

NFPA 1900 Review FAMA Spring Meeting

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REV Fire Group

February 17, 2024

Fire Apparatus Manufacturers' Association

Ways to View 1900

- Hardcopy
 - NFPA still sells hardcopy books for their standards, but they are only accurate as of the first printing. The books are not updated throughout the revision cycle. The 1900 book is already outdated as there was an entire section missing in the aerial chapter as well as several TIAs processed already.
- NFPA Link
 - Annual subscription
 - Updated with Errata corrections and TIAs



NFPA Next Revision Schedule

Public input opens Public input closing date First draft meeting in Public comment closing date Second draft meeting by Next issue to be issued in NOW Sep 2025 Mar 2026 Jul 2026 Sep 2026 Mar 2027





NFPA Next Revision FAMA Planning

Review chapters for simplification/deregulation What in the standard may no longer apply:

Is it measurable?

- Is it a minimum standard?
- Is it safety (not just operational)
- Is it useful

NFPA 199000 Sandard for Accord Rescue and Prefighting Whickes. Automotive Pre-Apparatus, automotive. Antomotive Pre-Apparatus, automotive. Antomotive. Antomotive. Antomotive. Antomotive. Antomotive. Automotive. Antomotive. Antomotive. Automotive. Antomotive. Automotive. Automotive

Chassis
Low Voltage Elect.
Driving and Crew Areas
Body
Pumps (Lo, Hi, Ultra-Hi)

Aerial
Line Voltage Elect.
Command & Communication
Breathing Air

Winches



NFPA 1900 Changes from 1901 & 1906

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CHAPTER 1

Admin 1901 Chapter 1



Scope of Standard

Scope of standard includes:

- Design
- Performance
- Acceptance
- Testing

1.1 Scope.

1.1.1

This standard defines the minimum requirements for the design, performance, acceptance criteria, and testing of aircraft rescue and firefighting apparatus, new automotive fire apparatus and trailers, wildland fire apparatus, and automotive and remounted ambulances.

<u>1.1.2*</u>

Vehicles without wheels are not covered by this standard.



Application of Standard

• Applies to apparatus contracted for after January 1, 2024

<u>7.1.3.1*</u>

A pparatus Manufacturers' A ssociation

Chapters <u>7</u> through <u>27</u> shall apply to new fire apparatus that meet the following criteria:

- Have 10,001 lb (4501 kg) or greater gross vehicle weight rating (GVWR) or are trailers intended to be towed by fire apparatus under emergency response conditions
- (2) Are designed for use under emergency conditions to transport personnel and equipment and to support the suppression of fires and mitigation of other hazardous situations, including wildland fires
- (3) Are contracted for on or after January 1, 2024

7.1.3.2

Nothing shall prevent the use of the standard prior to January 1, 2024, or for vehicles with less than 10,001 lb (4501 kg) gross vehicle weight rating (GVWR), if the purchaser and the contractor both agree.



CHAPTER 2

Reference Publications 1901 Chapter 2



Reference Standards Updated

Dates of most publications were updated to the most recent versions.

NFPA	CSA	NATO
ANSI	FAA	SAE
ASME	FAMA	TRA
ASNT	IPC	UL
ASTM	ISEA	UNECE
AWS	ISO	USDA
CGA	NTEA (AMD)	US CFR

Referenced Publications

2.1 General.

The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.

2.2 NFPA Publications.

National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471, www.NFPA.org.

NFPA 70[®], National Electrical Code[®], 2023 edition.

NFPA 460, Standard for Aircraft Rescue and Firefighting Services at Airports, 2024 edition.

NFPA 950, Standard for Data Development and Exchange for the Fire Service, 2020 edition.

NFPA 1910, Standard for the Inspection, Maintenance, Refurbishment, Testing, and Retirement of In-Service Emergency Vehicles and Marine Firefighting Vessels, 2024 edition.



CHAPTER 3





New Definitions

- Engine.
- Electrical Vehicle (EV) Motor.
- Fuel Cell.
- Internal Combustion (IC) Engine.
- Primary Seating Position
- Secondary Seating Position
- Foam Concentration

- Ground Fault Circuit Interrupter (GFCI)
- High Voltage Interlock
- Rated Capacity (Aerial Device).
- Rated Horizontal Capacity Dry (Aerial Device).
- Rated Horizontal Capacity Wet (Aerial Device).
- Structural Fire Apparatus
- Wildland Fire Apparatus



CHAPTER 7

General 1901 Chapter 4



Digital Alert Warning System

7.12.5

The purchaser shall provide the information identified in 7.12.1 through 7.12.4 for the following:

- (1) Radio communication equipment
- (2) Mobile data terminals or other computer equipment
- (3) Traffic preemption equipment
- (4)* Vehicle data recorder
- (5)* V2X communications
- (6) Digital alert warning system (DAWS)

ADDED AS OPTIONAL

<u>7.12.6*</u>

A DAWS, if provided, shall meet the requirements of NFPA 950.



VDR now Optional

• VDR moved from the body to the annex.

4.11 Vehicle Data Recorder.

4.11.1 All apparatus shall be equipped with an on-board vehicle data recorder (VDR).



A.7.12.5(4) **New** If a vehicle data recorder (VDR) is provided, it should provide at least the following minimum capabilities:

- (1) The VDR should be capable of recording the data shown in <u>Table A.7.12.5(4)(a)</u> at least once per second.
- (2) Data should be stored at the sampling rate in a 48-hour loop.
- (3) Memory should be sufficient to record 100 engine hours' worth of minute-by-minute summary showing the data in <u>Table A.7.12.5(4)(b)</u>.
- (4) When the memory capacity is reached, the system should erase the oldest data first.



ESC is now required if it is commercially available. This covers all apparatus other than 4x4 and TDAs

7.14 Vehicle Stability.

7.14.1* Stability Control System

7.14.1.1

The apparatus shall be equipped with a stability control system in any configuration for which it is commercially available.

7.14.1.2

The stability control system shall have, at a minimum, a steering wheel position sensor, a vehicle yaw sensor, a lateral accelerometer, and individual wheel brake controls.



Rollover Stability Testing

7.14.3 Rollover Stability.

Tilt table and calculations are not required any more if the apparatus is equipped with stability control

Effectively only AWD and TDA apparatus need tilt testing or calculations.

7.14.3.1

Structural fire apparatus not equipped with a stability control system and all wildland fire apparatus shall meet either of the following:

- (1)* The apparatus shall remain stable in both directions in accordance with Table 7.14.3.1 when tested on a tilt table in accordance with SAE J2180, A Tilt Table Procedure for Measuring the Static Rollover Threshold for Heavy Trucks.
- (2) The calculated or measured vertical center of gravity (VCG) divided by the rear axle track width shall not exceed the applicable criterion in <u>Table 7.14.3.1</u>.

Tabl	e 7.14.3.1 Rollover Stability Require	ements
Vehicle	Tilt Criteria (degrees)	VCG/Track (percentage)
Wildland fire apparatus ≤33,000 lb (15,000 kg) GVWR	30	75
Wildland fire apparatus >33,000 lb (15,000 kg) GVWR	27	80
Structural fire apparatus not equipped with a stability control system	26.5	80
(17



Operator Manuals on the Web

Operator manuals publicly available for download for 20 years.

Manual availability:

- Hardcopy on the apparatus
- Electronic display
- Link (QR Code) to the website download







Operator Manual - Water Fording

7.21.2.9*

The operator manual shall address the water fording capabilities of the vehicle.

<u>A.7.21.2.9</u>

The ability of an apparatus to ford water is dependent on a number of factors. One of these is the height of the engine air intake opening. This height can help the purchaser understand part of the apparatus's ability to operate in high water. Even this value must be considered carefully because the speed of travel as well as physical features around the opening will affect the fording ability. Other considerations include vents on axle differentials and engine crankcases as well as electrical equipment. If the purchaser intends to operate in high water, it is recommended that they work with their apparatus manufacturer to ensure that other components that would be affected by water will be addressed, and that the apparatus can be manufactured to the desired water fording depth.





Operator Manual – Aerial Inspection Criteria

7.21.2.8

The operator manual(s) shall specify all technical information needed to perform NFPA 1910 certification testing as described in <u>7.21.1(16)</u>.

(16) If the apparatus has an aerial device, all the technical information required for inspections to comply with NFPA 1910



NFPA 1910 Inspection Requirement	Operator Manual Content
23.8.4.1 Rotation-Bearing Mounting Bolts.	Provide fastener grade, size, and torque value with acceptable tolerance range.
23.8.4.2 Torque Box Mounting to Frame.	Provide fastener grade, size, and torque value with acceptable tolerance range.
23.8.4.3 Tractor-Drawn Components Mounting to Frame.	Provide fastener grade, size, and torque value with acceptable tolerance range.
23.8.4.5 Rotation Gear and Bearing.	Provide procedure for measuring bearing clearance along with target value and acceptable tolerance.
23.8.4.6 Rotation Gear Reduction Box Mounting.	Provide fastener grade, size, and torque value with acceptable tolerance range.
23.8.4.14 Elevation Cylinder Anchor Ears and Plates.	Provide fastener grade, size, and torque value with acceptable tolerance range.
23.8.4.16.2* The elevation cylinders shall be subjected to a drift test	Provide procedure and target drift value with tolerance
23.8.4.23.2 The operating speed of the engine	List engine idle, and High Idle RPM with tolerance range for each engine make and model.
23.8.4.25 Relief Hydraulic Pressure.	Main hydrualic pump relief pressure with tolerance range
23.8.5.3.3 If the stabilizer mounting to the frame or torque box is bolted	Provide fastener grade, size, and torque value with acceptable tolerance range.
23.8.5.8.2* The stabilizer extension cylinder drift test	Provide procedure and target drift value with tolerance
23.8.5.11 Leveling Indicator.	Provide procedure for measuring and level accuracy tolerance range.
23.8.5.14 Stabilizer Deployment.	Provide procedure for measuring deployment time and target value with tolerance.



Top Speed Minimum GVWR Increase

Over 33K GVW (was 26K) Over 50K GVW or 1250 gal water

68 mph 60 mph

<u>7.16.2*</u>

The maximum top speed of any fire apparatus with a GVWR over 33,000 lb (15,000 kg) shall not exceed either 68 mph (109 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.

7.16.3

If the combined water tank and foam agent tank capacities on the fire apparatus exceed 1250 gal (4732 L), or the GVWR of the vehicle is over 50,000 lb (22,680 kg), the maximum top speed of the apparatus shall not exceed either 60 mph (95 km/hr) or the manufacturer's maximum fire service speed rating for the tires installed on the apparatus, whichever is lower.





EV Fire Apparatus Cut Loop

7.23.2 High Voltage Battery First Responder Cut Loops.

7.23.2.1

There shall be a first responder cutloop in the battery management circuit that, when cut, will disconnect the charge from the high voltage battery cells.

7.23.2.2

Each first responder cut loop shall be protected behind an access door large enough to reach the loop with a standard pair of bolt cutters.

7.23.2.3

The access doors shall be located one on each side the apparatus on the pump panel or body as near to the back of the cab as practical.







EV Fuel Type Identification

7.23.3 EV Identification Sign.

7.23.3.1

Identification signs shall be located on each side of the cab and at the rear of the apparatus.

7.23.3.2

Each sign shall be in accordance with ISO 17840-4, Road vehicles – Information for first and second responders – Part 4: Propulsion energy identification.

7.23.3.2.1

The size of the sign for a vehicle Class 5 and below shall be 4.72 in. (120 mm) wide and 3.27 in. (83 mm) high.

7.23.3.2.2

The size of the sign for a vehicle Class 6 and above shall be 5.7 in. (145 mm) wide and 4.2 in. (107 mm) high.







CHAPTER 8

Fire Requirements by Type 1901 Chapter 5 - 11

Major Chapter Consolidation



Apparatus Type Chapters Eliminated

- Pumper
- Initial attack
- Mobile water supply
- Aerial
- Quint
- Special service
- Mobile foam

Chapter 9 Chapter 10 Chapter 11 Chapter 12 Chapter 13 Chapter 14

Chapter 8

COMBINED INTO COMMON CHAPTER 8

F IRE A pparatus Manufacturers' A ssociation

Requirements by Apparatus Type

 The requirements in 1901 chapters 8 through 14 were combined by creating a master table that lists those requirements by apparatus type.

<u>8.1*</u> General.

Apparatus shall meet the minimum requirements in **<u>Table 8.1</u>** based on the apparatus type.

		Pumper	Initial Attack	Mobile Water Supply	Mobile Water Supply w/pump	Aerial	Quint	Special Service	Mobile Foam	Wi Su	dland] ppressi	Fire ion	Wildland Mobile Water Supply	Wildland Crew Carrier
	GVWR <u>lbs</u> (kg)	-	-	-	-	-	-	-	-	10,001 - 14,000 <u>15</u> (4,501 - 6,350 kg)	14,001 - 26,000 <u>15</u> (6,351 - 11,793 kg)	Over 26,000 <u>[b</u> (Over 11,793 kg)		
Pump	Fire Pump Capacity - GPM (LPM)	750 (3000)	250 (1000)	-	-	-	1000 (4000)	-	750 (3000)	-	-	-	-	-
	Pump Specifications Chapter	19	19	-	19	-	19	-	19	44 or 19	44 or 19	44 or 19	44 or 19	-
Tank	Fire Suppression Fluid Tank Capacity Water and <u>Foam</u> - Gallons (Liters)	300 (1100)	200 (750)	1000 (4000)	1000 (4000)	-	300 (1100)	-	-	150 (600)	150 (600)	150 (600)	1000 (4000)	-
	Foam Tank Capacity - Gallons (Liters)	-	-	-	-	-	-	-	500 (1900)	-	-	-	-	-





Equipment Storage Capacity
Hose Storage Capacity
Roadside Safety Devices
Wheel Chocks
Vests
Cones
Aerial Ladder Belt







Not Required

Ground Ladders Hose Nozzles **Demolition Tools Portable Lights Give Extinguisher Tarps** Rope



F IRE A PPARATUS MANUFACTURERS' A SSOCIATION

Wheel Chocks

Wheel chocks were always required but they used to have to hold on a 20 percent grade. The new values are different between structural and wildland apparatus.

(23) Two or more wheel chocks, mounted in readily accessible locations, that together will hold the apparatus, when loaded to its GVWR or GCWR, on a hard surface with a 20 percent grade with the transmission in neutral and the parking brake released **Old**



8.15* Wheel Chocks.

8.15.1

New

Wheel chocks shall be mounted in a readily accessible location.

8.15.2

Wheel chocks for structural apparatus shall each hold the apparatus under the following conditions:

- (1) Apparatus loaded to its GVWR or GCWR
- (2) Road surface pitched to 10 percent for the length of the apparatus
- (3) Hard road surface such as asphalt or concrete
- (4) Transmission in neutral
- (5) Parking brake released
- 8.15.3

Wheel chocks for wildland apparatus shall each hold the apparatus under the following conditions:

- (1) Apparatus loaded to its GVWR
- (2) Road surface pitched to 15 percent for the length of the apparatus
- (3) Hard road surface such as asphalt or concrete
- (4) Transmission in neutral
- (5) Parking brake released



CHAPTER 9

Chassis 1901 Chapter 12 1906 Chapter 12



1901 and 1906 Requirements Combined

<u>1901</u>

"Structural Fire Apparatus"

<u>1906</u>

"Wildland Fire Apparatus"

9.3.2.4* Approach and Departure Angles.

9.3.2.4.1

For structural fire apparatus an angle of approach and an angle of departure of at least 8 degrees shall be maintained at the front and the rear of the vehicle when it is loaded to the estimated in-service weight.

9.3.2.4.2

For wildland fire apparatus, an angle of approach and an angle of departure of at least 20 degrees shall be maintained at the front and the rear of the vehicle when it is loaded to the estimated in-service weight.



Chapter Pruning

Old and outdated requirements removed

 Public Input No. 376-NFPA 1900-2020 [Sections 15.2.2.2, 15.2.3.]

 Sections 15.2.2.2, 15.2.2.3

 15.2.2.2 Drain Valves.

 15.2.2.2.1

 Readily accessible drain valves shall be installed at the lowest point of the cooling system and at such other points as are necessary to permit complete removal of the coolant from the system.

 15.2.2.2.*

 Drain valves shall be designed or positioned such that they will not open accidentally.

 15.2.2.3

 The radiator shall be mounted to prevent the development of leaks caused by twisting or straining where the apparatus operates over uneven ground.

 Statement of Problem and Substantiation for Public Input

 Cooling System Drain valves are no longer common on vehicles and not required if the system can be drained by the removal of a hose or other means. The radiator mounting text sounds good, but there is no way to measure whether it is met or not. Subcommittee reviewed and approved changes on Oct 5, 2020

Examples: Radiator, Oil Filters, Air Filter, Fuel Filters, Dual Fuel Tanks, DPF, Parking Brake, Transmission, Old Annex Text.



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Wildland Weight Ranges Adjusted

CLASS 1	
6,000 lb & Less	pick-up multi-purpose
CLASS 2	
6,001-10,000 lb	
CLASS 3	mik press makin
10,001-14,000 lb	compact van
CLASS 4	conventional van
14,001-16,000 lb	
CLASS 5	
16,001-19,500 lb	large wait-n
CLASS 6	Lundue schoel
19,501-26,000 lb	coe van single axte van
CLASS 7	Nome fuet Wanse
26,001-33,000 lb	i wedum Irash conventional
CLASS 8	dump Eardem conventional
33,001 lb & Over	57 Cornent costesper

Now Aligned with SAE Classes

		Equipment Allowance			
Apparatus Type	Apparatus Size	lb	kg		
Wildland fire suppression apparatus	10,001 to 16,000 lb (4,501 to 7,260 kg) GVWR	200	90		
	16,001 to 19,500 lb (7,261 to 8,845 kg) GVWR	500	225		
	19,501 to 26,000 lb (8,846 to 12,000 kg) GVWR	500	225		
	>26,000 lb (>12,000 kg) GVWR	750	340		

Chassis GVWR				
lb	Old 1906 Values kg			
10,001-15,000	4,501-7,000			
15,001-20,000	7,001-9,000			
20,001-26,000	9,001-12,000			
>26,000	>12,000			



Engine Air Restriction Requirement

12.2.4* Air Intake System.

<u>12.2.4.1*</u>

An air filter shall be provided in the engine's intake air system.

Old

12.2.4.2

Air inlet restrictions shall not exceed the engine manufacturer's recommendations.

<u>12.2.4.3*</u>

The air inlet shall be equipped with a means of separating water and burning embers from the air intake system.

12.2.4.4

The requirement in <u>12.2.4.3</u> shall be permitted to be achieved by either of the following methods:

- (1) Provision of a device such that burning particulate matter larger than 0.039 in. (1.0 mm) in diameter cannot reach the air filter element
- (2) Provision of a multiscreen ember separator capable of meeting the test requirements defined in the Parker Hannafin, Racor Division, publication LF 1093-90, *Ember Separation Test Procedure*, or an equivalent test

12.2.4.5

An air restriction indicator shall be mounted in the driving compartment and visible to the driver.

Air intake restriction indicator in cab eliminated

• FAMA test procedure replaces supplier test



9.2.4* Air Intake System for IC Engines.

<u>9.2.4.1*</u>

New

The air intake shall be equipped with a means of separating water and burning embers from the air intake system.

9.2.4.2

The requirement in 9.2.4.1 shall be permitted to be achieved by either of the following methods:

- A device such that burning particulate matter larger than 0.039 in. (1.0 mm) in diameter cannot reach the air filter element
- (2) A device capable of meeting the test requirements of FAMA TC079, Ember Separator Test



Changes to Accommodate EV

Internal Combustion (IC) Engine Requirements Identified

IC Engine EV Motor

9.2.1 Chassis Engine.

9.2.1.1

Engine derate programming shall be permitted to be used to protect the engine.

9.2.1.2 IC Engine Speed Auxiliary Control Device.

9.2.1.2.1*

If an IC engine speed auxiliary control device is provided, an interlock shall prevent the operation of the IC engine speed auxiliary control device unless the parking brake is engaged and the transmission is in neutral or park, or the parking brake is engaged and the IC engine is disengaged from the drive wheels.

9.2.<mark>1.2.2</mark>

The IC engine shall be prevented from regulating its own speed during times when speed control is critical for consistent apparatus functions such as generator, water pump, or aerial operation.



DPF/SCR Instruction Label - Annex

A.9.2.6.5.3

The purchaser might wish to specify a means of instruction available to the driver on how to perform a manual regeneration and to temporarily inhibit active regeneration. The purchaser might wish to specify a separate lighting cluster other than the universal symbol dashboard indicator lights to help the operator determine the DPF issue or reason for the alarm concerning the following:

- Regeneration required (1)
- (2)High exhaust system temperature (HEST)
- Low diesel exhaust fluid (DEF) (3)

Now Optional




CHAPTER 10

Low Voltage Electrical 1901 Chapter 13



Major Load Disconnect Switch

Battery Disconnect requirements removed

10.4.6

A major load disconnect switch shall be provided to minimize the electrical drain on the low voltage batteries when the switch is in the OFF position.





"Low Voltage" Batteries

Text Revised to distinguish low voltage DC from high voltage DC



10.4^{*} Low Voltage Batteries.

10.4.1

Low voltage batteries shall be of the high-cycle type.

10.4.2

With the engine off, the low voltage battery system shall be able to provide the minimum continuous electrical load for 10 minutes without discharging more than 50 percent of the reserve capacity and then to restart the engine.

10<mark>43</mark>

The low voltage battery system cold cranking amps (CCA) rating shall meet or exceed the minimum CCA recommendations of the engine manufacturer.



Updated Lighting Zones

• Changed from "X" to updated layout



Figure 10.7.4.2 Warning Zones for Optical Warning Devices.



Night Mode for Warning Lights

- Minimum lighting intensity always allowed dimmer lighting
- A guideline and some recommendations placed in the annex

<u>A.10.7.7</u>

The purchaser might want to consider additional mode(s), through manual or automatic means, adjusting the optical signaling characteristics to create greater conspicuity.

The introduction of LED warning lights has created brighter and more dynamic emergency warning signals with greater functionality than traditional halogen and strobe lighting. These brighter warning lights also have increased the concern for potential optical distraction.

Lighting manufacturers are increasingly offering new methods and technology that can alter optical signaling characteristics in various modes of operation to reduce potential optical obstruction and alert surrounding drivers of the actions being performed by the emergency apparatus.



(1) Mode changes:

- (a) Braking or slowing down
- (b) Daytime and nighttime operations
- (c) Specific function of apparatus such as pumping or aerial use
- (d) Speed increase of the apparatus

(2) Optical characteristic changes:

- (a) Slowing the flash rates
- (b) Using complex flash patterns through the combination of multiple flash patterns or nonflashing optical devices
- (c) Single flash rather than a train of flashes
- (d) Synchronizing the lights
- (e) Outlining the vehicle by marking corners with simultaneous flashes on both sides
- (f) Reducing the light intensity at night to reduce potential optical distraction
- (g) Altering the colors to more amber from red/blue to convey more of a caution message rather than an emergency message



Lights From More Than One Manufacturer Permitted

<u>A.10.7.4.4</u>

System compliance is achieved when each individual zone is documented as compliant. Compliance for all eight zones can be established form one lighting manufacture or multiple lighting manufacturers. When the optical warning devices for all zones are from one manufacturer, system compliance documentation should be provided by that manufacturer. When the optical warning devices are from more than one manufacturer, system compliance documentation should be provided by the manufacturer specific to that zone. The following are examples:

- (1) All lights could be from one lighting manufacturer.
- (2) All upper lights could be from one lighting manufacturer and all lower lights could be from another lighting manufacturer.
- (3) All front lights (upper and lower) could be from one lighting manufacturer, all side lights (upper and lower) could be from a second lighting manufacturer, and all rear lights (upper and lower) could be from a third lighting manufacturer.



CODE 3.

WHELEN





Flash Rates

- Allowable minimum flash rate dropped from 75 to 60 flashes per minute. This change was in response to a desire to reduce distraction from flashing lights at night.
- Reference to SAE J1690 was eliminated

Old

13.8.11 Flash Rate.

13.8.11.1

The minimum flash rate of any optical source shall be 75 flashes per minute, and the minimum number of flashes at any measurement point shall be 150 flashes per minute.

13.8.11.1.1

Steadily burning, nonflashing optical sources shall be permitted to be used.

13.8.11.1.2

The optical energy provided by nonflashing optical sources shall not be included in the calculations of the zone's total optical power.

13.8.11.2

The flasher of any current-interrupted flashing device shall otherwise meet the requirements of SAE J1690, *Flashers*.

10.7.12 Flashing.

10.7.12.1 Flash Rate.

The flash rate of any optical source shall be between 60 and 240 flashes per minute.

10.7.12.2 Steady Lights.

The optical energy provided by nonflashing optical sources, or the steady burning part of an optical flash characteristic, shall not be included in the calculations of the zone's total optical power.

New



Green Warning Lights OK, But Not Counted

<u>13.8.12*</u> Color of Warning Lights.

13.8.12.1

Permissible colors or combinations of colors in each zone, within the constraints imposed by applicable laws and regulations, shall be as shown in **Table 13.8.12.1**.

Old

Table 13.8.12.1 Zone Colors				
Color	Calling for Right-of-Way	Blocking Right-of-Wa		
Red	Any zone	Any zone		
Blue	Any zone	Any zone		
Yellow	Any zone except A	Any zone		
White	Any zone except C	Not permitted		

 Green warning lights are now allowed in any location, but they do not count towards the zone intensity requirements.

10.7.13.1

Permissible optical colors or combinations of colors in each zone, within the constraints imposed by applicable laws and regulations, shall be as shown in <u>Table 10.7.13.1</u>.

Color	Calling for Right-of-Way		Blocking Right-of-Way	
Red	Any zone		Any zone	
Blue	Any zone		Any zone	
Yellow	Any zone except A		Any zone	
White	Any zone except C		Not permitted	
Green	Any zone	New	Any zone	
•				

The optical energy provided by green optical sources shall not be included in the calculations of the zone's total optical power or meeting the requirements for any required lights.



Height Adjusted To Accommodate Some Modern Automotive Vans

• Minimum height increased by 6 inches.

13.8.14.2 Upper-Level Optical Warning Devices.Old13.8.14.2.1The upper-level optical warning devices shall be mounted as high as practical, but not over 8 ft (2.4 m), at the optical center.

10.7.15.2 Upper-Level Optical Warning Devices.

New

10.7.15.2.1

The upper-level optical warning devices shall be mounted as high as practicable, but not over 8 ft 6 in. (2.6 m), at the optical center.



 Bumper extension & Aerial Device compartments are added to the exceptions list so they will not have to have sensors tied to the Do-Not-Move-Apparatus warning light.

<u>10.10.3*</u>

Subsection 10.10.1 shall not apply to the following:

- (1) Manually raised pole lights with an extension of less than 5 ft (1.5 m)
- (2) Compartments located in the front bumper
- (3) Compartments mounted on an aerial device or turntable that would not affect the structure or operation of the aerial device if the compartment door was left open while the apparatus was moved



- Back-Up Cameras will be required on all apparatus.
- They must show an area no less than 10' x 20' behind the vehicle and activate automatically in reverse.

10.11.2

ASSOCIATION

A rear-view visibility system shall be provided that, upon placing the vehicle transmission into reverse, allows the vehicle operator to visibly see an area no less than 10 ft × 20 ft (3 m × 6 m) directly behind the vehicle.



Battery Charger Testing

- Battery chargers that are permanently installed on the apparatus will need to be tested prior to delivery.
- The test requirements were pulled directly from the annual test required by NFPA 1910.
- Expect an additional hour of labor to perform this test.



10.13.5 Low Voltage Battery Charger/Conditioner Test.

10.13.5.1

If the apparatus is equipped with a low voltage battery charger/conditioner, it shall be tested as follows:

- Low voltage batteries are fully charged to at least 12.66 V for a 12 V nominal system, 25.32 V for a 24 V nominal system, and 37.98 V for a 42 V nominal system with the engine off and the shoreline disconnected.
- (2)* Connect a dc ammeter to each output of the low voltage battery charger/conditioner.
- (3) Connect the shoreline to power the low voltage battery charger/conditioner.
- (4) Perform the test with the engine off and the shoreline power cord connected.
- (5)* Add or apply loads to each charger output so that the output current is between 80 percent and 100 percent of the rated output current for that output.
- (6) Record the low voltage battery voltage and output current for each charger output at the beginning of the test and every 20 minutes.
- (7) Maintain the load for 60 minutes.
- (8) Record the low voltage battery voltage and output current for each charger output at the end of the test with the load still applied and the charger/conditioner powered.
- (9) Remove any added load.

10.13.5.2

The test shall be considered a failure if the charger/conditioner does not maintain an output voltage of at least 12.54 V for a 12 V nominal system, 25.08 V for a 24 V nominal system, and 37.62 V for a 42 V nominal system, or if it cannot maintain at least 80 percent of the rated output current for the duration of the test.



Rear 10x10 area – work lighting

 A new graphic was added to clarify how measurements are to be made at the rear of the apparatus

10.9.1 Ground Lighting.

Ground lighting requirements shall apply to structural fire apparatus only.

10.9.1.1* Rear Work Area.

10.9.1.1.1

The work area immediately behind the vehicle shall be illuminated to an average level of at least 3 fc (30 lx), measured at the center of 25 equally spaced 2 ft² divisions within a 10 ft × 10 ft (3 m × 3 m) grid that is square to the rear of the vehicle, as shown in **Figure 10.9.1.1.1**.





Lateral hosebed lighting no longer required

 Lighting requirements were evaluated and found not to be practical or critical on lateral hose beds. The technical committee elected to remove the requirement for lighting this location.

10.9.2* Hose Bed Lighting.

Hose bed lighting requirements shall apply to structural fire apparatus only.

10.9.2.1

If a hose bed is provided, lighting on the hose bed floor shall be at an average level of 3 fc (30 lx) or higher measured at 30 in. equally spaced intervals along the center of the hose bed floor with all dividers and covers removed.

10.9.2.2

Lateral hose beds (i.e., crosslays) shall not be required to be illuminated.

Low Voltage Scene Lighting

- Low Voltage scene lighting mirrors line voltage lights.
- Must not degrade more than 25% from room temp to operating temp
- Handles may be pushup/pull up poles vs mounted to the light
- Must not block DOT lights

10.9.9* Thermal Degradation.

All devices used for work or scene lighting shall show no more than 25 percent drop in light output from initial turn-on with the light at room temperature to photometric stability per SAE J1889, *L.E.D. Signal and Marking Lighting Devices.*

10.9.10* Scene Lighting Systems.

Where fixed low-voltage scene lights are supplied, the requirements in $\underline{10.9.10.1}$ through $\underline{10.9.10.2.4}$ shall apply.

10.9.10.1

All scene lights shall be as follows:

- (1) Provided with a lens or a means for preventing damage from water spray
- (2) Designed for wet locations

10.9.10.2* Handle on Lights.

<u>10.9.10.2.1*</u>

If the light is directly adjustable and the housing temperature can exceed 131°F (55°C) at 110°F (43°C) ambient temperature, a handle shall be provided.

10.9.10.2.2

The design of the light shall not allow the temperature of the handle to exceed 131°F (55°C) at 110°F (43°C) ambient temperature.

10.9.10.2.3

If manually operated floodlights are not operable from the ground, access steps that meet the requirements of Section <u>12.6</u> and handrails that meet the requirements of Section <u>12.7</u> shall be provided to allow the user to reach the floodlights.

10.9.10.2.4

Any scene lights shall be mounted in a way that they do not block the DOT clearance or identification lights on the cab or the body.



CHAPTER 11

Driving and Crew Areas 1901 Chapter 14



Apparatus Seating

7.4 Responsibility of the Purchaser.

<u>7.4.1*</u>

It shall be the responsibility of the purchaser to specify the details of the apparatus in addition to the requirements in NFPA 1900 needed by the manufacturer to build the apparatus, including:

- (1) Requirements not uniquely specified in NFPA 1900, such as the type of apparatus desired.
- (2) Any features of the apparatus desired in addition to, or in excess of, the requirements in NFPA 1900.

(3) Identification of any crew seats as either designated primary seating positions or designated secondary seating positions.

11.1.9.1.7 Overlap.

11.1.9.1.7.1

The clear width of any primary seating position shall not overlap the clear width of any other primary seating position.

11.1.9.1.7.2

The clear width of any primary seating position shall be permitted to overlap the clear width of a secondary seating position.

11.1.9.1.8

Every seating position shall provide a minimum clear width of 22 in. (560 mm) at the shoulder level without overlap.

Purchaser Must Specify Primary Seating Locations

11.1.9* Seat Arrangement.

11.1.9.1 Seating Position Width.

11.1.9.1.1

Each designated primary seating position shall have a minimum clear width of 20.8 in. (529 mm) at the hip level and 27.6 in. (701 mm) at the shoulder level.

11.1.9.1.2

Each designated secondary seating position shall have a minimum clear width of 20 in. (508 mm) at the hip level and 22 in. (559 mm) at the shoulder level.

11.1.9.1.3 Width at hip level shall be measured at the seating H-point.

11.1.9.1.4

Width at shoulder level shall be measured at the height of line 2 as defined in the seat belt length determination procedure in <u>11.1.3.2</u>.

11.1.9.1.5

Width shall be measured with the seat adjusted to the center of its horizontal and vertical travel adjustment.

11.1.9.1.6

The center of any clear width shall not be offset from the center of the seat cushion by more than 3.0 in. (76 mm). $\hfill \ensuremath{\mbox{\tiny T}}$



- The FAMA submission was accepted in its entirety.
- Purchaser must be intentional about seating configurations and consider more carefully how they plan to staff the cab.
- Crew see designation as all primary will drive three-across seating in most custom cabs.



Driver - Officer

MANUFACTURERS'

2 Primary Crew

3 Primary Crew



SCBA Seat Back Holder Testing

 Accidental change was requiring compliance to SAE J2418 2020 version. TIA was passed and the requirement is back to the 2003 version as in NFPA 1901.

SAE J2394, Seven-Conductor Cable for ABS Power – Truck and Bus, 2020.

SAE J2418, Occup ant Restraint System Evaluation — Frontal Impact Component-Level Heavy Trucks, 2003.

SAE J2420, COE Frontal Strength Evaluation – Dynamic Loading Heavy Trucks, 2010.

(6) The deceleration pulse shall meet the SAE J2418, Occupant Restraint System Evaluation – Frontal Impact Component-Level Heavy Trucks, deceleration profile with an accuracy of ±10 percent within the 35 to 95 ms range.

Seat Belt Warning

- Committee decided that in smaller vehicles with no more than 5 occupants, it is easy enough for the driver to see who has belts on and a complicated system is not needed.
- Same logic holds for large vehicles with three or fewer occupants.



<u>11.1.3.8*</u>

A seat belt warning system shall be provided on the following structural fire apparatus:

- (1) SAE Class 4, Class 5, or Class 6 apparatus with seating for more than five occupants.
- (2) SAE Class 7 or Class 8 apparatus with seating for more than three occupants.



Seat Belt Color

- Committee decided that in smaller vehicles with no more than 5 occupants, it is easy enough for the driver to see who has belts on and special web coloring is not needed.
- Same logic holds for large vehicles with three or fewer occupants.



<u>11.1.3.3*</u>

The seat belt webbing shall be red or orange in color on the following:

- (1) SAE Class 4, Class 5, or Class 6 apparatus with seating for more than five occupants.
- (2) SAE Class 7 or Class 8 apparatus with seating for more than three occupants.



 Language was added to allow seat belt indication devices to avoid problem where occupant indication is lost if they raise their weight from the seat (shifting, bouncing, etc.)



11.1.3.8.6

Once an affirmative indication has been established for a seating position, it shall remain an affirmative indication until the next time the seat belt buckle is released or the system power is cycled.



TDA Tiller Training Seat

• If a tiller training seat is provided it must be inside the tiller cab.

11.4.3* Tiller Training Seat.

11.4.3.1

If a second seat is provided for training purposes, it shall be located within the enclosed portion of the tiller cab.

11.4.3.2

The training seat shall be equipped with a seat belt.

11.4.3.3

The tiller operator and training seating positions shall together have a minimum clear width of 40 in. (1016 mm) at the hip level and 44 in. (1118 mm) at the shoulder level.



Why not use Wireless Communication for Training?



TDA Tiller Operator Presence

Operator presence requirements consolidated and clarified.

11.4.4 Tiller Operator Presence.

11.4.4.1

One of the following means shall be provided to indicate that the tiller operator is present:

- (1) Tiller seat cushion occupant sensor
- (2) Seat-belt-engaged indicator
- (3) Manual operator presence switch
- (4) Other means to sense that an operator is seated at the tiller operator position

11.4.4.2

An audible warning alarm shall sound in the tractor cab if the parking brake is released and tiller operator presence is not indicated.





TDA Tiller Cab Communications

Cab communication requirements consolidated and clarified.

11.4.5 Tractor to Trailer Communications.

11.4.5.1

One of the following means shall be provided for communication between the driver and the tiller operator:

- (1) Two-way audible signal with a tone that is unique from other in-cab audible alert signals
- (2) Two-way push-to-talk intercom
- (3) Two-way hands-free intercom
- (4) Other two-way means to allow the driver and the tiller operator to communicate basic driving intentions

11.4.5.2

The communication system shall be operable without the tiller operator having to take his/her hands off the steering wheel.









TDA Tiller Cab Controls

Cab control requirements consolidated and clarified.

11.4.6 Instruments and Controls.

11.4.6.1

The following instrumentation and controls shall be mounted in the tiller operator's compartment:

- (1) Heater controls
- (2) Defroster controls
- (3) Turn signal indicator lights
- (4) Two-way buzzer signal switch
- (5) Windshield wiper and washer fluid control





FAMA Safety Signs Required

11.3.7

- Cab Crush Hazard
- Siren Noise
- Backing Hazards

Safety sign FAMA17, which warns of vehicle backing hazards, shall be visible to the driver while sitting in the driver seat.

11.2.4

Safety sign FAMA41, which warns of the dangers of cab tilt systems, shall be located on the inside panel of the driver cab door.

11.1.7

Safety sign FAMA42, which warns of loud sounds, shall be visible from each seat that is intended to be occupied while the vehicle is in motion.









Clean Cab Annex Text

- No requirements
- Suggestions added to the Annex

<u>A.11.1</u>

Fire departments might wish to establish procedures to minimize the fireground contamination that is introduced into any occupant compartments, and to specify features that will facilitate periodic cleaning. These features can include the following:

- (1) Dedicated body compartments to store SCBA and cylinders after fireground operations
- (2) Dedicated body compartments to store contaminated PPE
- (3) Dedicated clean compartments to store replacement PPE
- (4) Dedicated storage for gross decontamination equipment
- (5) Seat upholstery that is easy to clean, or seat covers that can be removed for cleaning
- (6) Methods of providing hose-down soap streams and rinse streams for gross decontamination prior to reentering the occupant compartments
- (7) Interior surfaces that are easy to clean and that will minimize contaminant absorption





CHAPTER 12

Body Compartments and Equip Mounting 1901 Chapter 15



Radio Compartment Eliminated

15.2* Radio Space.

A protected space or compartment shall be provided for the installation of radio equipment.

NFPA 1901 wording not included in 1900



Equipment Racks

- Flashing lights on rack eliminated.
- Reflective material requirement strengthened.
- Special indication for the driver eliminated still needs to meet Do Not Move Apparatus light requirement



12.3 Equipment Racks.

When an equipment rack is provided, it shall meet the requirements of this section.

12.3.1

A means shall be provided that will retain the device in the stowed position during travel.

New

12.3.2

Retroreflective material marking the extremity of the deployed equipment rack shall be visible when approaching the rack from any direction.

12.3.3

A visual signal shall be provided at the driver's position to indicate that the equipment rack is not stowed and the parking brake is not engaged.

15.4.5

A visual signal shall be provided at the driver's position to indicate that the equipment rack is in motion, or in the down position, and that the parking brake is not engaged.

Old

15.4.6

Flashing lights facing the front and rear of the apparatus shall be provided on the equipment rack and shall be illuminated whenever the equipment rack is in the down position.

15.4.7

The outward ends of the equipment rack that protrude beyond the body of the apparatus shall have retroreflective material to indicate a hazard or an obstruction.

Equipment Racks - Powered

 Powered equipment rack requirements consolidated and clarified.

12.3.4

Power-operated equipment racks shall meet the requirements of this section.

12.3.4.1

An interlock shall be provided to prevent operation of the equipment rack unless the apparatus parking brake has been activated.

12.3.4.2

Controls shall be provided in a position where the operator can visually follow the travel of the equipment rack.

12.3.4.3

Controls shall be provided in a position where the operator will be clear of a falling load.





Equipment Racks - Manual

 Manually operated rack defined with new requirements for operator manual instructions and maximum force to operate requirements.

12.3.5

Manually operated equipment racks shall meet the requirements of this section.

12.3.5.1

A means shall be provided that prevents the rapid deployment of the load.

12.3.5.2

Instructions on how to safely stow and deploy the rack and how many personnel are required shall be visible to the operator(s).

12.3.5.3

Stowing and deploying of a loaded rack shall require no more than 70 lbf. (310 N) of human force per required personnel.





Chevron Colors

 Option added to allow rear chevrons to be any two colors as long as they are contrasting.

12.8.3.2.1

Each stripe in the chevron shall conform to one of the following:

- A single color alternating between red and either yellow, fluorescent yellow, or fluorescent yellow-green
- (2) A single color alternating between different and high-contrasting colors











Hose Reels

• Hose reels with over 100 ft of hose must include power rewind.

<u>12.9.8*</u>

If a fire suppression hose reel is provided, it shall meet the requirements of <u>**12.9.8.1**</u> through <u>**12.9.8.3**</u>.

12.9.8.1

The hose reel shall be equipped with a brake.

12.9.8.2

The hose reel shall have a capacity of not less than 100 ft (30 m) of $\frac{3}{4}$ in. (19 mm) booster hose.

12.9.8.3

Where the reel has a capacity of over 100 ft (30 m) of hose, the reel shall have power rewind capability.





CHAPTER 13

Fire Pumps 1901 Chapter 16
Pump Capacity Discharge Timing MANUFACTURERS' ASSOCIATION

Additional time to start discharging water is allowed if the system includes a 4 inch or larger aux intake pipe.

FIRE

A PPARATUS



13.2.3.3.1

Where pumps are rated at less than 1500 gpm (6000 L/min), they shall be capable of taking suction through 20 ft (6 m) of suction hose under the conditions specified in 13.2.4.1 for the rated capacity of the pump and shall begin discharging water in not more than 30 seconds.

13.2.3.3.2

Where pumps are of 1500 gpm (6000 L/min) or larger but less than 3000 gpm (12,000 L/min), they shall be capable of taking suction through 20 ft (6 m) of suction hose under the conditions specified in 13.2.4.1 for the rated capacity of the pump and begin discharging water in not more than 45 seconds.

13.2.3.3.3

Where pumps are of 3000 gpm (12,000 L/min) or larger capacity, they shall be capable of taking suction through 20 ft (6 m) of suction hose under the conditions specified in 13.2.4.1 for the rated capacity of the pump and begin discharging water in not more than 90 seconds.

13.2.3.3.4

Where the pump system includes an auxiliary 4 in. (100 mm) or larger intake pipe having a

volume of 1 ft³ (0.03 m³) or more, an additional 15 seconds beyond that allowed in 13.2.3.3.1, 13.2.3.3.2, and 13.2.3.3.3 shall be permitted.



Size of bleeder valves for valved intake connections is no longer stipulated.

<u>13.6.5*</u>

Each valved intake shall be equipped with a bleeder valve.

13.6.5.1

The bleeder valve shall be operational without the operator having to get under the apparatus.

13.6.5.2

If a valved appliance is attached to an intake, it shall be equipped with a bleeder valve on each intake.

13.6.5.3

Bleeder valves for valved intakes 4 in. (100 mm) and larger not located at the pump operator's panel shall be located where the bleeder valve controls are visible and operationally functional while the operator remains stationary at the valved intake position.





Pump Test EV Accommodation

Test modified to accommodate fuel cells or EV batteries.

13.13.2.3.5.2

The pump shall be permitted to be stopped between tests in order to change the hose or nozzles, clean the strainer, add fuel for the pump drive IC engine, add fuel for the fuel cell, or recharge the EV motor batteries.





Aux Pumps 1901 Chapter 17



Pumps for Wildland Fire Fighting 1906 Chapter 16



The pump cooling or recirculation strainer with a clean-out and a means for verifying that they are not blocked are new requirements. This was prompted by at least one case where a blocked line caused an over-heat situation which led to an injury.

<u>15.7.8.3*</u>

ASSOCIATION

A pump cooling/recirculation line of sufficient size to prevent the pump from overheating when no discharge lines are open shall be provided between the pump discharge and the water tank.

15.7.8.3.1*

The pump cooling/recirculation line shall be equipped with a strainer with cleanout and a check valve.

15.7.8.3.2

The apparatus shall be provided with a means to verify that the recirculating line is functioning



Ultra-High Pressure Fire Pumps 1901 Chapter 28



Water Tanks 1901 Chapter 18



Structural and Wildland Combined

Examples of combining

- Tank baffle spacing
- Tank to pump flow rates
- Vents
- Fill lines

Minor Changes to Combine Chapters





Foam Proportioning 1901 Chapter 20



Structural and Wildland Combined

Examples of combining

- Gauge freeze protection
- Foam solution backflow

Minor Changes to Combine Chapters



CAFS 1901 Chapter 21



Aerial Devices 1901 Chapter 19

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Aerial Capacity Definitions

Established a new set of definitions that will better define aerial device capacity. This should allow purchasers to compare products more accurately.

Wet and Dry definitions were established.

3.3.237 Rated Capacity (Aerial Device).

Operational capacity for each condition of extension, elevation, and rotation as indicated on the load chart.

3.3.237.1 Rated Horizontal Capacity – Dry (Aerial Device).

The total amount of weight of all personnel and equipment that can be supported at the outermost rung of an aerial ladder or in the platform of an elevating platform under the following conditions: (1) aerial device placed in the horizontal position; (2) stabilizers fully deployed; (3) apparatus on firm and level ground; and (4) aerial device extended and rotated to any position the control system will allow that produces the lowest capacity.

3.3.237.2 Rated Horizontal Capacity – Wet (Aerial Device).

The total amount of weight of all personnel and equipment that can be supported at the outermost rung of an aerial ladder or in the platform of an elevating platform under the following conditions: (1) aerial device placed in the horizontal position; (2) stabilizers fully deployed; (3) apparatus on firm and level ground; (4) aerial device extended and rotated to any position the control system will allow that produces the lowest capacity; (5) monitor or water pipe flowing maximum rated water capacity; and (6) monitor pointed in the direction that produces the greatest overturning moment.



Platform Bucket Fall Protection Anchors

Test criteria for fall protection anchors established

20.15.4.3

Anchorage points provided for fall protection harnesses shall be clearly labeled and rated for a minimum of 450 lb (205 kg).

20.15.4.4

Anchorage points shall withstand 450 lb (205 kg) of force perpendicular to the mounting surface without noticeable permanent deformation.

20.15.4.5*

Anchorage points shall remain attached to the aerial structure after applying a force of 1800 lb (816 kg) perpendicular to the mounting surface.





Hydraulic Components Redefined

- Nonsealing, Dynamic Sealing, Static Sealing terms eliminated
- Detailed explanations in the Annex

20.27 Hydraulic System.

20.27.1*

All load-bearing hydraulic components whose failure results in motion of the aerial device shall have a minimum bursting strength of four times the operating pressure for which the system is designed.

20.27.2*

All other hydraulic system components normally rated according to bursting strength shall have a minimum bursting strength of at least three times the pressure they will be subjected to in normal operation.

20.27.3*

All other hydraulic components normally rated according to performance criteria shall have a minimum bursting strength of at least two times the pressure they will be subjected to in normal operations.



Stabilizer Pad Max Pressure

Increased the maximum pad pressure allowable from 75 to 100 psi

20.29.5.2

The ground contact area for each stabilizer shall be such that a unit pressure of not greater than 100 psi (675 kPa) will be exerted over the ground contact area when the apparatus is loaded to its maximum in-service weight and the aerial device is carrying its rated capacity in every position permitted by the manufacturer.





Load Chart Defined

A load chart will now be required, and the content is defined.



(5)* Rated wind speed

Rating Required

Wind



Line Voltage Electrical 1901 Chapter 22 Interim 1900 Chapter 25



Electrical Load Power Factor

- Any line-voltage device added to the apparatus must have a power factor rating of more than .9, or it must be labeled with the power factor.
- This is intended to help troubleshoot situations where multiple devices running off the generator cause device malfunctions when their differing power factors interfere with each other.

21.2.7* Power Factor Correction.

Any permanently mounted line voltage device shall be equipped with circuitry such that the power factor of the device is 0.9 or greater.

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Outlet locations

- Outlets permissible at least 3 in. above floor height (lower than previous)
- No receptacles are permitted face-up



21.11.5* Receptacles and Inlet Devices.

21.11.5.1 Wet and Dry Locations.

21.11.5.1.1

All wet-location receptacle outlets and inlet devices, including those on hardwired, remote power distribution boxes, shall be of the grounding type, provided with a wet location cover, and installed in accordance with 406.9 of *NFPA* 70.

21.11.5.1.2

All receptacles located in a wet location shall be not less than 24 in. (600 mm) from the ground.

<u>21.11.5.1.3*</u>

Receptacles on off road fire apparatus shall be a minimum of 30 in. (750 mm) from the ground.

21.11.5.2

All receptacles located in a dry location shall be both of the following:

(1) Of the grounding type

At at least 3 in. (75 mm) above the interior floor height

21.11.5.3

No receptacle shall be installed in a face-up position.

21.11.5.4

The face of any wet location receptacle shall be installed in a plane from vertical to not more than 45 degrees off vertical.



Scene lighting

- If scene lights are DC lights attached to AC power supplies, testing for Class 2 power units is now permitted
 - (this just expanded language to include newer commonly used tech which was not addressed be old UL standard for complete fixtures)

21.13.3 Testing and Listing.

21.13.3.1

The manufacturer of the device shall have the scene light tested by a nationally recognized testing laboratory and listed to UL 153, *Portable Electric Luminaires*, or UL 1598, *Luminaires*.

21.13.3.2

If the light source is LED, the manufacturer of the device shall also have the scene light tested by a recognized testing laboratory and listed to UL 8750, *Light Emitting Diode (LED) Equipment for Use in Lighting Products*.

21.13.3.3

If the scene light is powered by an external Class 2 power supply, the manufacturer of the device shall also have the power supply tested by a recognized testing laboratory and listed to UL 1310, *Standard for Class 2 Power Units*.



Added support for 50hz generators

- Expanded language to allow for 50hz generators for international customers.
- Language now reflects tolerance from specification vs from 60hz

21.15.7.3.7

Voltage shall be maintained within ±10 percent of the voltage stated on the power source specification label during the entire test.

21.15.7.3.8

Frequency shall be maintained within ±3 Hz of the frequency stated on the power source specification label during the entire test. Fire Appar Manuf Assoc

CHAPTER 22

Command and **Communications 1901 Chapter** 23 **Interim 1900 Chapter** 26 **No Significant Revisions**



Air Systems1901 Chapter24Interim 1900 Chapter27



Winches 1901 Chapter 25 Interim 1900 Chapter 28



Trailers

1901 Chapter26Interim 1900 Chapter29



Vehicle Protection Systems 1906 Chapter 27 **Interim 1900 Chapter** 55 **No Significant Revisions**



Wildland Crew Carrier Apparatus **1906 Chapter** 10 **Interim 1900 Chapter** 38 **No Significant Revisions**

CHAPTER 27



APPARATUS MANUFACTURERS' ASSOCIATION

