall allow for the pre-selection of all warning lights. All switches shall be of a heavy-duty design.

3.1.4 The following additional electrical equipment shall be installed on, and modifications performed to, the specified cab and chassis by the apparatus builder:

3.2 Battery Master Switch

3.2.1 One battery master body disconnect switch shall be provided in the cab. The switch shall be rated for 175 amps continuous duty and 800 amps intermittent duty. The switch shall be properly labeled "ON/OFF" and located on the floorboard to the left side of the driver's seat and placed as far aft as possible to protect against accidental actuation. A Cole Hersee brand™, Model #M-2484-16, with a Model #82065 switch plate "Off/On" label meets the labeling requirement. The switch shall be positioned so to not impact the driver seat or operation of the vehicle. Terminals shall not be exposed but protected from damage and inadvertent contact.

3.2.2 An OEM chassis battery master switch may be installed in lieu of item in 3.2.1.

3.3 Battery "On" Indicator Light

3.3.1 One "Battery On" indicator light, with a green lens, shall be provided on the dashboard in the cab interior within view of the driver's seating position. This light shall illuminate anytime the battery switch is turned to the "ON" position and the brightness shall dim automatically when the chassis headlights are turned on. The brightness of light shall not impair the driver's ability to see and operate the vehicle.

3.4 Electronic Control Module Programming

3.4.1 The cab and chassis electronic control module shall be programmed as required to allow the use of the original equipment manufacturer's cruise control feature as a manually controlled fast idle and as a backup to the pump operator's panel throttle.

3.5 Back Up Alarm

3.5.1 One solid state back up alarm shall be provided at the rear of the apparatus protected from impact and debris. The backup alarm shall be wired to the reverse circuit of the transmission and shall provide an audible alarm to the rear of the apparatus when reverse gear is selected. The alarm shall have a volume of 87 to 112 decibels while in operation. The alarm shall have a disconnect plug for easy replacement.

3.6 Ground Lights

3.6.1 Four 4-inch clear LED lights shall be provided under the vehicle's perimeter; on the chassis steps, ground-facing with two on each side. These lights shall be wired to the cab door switches and a switch on the cab center console so that the light will turn on when a cab door is opened or when the vehicle is placed in "blocking mode." The vehicle is in blocking mode when the vehicle's transmission is in "Park" with the parking brake set and the emergency master switch turned on with the forward-facing takedown lights off. The ground lighting "OFF" delay will be synchronized with the chassis exterior courtesy lighting delay.

3.7 Antennas

3.7.1 Four antenna bases shall be supplied and mounted on the cab roof as specified. The antenna cables shall be routed to the cab interior, terminating at location of radio mounting bracket.

3.8 Radio Pre-Wire

3.8.1 The chassis cab interior shall be wired with battery power, battery ground, switched power, and radio rebroadcast wires to the siren or PA, and labeled to simplify USFS radio installation. The radio shall be wired to reduce the FM radio volume when the GMH radio is keyed.

3.9 Auxiliary Lighting

3.10 LED off-road driving light(s) shall be installed on the front bumper. The light(s) shall produce a minimum of 6,000 lumens, capable of projecting light with a flood pattern. If using two lights, the distance between them shall be maximized. Any mounting fasteners used for these lights shall not damage the hose stored in the bumper hose tray. The dash switch shall be labeled "AUXILIARY LIGHTS, OFF HIGHWAY USE ONLY."

3.11 Multiplex System

3.11.1 A multiplexed solid-state management system for controlling the electrical system devices shall be provided. The system shall be fully programmable, and capable of performing load management functions, system monitoring and reporting. All electrical circuits and wiring shall be rated at 125% of the maximum load being imposed. Hale™ Class 1® ES-Key, Hale™ Class 1® Supernode, and Welden™ V-MUX® multiplexing systems meet this requirement.

3.12 Rear View Backup Camera System

3.12.1 A rear-view backup camera and display shall be provided. The display shall have a minimum display measurement of 7 inches diagonally and be factory installed in the dash. If an OEM camera system is not available, the builder shall propose the make and model of system for approval by the Government. The proposed system shall be installed in-dash unless written approval is approved by the Government. The backup camera shall be high durability and able to withstand harsh vibration; IP69K rated; and able to withstand 7Gs of force. The camera shall be shipped loose for installation by the apparatus builder. Combined AM/FM/WX radio and backup display systems are acceptable if approved in writing by the Government.

3.13 Tire Pressure Monitoring System (TPMS)

3.13.1 If not provided by the chassis manufacturer, a tire pressure monitoring system shall be installed. Aftermarket tire pressure monitoring systems shall be approved by the government prior to installation. Considerations for the approval of aftermarket solutions will be quality, durability, warranty, repair service, and savings to the Government.

3.14 Jump Start Stud Location

3.14.1 Jump start stud; remote-mounted; driver side; final location to be approved by the Government. Mounting within the wheel well shall not be accepted. Studs shall be clearly marked and identified.

4 — Traffic Warning Systems

4.1 Traffic Warning Systems Requirements

4.1.1 Requests for equivalent products shall be considered. Considerations for the approval of equivalent products will be quality, durability, warranty, repair service, and savings to the Government. Any requests for substitution of equivalent products must be approved by the Government in writing.

4.2 Electronic Siren and Controller

4.2.1 The manufacturer shall supply and install one electronic siren and digital control panel with 6 auxiliary buttons, 4 position slide switch, 6 position rotary speaker tone selector, traffic director control button, manual siren button, and airhorn button in the cab center console.

The control panel shall be flush mounted. The location of the controller shall be convenient to both the driver and the officer. The siren shall have four basic siren tones: manual, wail, yelp, and hi-lo. The “emergency master” switch shall power the controller. The manufacturer shall install a Tomar brand, 948L- SIREN-R, or equivalent.

4.2.2 The manufacturer shall program and label the electronic siren and digital control panel’s auxiliary buttons as follows:

- Auxiliary Switch “1” – Left Alley
- Auxiliary Switch “2” – Right Alley
- Auxiliary Switch “3” – Front Flood
- Auxiliary Switch “4” – Rear Scene
- Auxiliary Switch “5” – Left Scene
- Auxiliary Switch “6” – Right Scene

4.2.2.1 Additional auxiliary switches shall be provided separate from the siren controller:

- Auxiliary Switch “7” - Ground Lights
- Auxiliary Switch “8” – Cabin Lighting

4.3 Speaker

4.3.1 The manufacturer shall supply and install one 100 W siren speaker mounted behind the driver’s side of the front bumper. The manufacturer shall wire the speaker to the specified electronic siren controller. The manufacturer shall wire the lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model SPK-100 speaker, or equivalent.

4.4 Forward Upper Zone A/B/D Light Bar

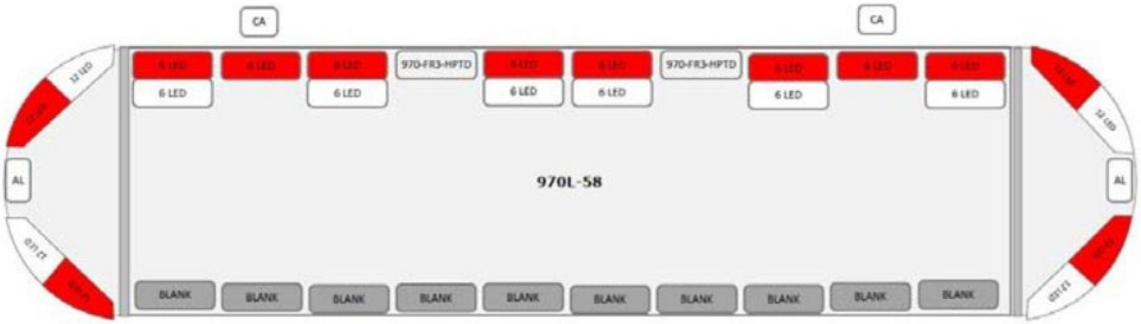
4.4.1 The manufacturer shall supply and install one LED lightbar on the cab roof, facing forward. The lightbar shall be 58 inches wide. The lightbar shall be constructed of extruded aluminum with cast aluminum end caps. The aluminum extrusion shall be clear anodized. All lightbar LED modules shall be waterproof using a vibration-welding sealing. The lightbar LED modules shall have total internal reflection (TIR) collimator optics to prevent stray warning light. The lightbar shall have one waterproof internal controller to control the entire lightbar. The internal lightbar controller shall feature CA-13 compliant flash rates and two steady-burn LED modules. The lightbar LED modules facing forward and at each end shall be able to override to steady white scene lights independently of each other. The manufacturer shall wire the lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model 970-581-0601-1, or equivalent.

4.4.2 The lightbar shall consist of the following:

- Eight 12 LED warning modules facing forward, with six red LEDs, six white LEDs and clear Lexan lenses
- Two 12LED forward facing single-color, steady burning, with twelve red LED and clear Lexan lenses
- Four 24LED modules at each corner with twelve red LEDs, twelve white LEDs and clear Lexan lenses
- Two 3LED modules forward facing spot scene lights with an 8.5-degree beam pattern with clear Lexan lenses
- One 3LED spot alley module at each end cap.

4.4.3 The manufacturer shall permanently mount the lightbar to the cab roof and wire it to the "Lightbar" switch in the cab center console.

4.4.4 Diagram LED Lighting Locations and Flashing/Steady Configuration



970-581-0601-B1

Figure 1—Diagram of LED Lighting locations and the flashing/steady configuration

4.4.5 The manufacturer shall mount the lightbar in a position that maximizes the height above the apparatus cabin.

4.4.6 The manufacturer shall mount the lightbar horizontally, not pointed upwards or downwards along the apparatus roof cabin. The manufacturer can use modified feet or shims, but the lightbar mount must also adhere to section 4.4.3.

4.5 Aft Upper Zone B/D Warning Lights

4.5.1 The manufacturer shall supply and install two 3-inch by 7-inch dual color LED warning lights with mounting flanges, side-facing, one per side on the upper aft corners of the apparatus. The warning lights shall consist of twenty-four LEDs, twelve LEDs red in color, twelve LEDs white in color, and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The lights shall flash red and white at 75 flashes per minute (FPM) in a simultaneous flash pattern. The warning light shall have the ability to override to steady burn white for use as an additional scene light. The manufacturer shall wire the lights to the

Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model R37D-W-RW-02, or equivalent.

4.6 Upper Zone C Warning Lights

4.6.1 The manufacturer shall supply and install two 7-inch by 9-inch dual color multi-function warning/scene LED lights with mounting flanges, rear facing, one per side, on the upper outboard rear of the apparatus. The multi-function lights shall consist of twenty-four LEDs with clear Lexan lenses. The upper half of the lights shall have twelve red warning LEDs with horizontal oriented optics. The lower half of the lights shall have twelve white LEDs with 13-degree angled down optics. The lights shall be waterproof using a vibration-welding process. The lights shall have TIR collimator optics to reduce stray warning light. The manufacturer shall wire the red LED lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall wire the white LED lights “Rear Scene” button on the Tomar brand, 984L- SIREN-R siren controller located on the cab center console and to the “Rear Scene” switch on the rear pump operator's panel. The manufacturer shall install Tomar brand, model R79LVD13-RW-01 and R79LVD13-RW-02, or equivalent.

4.7 Lower Zone A Warning Lights

4.7.1 The manufacturer shall supply and install two 3 inch by 7 inch dual color LED warning lights with mounting flanges on the front of the apparatus, forward-facing, one per side on the lower outboard corners of the cab grille. The warning lights shall consist of twenty-four LEDs, twelve LEDs red in color, twelve LEDs white in color, and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The lights shall flash red and white at 75 FPM in a flicker flash pattern. The lights shall flash in opposite phase of each other when blocking the roadway. The manufacturer shall wire the lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model R37D-RW- 03 and R37D-W-RW-04, or equivalent.

4.8 Forward Lower Zone B/D Warning Lights

4.8.1 The manufacturer shall supply and install two dual color LED warning lights with mounting flanges on the tilt hood of the apparatus, side facing, one per side, as low and as far forward as possible on the sides of the hood. The warning lights shall consist of twenty-four LEDs, twelve red LEDs, twelve white LEDs, and with clear Lexan lenses. The warning light shall flash red at 75 fpm. The warning light shall have the ability to override to steady burn white for use as an additional scene light. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The manufacturer shall wire the lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model RSDV13-RW-01, or equivalent.

4.9 Aft Lower Zone B/D Warning Lights

4.9.1 The manufacturer shall supply and install two 3-inch by 7-inch dual color LED warning lights with mounting flanges on the front of the apparatus, side-facing, one per side on the lower aft corners of the apparatus. The warning lights shall consist of twenty-four LEDs, twelve LEDs red in color, twelve LEDs white in color, and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The lights shall flash red and white at 75 FPM in a simultaneous flash pattern. The warning light shall have the ability to override to steady burn white for use as an additional scene light. The manufacturer shall wire the lights to the Tomar brand, model, 948L- SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model R37D-W-RW-02, or equivalent.

4.10 Lower Zone C Warning Lights

4.10.1 The manufacturer shall supply and install two 3-inch by 7-inch dual color LED warning/back-up lights on the rear of the apparatus, rear-facing, one per side on the lower rear of the apparatus above the rear step in the bottom position of the common housing with the DOT lights. The warning lights shall consist of twenty-four LEDs, twelve LEDs red in color, twelve LEDs white in color, and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray warning light. The lights shall flash red and white at 75 FPM in a simultaneous flash pattern. The warning light shall have the ability to override to steady burn white for use as a back-up light. The manufacturer shall wire the lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model R37D-W-RW-01(right) and R37D-W- RW-02 (left), or equivalent.

4.11 Air Horn

4.11.1 One Buell™ brand, Model #1063, or equivalent, 15-inch air horn shall be provided and mounted under the hood on the passenger’s side. One-foot switch shall be provided on the driver's side cab floor, and one momentary pushbutton switch shall be provided on the upper right corner of the officer's side top surface of the cab center console.

4.12 Headlight Flasher

4.12.1 The manufacturer shall supply and install one solid-state headlight flasher wired for daytime operation. The flasher shall be a multipurpose type with a high beam activated cut out option. The manufacturer shall wire the flasher to the Tomar brand, model 948L-SIREN-R siren controller “Wig Wag” switch located on the cab center console, through the parking brake valve, so that it is disabled when the parking brake is applied. The manufacturer shall install Tomar brand, model HF-1 flasher, or equivalent.

5 — Chassis Additions and Modifications

5.1 Additional Equipment

5.1.1 The following additional equipment shall be installed on, and modifications performed to the specified cab and chassis by the apparatus manufacturer:

5.2 Apparatus Fluid Types and Quantities

5.2.1 A permanently mounted label, showing the recommended fluid types and quantities for the apparatus chassis and associated components, shall be provided in the apparatus cab interior near the driver's seating position.

5.2.2 This label shall list the recommended fluid types and quantities for the following components:

- Chassis Engine Lubricant
- Chassis Engine Coolant
- Chassis Power Steering Fluid
- Chassis Transmission Fluid
- Chassis Drive Axle Lubricant
- Pump Gearbox Lubricant
- Transfer Case Fluid
- Front Chassis Drive Axle Lubricant

5.3 Seating Capacity

5.3.1 A warning label, listing the seating capacity of the completed apparatus, shall be provided in the apparatus cab interior. This label shall be located so that it is visible from all seating positions.

5.3.2 This apparatus shall have a seating capacity of two personnel in front and three personnel in the rear for a total seating capacity of five.

5.4 Seat Belts

5.4.1 3-point shoulder harness type seat belts shall be provided in all seating positions.

5.4.2 All seatbelts shall be red or orange in color.

5.5 Seat Belt Warning

5.5.1 A warning label, stating: "DANGER- Personnel Must Be Seated And Seat Belts Must Be Fastened While Vehicle Is In Motion Or DEATH OR SERIOUS INJURY MAY RESULT" shall be provided in the apparatus cab interior. This label shall be located so that it is visible from all seating positions.

5.5.2 A seatbelt visual and audible warning module shall be installed for all apparatus seating locations and be visible from both the driver and officer's seated positions.

5.6 Vehicle Height/Weight/Length Warning

5.6.1 A warning label listing the overall height, length and GVWR of the completed apparatus, shall be provided in the apparatus cab interior. This label shall be located so that it is visible from the driver's seating position.

5.7 Final Stage Manufacturer Vehicle Certification

5.7.1 A Final Stage Manufacturer vehicle certification label shall be provided and installed in the apparatus cab driver's door jamb area.

5.8 Noise Hazard Warning

5.8.1 A warning label, stating: "WARNING: Noise Hazards Occur During Siren Operation" shall be provided and installed in the apparatus cab interior. This label shall be located so that it is visible from all seating positions.

5.9 Air Filter Ember Protection Screen Warning

5.9.1 A warning label, stating: "This apparatus is equipped with an air filter ember protection screen; routine inspection is required" shall be provided and installed in the apparatus cab interior. This label shall be located so that it is visible from the driver's seating position.

5.10 Do Not Move Apparatus Warning

5.10.1 One surface mounted red LED light shall be provided in the center cab console, at the top, or most forward position. The light shall flash whenever side compartment doors are open, and the parking brake is released. The light shall be wired directly into the door ajar switch and hazard circuit. The hazard warning light shall be marked with a label stating, "DO NOT MOVE APPARATUS WHEN LIGHT IS ON."

5.11 Cab Console

5.11.1 The cab shall be equipped with an operator's control console located between the front driver's and officer's air ride seats. This console shall be sized to accommodate customer-mounted radios. The console shall be fabricated from steel and painted with a matte black finish. The console shall be securely mounted to the cab floor. The driver's and officer's side panels for the center console shall be extended as a continuous piece outward at a 90-degree angle from the bottom of the console. The center console shall be secured using the inboard mounting studs of the driver's and officer's air ride seat bases. There shall be two attachment points on the left horizontal extension of the console under the driver's seat base. There shall be two attachment points on the right horizontal extension of the console under the officers' seat base.

5.11.2 The console shall contain the following controls and switches:

- One 2½-inch diameter backlit discharge pressure gauge, 0-600 pounds per square inch (psi)
- One Fire Research Corporation™ brand, Model #WL2500, or equivalent, mini display tank level gauge
- One Tomar brand, 948L-SIREN-R, or equivalent.
- One flexible map light
- Four 12-volt power outlets
- Two U.S.B. charging connectors; one on each side of the console

5.11.3 One switch panel, containing a total of five switches with pilot lights, function labeled, and capitalized, configured from left to right as follows:

- 1 – Emergency Master
- 2 – Reserved
- 3 – Reserved
- 4 – Reserved
- 5 – Reserved

5.12 Center Console Aft Storage

5.12.1 A compartment for storage of items, such as maps and hand-held radios, shall be provided and attached directly behind the center console. The storage compartment shall be fabricated from steel and painted with a matte black finish. The height and width shall not exceed the cab console, and the depth shall be approximately 8 inches. The storage compartment shall be configured so as to be easily removable for access to the console inspection panel.

5.13 Chassis Manufacturer Grab Handle

5.13.1 One exterior chassis manufacturer grab handle shall be provided and installed aft of rear door; on driver's side of cab; with rubber insert.

5.14 Front Tow Hooks

5.14.1 Two original equipment front tow hooks shall be supplied with the chassis from the chassis manufacturer.

5.15 Rear Tow Eyes

5.15.1 Two heavy-duty tow eyes shall be provided at the rear of the apparatus, below the rear step. The tow eyes shall be mounted to the chassis frame.

5.16 Front Bumper Extension

5.16.1 A front bumper extension shall be provided at the forward end of the chassis frame rails. The bumper extension shall be covered with aluminum diamond plate. Support bracing shall be provided as required. The ends of the aluminum diamond plate cover shall be radiused and ground smooth.

5.17 Hose Storage Tray

5.17.1 One hose storage tray shall be provided in the center of the front bumper extension. The storage tray shall be approximately 20 inches long by 7 inches wide by 12 inches deep.

5.17.2 The tray shall be provided with an expanded metal mesh floor to allow drainage and air circulation. An aluminum diamond plate cover shall be provided for the hose well. The cover shall be approximately 1-inch shorter than the length of the hose well to allow the front discharge hose to remain pre-connected to the front bumper discharge swivel with the cover closed. The cover shall have a mechanical limiter or rubber bump stop to stop any contact with the chassis grille.

5.17.3 The hose storage tray shall be capable of holding fifty feet of 1½-inch hose.

5.18 Front Fenders, Rubber

5.18.1 An extruded black rubber fenderette shall be installed on each front wheel well opening on the chassis tilt hood.

5.19 Mud Flaps

5.19.1 One pair of flexible rubber mud flaps shall be provided on both sides of the apparatus body behind the rear wheels. The mud flaps shall not bear company logo.

5.19.2 The mud flaps shall extend down far enough to be effective but shall not allow the flaps to become entangled with the rear tires when the apparatus is backing up.

5.20 Cab Steps, Batteries, and Air Tanks

5.20.1 All cab steps shall be modified in such a manner as to provide maximum ground clearance. The driver's side and passenger's side rear cab steps shall be 21 inches minimum above ground level.

5.20.2 The chassis-mounted battery box shall be relocated in such a manner as to provide maximum ground clearance.

5.21 Exhaust System

5.21.1 The exhaust system shall remain unmodified and as received from the chassis manufacturer.

5.22 Vertical Exhaust

5.22.1 A vertical exhaust pipe shall be mounted at the passenger's side rear corner of the cab. Brackets and clamps shall be positioned to minimize impact with the chassis cab. The vertical exhaust shall be sufficiently shielded or wrapped to prevent burn injuries to personnel who may come in contact with the exhaust pipe while entering or exiting the chassis rear passenger's side door. The top of the exhaust shall be cut off at the same height as the top of the lightbar.

5.23 Heat Protection

5.23.1 The exhaust after-treatment system shall be sufficiently shielded or wrapped to protect the underside of the chassis cab during active regeneration. Heat from regeneration shall not be detected by personnel seated inside the cab.

5.24 Air Line, Fuel Hose, Electrical Harness and Connector Protection

5.24.1 All air lines, fuel lines and electrical harnesses below the chassis frame rails shall be protected with a fireproof sleeve. All air lines and connectors to the air tank(s) located between the chassis steps shall be protected with a fireproof sleeve. All protected and wrapped lines shall have continuous coverage, to include the line to tank connections.

5.25 Cabin Air Ember Guard

5.25.1 The cabin air filter shall be protected by an ember guard with a maximum mesh opening of 0.039 inches.

5.26 Transmission Power Take Off

5.26.1 A transmission power take-off (PTO) unit shall be provided and installed on the chassis automatic transmission to drive the firefighting water pump. The PTO shall be a 10-bolt type, with a minimum torque rating of 300 pound-foot (intermediate duty), and an engine speed ratio that provides the required pump performance. The PTO driveshaft shall be equipped with 1350 series universal joints. The PTO shift shall be located in the cab interior in a location accessible to both the driver's and officer seating positions.

6 — Apparatus Body Description

6.1 General Requirements

6.1.1 The body shall be designed for fire/rescue service operations only and will be constructed to withstand off-road use. Commercially designed bodies intended for use in other vocations or applications are unacceptable in quality, construction, design, or durability.

6.1.2 The apparatus body design shall be consistent with current fire vehicle engineering technology and design standards.

6.1.3 The apparatus body shall be constructed from materials consistent with current fire vehicle industry manufacturing standards.

6.1.4 Apparatus compartment doors shall be constructed from materials consistent with current fire vehicle industry manufacturing standards.

6.1.5 Proposals for the apparatus body shall include:

- Detailed descriptions of body construction type, style, materials, and components.
- Drawings showing locations and dimensions of proposed compartmentation and location of hose reels, including spare tire storage
- Drawings showing the location of plumbing discharges and intakes
- Drawings showing the locations for dunnage and hand tool storage
- Drawings showing the location(s) and dimensions for the hose bed, including storage of 4 each, 3-inch by 8½-feet hard suction hoses
- Drawings showing the rear pump operator's panel layout
- Any additional information as shall be requested by the Government

6.2 Body Design and Construction Requirements

6.2.1 The body shall be completely modular in design, thereby allowing its transfer to a new chassis, without cutting or welding, in the event of an accident or chassis replacement.

6.3 Body Materials

6.3.1 All materials utilized in the fabrication of the body shall be of the correct type, alloy, and thickness to withstand the intended usage and provide protection against cracking, corrosion or metal fatigue. All materials utilized shall be of open stock origin, available to all apparatus manufacturers and commonly available through local sources, for the rapid and economical repair or modification of the body. Any use of proprietary parts or materials in the construction of the body shall be unacceptable, due to the potential for delays or difficulties in the event future repairs or service become necessary.

6.4 Body Mounting

6.4.1 The body module shall be connected to the chassis frame rails with two different designs of mounts.

6.4.2 The mounts at the aft end of the body shall be comprised of vertical steel plates with a thickness of 0.625 inch, welded to the body subframe and bolted to the exterior vertical surface of the chassis frame rails. These mounts shall extend rearward horizontally to incorporate the rear step supports and rear tow eyes.

6.4.3 Two mounts of this design shall be provided, one on each side of the body.

6.4.4 The mounts at the forward end of the body shall be comprised of a two-piece design, fabricated from 0.250-inch steel plate, with the upper section welded to the body module subframe and the lower section bolted to the exterior vertical surface of the chassis frame rails. The upper mount section shall be designed to nest within the lower mount section. The body mount sections shall be aligned and connected by a 0.625 inch diameter Grade 8 bolt, equipped with an appropriate tension rating spring, flat washers and a locking nut.

6.4.5 Two mounts of this design shall be provided, one on each side of the body.

6.5 Compartmentation

6.5.1 All compartment walls, ceilings, and floors shall be fabricated from materials consistent with current fire vehicle industry manufacturing standards. All compartments shall be constructed for strength and shall be sealed from the elements.

6.5.2 All compartment interiors shall be free of exposed electrical harnesses or plumbing components.

6.5.3 All enclosed compartments, including dunnage compartments, shall be water and dust tight.

6.5.4 All compartments shall be as large as possible, as determined by the design of the apparatus.

6.6 Driver's Side Compartments

6.6.1 One low side compartment shall be provided forward of the rear wheels. The compartment shall extend from the front of the body to the front of the wheel well. The compartment shall be accessible by two vertically hinged doors.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	52 inches wide by 28.5 inches high by 16 inches deep

6.6.2 One upper forward compartment shall be provided above the low side front compartment. The compartment shall be accessed by a vertically hinged door, with the hinged side of the door toward the front of the body.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	34 inches wide by 34 inches high by 16 inches deep

6.6.3 One compartment shall be provided that extends from the upper forward compartment and spans across the rear wheels. The compartment shall be accessible through two vertically hinged doors.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	68 inches wide by 34 inches high by 16 inches deep

6.6.4 One low side compartment shall be provided aft of the rear wheel well. The compartment shall extend from behind the wheel well area to the front of the rear step area. The compartment shall be accessible through a vertically hinged door, with the hinged side toward the front of the body.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	30 inches wide by 32 inches high by 16 inches deep

6.7 Passenger's Side Compartments

6.7.1 One rescue style compartment shall be provided on the passenger's side of the apparatus body forward of the rear wheels. The compartment shall extend from the front of the body to the front of the wheel well area in width and equal to the compartment over the rear wheel at the top extending to the hose storage compartment below it in height. The compartment shall be accessed by a vertically hinged door, with the hinged side of the door toward the front of the body.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	34 inches wide by 52 inches high by 16 inches deep

6.7.2 One foam system compartment shall be provided on the passenger's side of the apparatus under the rescue style compartment forward of the rear wheels. A drop-down aluminum diamond plate access door shall be provided.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	38 inches wide by 13 inches high by 23 inches deep

6.7.3 One low side compartment shall be provided forward of the rear wheels. The compartment shall extend from the front of the rescue style compartment to the front of the wheel well. The compartment shall be accessible through a vertically hinged door, with the hinged side of the door toward the front of the body.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	16 inches wide by 28.5 inches high by 24 inches deep

6.7.4 One compartment shall be provided that extends from the rescue style compartment and spans across the rear wheels. The compartment shall be accessible through two vertically hinged doors.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	68 inches wide by 34 inches high by 16 inches deep

6.7.5 One low side compartment shall be provided aft of the rear wheel well. The compartment shall extend from behind the wheel well area to the front of the rear step area. The compartment shall be accessible through a vertically hinged door, with the hinged side toward the front of the body.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	30 inches wide by 32 inches high by 16 inches deep

6.8 Hose Reel Compartments

6.8.1 Two compartments, one on each side, shall be provided at the upper rear corners of the apparatus body. The compartments shall be provided with quick-disconnect electrical and hose connections to allow for the servicing or removal of the hose reel located in the compartment. The floor of this compartment shall be removable for service access to the plumbing components located below it.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	36 inches wide by 28 inches high by 22.5 inches deep

6.9 Dunnage Compartments

6.9.1 Four compartments, two on each side, accessible from the top of the body, shall be provided at the top of the apparatus at the upper outboard sides of the body; two on each side of the body. The top of each compartment shall be enclosed with double pan lift up doors, hinged on their outboard edges, with a single gas strut and two compression latches. One compression latch on each door shall have a lock that is keyed to a number “1250” key. The compartment interiors shall be finished in Zolatone™ #20-11 (Apollo

Gray), with the inner door pans finished in the apparatus body exterior color and the exterior top surfaces coated with black Dura Coat™.

Description	Nominal Dimension
Compartment dimension ±0.25 inch	72 inches wide by 24 inches high by 14 inches deep

6.10 Compartment Doors

6.10.1 All compartment doors shall be recessed into the apparatus body sides, with overlapping outer door panels for a secondary seal. Their construction shall be full double pan, with a 2-inch inner pan. No welds shall be visible on the outer door panel, door pan sides or inner door panel. The door edges shall be contoured with radiused corners to provide a smooth, snag-free perimeter.

6.10.2 All painted compartment doors shall be constructed with an inner and outer door pan of 0.125 inch bright finish aluminum plate, attached to a square aluminum tubing inner structure. The inner door structure shall be fabricated from 1.75 inches by 1.75 inches by 0.140-inch wall thickness square aluminum tubing, welded into a framework with perimeter dimensions matching the dimensions of the inner door panel. Industrial grade closed cell foam of the correct thickness shall be inserted between the inner and outer door pans within the tubing framework. The outer door panel shall be attached to the framework with industrial grade double-sided tape and stitch welding. The inner door panel shall be attached with industrial grade double-sided tape.

6.10.3 No welding shall be visible on the finished door.

6.10.4 A removable stainless-steel cover shall be installed on the inner door panel for access to the latch mechanism for servicing or replacement.

6.10.5 All compartment door opening perimeters shall be fitted with automotive grade, closed-cell, extruded, wire-reinforced, clip-on type door seals. All door outer panels shall have automotive grade, closed-cell, self-adhesive, “D” type gaskets fitted to the overlap surface for a secondary seal.

6.11 Door Latches and Hardware

6.11.1 All compartment door latch assemblies shall be installed with threaded fasteners, shall not be welded, and shall be easily removable through the outer panel of the door for servicing or replacement. All door latch assemblies shall be of a flush-mount, rotary “D- Handle” design, with all external components fabricated from polished stainless steel. All latches shall be of a slam-type design, with a two-point latching operation. Matching striker bolts shall be utilized with all latch assemblies. All striker bolts shall have slotted mounting holes and shall be attached to threaded captive steel plates in the body structure for strength and ease of adjustment. Welded striker bolts or plates are not acceptable.

6.11.2 The following door latch assemblies shall be provided:

- Compartment Door Handle Assembly – Hansen™ brand, Model # 279L SS, or equivalent
- Compartment Door Latch Assembly – Hansen™ brand, Model # 550, or equivalent
- Striker Bolt Assembly – Hansen™ brand, Model # 551S, or equivalent

6.11.3 All doors shall be mounted with continuous, heavy-duty stainless-steel piano-type hinges. The hinges shall have pins with a minimum diameter of 0.250 inches and shall be polished to a mirror finish. The mounting holes in the hinges shall be pre-punched in a uniform and standard manner to allow easy replacement in the future if damaged. The mounting holes shall be slotted to allow the adjustment of the door within the compartment door opening. The slots that are punched into the hinge shall be length wise on one leaf and width wise on the opposite leaf to allow the doors to be adjusted up and down as well as in and out relative to the opening to maintain a good seal and ease of opening. All hinges shall be attached to the doors and the apparatus body with ¼-inch - 20 stainless steel truss head screws. The use of nuts and bolts, sheet metal screws, rivets, welding or any other means of hinge attachment that does not allow for easy readjustment in the field shall be unacceptable.

6.12 Compartment Door Locks

6.12.1 All compartment doors listed shall include locking exterior latches keyed to “1250.”

6.13 Door Hold Open Devices

6.13.1 All vertically hinged, outward-opening compartment doors shall be provided with one gas cylinder type hold open device, properly sized for the door, and installed horizontally at the top of the compartment door opening. The hold open device shall assist the compartment door while opening and closing and shall be securely fastened to the compartment door inner pan and compartment ceiling with threaded fasteners, enabling it to be easily removed for repair or replacement. All vertically hinged, outward-opening compartment doors shall be capable of being closed with one hand, allowing a free hand to hold equipment or supplies.

6.13.2 All horizontally hinged, overhead lift-up compartment doors shall be provided with two extending, gas cylinder type hold open devices, one mounted vertically on each side of the compartment door opening. The pressure rating of the gas cylinders shall be carefully matched to the size and weight of the compartment door, and they shall hold the compartment door securely open at 90 degrees to the apparatus body, or more when required, without any additional support. The gas cylinder hold openers shall dampen the upward movement of the compartment door while opening and shall permit the closing of the compartment door without the need to release any type of manual locking devices.

6.13.3 The gas cylinders shall be securely fastened to the compartment door inner panels and compartment side walls with threaded fasteners and shall be easily removable for repair or

replacement. All horizontally hinged, overhead lift-up compartment doors shall be capable of being closed with one hand, allowing a free hand to hold equipment or supplies.

6.14 Compartment Door Switches

6.14.1 All compartments shall be equipped with a one single function automatic compartment door switch. The switch shall activate the flashing door hazard warning light located in the cab interior.

6.14.2 One flashing indicator light shall be provided in the cab interior within view of the driver's and passenger's seating positions. The light shall flash whenever a compartment door on the apparatus is open or ajar. The light shall be wired directly into the door ajar switch and hazard circuit. This light shall have a red lens.

6.15 Spare Tire Compartment

6.15.1 One spare tire storage compartment shall be provided at the rear of the apparatus body behind the rear wheels. The spare tire shall be stored horizontally within this compartment.

6.15.2 Drain holes shall be provided in the bottom of the compartment. There shall be no floor decking supplied in this compartment. The hat shapes shall be sized to allow approximately 12½ inches for the tire width.

6.15.3 The compartment shall be accessible from the rear of the apparatus through door with a locking "D" ring handle. The door shall be horizontally hinged and shall be provided with rubber door stops as needed.

6.16 Spare Tire Winch System

6.16.1 A slide-out, telescoping winch system shall be provided in the spare tire storage compartment at the driver's side rear corner of the body. The winch system shall be comprised of a pair of inner and outer rails, which shall slide within each other, supported by sealed automotive grade bearings. The outer pair of rails shall remain fixed within the compartment, with the inner set of rails, when extended, protruding out through the compartment door opening towards the rear of the apparatus. This assembly shall be attached to the roof of the spare tire storage compartment with threaded fasteners for ease of removal for service or repair.

6.16.2 A Warn™ brand, model #1700, or equivalent, 12-volt direct current electric winch shall be provided and secured to the forward end of the sliding section of the assembly. The winch shall have a capacity of 1700 pounds and shall be equipped with 35 feet of 0.188-inch diameter wire rope. The winch shall be controlled with a remote switch at the end of a 12-foot-long cable. The cable shall be deployed horizontally towards the aft end of the sliding section of the assembly. A pulley shall be provided at the aft end of the sliding section to allow the wire rope to turn 90 degrees downwards, where it shall be connected to the spare tire and wheel assembly.

6.16.3 The winch system shall enable the apparatus crewmembers to remove or replace the spare tire out of or into the storage compartment without the need to manually lift or lower the spare tire and wheel assembly.

6.17 Rear Seat Storage Compartment

6.17.1 The area below the rear bench seat shall be enclosed to provide storage. Three drop-down doors shall be provided on the forward-facing surface underneath each seating area. Storage area shall be maximized based on space available.

6.18 Compartment Floor Mats

6.18.1 All enclosed body compartments and dunnage compartments shall have floor mats installed in them, custom cut to fit the compartment floors. The floor mats shall be black in color and shall be easily removable to allow the compartment to be cleaned. The floor mats shall be designed to provide ventilation to the equipment stored in the compartment, and to protect the stored equipment from direct contact with the metal compartment floor surfaces.

6.19 Compartment Shelves

6.19.1 Adjustable shelves shall be provided and installed in the completed body compartments. The number and location of shelves shall be provided by the Government during construction. The shelves shall be free of welds, sharp corners, or rough edges. The shelves shall be attached to the Unistrut™ or equivalent channels fastened to the compartment side walls and shall be infinitely adjustable. Spring-loaded extrusion nuts and locking fasteners shall be provided.

6.19.2 Ten adjustable shelves shall be provided and installed in the completed body compartments. The shelves shall be fabricated from 0.125-inch bright finish smooth aluminum plate, with a 90-degree break on the inboard and outboard sides, 1-inch in height. A 1-inch by 1-inch aluminum angle shall be provided on both ends of the shelf to enclose the ends and attach the shelf to the mounting channels. The shelves shall be free of welds, sharp corners, or rough edges. The shelves shall be attached to the Unistrut™ channels fastened to the compartment side walls and shall be infinitely adjustable. Spring-loaded extrusion nuts and locking fasteners shall be provided.

6.19.3 The shelf locations shall be as follows:

- One in the driver’s side compartment forward of the rear wheels
- Two in the driver's side compartments above the rear wheels
- One in the lower driver’s side compartment aft of the rear wheels
- Two in the passenger's side compartments above the rear wheels
- Three in the passenger’s side rescue style compartment
- One in the lower passenger’s side compartment aft of the rear wheels

6.20 Adjustable Shelf Channels

6.20.1 A minimum of four vertically mounted steel Unistrut™ or equivalent channels shall be provided and installed in all enclosed body compartments for the current or future installation of infinitely-adjustable shelving, slide out trays or equipment brackets. The channels shall be designed as to allow the use of spring-loaded, self-tightening extrusion nuts inside the channels to install the specified shelving.

6.21 Tool Bracket Mounting Channels

6.21.1 Two parallel vertically mounted steel Unistrut™ or equivalent channels shall be mounted in compartments intended for tool storage. These channels shall be located in the compartment in a configuration to allow the customer mounting of tool brackets. The channels shall be designed as to allow the use of spring-loaded, self-tightening extrusion nuts inside the channels to install the specified tool brackets.

6.22 I-Zone Brackets

6.22.1 Two folding I-Zone hose brackets shall be provided on the rear of the apparatus body, rear-facing, one on each side of the body. Each I-Zone bracket assembly shall consist of an aluminum diamond plate mount and a tubular aluminum fold down bracket. The pivot point of the bracket shall be located in the aluminum diamond plate mount. The bracket shall be held in a vertical position when not in use. A nylon insulated clip shall be provided to secure the bracket when stowed in the vertical position. A protective cap shall be provided on the outboard end of the fold down bracket.

6.23 Fenders and Wheel Wells

6.23.1 The rear wheel wells of the apparatus body shall be provided with fenders and full liners. The rear fenders shall be fabricated from extruded black rubber, contoured to match the perimeter of the wheel well openings. The rear fenders shall extend out from the body approximately 2 inches and shall have a 3-inch radius. The fenders shall be bolted to the wheel well liner and/or the body to allow for easy replacement in the event of damage. Full-width wheel well liners shall be provided to deflect road splash away from the apparatus body module interior. The wheel well liners shall be contoured to match the shape of the fenders. The wheel well liners shall be sized to provide ample clearance for chains fitted to the specified size of wheel and tire fitted to the chassis and shall be bolted to the quarter panel and the fender to allow for easy replacement in the event of damage. The vertical body quarter panels spanning between the rear wheel wells and the apparatus body superstructure shall be fabricated from 12-gauge galvanneal steel, continuously seam welded to the body superstructure and body worked as needed to provide a smooth seamless appearance. The quarter panels shall be finish painted to match the body.

6.24 Wheel Chock Storage Compartments

6.24.1 Two-wheel chock storage compartments, each with a bright aluminum locking door, shall be provided in the wheel well areas, one each side of the apparatus body, aft of the rear wheel well openings.

6.25 Body Scuff Guards

6.25.1 Scuff guards shall be provided and installed on the bottom horizontal edges of the body, under all compartment door openings, both forward and aft of the rear wheel well openings. The scuff guards shall be fabricated from 0.063-inch polished aluminum tread plate.

6.26 Drip Moldings

6.26.1 Bright anodized extruded aluminum drip moldings shall be installed above all compartment door openings.

6.27 Vertical Surfaces

6.27.1 The forward and aft-facing vertical surfaces at the front and outboard rear of the body shall be covered with polished aluminum tread plate for appearance, wear, and enhanced visibility at night.

6.28 Hose Bed

6.28.1 A hose bed design shall be provided by the apparatus builder and approved by the Government. It shall have a minimum of three adjustable hose bed dividers and incorporate storage for 4 sections of 3-inch by 8½-feet hard suction hose on either lateral end of the hose bed.

6.29 Hose Bed Cover

6.29.1 The hose bed shall have a two-piece aluminum diamond plate cover. The two-piece cover shall be fabricated from 0.188-inch bright finish aluminum diamond plate, reinforced as required to be sturdy enough to support the weight of two personnel standing on the cover, however, the lifting force to open either cover section shall not exceed 60 pounds. The cover shall be mounted with full-length polished stainless-steel hinges on the outboard edges of the hose bed. Each cover section shall be angled up from the outer edge of the hose bed to increase the hose bed storage area and to provide drainage. The covers, when closed, shall rest in a fixed channel “trough” mounted on a 0.250-inch-thick aluminum plate support running the length of the hose bed. A downwards flange, approximately 2 inches wide and spanning the length of each cover section, shall be formed at 90 degrees to the cover, along the inboard edges. The flange of each cover shall rest in the trough when the lids are closed.

6.29.2 Each cover section shall be equipped with a heavy-duty gas strut mounted at its outboard front corner to assist with opening the cover section. Two heavy duty cam lock style

latches shall be mounted on the top surface of the covers, one at the front and one at the rear, to secure the covers during transport.

6.29.3 Each cover section shall have one 4-inch diameter clear LED light mounted to its underside to illuminate the hose bed area interior. The hose bed lights shall be switched at the pump operator's panel.

6.29.4 A total of four 1¼-inch diameter extruded aluminum handrails, with rubber inserts, shall be provided on the cover section exterior surfaces to facilitate access to the top of the truck and to assist in opening and closing the cover sections. Each handrail shall be secured with two chrome plated end stanchions.

6.29.5 The handrails shall be provided as follows:

- Two handrails, each approximately 18 inches long, shall be mounted running front to rear on the top rear of the driver's side cover section, directly ahead of each access ladder side rail.
- Two 24-inch handrails, one on each cover section, shall be installed on the top surface at the opening edge, running front to rear, and located center of each cover section.

6.29.6 A black fabric flap, fabricated from Herculite™ 80 material, shall be provided at the rear of each cover section, equipped with three adjustable straps, spring-loaded metal buckles and related tie down hardware for each flap. The Herculite™ 80 material shall be flame retardant, resistant to mildew, abrasion, tearing and ultraviolet sun rays.

6.29.7 Four rope tie down brackets shall be installed toward the hinged side of each cover section, evenly spaced from front to rear.

6.29.8 The walking surfaces of the two-piece hose bed cover shall be coated with black DuraCoat™ non-skid material.

6.30 Stainless Steel Body Trim

6.30.1 All enclosed compartment door thresholds, except the hose storage and Foam Pro™ system mounting compartments, shall be covered with horizontal polished stainless steel scuff guards to provide paint protection against chips and scratches.

6.30.2 All vertical exterior body corners shall be covered with polished stainless steel angles, secured with fasteners, to act as body corner scuff guards and to provide paint protection against chips and scratches.

6.31 Hard Suction Hose Storage

6.31.1 Two hard suction hose storage compartments shall be provided in the hose bed area, one on each side of the body. The compartments shall accommodate suction hose 8½ feet

minimum in length. The compartments shall be constructed from 0.125-inch smooth aluminum sheet and shall be fully enclosed within the apparatus body. The compartments shall be provided with vertically hinged access doors, each with a paddle latch, at the rear of the body. The compartments shall be left in an unpainted natural aluminum finish.

6.32 Rear Cab Step Storage

6.32.1 If OEM manufacturer's chassis allows, a storage compartment shall be provided under the rear passenger cab step. The storage compartment door shall be diamond plate, with a vertical hinge and a locking compression latch. Storage compartment door shall be diamond plate with a vertical hinge and lockable compression latch keyed to “1250.”

7 — Pump and Plumbing

7.1 Pump General

7.1.1 The fire pump shall be a Darley Model HSP 250 GPM single-stage PTO driven, mounted behind the chassis cab. The pump shall be of a centrifugal design, with a cast iron pump body, bronze fitted, with a 4-inch Victaulic suction inlet and a 2-1/2-inch discharge outlet. The first three feet of the pressure gauge lines from the pump shall be rated at a working pressure of 400 pounds per square inch and a temperature of 430 degrees Fahrenheit minimum. The pump discharge shall be equipped with a full flow check valve.

7.1.2 The pump gear case shall be mounted in a manner that meets OEM installation specifications. If sideways mounting is required for ground clearance, a model CBP-S gearbox shall be used.

7.2 Pump Specifications

7.2.1 As installed on the apparatus, the pump shall be capable of delivering 200 GPM at 300 psi output pressure from a 5-foot lift through 24 feet of 3-inch suction hose with strainer and from the water tank installed on the apparatus.

7.2.2 In addition, the pump manufacturer shall certify that the pump can deliver the following capacities at net pump pressure from draft:

- 300 GPM at 150 psi net pump pressure
- 200 GPM at 300 psi net pump pressure
- 100 GPM at 400 psi net pump pressure

7.2.2.1 Pump capacities shall meet the discharge flow rates at the rated pressure under the following conditions:

- An altitude of not more than 2000 feet above sea level
- Atmospheric pressure of 29.9 inches of mercury (corrected to sea level)
- Water temperature of 60 degrees Fahrenheit

- Through a single intake with 20 feet of 3-inch suction hose equipped with a suction hose strainer
- With a lift of 10 feet

7.2.3 When dry, the pump shall be capable of taking suction and discharging water with a lift of 10 feet or more in not more than 30 seconds.

7.3 Pump Body and Seals

7.3.1 The volute shall be fabricated from a fine grain alloy cast iron, with a minimum tensile strength of 30,000 psi.

7.3.2 The entire pump shall be hydro dynamically tested to 400 psi and hydrostatically tested to 500 psi.

7.3.3 The mechanical seal shall use silicon carbide mechanical seals with welded springs. The stationary face of the mechanical seal shall be silicon carbide, an extremely hard and heat dissipative material, which resists wear and dry running damage much better than conventional Ni-resist and Tungsten Carbide materials.

7.4 Impeller

7.4.1 The Darley High Pressure impeller shall be utilized to achieve pressure significantly higher than NFPA requirements for fire pumps to ensure the highest firefighting performance at high elevations and for up-hill water transport eliminating the need for relay pumping.

7.4.2 The impeller shall be a high strength bronze alloy, splined to the pump shaft for precision fit, durability, and ease of maintenance.

7.4.3 Impeller shaft oil seals shall be constructed to be free from steel components except for the internal lip spring. The impeller shaft oil seals shall carry a lifetime warranty against damage from corrosion from water and other fire-fighting fluids.

7.5 Pump Shaft

7.5.1 The pump shaft shall be splined to receive broached impeller hubs, for greater resistance to wear, torsional vibration, and torque imposed by engine, as well as ease of maintenance and repair.

7.5.2 Bearings provided shall be heavy duty, deep groove, radial-type ball bearings. Sleeve bearings on any portion of the pump or transmission shall be prohibited due to wear, deflection, and alignment concerns. The bearings shall be protected at all openings from road dirt and water splash with oil seals and water slingers.

7.6 Drive Unit Construction

7.6.1 The drive unit, as well as the entire pump, shall be completely manufactured at the pump manufacturer's factory or at a designated facility approved in writing by the pump manufacturer.

7.6.2 The drive unit bearings shall be of a heavy-duty design and shall be precision ground to size.

7.6.3 The drive unit shall be of sufficient size to withstand full torque during pumping operations. The drive unit shall have ample capacity for lubricant reserve and the maintenance of proper operating temperatures.

7.6.4 All gears shall be fabricated from the highest quality steel alloy. They shall have case hardened teeth, to provide long life, smooth, quiet running and higher load carrying capability. An accurately cut spur design shall be utilized to eliminate all possible end thrust.

7.6.5 The pump and PTO ratios shall be selected by the apparatus manufacturer to provide maximum performance within the limits of the engine, transmission, and PTO selected. The pump shall provide 60 to 80 psi static at engine idle and 400 psi static between 1700 and 1900 revolutions per minute (RPM).

7.6.6 The pump driveline from the PTO to the pump shall be installed within the PTO, driveline, and transmission manufacturer’s recommendations and limits. The PTO output shaft and the pump input shaft shall be parallel, and the driveline u-joints shall be phased to minimize vibration. The driveline shall utilize a 2-joint universal driveline design where possible, otherwise a 4-joint universal driveline consisting of an intermediate shaft, parallel to the PTO shaft and two separate 2-joint drivelines de- phased is required. The apparatus manufacturer shall submit a driveline design showing u-joints, u-joint angles, u-joint sizes, u-joint torque ratings, and the driveline phasing plan and calculations to the Government for approval prior to installation of pump driveline.

7.7 PTO Shift

7.7.1 The pump shall be driven through a power take off (PTO) mounted on the chassis transmission. The PTO shall be equipped with a two-position, positive locking, electric-over-hydraulic shift control, located in the cab interior within reach of the driver’s seating position. The PTO shifting mechanism shall be interlocked with the parking brake and the chassis transmission to provide throttle control per NFPA requirements. Throttle authority on the pump panel shall be active only when 1) PTO is engaged, 2) the parking brake is set, and 3) the transmission is in neutral or park or 1) the PTO is engaged, 2) the parking brake is set and 3) the transmission is in neutral or park. Throttle authority in the cab shall be active at all times with the PTO engaged or disengaged, with the parking brake on or off and the transmission selector in any position. The PTO shall be capable of being engaged with the parking brake on or off and the transmission selector in any position.

7.8 Pump Shift Indicator Lights

7.8.1 Three indicator lights shall be provided in the cab interior.

7.8.2 The “PUMP ENGAGED” light shall illuminate to indicate that the PTO is engaged.

7.8.3 The “OK TO PUMP” light shall be illuminated when 1) the PTO is engaged, 2) the parking brake is set and 3) the transmission is in neutral or park.

7.8.4 The “OK TO PUMP AND ROLL” shall be illuminated when 1) the PTO is engaged, 2) the parking brake is off and 3) the transmission is in any forward gear, reverse, or neutral. When the “OK TO PUMP AND ROLL” indicator is illuminated the “OK TO PUMP” indicator shall not be illuminated.

7.9 Rear Mounted Pump Operator's Panel

7.9.1 The pump operator’s control panel shall be located at the rear of the apparatus body. The pump panel shall be fully removable and shall be fabricated from 0.125-inch clear anodized aluminum plate.

7.9.2 All controls and gauges shall be located at the rear of the apparatus body and shall be properly labeled. The panel shall be hinged, with a vertical hinge, for ease of access to its reverse side.

7.9.3 The unit shall have two indicator lights on the rear control panel, “THROTTLE READY” and “OK TO PUMP.”

7.9.4 The “THROTTLE READY” light shall be illuminated when the parking brake is engaged and when the chassis transmission is in “Neutral” or “Park.” The “THROTTLE READY” light shall also illuminate when the “OK TO PUMP” light is illuminated.

7.9.5 The “OK TO PUMP” light shall be illuminated when 1) the PTO is engaged, 2) the parking brake is set and 3) the transmission is in neutral or park.

7.9.6 An engine speed advancement interlock system shall be provided to prevent advancement of the engine speed at the pump operator’s panel unless the apparatus has a “THROTTLE READY” indication.

7.10 Pump/Plumbing Compartment

7.10.1 The floor of the rear compartment shall be removable to provide access to the pump plumbing. All plumbing components shall be fabricated from stainless steel.

7.10.2 All pump compartment components, including wiring, gauges, pump panel rear surfaces, high pressure hoses, and small diameter tubing, shall be left unpainted for rapid identification and ease of repair.

7.11 Pump Panel Lights

7.11.1 Two LED lights, each installed on a cast aluminum mount, shall be provided to illuminate the rear mounted pump operator's panel. The lights shall be Weldon™ brand, Model #3-2025-7100, or equivalent, each with a single replaceable bulb and a clear refracted lens cover.

7.11.2 An additional light shall be located on the lower panel, under the rear compartment door, to illuminate the air control switches and other components on the lower control panel. The pump panel lights shall be controlled by a master switch on the pump operator's panel.

7.12 Required Testing – Indicator Lights and Engine Speed Advancement Interlock

7.12.1 A test is required before delivery to ensure that the "PUMP ENGAGED," "OK TO PUMP," "OK TO PUMP-AND-ROLL," and "THROTTLE READY" indicator lights are properly configured and activate in the proper conditions as described by the table in (below). The engine speed advancement interlock system shall be tested to verify that the engine speed cannot be increased at the pump operator's panel unless the proper conditions can be met.

7.12.2 Table – Indicator Light Test Conditions and Verifications

Transmission Type	Chassis Transmission Gear Selected	Parking Brake Status	Pump Shift Control Action Status (Driving Compartment)	Indicator Status (Driving Compartment)	Indicator Status (Pump Operator's Panel)	Engine Speed Control in Cab	Engine Speed Control at Pump Operator's Panel
Automatic	Neutral or Park	On	Disengaged	None	"Throttle Ready"	Yes	Yes
Automatic	Neutral or Park	Off	Disengaged	None	None	Yes	No
Automatic	Neutral or Park	On	Engaged	"Pump Engaged" and "OK to Pump"	"Throttle Ready" and "OK to Pump"	Yes	Yes
Automatic	Neutral or Park	Off	Engaged	"Pump Engaged" and "OK to Pump"	None	Yes	No
Automatic	Any Gear other than neutral	On	Engaged	"Pump Engaged" and "OK to Pump"	None	Yes	No
Automatic	Any Gear other than neutral	Off	Engaged	"Pump Engaged" and "OK to Pump"	None	Yes	No

Automatic	Any Gear other than neutral	On	Disengaged	None	None	Yes	No
Automatic	Any Gear other than neutral	Off	Disengaged	None	None	Yes	No

8 — Valves, Controls, Gauges and Plumbing Requirements

8.1 Items Provided

8.1.1 The following pump, plumbing, controls, gauges, and accessories shall be provided as indicated below. The plumbing requirements outlined below shall be considered a minimum standard, and shall be followed by the apparatus manufacturer without exception:

8.2 Main Pump Discharge and Intake Plumbing

8.2.1 The discharge and intake valves specified shall be either of a direct-actuated quarter turn design or shall be provided with control rods that are directly connected from the valve handle to the rear mounted pump panel. The valves or valve controls shall be provided with a locking feature

8.2.2 All discharges shall have NST thread brass bleed-off caps and chains, unless designed to be pre- connected, or otherwise specified.

8.2.3 All valves shall be Akron™ 8800 series swing-out style. All valves shall be designed to operate under normal conditions up to 500 psi and shall have dual seats to work in both pressure and vacuum environments.

8.2.4 All valves and controls shall be easily accessible for service, repair or replacement.

8.2.5 Where vibration or chassis flexing may damage or loosen piping, the piping shall be equipped with Victaulic™ couplings.

8.2.6 The main suction and discharge plumbing shall be welded stainless steel pipe or high-pressure flexible hose. The flexible hose shall be designed to withstand the normal operating pressures of the pump. All high-pressure hose shall be installed with a swivel or Victaulic™ coupling on at least one end of the hose. The completed plumbing system shall be hydro dynamically tested to 400 psi. The nominal sizes of the plumbing supplying the pump and discharges shall be as follows:

- Main suction – 3-inch NH
- Discharges – 1½-inch, 2½-inch NH
- Hose reel – 1-inch NPSH

8.3 Pump Operator's Panel Controls

8.3.1 The following components shall be provided on, and/or controlled at the rear mounted pump operator's panel:

8.4 Truck Identification and Pump Performance Plate

8.4.1 A durable truck identification plate, fabricated from corrosion resistant metal, shall be provided, and installed on the pump operator's panel. The plate shall provide performance information, including engine RPM, at the following flows and pressures from a at 5-foot lift through 24 feet of 3-inch suction hose with a strainer at the following pressures:

- 150 psi
- 300 psi
- 400 psi

8.5 Pump Operating Instruction Plate

8.5.1 An identification plate shall be provided on the pump operator's panel which indicates valve position ("O" = open, "X" = close) for the following operations:

- Tank to Fire
- Suction to Fire
- Suction to Tank
- Drain Plumbing
- Drain Tank and Plumbing
- Prime

8.6 Test Gauge Connections

8.6.1 The plumbing system shall be provided with two test ports on the pump panel exterior: one plumbed to the intake side and one plumbed to the discharge side of the water pump. These test ports shall be installed to provide a means for connecting certified test gauges when testing the pump's performance. The test ports shall be located for easy access and shall be labeled.

8.7 Switch Panel

8.7.1 One switch panel, containing a total of six switches with pilot lights, function labeled, capitalized, and configured from left to right as follows:

- (1) PANEL LIGHTS
- (2) COMPT LIGHTS
- (3) HOSEBED LIGHT
- (4) LEFT SCENE
- (5) REAR SCENE

- (6) RIGHT SCENE

8.8 Pump Panel Labeling

8.8.1 All controls, discharges, intakes, pressure gauges, and other pump panel components that are not provided with a pre-printed legend or trim plate shall be labeled as required for ease of operation. Valves shall be labeled as outlined under “Valve Numbering System” in NWCG (National Wildfire Coordinating Group) Fire Equipment Working Team’s Water Handling Equipment Guide, latest edition. The tags shall be self-adhesive and shall be installed on the pump control panel with chrome plated bezels. The tags shall be placed adjacent to the components in such a way as to clearly distinguish the item that they are identifying.

8.9 Master Discharge Pressure Gauge

8.9.1 One master discharge pressure gauge shall be provided on the operator's panel, located close to, above and to the left of, the master intake pressure gauge. The gauge shall be a graduated from 0-600 psi, with a minimum diameter of 4½ inches, back lit for nighttime operations and glycerin filled. The glycerin in the bourdon tube shall be retained by a flexible rubber plug. The gauge shall be equipped with a drain cock (vent) at the gauge connection. The pressure gauge shall be connected prior to any check valves on the pump discharge. A Class 1™ brand gauge, or equivalent, meets this requirement.

8.10 Master Intake Pressure Gauge

8.10.1 One master intake pressure gauge shall be provided on the operator's panel, located close to, below and to the right of, the master discharge pressure gauge. The gauge shall be 30-0-150 psi graduated, with a minimum diameter of 4½ inches, back lit for nighttime operations and glycerin filled. The glycerin in the bourdon tube shall be retained by a flexible rubber plug. The gauge shall be equipped with a drain cock (vent) at the gauge connection. A Class 1™ brand gauge, or equivalent meets this requirement.

8.11 Pump Cooler/Bypass

8.11.1 A pump cooler/bypass line shall be installed to the water tank fill tower to cool the pump when it is engaged and not discharging water.

8.11.2 The pump cooler/bypass line shall be tapped from the pump discharge plumbing before the full- flow check valve. The tap shall be 1/2-inch NPT and connect to a 1/2-inch NPT, horizontally mounted, cast bronze “Y” strainer. The “Y” strainer shall be rated at 500 pounds per square inch at 150 degrees Fahrenheit and have a 20-mesh screen. The “Y” strainer outlets shall consist of a 1/2-inch NPT face outlet and a 3/8-inch NPT blowdown (cleanout) outlet. A 3/8-inch quarter-turn NPT valve shall be directly connected to the blowdown (cleanout) outlet. A 3/8-inch flexible, braided pigtail shall be installed to direct water flow to the ground during cleanout. A metal tag shall be attached to the “Y” strainer clean out valve stating “#12 - PUMP COOLER “Y” STRAINER CLEAN OUT.”

8.11.3 The 1/2-inch NPT face outlet of the strainer shall be connected to a 1/4-inch NPT check valve. After the 1/4-inch check valve, the line shall be reduced to a 1/4-inch inside diameter line and run to the pump operator's control panel. A 1/4-inch, quarter-turn valve shall be mounted on the pump operator's control panel. The valve shall be labeled, "#17 – PUMP BYPASS" and have labels to designate the "OPEN" and "CLOSED" positions. The valve handle position for the #17 valve shall be vertical when open and horizontal when closed. The 1/4-inch inside diameter line shall run from the rear panel mounted valve (#17) to the top of the tank and discharge into the tank with a bulkhead fitting mounted halfway up the fill tower.

8.11.4 The inlet side of the bulkhead fitting shall have a 90-degree elbow pointing downward to accept the incoming 1/4-inch pump line. The outlet side of the bulkhead fitting shall terminate with a 90-degree elbow directing flow downwards into the tank.

8.11.5 Water flow in the pump cooler/by-pass line shall be between 4.5 GPM and 5.5 GPM at 400 psi pump pressure. If flow exceeds these limits, an orifice restriction may be installed to reduce flow, provided the orifice can be easily removed for cleaning.

8.11.6 A warning label shall be affixed near the #17 valve that states "Pump Damage and Serious Injury May Occur if the Pump is Operated with the #17 Valve Closed."

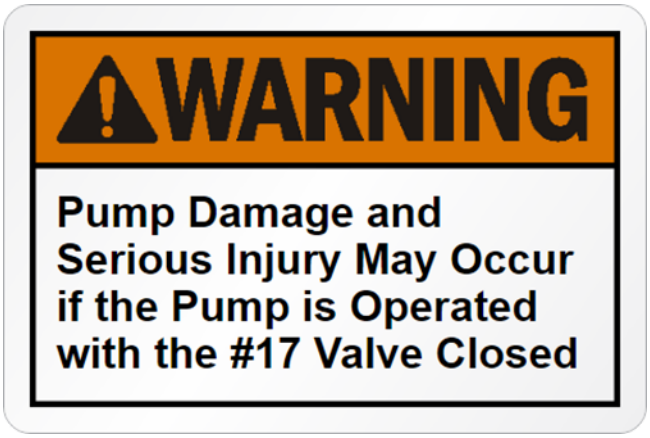


Figure 2 — Warning Label

8.12 Master Drain

8.12.1 One manually operated multiple port drain valve shall be provided. The valve shall be operated by a manually operated hand wheel. The valve shall be plumbed to drain both the discharge and intake sides of the pump, the relief valve and other plumbing components as required. The valve shall be placed as low as possible to provide proper drainage of the components plumbed to it. The valve shall be rated to 600 psi minimum and suitable for daily valve operation.

8.13 Pressure Gauge Access Door

8.13.1 The intake and discharge pressure gauges shall be accessible from the back operator's panel by a hinged door. The door shall open 90° minimum for access to the gauges and related connections.

8.14 In-Cab Gauge

8.14.1 One pressure gauge shall be provided on the cab center console, within view of the driver's seating position, to monitor the pump's discharge pressure. The gauge shall be glycerin filled, with a minimum diameter of 2½ inches, graduated 0-600 psi, and backlit for nighttime operations. The glycerin in the bourdon tube shall be retained by a flexible rubber plug. The gauge shall be equipped with a drain cock (vent) at the gauge connection. A Class 1™ brand gauge meets this requirement.

8.15 Remote Throttle and Engine Status Center (ESC)

8.15.1 One integrated throttle and engine status center (ESC), FRC™ brand, model ThrottleXcel®, or equivalent, shall be provided on the pump operator's panel to provide chassis engine monitoring and critical warnings. The ESC shall be a weatherproof display with super- bright digits.

8.15.2 The ESC shall continuously display chassis engine RPM, oil pressure, engine coolant temperature, and electrical system voltage, along with providing critical warnings. The warning levels for low oil pressure, high engine coolant temperature, low voltage (programmed for 11.8 volts direct current- default setting), and high voltage shall be independently programmable. The ESC shall provide visual warnings and an output for controlling an audible warning when alarm levels are reached. The ESC shall also provide a message center that displays total PTO hours.

8.15.3 The Vernier style remote throttle control shall be provided on the pump operator's panel to control the chassis engine speed during stationary pumping operations. The design of the remote throttle shall allow the throttle to start at idle when it is enabled, regardless of the Vernier dial position. The remote throttle shall feature solid state optical technology, which shall eliminate potentiometers or electro-mechanical switches. The throttle shall sense the speed of the Vernier dial for fast and fine RPM setting, and the central red idle button shall immediately return the chassis engine speed to idle. Regardless of chassis engine emissions status, the throttle control shall remain operational.

8.16 Automatic Pump Override

8.16.1 A pump override system shall be provided to automatically return the chassis engine to idle if the pump discharge pressure drops below 50 psi.

8.16.2 A toggle switch, properly labeled, shall be located on the pump operator's panel to allow the operator to disengage the automatic shutdown feature when required.

8.17 Water Tank Level Sight Gauge

8.17.1 One sight tube level gauge shall be provided on the pump operator's panel to monitor the water tank liquid level. This level gauge shall be fabricated from clear acrylic tubing, with stainless steel rods down each side for protection of the sight tube. A chromed shut off valve, with a built-in drain, shall be provided at the bottom of the gauge to drain water from the tube in cold weather. A vent line shall be installed at the top of the sight tube and routed to the water tank fill tower to exhaust trapped air to the atmosphere.

8.18 Water Tank Level Electronic Gauges

8.18.1 One Fire Research™ brand, model WL200, or equivalent, tank level gauge shall be provided on the pump operator's panel to monitor the water tank liquid level. The gauge shall indicate the water tank liquid level on an LED bar graph display.

8.18.2 One Fire Research™ brand, model WL205, or equivalent, mini tank level gauge shall be provided on the cab center console, within view of the driver's seating position, to monitor the water tank liquid level. The gauge shall indicate the water tank liquid level on an LED bar graph display and shall be wired in common with the sensor circuit for the pump operator's panel-mounted gauge.

8.19 Class A Foam Tank Level Gauge

8.19.1 One Fire Research™ brand, model WL 2600, or equivalent, tank level gauge shall be provided on the pump operator's panel to monitor the foam concentrate storage tank level. The gauge shall indicate the foam concentrate storage tank liquid level on an LED bar graph display.

8.20 Priming Pump

8.20.1 One positive displacement, oil-less, rotary vane, electric motor-driven priming pump, conforming to the NFPA requirements, shall be provided. The primer pump body shall be fabricated from heat- treated anodized aluminum for wear and corrosion resistance. The priming pump shall be capable of producing a minimum of 20 inches of mercury vacuum at 2000 feet above sea level. The apparatus shall be able to prime and pump from a 10-foot lift in 30 seconds and prime and pump from a 17-foot lift in 45 seconds.

8.20.2 The primer pump electric motor shall be of a 12-volt direct current totally enclosed design. The priming pump shall not require lubrication from an external source. The priming pump shall be operated by a single push-pull control valve mounted on the pump operator's panel. The control valve shall be of all bronze construction and labeled #6 Primer.

8.20.3 The primer control shall be connected to the 3/8-inch NPTF connection on the top of the pump inlet, and also to the highest point (hump) in the plumbing. This shall be accomplished with two separate lines from the primer control. The line from the primer control to the top of the pump inlet shall be 1/2-inch inside diameter, and the line from the primer control to the highest point in the plumbing shall be 3/8-inch inside diameter.

8.21 Discharge Locations

8.21.1 One 2½-inch water-only discharge, labeled #19 Water Only, discharge shall be provided at the rear pump operator's panel. The discharge shall be plumbed with stainless steel pipe and/or 2½-inch flexible high-pressure hose and shall terminate with 2½-inch NSTM threads with a 2½-inch NSTF brass cap and chain. The discharge valve shall be controlled at the valve with a TS style handle. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.21.2 One 1½-inch discharge, labeled #3 Discharge, plumbed to the on-board foam system, shall be provided at the driver's side of the apparatus. The apparatus builder shall provide drawings for the proposed location. A hose storage tray shall be located nearby. The discharge shall be plumbed with stainless steel pipe or 1½-inch flexible high-pressure hose and shall terminate with 1½-inch NSTM threads with 1½-inch NSTF brass cap and chain. The discharge valve shall be controlled at the valve with a TS style handle. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.21.3 One 1½-inch discharge, labeled #3 Discharge, plumbed to the on-board foam system, shall be provided at the passenger's side of the apparatus. The apparatus builder shall provide drawings for the proposed location. A hose storage tray shall be located nearby. The discharge shall be plumbed with stainless steel pipe or 1½-inch flexible high-pressure hose and shall terminate with 1½-inch NSTM threads with 1½-inch NSTF brass cap and chain. The discharge valve shall be controlled at the valve with a TS style handle. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.21.4 One 1½-inch discharge, labeled #3 Discharge, plumbed to the on-board foam system, shall be provided at the passenger's side of the front bumper extension. The discharge shall be plumbed with 1½-inch flexible high-pressure hose with reusable fittings or welded stainless steel pipe. The front bumper discharge shall be equipped with a 1½-inch quarter turn ball valve installed at the front bumper, controlled at the valve with a TS style handle. The discharge shall have a 90-degree full swivel elbow, terminating in 1½-inch NSTM threads, to allow the hose to be pulled in any direction without kinking. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.21.5 One 1½-inch inline valve shall be provided to isolate the side and front bumper extension discharge valve piping in the case of a hose or piping failure. This valve shall normally be left in the open position. Control for this valve shall be through the use of a TS or R1 handle at the valve. The valve handle shall be parallel to the run of piping when open and perpendicular to the run of piping when closed. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.21.6 Two 1½-inch NSTM discharges, labeled #3 Discharge, with 2-inch plumbing and 1½-inch valves, plumbed to the on-board foam system, shall be provided at the rear pump operator's panel. The valves shall be mounted outside of the panel for ease of operation and maintenance. The discharges shall have 1½-inch NSTF brass caps and chains. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.21.7 The discharges shall be controlled at the valves with a TS style handle and shall be plumbed to a drain.

8.22 Intake Location

8.22.1 One 3-inch intake, labeled #8 Overboard Suction, shall be provided on the pump operator's panel at the rear of the apparatus body, plumbed with 3-inch piping to the intake side of the pump. The intake shall be equipped with a 3-inch ball valve with a manual locking handle, mounted outside the pump panel at the rear of the apparatus and terminating with a NSTM fitting. A 3-inch brass cap with chain shall be supplied on the main intake at the rear. A removable screen shall be installed in the intake to prevent debris from entering the pump.

8.23 Tank Fill

8.23.1 One 1½-inch Akron™, or equivalent, manually operated inline valve, labeled #2 Pump to Tank, shall be installed between the pump discharge and the water tank fill inlet. The control for the tank fill line shall be located at the pump operator's panel.

8.24 Tank to Pump Line

8.24.1 One 3-inch Akron™, or equivalent, inline valve, labeled #1 Tank to Pump, shall be installed between the water tank outlet and the pump inlet. The valve shall be air actuated and shall be controlled from the pump operator's panel by a heavy-duty water- protected toggle valve, equipped with an aircraft-style red protective cover to prevent accidental movement of the switch. The valve and air cylinder shall be installed so that the tank to pump valve is in the "open" position when the cylinder rod is retracted, and the protective cover is closed. All valving and piping shall be 3-inch without restrictions. An access panel shall be provided to allow access to this valve for servicing or replacement.

8.25 Direct Tank Fill/Drain

8.25.1 One 2½-inch direct tank fill/tank drain, labeled #13 Gravity Drain, shall be provided on the pump operator's panel, equipped with an Akron™ 2½-inch inline valve. The inlet/outlet shall terminate in a 2½-inch NSTM adapter, with a 2½-inch NSTF brass cap and chain. A removable screen shall be installed in the inlet. The valve shall be actuated with a manual control handle located on the pump operator's panel. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.26 Backpack Fill

8.26.1 One 3/4-inch GHT bib type fitting, with cap, shall be provided below the driver's side of the rear step for filling backpacks. The outlet shall be gravity supplied from the water tank and shall be controlled with an inline quarter-turn valve, labeled #18 Backpack Fill, located on the pump operator's panel. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.27 Booster Hose Reels

8.27.1 One Hannay™ brand, model #EPF 32-23-24 RT, or equivalent booster hose reel, with a capacity of 150 feet of 1-inch booster hose, shall be provided on each side of the apparatus. The apparatus builder shall provide a drawing of the location to the Government for approval. The hose reel inlet connection shall be a 1-inch, 90-degree swivel, designed to withstand 1000 psi, which shall be plumbed from the pump with a 1-inch inline valve, a TS handle for control, and 1-inch flexible high-pressure hose. The inlet valve, labeled #4 Reel, shall be located near the reel. In addition, an open-closed indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.27.2 The reel shall be provided with a #043 2/3-horsepower, 12-volt direct current electric motor for rewinding the hose on to the reel. This motor shall be controlled with a push button momentary switch located at the reel. The booster reel shall have provisions for manual rewind. The pinion shaft for the manual rewind gear shall have an adjustable tension brake, controlled at the reel. A cover shall be installed to protect the solenoid.

8.27.3 The hose reel shall be equipped with a 1-inch NPSH male thread.

8.27.4 One polished stainless-steel hose roller and 4-way guide assembly shall be provided on the outboard side of the reel.

8.28 Foam Proportioning System

8.28.1 The pump system shall be provided with a FoamPro™ 2001 foam injection system, plumbed to the specified discharges. This product shall be an automatic foam proportioning system, with electronically controlled, direct concentrate injection occurring on the discharge, or pressure, side of the water pump. The system shall reliably and accurately meter Class A fire suppressant foam concentrates. These foam concentrates are typically proportioned at ratios of 0.2% - 0.5% of foam concentrate in solution. The proportional injection system shall ensure that only the specified amount of foam concentrate is used. The system shall be simple to operate and shall have a maximum pressure loss of 7 psi at 200 GPM. A microprocessor control device shall be provided which incorporates a closed-loop feedback signal for more accurate proportioning in variable flow conditions. A stainless-steel Victaulic™ foam manifold or mainline check valve, that meets manufacturer specifications, must be installed to prevent foam solution from returning to the pump, suction water source, or engine water tank.

8.28.2 The proportioner shall maintain accurate foam concentrate proportioning and injection rates over water discharge flows of 5 to 200 GPM and shall maintain accurate proportioning and injection rates throughout a range of 0 to 400 psi. The proportioner shall be provided with a 1½-inch NPT flowmeter, Foam Pro™ Model 2660. It shall be installed using 2-inch Victaulic™ couplings. The system shall provide flexibility in operation by maintaining a constant concentration of foam solution over a variable range of water stream flow rates and pressures. The proportioning rate shall be adjustable from 0.1% to 6% of the corresponding water discharge flow within the accuracy parameters recommended by NFPA.

8.28.3 The system shall be compatible with nozzle aspirating systems, where nozzle flow volumes must be adjustable on demand, while maintaining a constant percent foam solution.

8.28.4 The foam system shall have a pump operator's panel-mounted digital control module that shall provide a constant readout of GPM of water, foam solution, concentrate rate and amounts discharged at any time during operation. The total readable figure shall be 99,999 gallons. The foam system shall be capable of being calibrated from the pump operator's panel. Diagnostic testing shall be provided in the readout from the instruments on the pump operator's panel. A visible low foam concentrate level warning device shall be incorporated into the digital control module.

8.28.5 Foam concentrate shall be provided from the onboard foam concentrate storage tank.

8.29 Foam Upload System

8.29.1 An electric foam upload system shall be provided to enable the refilling of the foam concentrate storage tank from the ground. The foam upload system shall be controlled at the pump operator's panel, utilizing a three-way valve to select from either "Pick Up," "Flush," or "Switch Off" positions. The electric foam refill pump shall be controlled by a momentary switch on the pump operator's panel. The foam concentrate storage tank shall be equipped with an automatic shut off sensor to prevent it from being overfilled. A garden hose thread fitting shall be provided on the pump operator's panel to allow the connection of a suction hose for refilling from standard 5-gallon foam concentrate storage containers. In addition, Pick Up, Flush, Off position indicator shall be affixed adjacent to the valve to indicate valve is open or closed.

8.30 Pump Performance Test and Certification

8.30.1 Upon completion, the apparatus shall undergo a complete pumping test that conforms to the requirements of NFPA Standard 1900 (latest edition) for the size and type of pump provided. The test shall consist of a continuous one-half hour test pumping at rated capacity and rated net pump pressure, a vacuum test of the primer system and plumbing, a tank discharge flow test and a pressure test of the apparatus piping. The chassis engine and transmission, the pump and other components of the apparatus shall show no undue

heating, leaks, or other defect. The results of the test shall be documented to establish the performance of the apparatus and to further ensure that the unit shall perform satisfactorily when placed into service. The test results shall be certified in writing, with the certification provided to the purchaser for their records at the time of delivery of the completed apparatus.

9 — Water Tank

9.1 Construction

9.1.1 The water tank shall be fabricated from 1/2-inch thick polypropylene sheet stock. This material shall be a non-corrosive, stress-relieved thermo-plastic, ultra-violet light stabilized for maximum protection.

9.1.2 The water tank shall be so designed to be completely independent of the body structure and compartments shall be a modified rectangle in design.

9.1.3 All joints and seams shall be nitrogen-welded inside and out. The top of the water tank shall be fitted with lifting eyes to facilitate ease of removal. The swash partitions shall have vent and air hole openings, both at the top and bottom, to permit the movement of air and water between the internal compartments. The longitudinal swash partitions shall be fabricated from 3/8-inch polypropylene and shall extend from the floor of the tank through the cover to allow for positive welding. The transverse swash partitions shall be fabricated from 3/8-inch polypropylene and shall extend from the floor of the tank to the underside of the top cover. All swash partitions shall interlock with one another and shall be welded to each other, as well as to the floor and sides of the tank.

9.1.4 The water tank shall have a combination vent and manual fill tower. The fill tower shall be fabricated from 1/2-inch polypropylene and shall have a minimum outer perimeter dimension of 8 inches by 8 inches. The tower shall have a 1/4-inch thick polypropylene screen and a polypropylene hinged cover. Inside the fill tower, halfway down from the top, shall be fastened a vent overflow pipe. The vent overflow shall be fabricated from Schedule 40 polypropylene pipe, with a minimum inside diameter of 4 inches. The vent overflow shall be designed to run through the tank interior and shall exit at least 12 inches behind the centerline of the rear axle.

9.1.5 The tank cover shall be fabricated from 1/2-inch-thick polypropylene and shall incorporate a three-piece design which allows for the removal of each individual cover section for inspection or repair of the tank interior, if necessary. The tank cover shall be recessed 3/8-inch from the top of the tank sides and shall be welded to both the sides and the longitudinal baffles. Each of the three cover sections shall have hold downs to assist in keeping the cover rigid under fast-filling conditions. These hold downs shall consist of 2-inch polypropylene dowels, spaced a maximum of 30 inches apart, fitted and then welded to the transverse partitions. The dowels shall extend through the cover sections and be

welded to them. Two of the dowels shall be drilled and tapped to accommodate the tank lifting eyes.

9.1.6 The sump shall have a minimum dimension of 8 inches by 6 inches with a 3/4-inch thick bottom. On all tanks with a bulkhead suction inlet, a 3-inch Schedule 40 polypropylene pipe sweep shall be provided from the front of the tank to the sump location. The sump shall have a threaded plug located at the bottom of it for a tank drain and clean out.

9.1.7 There shall be two standard tank outlets: one for the tank to pump suction line, which shall be a minimum of a 3-inch NPTF coupling, and one for a tank fill line, which shall be a minimum of a 2½- inch NPTF coupling. All tank fill couplings shall be backed with flow deflectors to break up the stream of water entering the tank.

9.1.8 The water tank shall rest on the body subframe cross members, which shall be spaced a maximum of 22 inches apart. The tank shall be insulated from those cross members by hard rubber insulators, with a minimum thickness of 1/4-inch, glued and mechanically fastened to the cross members to protect the tank from direct contact with the steel body subframe. The tank shall be designed on a free-floating suspension principle and shall not require the use of additional hold downs. The tank shall be completely removable without disturbing or dismantling the apparatus body structure.

9.2 Clean Out Plug

9.2.1 The bottom of the tank sump shall be equipped with a 3-inch NPTF clean out fitting, equipped with a 3-inch NPTM PVC pipe plug.

9.3 Tank Capacity

9.3.1 The water tank shall have a usable capacity of 750 gallons.

9.4 Foam Tank

9.4.1 One 30-gallon capacity foam concentrate storage tank shall be provided and plumbed to the on-board foam system. The tank shall be fabricated from polypropylene and shall be designed and fabricated as an integral part of the main water tank. The foam tank shall have a separate fill tower. The foam tank fill tower lid shall be labeled as to the type of foam concentrate contained within the tank.

10 — Body Electrical Requirements

10.1 General Electrical Requirements

10.1.1 All apparatus body electrical components shall be served by independent circuits which shall be separate and distinct from the apparatus cab and chassis electrical circuits or be integrated into the multiplex system. All wiring supplied and installed by the apparatus manufacturer shall be installed in flexible split convoluted loom and shall be color coded

and function labeled at 6-inch intervals. All wiring supplied and installed by the apparatus manufacturer shall be grease, oil and moisture resistant; and shall be securely fastened with insulated metal clamps and nylon wire ties. Wiring shall be routed and/or protected to eliminate exposure to moving parts or debris. Solderless insulated connectors shall be utilized at all splice joints and shall be enclosed with heat shrink tubing for extra corrosion protection. Automatic reset type circuit breakers shall be provided wherever possible in accordance with SAE J1625 and J553.

10.2 Electrical Equipment

10.2.1 The following electrical components shall be provided and installed on the completed apparatus by the apparatus builder:

10.3 Rear DOT Lighting

10.3.1 The rear DOT lighting shall consist of the following components:

10.4 Taillights, Brake Lights

10.4.1 The manufacturer shall supply and install two 3-inch by 7-inch single color LED stop, tail, and turn lights on the rear of the apparatus, rear-facing, one per side on the lower rear of the apparatus above the rear step in the top position of the common housing with the DOT lights. The stop, tail, turn lights (STT) shall consist of twelve LEDs red in color and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray light. The manufacturer shall install Tomar brand, model R37L-STT, or equivalent.

10.5 Turn Signal Lights

10.5.1 The manufacturer shall supply and install two 3-inch by 7-inch single color LED stop, tail, and turn lights on the rear of the apparatus, rear-facing, one per side on the lower rear of the apparatus above the rear step in the middle position of the common housing with the DOT lights. The stop, tail, turn (STT) lights shall consist of twelve LEDs amber in color and with clear Lexan lens. The lights shall be waterproof using a vibration-welding sealing process. The lights shall have TIR collimator optics to prevent stray light. The manufacturer shall install Tomar brand, model R37L- STT, or equivalent.

10.6 Back Up Lights

10.6.1 The manufacturer shall supply and install two vertical three-position frames at the rear of the apparatus body, one each side to house the STT and warning/back-up lights, per 4.10.1. The frames shall have a chrome finish. The manufacturer shall install Tomar brand, model R37-BZ3, or equivalent.

10.7 License Plate Bracket and Light

10.7.1 One Weldon™ brand, Model #9186-23882-30, or equivalent, clear light fixture, with license plate mounting bracket, shall be provided at the rear of the body.

10.7.2 A front license plate bracket shall be provided and mounted on the front bumper.

10.8 Rear Upper Marker Lights

10.8.1 A pair of Weldon™ brand, Model #9186-1500-10, or equivalent, red LED marker lights, with stainless steel guards, shall be provided at the upper rear corners of the body, side-facing, one on each side of the body.

10.9 Cluster/Clearance Lights and Reflectors

10.9.1 Three Weldon™ brand, Model #9186-1500-10, or equivalent, red LED marker lights, with stainless steel guards, shall be provided at the rear of the body, below the rear hose bed horizontal exit threshold.

10.9.2 Two Weldon™ brand, Model #9186-1500-10, or equivalent, red LED marker lights, with stainless steel guards, shall be provided on the vertical surfaces of the rear step, one on each side of the body, facing to the sides of the apparatus.

10.9.3 Two self-adhesive red reflectors, one on each side of the body, shall be provided on the lower rear corners of the compartment doors behind the rear wheel wells, facing to the sides of the apparatus.

10.9.4 Two self-adhesive red reflectors, one on each side of the body, shall be provided on the lower outboard corners of the body, above the rear step, facing to the rear of the apparatus.

10.9.5 Two self-adhesive amber reflectors, one on each side of the body, shall be provided on the forward lower corners of the compartment doors forward of the rear wheel wells, facing to the sides of the apparatus.

10.10 Rear Directional Light Bar

10.10.1 The manufacturer shall supply and install one traffic advisor light bar on the rear of the apparatus body, rear facing. The manufacturer shall wire the traffic advisor light bar to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model LSTICK-14TD8-B, or equivalent.

10.11 Scene Lights

10.11.1 The manufacturer shall provide and install rear scene lights as described in 3.6.1 of this specification.

10.11.2 The manufacturer shall supply and install two 7-inch by 9-inch dual color multi-function LED lights with mounting flanges, side facing, one per side, on the upper passenger's side and upper driver's side, centered front to rear of the apparatus. The multi-function lights shall consist of twenty-four LEDs with clear Lexan lenses. The upper half of the lights shall have twelve red warning LEDs with horizontal oriented optics. The lower half of the lights shall have twelve white LEDs with 13-degree angled down optics. The lights shall be waterproof using a vibration-welding process. The lights shall have TIR collimator optics to reduce stray warning light. The manufacturer shall wire the lights to the Tomar brand, model, 948L-SIREN-R siren controller located on the cab center console. The manufacturer shall install Tomar brand, model R39LVD13-RW-01 and R79LVD13-RW-02, or equivalent.

10.12 Compartment Lights

10.12.1 LED strip lighting shall be provided and installed in each exterior compartment. Full length LED strip lighting shall be installed behind the door frame on the left side, right side and top. The strip lighting shall be positively attached to the inside of the compartment and shall be easily removable for replacement or repair. No adhesive tape shall be used to mount the lights of mounting clips. The LED strip lighting provided shall have a maximum spacing of 1" inch between the light- emitting diodes. Code 3® Model #CW0803 sized per compartment dimensions, or equivalent, shall be installed.

10.12.2 Door ajar and compartment light switches shall not be provided in the compartment door jambs. The compartment lights shall be controlled with a master switch on the pump operator's panel.

10.13 Hose Bed Area Lighting

10.13.1 Two TruckLite™ brand, or equivalent, 4-inch diameter clear LED rubber-mounted lights, with clear lenses, shall be provided on the inside surfaces of the hose bed covers, one on each cover section. The lights shall be located near the non-hinged side of the cover sections to provide illumination of the hose bed area. The lights shall be controlled by a switch on the pump operator's panel.

11 — Electrical System Performance Test, Low-Voltage

11.1 Test Requirement

11.1.1 The fire apparatus low voltage electrical system shall be tested as required by this section and the test results shall be certified by the apparatus manufacturer. The certification shall be delivered to the purchaser with the documentation for the completed apparatus. The tests shall be performed when the air temperature is between 32 degrees Fahrenheit (0 degrees Celsius) and 110 degrees Fahrenheit (43 degrees Celsius).

11.2 Test Sequence

11.2.1 The four tests defined in sections 11.3, 11.4, 11.5, and 11.6 shall be performed in the order in which they appear. Before each test, the chassis batteries shall be fully charged until the voltage stabilizes at the voltage regulator set point and the lowest charge current is maintained for 10 minutes. The failure of any of these tests shall require a repeat of the test sequence.

11.3 Reserve Capacity Test

11.3.1 The chassis engine shall be started and kept running until the chassis engine and engine compartment temperatures are stabilized at normal operating temperatures and the chassis battery system is fully charged. The chassis engine shall be shut off and the minimum continuous electrical load shall be applied for 10 minutes. All electrical loads shall be turned off prior to attempting to restart the chassis engine. The chassis battery system shall then be capable of restarting the chassis engine. The failure to restart the chassis engine shall be considered a failure of this test.

11.4 Alternator Performance Test at Idle

11.4.1 The minimum continuous electrical load shall be applied with the chassis engine running at idle speed. The chassis engine temperature shall be stabilized at normal operating temperature. The chassis battery system shall be tested to detect the presence of a chassis battery current discharge. The detection of chassis battery current discharge shall be considered a failure of this test.

11.5 Alternator Performance Test at Full Load

11.5.1 The total continuous electrical load shall be applied with the chassis engine running up to the engine manufacturer's governed speed. The test duration shall be a minimum of two hours. The activation of the electrical system load management system shall be permitted during this test. The activation of an alarm due to excessive chassis battery discharge, as detected by the system required by NFPA (current edition), or an electrical system voltage of less than 11.8 volts direct current for a 12-volt direct current nominal system, for more than 120 seconds, shall be considered a failure of this test.

11.6 Low Voltage Alarm Test

11.6.1 Following the completion of the tests described above, the chassis engine shall be turned off. With the chassis engine turned off, the total continuous electrical load shall be applied and shall continue to be applied until the excessive battery discharge alarm activates. The chassis battery voltage shall be measured at the battery terminals.

11.6.2 The test shall be considered to be a failure if the low voltage alarm has not yet sounded 140 seconds after the voltage drops to 11.70 volts direct current for a 12-volt direct current nominal system. The chassis battery system shall then be able to restart the chassis engine. The failure of the chassis battery system to restart the chassis engine shall be considered a failure of this test.

11.7 Documentation

11.7.1 The apparatus manufacturer shall provide the results of the low-voltage electrical system performance test, certified in writing, with the documentation provided to the purchaser at the time of delivery of the completed apparatus.

11.7.2 The test results shall consist of the following documents:

- Documentation of the electrical system performance tests.
- A written electrical load analysis, including the following:
- The nameplate rating of the alternator.
- The alternator rating under the conditions specified in NFPA 1900 current edition.
- Each of the component loads specified that make up the minimum continuous electrical load.
- Additional electrical loads that, when added to the minimum continuous electrical load, determine the total continuous electrical load.
- Each individual intermittent electrical load.

12 — Apparatus Finish

12.1 Apparatus Finish Procedure

12.1.1 All exposed surfaces shall be thoroughly cleaned and prepared for finish painting.

12.1.2 All removable items, such as brackets and compartment doors, shall be removed and painted separately to ensure finish paint behind them after they are reinstalled.

12.1.3 All compartment door interior panels shall be left unpainted in a natural aluminum finish.

12.1.4 The apparatus body shall be masked as needed to prevent the painting of unwanted areas and overspray damage. Due to its modular design, the apparatus body shall be finish painted prior to its installation on the chassis.

12.1.5 All exterior surface scratches and blemishes shall be filled with body putty and sanded down, along with all primed surfaces.

12.1.6 The complete apparatus body shall be cleaned, blown free of dust; washed with thinner; and wiped with tack cloths. A non-sanding primer shall be applied and when dry, the apparatus body shall be sprayed with three coats of finish paint. All loose body components shall be treated in the same manner.

12.1.7 Any irregularity in any painted surface shall be repaired prior to the application of the finish paint coats.

12.1.8 The compartment interiors are to be sealed for leaks and the inside surface areas cleaned and prepped, then finish painted with Zolatone™ #20-11 (Apollo Gray).

12.2 Apparatus Body Color

12.2.1 The apparatus body shall be painted to match the color of the chassis cab exterior. The chassis cab shall not be repainted. The color of chassis cab exterior and body shall be Number 14260 of Federal Standard Number 595 (Forest Service Green).

12.3 Chassis Finish

12.3.1 The chassis cab exterior paint finish shall be supplied by the chassis manufacturer.

12.4 Vehicle Marking

12.4.1 A 4-inch-wide white reflective stripe shall be provided and installed horizontally on both the chassis cab and body. The stripe shall be placed as high as possible on the vertical surfaces on the sides of the chassis tilt hood and shall run the full length of the apparatus at that height. A break shall be provided in the striping on either side of the apparatus body approximately over rear wheel centerline. The ends of the horizontal stripe shall be sloped at approximately 45 degrees on either side of the break.

12.4.2 Block style lettering, fabricated from reflective material, shall be provided and installed on the apparatus as follows:

12.4.3 The word “FIRE,” in 4-inch-tall white letters, shall be centered in the break in the horizontal 4-inch stripe on the compartment doors on each side of the body, approximately over rear wheel centerline.

12.4.4 The unit designator and equipment designator (Example OR-WWF-E311), in 8-inch-tall white letters, shall be provided on the forward and center compartment doors, above the 4-inch stripe, on each side of the apparatus body.

12.4.5 The words “USDA,” “FOREST SERVICE” in 3-inch-tall letters, “FIRE” in 4-inch-tall letters shall be provided and installed at a location to be determined by the Government. The unit designator (example: OR-WWF) and equipment number (example: E311), in 6-inch-tall letters shall be provided and installed at a location to be determined by the Government. The lettering at the rear of the apparatus shall be arranged as follows:

USDA FOREST SERVICE

FIRE

OR - WWF - E311

12.4.6 The unit designator, in 6-inch-tall white letters, shall be provided centered on the swept back portion of the front bumper on the passenger’s side, and the equipment designator, in

6-inch-tall white letters, shall be provided centered on the swept back portion of the front bumper on the driver's side.

12.4.7 The Forest identifier of the unit designator (example: WWF), in tall black letters, shall be provided on the cab roof, aft of the light bar, and the equipment designator (example: E311), in tall black letters, shall be provided on the cab roof below the unit designator.

12.5 Door Decal (Shield and Vehicle Numbers)

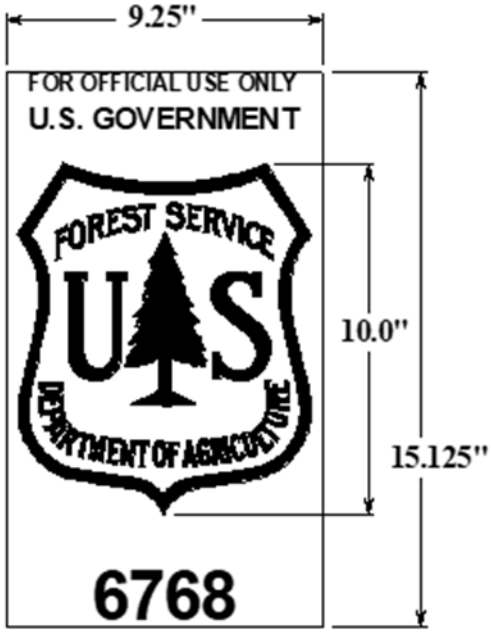
12.5.1 The apparatus manufacturer shall provide and install door decals (shield and vehicle numbers) on the front cab doors, below the reflective striping.

12.5.2 First line: FOR OFFICIAL USE ONLY. All letters must be Engineering Grade reflective (3M series 3279 or equivalent), ½ inch high, Highway Gothic Wide (52 pt.), capitalized, die cut, pre-spaced, and brown.

12.5.3 Second line: U.S. GOVERNMENT. All letters must be Engineering Grade reflective (3M series 3279 or equivalent), 5/8-inch-high, Highway Gothic Wide (64 pt.), capitalized, die cut, pre-spaced, and brown.

12.5.4 The shield decal must have a base layer of brown Engineer Grade reflective (3M series 3279 or equivalent) vinyl die-cut to the FS Shield shape with a second layer of white Engineer Grade reflective (3M series 680-10 or equivalent) vinyl die-cut at a reduced size to create the border of the shield with all the text and graphics die-cut and removed, and in approved Forest Service font.

12.5.5 Fourth line: Four Digit Equipment Number. All letters must be Engineering Grade reflective (3M series 3279 or equivalent), 1 ½ inch high, Highway Gothic Condensed (154 pt), capitalized, die cut, pre-spaced, and brown. Center the equipment number on the door approximately 1-¼ to 2 inches below the shield.



12.6 Truck Identification Plate

12.6.1 A durable truck identification plate, fabricated from corrosion resistant metal, shall be provided, and installed on the pump operator's panel. The plate shall state the name and address of the apparatus manufacturer, the serial number of the unit and the pump performance test results.

13 — Equipment

13.1 Provided Equipment

13.1.1 The following equipment shall be provided with the completed apparatus. The equipment shall be new and unused, and shall meet all current NFPA, OSHA and other applicable safety regulations.

13.2 Manuals and Drawings

13.2.1 The following specified materials shall be provided with the completed apparatus:

13.2.1.1 One complete set of standard chassis operation, parts and service manuals.

13.2.1.2 One apparatus manufacturer’s operation and service manual, to include:

- Manufacturer’s Record of Construction
- Warranty Registration and Information
- Operator Safety Information
- Pump Operation and Troubleshooting Instructions

- Foam System Operation Instructions
- Vehicle Exterior Maintenance Instructions
- Maintenance and Lubrication Information & Charts
- Complete Electrical Diagrams
- Component Literature (Example: siren, PTO, hose reel, etc.)
- Pump Test Certificate, Weight Certificate, Service Parts Replacement List

13.2.1.3 A document showing the recommended fluid types and quantities for the apparatus chassis and associated components shall be provided. This label shall list the recommended fluid types and quantities for the following components:

- Chassis Engine Lubricant
- Chassis Engine Coolant
- Chassis Power Steering Fluid
- Chassis Transmission Fluid
- Chassis Transfer Case Lubricant
- Chassis Drive Axle Lubricant
- Pump Gearbox Lubricant
- Chassis Brake Fluid

13.3 Road Kit

13.3.1 The completed apparatus shall be equipped with a road kit containing the following items:

- One 5-pound Class B/C fire extinguisher with vehicle mounting bracket, shipped loose
- One set of warning triangle reflectors, containing three folding reflectors in a plastic storage case
- One 12-ton hydraulic jack with handle and lug wrench

13.4 Wheel Chocks

13.4.1 Two NFPA-compliant solid bottom wheel chocks shall be provided with the completed apparatus.

13.5 Tool Holders

13.5.1 One set of tool holders shall be purchased or fabricated from stainless steel and/or steel with a gray DuraCoat™ finish. The tool holders shall be shipped with the loose equipment accompanying the completed apparatus.

13.6 Coupling Mounts

13.6.1 The following quantities and sizes of coupling holders shall be provided with the completed apparatus:

- Six 3/4-inch GHT
- Seven 1-inch NPSH
- Two 1½-inch NPSH
- Eleven 1½-inch NH
- Two 2½-inch NH
- One 2½-inch NH quick release

14 — Warranty Provisions

14.1 Fifteen Year Apparatus Warranty

14.1.1 All materials and workmanship herein specified, including all equipment furnished, shall be guaranteed for a period of fifteen years after the acceptance date of the apparatus, unless otherwise noted, with the exception of any normal maintenance services or adjustments which shall be required.

14.1.2 Under this warranty, the apparatus manufacturer shall be responsible for the costs of repairs to the apparatus that have been caused by defective workmanship or materials during this period.

14.1.3 This warranty shall not apply to the following:

- Any component parts or trade accessories such as chassis, engines, tires, pumps, valves, signaling devices, batteries, electric lights, bulbs, alternators, and all other installed equipment and accessories, in as much as they are usually warranted separately by their respective manufacturers, or are subject to normal wear and tear.
- Failures resulting from the apparatus being operated in a manner or for a purpose not recommended by the apparatus manufacturer.
- Loss of time or use of the apparatus, inconvenience or other incidental expenses.
- Any apparatus which has been repaired or altered outside of the apparatus manufacturer's factory in any way that affects its stability, or which has been subject to misuse, negligence, or accident.

14.2 Water and Foam Tank Warranty

14.2.1 The polypropylene water and foam tank that is specified to be supplied with this apparatus shall be warranted by the water tank manufacturer for a “lifetime” period from the date that the apparatus is put into service. The manufacturer shall repair, at no cost to the purchaser, any problems caused by defective materials and/or workmanship. The warranty shall cover the reasonable costs of removing the water tank from the apparatus and reinstalling it after the completion of the covered warranty repairs but shall not cover any liability for the loss of service or downtime costs of the apparatus.