Second Revision No. 28-NFPA 1911-2016 [Section No. 2.4]

2.4 References for Extracts in Mandatory Sections.

NFPA 70®, National Electrical Code®, 2017 edition.

NFPA 99, *Health Care Facilities Code,* 2015 edition.

NFPA 414, *Standard for Aircraft Rescue and Fire-Fighting Vehicles,* 2017 edition.

NFPA 1451, *Standard for a Fire and Emergency Service Vehicle Operations Training Program,* ~~2018~~ 2013 edition.

NFPA 1901, *Standard for Automotive Fire Apparatus,* 2016 edition.

~~NFPA 1912, *Standard for Fire Apparatus Refurbishing,* 2016 edition.~~

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: National Fire Protection Assoc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Apr 20 08:27:27 EDT 2016

Committee Statement

Committee Statement: These changes were editorial in nature.
Response Message:

Second Revision No. 1-NFPA 1911-2016 [Section No. 4.3.1 [Excluding any Sub-Sections]]

Inspections, maintenance, and testing of emergency vehicles shall be performed by qualified personnel as required by 4.3.1.1 or 4.3.1.2.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 11:52:01 EST 2016

Committee Statement

Committee Statement: needed space between of and emergency vehicle.
Response Message:

Public Comment No. 19-NFPA 1911-2015 [Section No. 4.3.1 [Excluding any Sub-Sections]]

Second Revision No. 2-NFPA 1911-2016 [Section No. 4.5.4.2]

4.5.4.2

A check sheet shall be utilized to record the results of the visual and operational checks. *(See Annex C.)*

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 11:52:58 EST 2016

Committee Statement

Committee Statement: the words "visual and" were not included in first draft, but were part of the original input # 37.
Response Message:

Public Comment No. 6-NFPA 1911-2015 [Section No. 4.5.4.2]

Second Revision No. 3-NFPA 1911-2016 [Section No. 4.5.5.1]

4.5.5.1

A complete inspection and diagnostic check of the emergency vehicles in accordance with Chapter 8 shall be conducted at least as frequently as recommended by the emergency vehicle manufacturer or twice a year, whichever comes first.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 11:53:27 EST 2016

Committee Statement

Committee Statement: missing a space between 8 and shall
Response Message:

Public Comment No. 11-NFPA 1911-2015 [Section No. 4.5.5.1]

Second Revision No. 4-NFPA 1911-2016 [New Section after 6.1.6.2]

6.1.6.3

If the fire pump or the aerial device is out of service, the engagement device shall be disabled so as to prevent operation of the pump or the aerial device.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 12:09:19 EST 2016

Committee Statement

Committee Statement: The committee has added this back into the document.
Response Message:

Second Revision No. 5-NFPA 1911-2016 [Section No. 16.4]

16.4 Trailer Electrical and Lighting.

All trailer electrical systems and lighting shall be inspected and maintained to the applicable requirements of Chapter 9 of this document.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 12:13:18 EST 2016

Committee Statement

Committee Statement: This section points to the wrong chapter 8 instead of chapter 9 for low voltage systems.
Response Message:

Public Comment No. 22-NFPA 1911-2015 [Section No. 16.4]

Second Revision No. 6-NFPA 1911-2016 [Section No. 20.7.1]

20.7.1

If the emergency vehicle is equipped with a battery charger or conditioner, it shall be tested as follows:

(1) Batteries shall be fully charged to at least 12.66 volts for a 12-volt nominal system, 25.32 volts for a 24-volt nominal system, and ~~44.31~~ 37.98 volts for a 42-volt nominal system before starting the test.

(2) Engine shall be turned off, and the shoreline power cord shall be attached.

(3) ~~Record battery~~ Battery voltage shall be recorded at the beginning of the test.

(4) ~~Apply a~~ A load of at least 80 percent of nominal charger output for 1 hour shall be applied .

(5) ~~Remove the load and record battery voltage at end of test~~ At the end of the test, the load shall be removed and the battery voltage recorded .

(6) The ~~battery charger~~ test shall ~~fail~~ be considered a failure if the ~~charger~~ system does not maintain battery voltage of at least 12.54 volts or higher for a 12-volt nominal system, 25.~~02~~ 08 volts or higher for a 24-volt nominal system, and ~~43.75~~ 37.62 volts or higher for a 42-volt nominal system.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 12:16:02 EST 2016

Committee Statement

Committee Statement: The sentence did not make sense as written, changed back to original input # 52 and some of the changes were editorial in nature.
Response Message:

Public Comment No. 23-NFPA 1911-2015 [Section No. 20.7.1]

Second Revision No. 7-NFPA 1911-2016 [Section No. 21.3.1]

21.3.1* Test Site from Draft.

The test site shall be adjacent to a supply of clear water, with the water level such that the lift from the surface of the water to the center of the pump intake connection is not greater than the maximum lift shown in 21.5.1.1 and is close enough to allow the suction strainer to be submerged at least 2 ft (0.6 m) below the surface of the water.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 12:31:10 EST 2016

Committee Statement

Committee Statement: The committee believes that this is a better reference.
Response Message:

Public Comment No. 67-NFPA 1911-2015 [Section No. 21.3.1]

Second Revision No. 16-NFPA 1911-2016 [Section No. 21.5.2.3]

21.5.2.3

To ascertain if the hose and coupling are starting to separate, the hose shall be marked immediately behind each coupling.

21.5.2.4

If the hose ~~stretches from the coupling more than 3/8 in. (10 mm),~~ assembly shows any sign of coupling slippage, the test shall be stopped and that section of hose ~~shall be~~ replaced.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 14:58:59 EST 2016

Committee Statement

Committee Statement: The committee agrees with the submitter's comment, however the change was made due to NFPA MOS.

Response Message:

Public Comment No. 68-NFPA 1911-2015 [Section No. 21.5.2.3]

Second Revision No. 9-NFPA 1911-2016 [Section No. 21.5.5.1]

21.5.5.1

All test gauges ~~shall have been calibrated within 60 days preceding the tests~~ shall be calibrated at least annually, or if damaged or accuracy is in question, in accordance with ASME B40.100, *Pressure Gauges and Gauge Attachments* .

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 13:03:06 EST 2016

Committee Statement

Committee Statement: Larger fire department's, service centers, dealerships or testing agency's that perform pump testing on a monthly basis would have to get their gauges calibrated every 60 days the way the standard is written currently. With this change it will comply with ASME B40.100 as far as calibration intervals.

Response Message:

Public Comment No. 59-NFPA 1911-2015 [Section No. 21.5.5.1]

Second Revision No. 10-NFPA 1911-2016 [Section No. 21.7.7]

21.7.7 Pumping Tests.

21.7.7.1 Wildland and Ultra-High-Pressure Fire Pumps.

21.7.7.1.1

Wildland fire pumps and ultra-high-pressure fire pumps shall be subjected to a 30-minute pumping test consisting of continuous pumping at rated capacity at rated net pump pressure.

21.7.7.1.2

The flow, discharge pressure, intake pressure, and engine speed shall be recorded at least every 15 minutes but not fewer than three times for each test sequence.

21.7.7.2 Fire Pumps and Industrial Supply Pumps.

21.7.7.2.1

If the fire pump has a rated capacity of 250 gpm (1000 L/min) or greater but less than 3000 gpm (12,000 L/min), the pump shall be subjected to ~~a~~ the pumping test consisting of the following:

(1) At least 20 minutes of pumping at 100 percent of rated capacity at 150 psi (1000 kPa) net pump pressure

(2) Overload test

(a) If the fire pump has a rated capacity of 750 gpm (3000 L/min) or greater but less than 3000 gpm (12,000 L/min), the pump shall be subjected to an overload test consisting of pumping rated capacity at 165 psi (1100 kPa) net pump pressure for at least 5 minutes .

(b) The overload test shall ~~be performed~~ immediately ~~following~~ follow the pumping test ~~of pumping~~ at rated capacity at 150 psi (~~1000~~ 1100 kPa) net pump pressure.

(3) At least 10 minutes of pumping at 70 percent of rated capacity at 200 psi (1400 kPa) net pump pressure

(4) At least 10 minutes of pumping at 50 percent of rated capacity at 250 psi (1700 kPa) net pump pressure

21.7.7.2.2*

If the fire pump or industrial supply pump has a rated capacity of 3000 gpm (12,000 L/min) or greater, the pump shall be subjected to ~~a~~ the pumping test consisting of the following:

(1) At least 20 minutes of pumping at 100 percent of rated capacity at 100 psi (700 kPa) net pump pressure

(2) At least 10 minutes of pumping at 70 percent of rated capacity at 150 psi (1000 kPa) net pump pressure

(3) At least 10 minutes of pumping 50 percent of rated capacity at 200 psi (1400 kPa) net pump pressure

21.7.7.2.3*

~~The pumping test shall not be started until the~~ If the fire pump ~~pressure and the discharge flow are stabilized. If the~~ or industrial supply pump is a two-stage, parallel/series-type pump, the following criteria shall apply:

(1) The test at 100 percent of capacity shall be run with the pump in parallel mode.

(2) The test at 70 percent of capacity shall be permitted to be run with the pump in either series or parallel mode.

(3) The test at 50 percent of capacity shall be run with the pump in series mode.

~~21.7.7.2.4~~

A complete set of readings shall be taken and recorded a minimum of five times during the 20-minute test for 100 percent rated capacity, a minimum of twice during the overload test if performed , and a minimum of three times during each of the 10-minute tests for 70 percent capacity and 50 percent capacity.

~~21.7.7.4 Overload Test.~~

~~21.7.7.4.1~~

~~If the fire pump has a rated capacity of 750 gpm (3000 L/min) or greater but less than 3000 gpm (12,000 L/min), the pump shall be subjected to an overload test consisting of pumping rated capacity at 165 psi (1100 kPa) net pump pressure.~~

~~21.7.7.4.2~~

~~The overload test shall be performed immediately following the test of pumping at rated capacity at 150 psi (1000 kPa) net pump pressure.~~

21.7.7.3

The prescribed duration of the pumping tests shall not be started until the pump pressure and the discharge quantity are stabilized at the prescribed values.

21.7.7.4

The engine shall not be throttled down, except when the hose, a nozzle, or the position of a transfer valve is being changed.

~~21.7.7.4~~

~~A complete set of readings shall be taken and recorded a minimum of five times during the 20-minute test for 100 percent rated capacity, a minimum of twice during the overload test, and a minimum of three times during each of the 10-minute tests for 70 percent capacity and 50 percent capacity.~~

21.7.7.5

If the ~~fire pump~~ flow rate or pressure readings vary by more than 5 percent during a particular test, the reason for the fluctuation shall be determined, the cause corrected, and the test continued or repeated.

Supplemental Information

File Name	Description
21.7.7_KH.docx	New text for this section. For staff use.
A.21.7.7.2.3_text.docx	Annex text that is associated with the new text for this section.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 13:09:56 EST 2016

Committee Statement

Committee Statement: The text as revised in the First Draft for section 21.7.7 does not provide clear distinctions of the tests for the various types of pumps now covered by NFPA 1911.

The proposed text organizes and separates the requirements for wildland and ultra-high pressure fire pumps from the "regular" fire pumps and industrial supply pumps that existed during the 2003 edition of 1901. The proposed text also attempts to overcome the confusion to the reader of the standard

that the NFPA Style Guide creates in dictating which text is highlighted in bold. This was done by organizing the text so that both the wildland and ultra-high pressure section heading and the fire pumps and industrial supply pumps heading are bold while removing the bold heading for the overload test, which is simply a part of the fire pump test.. The proposed text doesn't create and new or changed requirements; it just reorganizes the requirements.

Annex: Number change to match new main body text numbering as submitted in PC 53. Removed the "a" as editorial change.

Response Message:

Public Comment No. 53-NFPA 1911-2015 [Section No. 21.7.7]

Public Comment No. 58-NFPA 1911-2015 [Section No. A.21.7.7.6]

A.21.7.7.2.3

If the pump is a two-stage, parallel/series-type unit, then operation of the transfer (that is, changeover) valve should be checked thoroughly. Conducting the pumping test with the transfer valve positioned as specified in 21.7.7.2.3 will ensure that the valve is exercised. If comparison with the original engine speeds shows a significant difference for any of the tests, one of the problems could be with the transfer valve.

Second Revision No. 26-NFPA 1911-2016 [Sections 21.7.8.1, 21.7.8.2, 21.7.8.3, 21.7.8.4, 21.7.8.5]

21.7.8.1 Wildland Fire Pumps.

If a pressure control system is supplied on a wildland fire pump, it shall be tested as follows:

(1) The wildland fire pump shall be operated to deliver rated capacity at rated net pump pressure.

(2) ~~If a~~ The pressure control system ~~is supplied, it~~ shall be set in accordance with the manufacturer's instructions to maintain the discharge at rated net pump pressure ~~+/−~~ ± 5 percent.

(3) All discharge valves shall be closed ~~not more rapidly~~ in no fewer than ~~in~~ 3 seconds and ~~not~~ no more ~~slowly~~ than ~~in~~ 10 seconds.

(4) The rise in discharge pressure shall not exceed 60 psi (400 kPa) ~~and shall be recorded~~ .

(5) The rise in discharge pressure shall ~~not exceed 60 psi (400 kPa) and shall~~ be recorded.

~~**21.7.8.1.2**~~

~~The wildland fire pump shall be operated to deliver rated capacity at rated net pump pressure.~~

~~**21.7.8.1.3**~~

~~If a pressure control system is supplied, it shall be set in accordance with the manufacturer's instructions to maintain the discharge at rated net pump pressure +/− 5 percent.~~

~~**21.7.8.1.4**~~

~~All discharge valves shall be closed not more rapidly than in 3 seconds and not more slowly than in 10 seconds.~~

~~**21.7.8.1.5**~~

~~The rise in discharge pressure shall not exceed 60 psi (400 kPa) and shall be recorded.~~

21.7.8.2 Fire Pumps Less than 3000 gpm (12,000 L/min).

If the fire pump has a rated capacity of ~~250 gpm (3000 L/min) or greater but~~ less than 3000 gpm (12,000 L/min), the pressure control device shall be tested ~~at rated capacity at 150 psi (1000 kPa) net pump pressure~~ as specified in 21.7.8.2.1 through 21.7.8.2.3.

21.7.8.2.1

The pressure control device shall be tested at 150 psi (1000 kPa) net pump pressure as follows:

(1) The pump shall be delivering rated capacity at 150 psi (1000 kPa) net pump pressure.

(2) The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 150 psi (1000 kPa) net pump pressure.

(3)* All discharge valves shall be closed in no ~~faster~~ fewer than ~~in~~ 3 seconds and no ~~slower~~ more than ~~in~~ 10 seconds.

(4) The rise in discharge pressure shall not exceed 30 psi (200 kPa).

(5) The rise in discharge pressure shall be recorded.

~~**21.7.8.2.2**~~

~~The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 150 psi (1000 kPa) net pump pressure.~~

~~**21.7.8.2.3**~~

~~All discharge valves shall be closed no faster than in 3 seconds and no slower than in 10 seconds.~~

~~**21.7.8.2.4**~~

~~The rise in discharge pressure shall not exceed 30 psi (200 kPa).~~

21.7.8.2.2

The pressure control device shall be tested at 90 psi (620 kPa) net pump pressure as ~~specified in 21.7.8.2.2.1 through 21.7.8.2.2.5 .~~ follows:

(1) The original conditions of pumping rated capacity at 150 psi (1000 kPa) net pump pressure shall be reestablished.

(2) The discharge pressure shall be reduced to 90 psi (620 kPa) net pump pressure by throttling the engine fuel supply with no change to the discharge valve setting, hose, or nozzles.

(3) The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 90 psi (620 kPa) net pump pressure.

(4) All discharge valves shall be closed in no ~~faster~~ fewer than ~~in~~ 3 seconds and no ~~slower~~ more than ~~in~~ 10 seconds.

(5) The rise in discharge pressure shall not exceed 30 psi (200 kPa).

(6) The rise in discharge pressure shall be recorded.

~~**21.7.8.2.2.1**~~

~~The original conditions of pumping rated capacity at 150 psi (1000 kPa) net pump pressure shall be reestablished.~~

~~**21.7.8.2.2.2**~~

~~The discharge pressure shall be reduced to 90 psi (620 kPa) net pump pressure by throttling the engine fuel supply with no change to the discharge valve setting, hose, or nozzles.~~

~~**21.7.8.2.2.3**~~

~~The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 90 psi (620 kPa) net pump pressure.~~

~~**21.7.8.2.2.4**~~

~~All discharge valves shall be closed no faster than in 3 seconds and no slower than in 10 seconds.~~

~~**21.7.8.2.2.5**~~

~~The rise in discharge pressure shall not exceed 30 psi (200 kPa).~~

21.7.8.2.3

The pressure control device shall be tested at 50 percent of rated capacity at 250 psi (1700 kPa) net pump pressure as ~~specified in 21.7.8.2.3.1 through 21.7.8.2.3.4 .~~ follows:

(1) The pump shall be delivering 50 percent of rated capacity at 250 psi (1700 kPa) net pump pressure.

(2) The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 250 psi (1700 kPa) net pump pressure.

(3) All discharge valves shall be closed in no ~~faster~~ fewer than ~~in~~ 3 seconds and no ~~slower~~ more than ~~in~~ 10 seconds.

(4) The rise in discharge pressure shall not exceed 30 psi (200 kPa).

(5) The rise in discharge pressure shall be recorded.

~~**21.7.8.2.3.1**~~

~~The pump shall be delivering 50 percent of rated capacity at 250 psi (1700 kPa) net pump pressure.~~

~~**21.7.8.2.3.2**~~

~~The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 250 psi (1700 kPa) net pump pressure.~~

~~**21.7.8.2.3.3**~~

~~All discharge valves shall be closed no faster than in 3 seconds and no slower than in 10 seconds.~~

~~**21.7.8.2.3.4**~~

~~The rise in discharge pressure shall not exceed 30 psi (200 kPa).~~

21.7.8.3 Pumps 3000 gpm (12,000 L/min) or Greater.

If the fire pump or industrial supply pump has a rated capacity of 3000 gpm (12,000 L/min) or greater ~~but less than 3000 gpm (12,000 L/min)~~ , the pressure control device shall be tested ~~at rated capacity at 100 psi (700 kPa) net pump pressure~~ as specified in 21.7.8.3.1 through 21.7.8.3.3 .

21.7.8.3.1

The pressure control device shall be tested at rated pump capacity at 100 psi (700 kPa) net pump pressure as follows:

(1) The pump shall be delivering rated capacity at 100 psi (700 kPa) net pump pressure.

(2) The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 100 psi (700 kPa) net pump pressure.

(3)* All discharge valves shall be closed in no ~~more rapidly~~ fewer than ~~in~~ 3 seconds and no more ~~slowly~~ than ~~in~~ 10 seconds.

(4) The rise in discharge pressure shall not exceed 30 psi (200 kPa).

(5) The rise in discharge pressure shall ~~not exceed 30 psi (200 kPa)~~ be recorded .

21.7.8.3.2

The pressure control device shall be tested at 90 psi (620 kPa) net pump pressure as follows:

(1) The original conditions of pumping rated capacity at 100 psi (700 kPa) net pump pressure shall be reestablished.

(2) The discharge pressure shall be reduced to 90 psi (620 kPa) net pump pressure by throttling the engine fuel supply with no change to the discharge valve setting, hose, or nozzles.

(3) The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 90 psi (620 kPa) net pump pressure.

(4) All discharge valves shall be closed in no ~~more rapidly~~ fewer than ~~in~~ 3 seconds and no more ~~slowly~~ than ~~in~~ 10 seconds.

(5) The rise in discharge pressure shall not exceed 30 psi (200 kPa).

(6) The rise in discharge pressure shall ~~not exceed 30 psi (200 kPa)~~ be recorded .

21.7.8.3.3

The pressure control device shall be tested at 50 percent of rated pump capacity at 200 psi (1400 kPa) net pump pressure as follows:

(1) The pump shall be delivering ~~0~~ 50 percent of rated capacity at 200 psi (1400 kPa) net pump pressure.

(2) The pressure control device shall be set in accordance with the manufacturer's instructions to maintain the discharge at 200 psi (1400 kPa) net pump pressure.

(3) All discharge valves shall be closed in no ~~more rapidly~~ fewer than ~~in~~ 3 seconds and no more ~~slowly~~ than ~~in~~ 10 seconds.

(4) The rise in discharge pressure shall not exceed 30 psi (200 kPa).

(5) The rise in discharge pressure shall be recorded.

21.7.8.4* Ultra-High-Pressure Fire Pumps.

The pressure control system of an ultra-high-pressure fire pump shall be tested as follows:

(1) The ultra-high-pressure fire pump shall be operated to deliver rated capacity at rated ~~net pump~~ discharge gauge pressure.

(2) If a pressure control system is supplied, it shall be set in accordance with the manufacturer's instructions.

(3) All discharge valves shall be closed.

(4) Any rise in discharge pressure shall not exceed 40 percent of the rated pump pressure.

(5) The pump shall be operated with the discharge lines closed for 3 minutes without the temperature of the pump exceeding 140°F (60°C).

(6) The final discharge pressure, any rise in discharge pressure, and the final pump temperature shall be recorded.

~~**21.7.8.4.1**~~

~~The ultra-high-pressure fire pump shall be operated to deliver rated capacity at rated net pump pressure.~~

~~**21.7.8.4.2**~~

~~All discharge valves shall be closed not more rapidly than in 3 seconds and not more slowly than in 10 seconds.~~

~~**21.7.8.4.3**~~

~~The rise in discharge pressure shall not exceed 10 percent of the rated pump pressure.~~

Supplemental Information

File Name	Description
21.7.8_final_final_version_KH_march_29_2016.docx	For staff use.
NEW_A.21.7.8.4_Text.docx	

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 03 13:49:03 EST 2016

Committee Statement

Committee Statement: The committee has made these changes in order to reflect new requirements for pumps and UHP pumps. The text developed in San Diego was prepared without full working knowledge of the characteristics of UHP systems. Additional information has been gained. This includes:

A. Positive displacement pumps (PDP's) may be equipped with trap pressure unloaders or with relief valves that bypass when discharge valves are closed.

B. PDP's with trap pressure unloaders will trap pressure between a check valve in the outlet of the unloader and the discharge nozzle when the spray nozzle is closed while bypassing pump output back to the pump intake or back to a tank. The pump recirculates water without building any more pressure than is required to overcome the friction loss of pushing the water through the unloader and through whatever passageway (internal or external hose, pipe, etc.) back to intake or tank. This arrangement doesn't present an overheat issue in the near term.

C. PDP's equipped with a relief valve to maintain the desired discharge pressure, causes all of the output flow to pass through the relief valve and then back to intake or tank when the discharge is closed. In this case, the pump is still under full load and unless the recirculation involves a large volume of water, the unit will likely overheat rapidly.

D. Typical trap pressure unloaders structurally are very similar to relief valves and in fact include a spring tension relief valve of the type commonly employed in relief valves. Additionally, the unloader includes the provision for a check valve in the outlet and a bypass circuit back to intake or tank. Both unloaders and relief valves must be installed and adjusted according to their manufacturer's instructions for proper operation. For instance, trap pressure unloaders must be adjusted to bypass a small amount of water while the delivering rated flow through the discharge.

E. PDP systems with trap pressure unloaders with two discharges, when adjusted properly, will see little increase in discharge gauge pressure when one discharge is closed.

F. If the master discharge pressure gauge required by NFPA 1901 & 1906 takes pressure readings on the pump head, the pressure reading will drop when the pump discharge is closed for a PDP equipped with a trap pressure unloader. The pressure will essentially stay at the relief valve setting when the pump discharge is closed for a PDP with relief valve.

G. NFPA 1901 and 1906 only state that a master pressure gauge shall be provided (28.11.1). The text does not specify where on the pump system the gauge should take the pressure measurement. The standards are also silent on specifying that provision should be provided for taking additional pressure readings elsewhere on the UHP discharge system.

H. At least two manufacturers that use trap pressure unloaders take master pressure gauge measurements from the pump head.

I. The proposed pressure rise limit of 40% is proposed based on the following factors:

i. The system has previously been subjected to a hydrostatic test at 1.4 times the rated pump discharge pressure.

ii. Handlines used on UHP pumps flow 20 gpm or less limits the change in nozzle reaction force due to relatively low mass flow rates.

iii. Higher flow rates (with greater nozzle reaction forces) are through turret nozzles or ground sweep nozzles rather than being handled by a fire fighter.

J. A requirement to monitor and record the pump temperature is included in the proposed text for consideration. Please consider the following to determine whether the pump temperature should be monitored and recorded for UHP pumps:

i. In the new 1906 and 1901, 28.8.6 addresses Pump Cooling. 28.8.6.1 requires a pump cooling/recirculation line between the pump discharge and the water tank, while 28.8.6.2 allows positive displacement pumps to use an automatic bypass relief valve in place of the recirculation line. In addition, the annex item for 28.8.6.1 advises that consideration should be given to the use of thermally activated overheat protection devices. (At least two manufacturers use thermally activated overheat protection devices.)

ii. There are not currently any requirements in 1906 or 1901 to provide a means to monitor UHP pump temperature. Pumps may be buried within an apparatus that precludes access for taking temperature measurements.

iii. The wildland fire pump chapter of 1906 does address pump cooling. 16.7.8.3 requires a pump cooling/recirculation line. However, the fire pump chapter does not address pump cooling and only make passing reference to a bypass line during tank-to-pump flow test.

iv. There are not pump temperature tests for wildland and fire pumps in 1906 or 1901, or in 1911.

Response Message:

Public Comment No. 56-NFPA 1911-2015 [Section No. 21.7.8.5.3]

Public Comment No. 55-NFPA 1911-2015 [Section No. 21.7.8.2]

Public Comment No. 54-NFPA 1911-2015 [Section No. 21.7.8.1]

A.21.7.8.4 Positive displacement UHP pumps equipped with trap pressure unloaders trap pressure between a check valve in the outlet of the unloader and the discharge nozzle when the spray nozzle is closed while bypassing pump output back to the pump intake or back to a tank. The pump recirculates water without building any more pressure than is required to overcome the friction loss of pushing the water through the unloader and through whatever passageway (internal passageway or external hose, pipe, etc.) back to intake or tank. UHP systems on which the discharge pressure gauge is installed on the pump head will indicate a significant drop in the observed gauge pressure when the discharge is closed. If the observed final discharge pressure reading during the pressure control test increases from one year to the next or over time, this may indicate that the setting of the unloader has changed, the check valve has become damaged or fails to fully close, or the bypass passageway has become restricted. Such changes indicate that the unloader should be investigated and repaired.

Second Revision No. 11-NFPA 1911-2016 [Section No. 21.8.4]

21.8.4

If the engine speed required to meet ~~the~~ any of the test points during the pumping test exceeds 110 percent of the engine speed listed on the test label attached to the apparatus, the pump shall be repaired or replaced.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 13:35:57 EST 2016

Committee Statement

Committee Statement: The committee should set a percentage of difference in RPM to perform any of the test points during the pump performance test. The additional RPM required to make the flow and pressure readings could indicate a decrease in pump performance. However, it just could be caused by a difference in ambient pressure, elevation, setup, equipment and / or water source from when the original test was done. The 10 % increase in rpm from the pump panel data plate has been in the pump testing standard for many years. I have been pump testing for 40 years and have always used the 10 % increase in rpm to let my customers know that something has to be done with the pump. Pump testing in the field is much different then pump testing at the manufacturer's test pits. Those pits are permanently setup for testing to perform the tests as quickly and efficiently as possible. In-service pump testing is done under varying conditions, with different equipment, different setups and even different water sources. Any one of these differences can change the outcome of the test. If we require that the RPM match the data plate many pumps with minor wear will have to be disassembled and at least inspected or at worst rebuilt, with minimal results. Since the first draft meeting, I have ask many technicians and mechanics associations "What increase in rpm do you use to determine when a fire pump must be repaired?". All of them said 10 % and many of them thought that it was in the pump testing standard, so that is what they used. Since 10 % has been in the standard either in the body or in the annex since at least 1997, we should require it.

Response Message:

Public Comment No. 21-NFPA 1911-2015 [Section No. 21.8.3]

Public Comment No. 20-NFPA 1911-2015 [Section No. 21.8.4]

Public Comment No. 9-NFPA 1911-2015 [Section No. 21.8.4]

Public Comment No. 57-NFPA 1911-2015 [Section No. 21.8.4]

Public Comment No. 69-NFPA 1911-2015 [Section No. 21.8.4]

Second Revision No. 22-NFPA 1911-2016 [Section No. 22.8.6.14]

22.8.6.14 Extension Cables.

The extension cables shall be inspected for compliance with Chapter 5-2 of ASME B30.5 ~~2004~~ , *Mobile and Locomotive Cranes* .

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 03 13:09:06 EST 2016

Committee Statement

Committee Statement: This change was editorial in nature.
Response Message:

Second Revision No. 24-NFPA 1911-2016 [Section No. 22.9.10.2]

22.9.10.2

The operation of the elevating platform shall include, but not be limited to, moving the platform from ground to maximum elevation, as well as ~~revolving~~ rotating the platform ~~360~~ 30 degrees ~~to the left~~ and returning to the ~~right~~ starting point in the opposite direction while the ~~unit~~ aerial device is at its maximum horizontal ~~reach~~ extension .

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 03 13:21:40 EST 2016

Committee Statement

Committee Statement: This change was made for document consistency.
Response Message:

Second Revision No. 23-NFPA 1911-2016 [Section No. 22.9.11.2]

22.9.11.2

The operation of the elevating platform shall include, but not be limited to, ~~movement of~~ moving the platform from ground to maximum elevation, as well as ~~revolving~~ rotating the platform ~~360 degrees to the left and to the right while the unit~~ a minimum of 30 degrees and returning to the starting point in the opposite direction while the aerial device is at its maximum horizontal ~~reach~~ extension .

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 03 13:12:42 EST 2016

Committee Statement

Committee Statement: The committee agrees with the submitter, however they believe these changes meet what the submitter was looking to accomplish. The submitter was also present at the meeting and assisted with the development of this text.

Response Message:

Public Comment No. 65-NFPA 1911-2015 [Section No. 22.9.11.2]

Second Revision No. 12-NFPA 1911-2016 [New Section after 22.9.14]

22.9.14.7 Water Curtain System.

22.9.14.7.1

The water curtain system control shall be identified for function and direction.

22.9.14.7.2

The water curtain system shall be inspected for function and operation with a minimum of 100 psi (690 kPa) water pressure to produce a fog pattern.

22.9.14.7.3

Any device within the system that is found inoperable shall be repaired or replaced.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 14:12:37 EST 2016

Committee Statement

Committee Statement: All platforms have some type of water curtain providing device but it is not addressed in this standard.
Response Message:

Public Comment No. 63-NFPA 1911-2015 [New Section after 22.9.14]

Second Revision No. 25-NFPA 1911-2016 [Section No. 22.9.14.6.2]

22.9.14.6.2*

Any relief valve that fails to operate within 10 psi (70 kPa) of the manufacturer's required setting shall be repaired, recalibrated, or replaced.

Supplemental Information

File Name	Description
NEW_A.22.9.14.6.2.docx	New annex text

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Wed Feb 03 13:26:31 EST 2016

Committee Statement

Committee Statement: The committee has added this new annex material in order to provide further clarification to the end user.
Response Message:

Public Comment No. 62-NFPA 1911-2015 [Section No. 22.9.14.6.2]

Second Revision No. 17-NFPA 1911-2016 [Section No. 25.3.2]

25.3.2

The power source shall be tested ~~using the electrical loads typically carried on the emergency vehicle connected simultaneously, up to~~ at between 50 percent and 100 percent of the limit specified in 25.3.3.

25.3.2.1

The test shall be performed using the electrical loads typically carried on the emergency vehicle ~~connected simultaneously, up to the limit specified in~~ ~~25.3.3~~ , with additional loads if necessary.

25.3.2.2

The text shall be performed using a load bank.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 17:15:21 EST 2016

Committee Statement

Committee Statement: The committee has added this text to provide further clarification regarding this test.
Response Message:

Public Comment No. 12-NFPA 1911-2015 [New Section after 25.3.1]

Second Revision No. 18-NFPA 1911-2016 [New Section after 25.3.5]

25.3.5.1

If the power source has a minimum turn-on load threshold, the conditions specified in 25.3.5(1) and 25.3.5(4) shall include sufficient load to exceed the minimum turn-on load threshold.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 17:18:22 EST 2016

Committee Statement

Committee Statement: The committee has added this text in order to provide further clarification on the requirement.
Response Message:

Second Revision No. 19-NFPA 1911-2016 [Section No. 25.7.3]

25.7.3

If the emergency vehicle is equipped with a fire pump, during the power source test, the fire pump shall be running at ~~150 psi (1000 kPA) net pump pressure and flowing rated capacity for 20 minutes, followed by 200 psi (1400 kPA) net pump pressure and flowing at 70 percent rated capacity for 10 minutes, followed by 250 psi (1700 kPA) net pump pressure and flowing at 50 percent rated capacity for 10 minutes~~ the pressures and flows specified in 21.7.7 .

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 17:20:13 EST 2016

Committee Statement

Committee Statement: The committee has made this change in order to provide clarification for the end user.
Response Message:

Second Revision No. 20-NFPA 1911-2016 [New Section after 25.7.4.1]

25.7.4.1.1

If the power source has a minimum turn-on load threshold, sufficient load shall be applied to exceed the minimum turn-on threshold for this step.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 17:21:33 EST 2016

Committee Statement

Committee Statement: The committee has added this text in order to provide further clarification for the end user.
Response Message:

Second Revision No. 21-NFPA 1911-2016 [New Section after 25.7.4.6]

25.7.4.6.1

If the power source has a minimum turn-on load threshold, sufficient load shall be applied to exceed the minimum turn-on load threshold for this step.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 17:23:53 EST 2016

Committee Statement

Committee Statement: The committee has added this new text in order to provide clarification for the end user.
Response Message:

Second Revision No. 15-NFPA 1911-2016 [Section No. A.22.9.9.5]

A.22.9.9.5

The proper tensioning of extension and retraction cables of an aerial device is very important to ~~insure~~ ensure the smooth and safe operation of the aerial. When cable tension is too loose, the cable can jump the sheave wheel causing damage. When tension is too tight, the cable can cause damage to the sheave groove and bearings, which can damage the pulley and the cable. The manufacturers of aerial devices have different methods to determine that proper cable tensions are achieved. It is important that the manufacturer's guidelines are strictly followed for establishing cable tension. Cable tension is best measured using a tensiometer. The manufacturers of aerial devices are encouraged to provide the user with acceptable tensionmeter readings for each cable. Determining cable tension with finger pressure should be avoided, as it is a less than accurate practice.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:
Zip:
Submittal Date: Tue Feb 02 14:50:00 EST 2016

Committee Statement

Committee Statement: Manufacturers need to be encouraged to utilize technology instead of human touch to determine the correct tension of aerial cables.
Response Message:

Public Comment No. 1-NFPA 1911-2015 [Section No. A.22.9.9.5]

Second Revision No. 29-NFPA 1911-2016 [Section No. A.25.6]

A.25.6

~~**Dielectric Voltage Withstand Test.**~~ At least every 5 years and after a vehicle accident or body repair, a dielectric test should be performed on the line voltage electrical system. The wiring and permanently connected devices and equipment should be subjected to a dielectric voltage withstand test of 900 volts for 1 minute.

The test should be conducted as follows:

(1) If the system has a neutral conductor bonded to the vehicle chassis, isolate the power source from the panel board.

(2) Disconnect any solid-state low-voltage components.

(3) Connect one lead of the dielectric tester to all the hot and neutral busses tied together.

(4) Connect the other lead to the fire vehicle frame or body.

(5) Close any switches and circuit breakers in the circuit(s).

(6) Apply the dielectric voltage for 1 minute in accordance with the testing equipment manufacturer's instructions.

Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: National Fire Protection Assoc
Street Address:
City:
State:
Zip:
Submittal Date: Wed Apr 20 08:49:04 EDT 2016

Committee Statement

Committee Statement: This change was editorial in nature.
Response Message:

Second Revision No. 27-NFPA 1911-2016 [Chapter D]

Annex D Guidelines for First-Line and Reserve Fire Apparatus

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

D.1 General.

~~To maximize fire fighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities. In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatus manufactured prior to 1991 usually included only a few of the safety upgrades required by the 1991 and subsequent editions of the NFPA fire department apparatus standards or the equivalent Underwriters' Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine tuning to NFPA 1901 since 1991 have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to fire fighters of keeping pre-1991 fire apparatus in first-line service.~~

~~The 1991 edition of the NFPA fire department apparatus standards included, among other provisions, requirements for fully enclosed driving and riding areas, auxiliary braking systems, reflective striping, improved warning lights, and prohibition of roof-mounted audible warning devices. The minimum tip load for an aerial ladder was set at 250 lb (114 kg), and other requirements, such as a minimum rail height, were added to make the aerial ladder safer for fire fighters to use. The 1991 editions have been recognized as the benchmark from which improved and safer fire apparatus have evolved. It is recommended that only apparatus that were designed and manufactured to meet the 1991 or later editions of the NFPA fire apparatus standards, or apparatus that have been refurbished in accordance with NFPA 1912 to meet the 1991 or later editions of the NFPA fire apparatus standards, be permitted to operate in first-line service. This will ensure that, while the apparatus might not totally comply with the current edition of the automotive fire apparatus standards, many of the improvements and upgrades required by the standards since 1991 are available to the fire fighters who use the apparatus.~~

~~It is recommended that apparatus manufactured prior to 1991 that is less than 25 years old, that has been properly maintained, and that is still in serviceable condition should be placed in reserve status and upgraded to incorporate as many features as possible of the post-1991 fire apparatus *(see Section D.3)* . Apparatus that was not manufactured to the applicable NFPA fire apparatus standards or that is over 25 years old should be replaced.~~

To maximize fire fighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities.

In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatus more than 15 years old might include only a few of the safety upgrades required by the recent editions of the NFPA fire department apparatus standards or the equivalent Underwriters Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine tuning to NFPA 1901 have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to fire fighters of keeping fire apparatus more than 15 years old in first-line service.

It is recommended that apparatus more than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status; be upgraded in accordance with NFPA 1912 ; and incorporate as many features as possible of the current fire apparatus standard *(see Section D.3)* . This will ensure that, while the apparatus might not totally comply with the current editions of the automotive fire apparatus standards, many of the improvements and upgrades required by the current editions of the standards are available to the fire fighters who use the apparatus.

Apparatus that were not manufactured to the applicable NFPA fire apparatus standards or that are over 25 years old should be replaced.

~~**D.2** How the Standards Have Changed.~~

It is a generally accepted fact that fire apparatus, like all types of mechanical devices, have a finite life. The length of that life depends on many factors, including vehicle mileage and engine hours, quality of the preventative maintenance program, quality of the driver training program, whether the fire apparatus was used within the design parameters, whether the apparatus was manufactured on a custom or commercial chassis, quality of workmanship by the original manufacturer, quality of the components used, and availability of replacement parts, to name a few. In the fire service, there are fire apparatus with 8 to 10 years of service that are simply worn out. There are also fire apparatus that were manufactured with quality components, that have had excellent maintenance, and that have responded to a minimum number of incidents that are still in serviceable condition after 20 years. Most would agree that the care of fire apparatus while being used and the quality and timeliness of maintenance are perhaps the most significant factors in determining how well a fire apparatus ages.

Prior to 1991, the single fire department apparatus standard was NFPA 1901 . It was basically a "reactive standard." If something worked well in field use for a few years, it might have been suggested for inclusion in NFPA 1901 . It was a very basic standard. In the late 1980s, the Technical Committee on Fire Department Apparatus decided to become proactive and to greatly enhance the value of the standard for the fire service. Task groups were appointed to develop reasonable requirements for the various components that made up a fire apparatus, and a safety task group was charged with looking at issues across the board that would improve the safety of fire fighters who use the apparatus.

The completely revised 1991 edition of NFPA fire department apparatus standards was the result of these efforts and the full committee's strong desire to make the automotive fire apparatus standards not only more safety oriented but also more user friendly. In 1991, four standards were issued: NFPA 1901 , NFPA 1902 , NFPA 1903 , and NFPA 1904 .

Contained within the 1991 editions of the fire department apparatus standards were requirements for such items as increased battery capacity to ensure starting under most conditions, intersection lights for increased visibility, removal of all roof-mounted audible warning devices to reduce hearing problems, a flashing light in the cab to warn if a cab or body door is open, a backup alarm, an automatic transmission to make it easier to drive (unless the purchaser has a specific reason for a manual transmission), fully enclosed riding areas with reduced noise (dBA) levels to keep crew members safe and informed, seats and seat belts for all crew members riding on the apparatus, fail-safe door handles so the sleeve of a coat does not inadvertently catch a handle and open a door, and signs requiring everyone to be seated and belted.

In the pump area, the standard specified that 3 in. (75 mm) or larger valves be "slow close," that caps on intakes and discharge outlets be tested to 500 psi (3400 kPa), that an intake relief valve be provided to help manage incoming pressure, that 30-degree sweep elbows be provided on the discharges to eliminate hose kinking, and that all 3 in. (75 mm) and larger discharges be eliminated from the pump panel to reduce the possibility of injuries to the pump operator.

Fire apparatus equipped with electronic or electric engine throttle controls were required to include an interlock system to prevent engine speed advancement, unless the chassis transmission is in neutral with the parking brake engaged or unless the parking brake is engaged, the fire pump is engaged, and the chassis transmission is in the correct pumping gear.

In the body area, the minimum step surface size and load-carrying capabilities were increased, handrails were required to be slip resistant, and reflective striping was required on all four sides of the apparatus. Electrical system requirements for line voltage systems were added to include the use of listed components that were grounded.

Many requirements were added to increase the operating capabilities of all aerial devices. For aerial ladders, the minimum design strength of the rungs was increased, a height requirement for the handrails was specified, a minimum load-carrying requirement for folding steps was specified, and the aerial ladder had to have a minimum carrying capacity of 250 lb (114 kg) at the tip when the aerial ladder is at zero degrees elevation and maximum extension. Where a water tower is equipped with a ladder, the same requirements that applied to an aerial ladder were required of the ladder on the water tower.

The carrying capacity of elevating platforms at zero degrees elevation and maximum extension was raised to 750 lb (340 kg). Elevating platforms were also required to have handrails, breathing air available in the platform (with low-air warning capability) for at least two fire fighters, and a water curtain cooling system under the platform.

All aerial devices had to be capable of supporting a static load of one and one-half times their rated capacity in any position. A requirement for a stabilizer movement alarm and reflective striping with warning lights was added. Interlocks to prevent inadvertent movement to an unsupported side and to

~~prevent raising the aerial device prior to the stabilizers being deployed were specified. One hundred percent nondestructive tests (NDT) became a requirement. All these requirements were included in the 1991 editions of the NFPA fire department apparatus standards.~~

~~In 1996, the four fire department apparatus standards (NFPA 1901 , NFPA 1902 , NFPA 1903 , and NFPA 1904) were recombined into a single standard that was designated as NFPA 1901 . This edition further enhanced the safety and operating characteristics of all the apparatus.~~

~~The 1999 edition included chapters on quints and mobile foam apparatus, further defined slip resistance of stepping and walking surfaces, required better mounting of equipment in the driving and crew compartments, required predelivery testing of foam systems, and specified that fill stations for breathing air cylinders be designed to totally contain a rupturing cylinder.~~

~~The 2003 edition continued to refine the requirements in the driving and crew riding areas with increased head height requirements at seating positions and additional requirements for storage of SCBAs in seat backs, both aimed at reducing fire fighter injuries. The test protocol for slip resistance of standing and walking surfaces was better defined. There was a general cleanup of the requirements throughout the document to enhance the operational usefulness of the apparatus.~~

D.2 Evaluating Fire Apparatus.

It is a generally accepted fact that fire apparatus, like all types of mechanical devices, have a finite life. The length of that life depends on many factors, including vehicle mileage and engine hours, quality of the preventative maintenance program, quality of the driver training program, whether the fire apparatus was used within the design parameters, whether the apparatus was manufactured on a custom or commercial chassis, quality of workmanship by the original manufacturer, quality of the components used, and availability of replacement parts, to name a few.

In the fire service, there are fire apparatus with 8 to 10 years of service that are simply worn out. There are also fire apparatus that were manufactured with quality components, that have had excellent maintenance, and that have responded to a minimum number of incidents that are still in serviceable condition after 20 years. Most would agree that the care of fire apparatus while being used and the quality and timeliness of maintenance are perhaps the most significant factors in determining how well a fire apparatus ages.

Critical enhancements in design, safety, and technology should also play a key role in the evaluation of an apparatus life cycle. Previous editions of the fire department apparatus standards featured many requirements advancing the level of automotive fire apparatus safety and user friendliness.

Contained within the 2009 edition were requirements for rollover stability; tire pressure indicators; seat belt warning systems requiring all occupants be properly seated and belted; extended seat belt length requirements resulting from an in-depth anthropometric study evaluating the average size of today's fully dressed firefighter; roadability, including minimum accelerations and top speed limitations; enhanced step and work surface lighting; cab integrity testing; increased use of retroreflective striping in the rear of apparatus, providing a consistent identifiable set of markings for all automotive fire apparatus; and enhanced aerial control technologies, enabling short jacking and envelope controls.

D.3 Upgrading Fire Apparatus.

~~Any apparatus, whether in first-line or reserve service, should be upgraded in accordance with~~ NFPA 1912 ~~as necessary to ensure that the following features are included as a minimum:~~ Any apparatus, whether in first-line or reserve service, should be upgraded in accordance with NFPA 1912 , as necessary, to ensure that the following features are included as a minimum:

(1) Seat belts with seat belt warning systems are available for every seat and are new or in serviceable condition.

(2) Warning lights meet or exceed the current standard.

(3) Reflective striping meets or exceeds the current standard.

(4) Slip resistance of walking surfaces and handrails meets the current standard.

(5) A low-voltage electrical system load manager is installed if the total connected load exceeds the alternator output.

(6) The alternator output is capable of meeting the total continuous load on the low voltage electrical system.

(7) Where the gross vehicle weight rating (GVWR) is 36,000 lb (16,000 kg) or more, an auxiliary braking system is installed and operating correctly.

(8) Ground and step lighting meets or exceeds the current standard.

(9) Noise levels in the driving and crew compartment(s) meet the current standard, or appropriate hearing protection is provided.

(10) All horns and sirens are relocated to a position as low and as far forward as possible.

(11) Signs are present stating that no riding is allowed on open areas.

(12) A pump shift indicator system is present and working properly for vehicles equipped with an automatic chassis transmission.

(13) For vehicles equipped with electronic or electric engine throttle controls, an interlock system is present and working properly to prevent engine speed advancement at the operator's panel, unless either the chassis transmission is in neutral with the parking brake engaged, or the parking brake is engaged, the fire pump is engaged, and the chassis transmission is in pumping gear.

(14) All loose equipment in the driving and crew areas is securely mounted in accordance with the current standard.

~~Fully enclosed seating is provided for all members riding on the fire apparatus.~~

~~Warning lights meet or exceed the current standard.~~

~~Reflective striping meets or exceeds the current standard.~~

~~Slip resistance of walking surfaces and handrails meets the current standard.~~

~~A low-voltage electrical system load manager is installed if the total connected load exceeds the alternator output.~~

~~The alternator output is capable of meeting the total continuous load on the low-voltage electrical system.~~

~~Where the gross vehicle weight rating (GVWR) is 36,000 lb (16,000 kg) or more, an auxiliary braking system is installed and operating correctly.~~

~~Ground and step lighting meets or exceeds the current standard.~~

~~Noise levels in the driving and crew compartment(s) meet the current standard, or appropriate hearing protection is provided.~~

~~All horns and sirens are relocated to a position as low and as far forward as possible.~~

~~Seat belts are available for every seat and are new or in serviceable condition.~~

~~Signs are present stating no riding on open areas.~~

~~A pump shift indicator system is present and working properly for vehicles equipped with an automatic chassis transmission.~~

~~For vehicles equipped with electronic or electric engine throttle controls, an interlock system is present and working properly to prevent engine speed advancement at the operator's panel,~~

~~unless the chassis transmission is in neutral with the parking brake engaged; or unless the parking brake is engaged, the fire pump is engaged, and the chassis transmission is in pumping gear.~~

~~All loose equipment in the driving and crew areas is securely mounted to prevent its movement in case of an accident.~~

D.4 Proper Maintenance of Fire Apparatus.

~~In addition to needed upgrades to older fire apparatus, it is imperative that all fire apparatus be checked and maintained regularly to ensure that they will be reliable and safe to use. The manufacturer's instructions should always be followed when maintaining the fire apparatus. Special attention should be paid to ensure that the following conditions exist, as they are particularly critical to maintaining a reliable unit:~~ In addition to needed upgrades to older fire apparatus, it is imperative that all fire apparatus be checked and maintained regularly to ensure that they will be reliable and safe to use. The manufacturer's instructions should always be followed when maintaining the fire apparatus. Special attention should be paid to ensure that the following conditions, which are particularly critical to maintaining a reliable unit, exist:

~~Engine belts, fuel lines, and filters have been replaced in accordance with the manufacturers' maintenance schedule(s).~~

~~Brakes, brake lines, and wheel seals have been replaced or serviced in accordance with the manufacturers' maintenance schedule.~~

~~Tires and suspension are in serviceable condition, and tires are not more than 7 years old.~~

~~The radiator has been serviced in accordance with the manufacturer's maintenance schedule, and all cooling system hose are new or in serviceable condition.~~

~~The alternator output meets its rating.~~

~~A complete weight analysis shows the fire apparatus is not over individual axle or total gross vehicle weight ratings.~~

~~The fire pump meets or exceeds its original pump rating.~~

~~The water tank and baffles are not corroded or distorted.~~

~~If equipped with an aerial device, a complete test to original specifications has been conducted and certified by a certified testing laboratory.~~

~~If so equipped, the generator and line voltage accessories have been tested and meet the current standard.~~

(1) Engine belts, fuel lines, and filters have been replaced in accordance with the manufacturers' maintenance schedule(s).

(2) Brakes, brake lines, and wheel seals have been replaced or serviced in accordance with the manufacturers' maintenance schedule.

(3) Tires and suspension are in serviceable condition, and tires are not more than 7 years old.

(4) The radiator has been serviced in accordance with the manufacturer's maintenance schedule, and all cooling system hoses are new or in serviceable condition.

(5) The alternator output meets its rating.

(6) A complete weight analysis shows the fire apparatus is not over individual axle rating or total GVWR.

(7) The fire pump meets or exceeds its original pump rating.

(8) The water tank and baffles are not corroded or distorted.

(9) If the apparatus is equipped with an aerial device, a complete test to original specifications has been conducted and certified by a certified testing laboratory.

(10) If so equipped, the generator and line voltage accessories have been tested and meet the current standard.

D.5 Refurbishing or Replacing Fire Apparatus.

Fire department administrators and fire chiefs should exercise special care when evaluating the cost of refurbishing or updating an apparatus versus the cost of a new fire apparatus. Apparatus that are refurbished should comply with the requirements of NFPA 1912 . A thorough cost-benefit analysis of the value of upgrading or refurbishing a fire apparatus should be conducted. In many instances, it will be found that refurbishing costs will greatly exceed the current value of similar apparatus. Experience has also shown that refurbishing a fire apparatus that is over 20 years old, other than to paint or repair the apparatus, is a very poor investment.

Some factors to consider and evaluate when considering whether to refurbish or replace a fire apparatus include the following:

What is the true condition of the existing apparatus? Has it been in a major accident, or has something else happened to it that would make spending significant money on it ill advised?

Does the current apparatus meet the program needs of the area it is serving? Is it designed for the way the fire department operates today and is expected to operate into the foreseeable future, or is the apparatus functionally obsolete? Can it carry everything that is needed to do the job without being overloaded?

If the apparatus is refurbished, will it provide the level of safety and operational capability of a new fire apparatus? Remember, in many cases, refurbishing does not mean increasing the GVWR, so it is not possible to add a larger water tank or additional foam agent tanks or to carry massive amounts of additional equipment. Enclosing personnel riding areas might add enough weight to the chassis that existing equipment loads need to be reduced to avoid overloading the chassis. An aerial ladder that does not have a 250 lb (114 kg) tip load rating at zero degrees elevation and maximum extension cannot be made stronger.

What is the anticipated cost per year to operate the apparatus if it were refurbished, and what would the cost per year be for a new apparatus? Do not forget insurance costs, downtime costs, maintenance costs, depreciation, reliability, and the safety of the users and the public. At what rate are those costs rising each year? Are parts still readily available for all the components on the apparatus? A refurbished 15-year-old apparatus still has 15-year-old parts in it. How long could the fire department operate without the apparatus if it suddenly needed major repairs?

Is there a current trade-in value that will be gone tomorrow? Most apparatus over 12 years old have little trade-in value. Are there creative financing plans or leasing options that can provide a new fire apparatus for little more than the cost of refurbishing or maintaining an older apparatus?

Fire department administrators and fire chiefs should exercise special care when evaluating the cost of refurbishing or updating an apparatus versus the cost of a new fire apparatus. Apparatus that are refurbished should comply with the requirements of NFPA 1912 . A thorough cost–benefit analysis of the value of upgrading or refurbishing a fire apparatus should be conducted. In many instances, it will be found that refurbishing costs will greatly exceed the current value of similar apparatus.

Some factors to consider and evaluate when determining whether to refurbish or replace a fire apparatus include the following:

(1) What is the true condition of the existing apparatus? Has it been in a major accident, or has something else happened to it that would make spending significant money on it ill advised?

(2) What advancements in design, safety, and technology have improved the efficiency and safety of personnel?

(3) Does the current apparatus meet the program needs of the area it is serving? Is it designed for the way the fire department operates today and is expected to operate in the foreseeable future, or is the apparatus functionally obsolete? Can it carry everything that is needed to do the job without being overloaded?

(4) If the apparatus is refurbished, will it provide the level of safety and operational capability of a new fire apparatus? It should be kept in mind that in many cases, refurbishing does not mean increasing the GVWR, so it is not possible to add a larger water tank or additional foam agent tanks or to carry massive amounts of additional equipment. Enclosing personnel riding areas might add enough weight to the chassis that existing equipment loads need to be reduced to avoid overloading the chassis.

(5) What is the anticipated cost per year to operate the apparatus if it were refurbished? What would the cost per year be for a new apparatus? Insurance costs, downtime costs, maintenance costs, depreciation, reliability, and the safety of the users and the public all have to be considered. At what rate are those costs rising each year? Are parts still readily available for all the components on the apparatus? A refurbished 15-year-old apparatus still has 15-year-old parts in it. How long could the fire department operate without the apparatus if it suddenly needed major repairs?

(6) Is there a current trade-in value that will be gone tomorrow?

D.6 Conclusion.

~~A fire apparatus is an emergency vehicle that must be relied on to transport fire fighters safely to and from an incident and to operate reliably and properly to support the mission of the fire department. A piece of fire apparatus that breaks down at any time during an emergency operation not only compromises the success of the operation but might jeopardize the safety of the fire fighters relying on that apparatus to support their role in the operation. An old, worn out, or poorly maintained fire apparatus has no role in providing emergency services to a community.~~ A fire apparatus is an emergency vehicle that must be relied on to transport fire fighters safely to and from an incident and to operate reliably and properly to support the mission of the fire department. A piece of fire apparatus that breaks down at any time during an emergency operation not only compromises the success of the operation but might jeopardize the safety of the fire fighters relying on that apparatus to support their role in the operation. An old, worn-out, or poorly maintained fire apparatus has no role in providing emergency services to a community.

Supplemental Information

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Submitter Information Verification

Submitter Full Name: Ken Holland
Organization: [Not Specified]
Street Address:
City:
State:

Zip:

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Committee Statement

Committee Statement: The committee is deleting the current annex D and replacing it with the attached annex D from NFPA 1901. This change was for document and project consistency .

Response Message:

Annex D Guidelines for First-Line and Reserve Fire

Apparatus

This annex is not a part of the requirements of this NFPA document but is included for informational purposes only.

D.1 General. To maximize fire fighter capabilities and minimize risk of injuries, it is important that fire apparatus be equipped with the latest safety features and operating capabilities.

In the last 10 to 15 years, much progress has been made in upgrading functional capabilities and improving the safety features of fire apparatus. Apparatus more than 15 years old might include only a few of the safety upgrades required by the recent editions of the NFPA fire department apparatus standards or the equivalent Underwriters Laboratories of Canada (ULC) standards. Because the changes, upgrades, and fine tuning to NFPA 1901 have been truly significant, especially in the area of safety, fire departments should seriously consider the value (or risk) to fire fighters of keeping fire apparatus more than 15 years old in first-line service.

It is recommended that apparatus more than 15 years old that have been properly maintained and that are still in serviceable condition be placed in reserve status be upgraded in accordance with NFPA 1912; and incorporate as many features as possible of the current fire apparatus standard *(see Section D.3)*. This will ensure that, while the apparatus might not totally comply with the current editions of the automotive fire apparatus standards, many of the improvements and upgrades required by the current editions of the standards are available to the fire fighters who use the apparatus.

Apparatus that were not manufactured to the applicable NFPA fire apparatus standards or that are over 25 years old should be replaced.

D.2 Evaluating Fire Apparatus. It is a generally accepted fact that fire apparatus, like all types of mechanical devices, have a finite life. The length of that life depends on many factors, including vehicle mileage and engine hours, quality of the preventative maintenance program, quality of the driver training program, whether the fire apparatus was used within the design parameters, whether the apparatus was manufactured on a custom or commercial chassis, quality of workmanship by the original manufacturer, quality of the components used, and availability of replacement parts, to name a few.

In the fire service, there are fire apparatus with 8 to 10 years of service that are simply worn out. There are also fire apparatus that were manufactured with quality components, that have had excellent maintenance, and that have responded to a minimum number of incidents that are still in serviceable condition after 20 years. Most would agree that the care of fire apparatus while being used and the quality and timeliness of maintenance are perhaps the most significant factors in determining how well a fire apparatus ages.

Critical enhancements in design, safety, and technology should also play a key role in the evaluation of an apparatus life cycle. Previous editions of the fire department apparatus standards featured many requirements advancing the level of automotive fire apparatus safety and user friendliness.

Contained within the 2009 edition were requirements for rollover stability; tire pressure indicators; seat belt warning systems requiring all occupants be properly seated and belted; extended seat belt length requirements resulting from an in-depth anthropometric study evaluating the average size of today's

fully dressed firefighter; roadability, including minimum accelerations and top speed limitations; enhanced step and work surface lighting; cab integrity testing; increased use of retroreflective striping in the rear of apparatus, providing a consistent identifiable set of markings for all automotive fire apparatus; and enhanced aerial control technologies, enabling short jacking and envelope controls.

D.3 Upgrading Fire Apparatus. Any apparatus, whether in first-line or reserve service, should be upgraded in accordance with NFPA 1912, as necessary, to ensure that the following features are included as a minimum:

(1) Seat belts with seat belt warning systems are available for every seat and are new or in serviceable condition.

(2) Warning lights meet or exceed the current standard.

(3) Reflective striping meets or exceeds the current standard.

(4) Slip resistance of walking surfaces and handrails meets the current standard.

(5) A low-voltage electrical system load manager is installed if the total connected load exceeds the alternator output.

(6) The alternator output is capable of meeting the total continuous load on the low voltage electrical system.

(7) Where the gross vehicle weight rating (GVWR) is 36,000 lb (16,000 kg) or more, an auxiliary braking system is installed and operating correctly.

(8) Ground and step lighting meets or exceeds the current standard.

(9) Noise levels in the driving and crew compartment(s) meet the current standard, or appropriate hearing protection is provided.

(10) All horns and sirens are relocated to a position as low and as far forward as possible.

(11) Signs are present stating that no riding is allowed on open areas.

(12) A pump shift indicator system is present and working properly for vehicles equipped with an automatic chassis transmission.

(13) For vehicles equipped with electronic or electric engine throttle controls, an interlock system is present and working properly to prevent engine speed advancement at the operator’s panel, unless either the chassis transmission is in neutral with the parking brake engaged, or the parking brake is engaged, the fire pump is engaged, and the chassis transmission is in pumping gear.

(14) All loose equipment in the driving and crew areas is securely mounted in accordance with the current standard.

D.4 Proper Maintenance of Fire Apparatus. In addition to needed upgrades to older fire apparatus, it is imperative that all fire apparatus be checked and maintained regularly to ensure that they will be reliable and safe to use. The manufacturer’s instructions should always be followed when maintaining

the fire apparatus. Special attention should be paid to ensure that the following conditions, which are particularly critical to maintaining a reliable unit, exist:

(1) Engine belts, fuel lines, and filters have been replaced in accordance with the manufacturers' maintenance schedule(s).

(2) Brakes, brake lines, and wheel seals have been replaced or serviced in accordance with the manufacturers' maintenance schedule.

(3) Tires and suspension are in serviceable condition, and tires are not more than 7 years old.

(4) The radiator has been serviced in accordance with the manufacturer's maintenance schedule, and all cooling system hoses are new or in serviceable condition.

(5) The alternator output meets its rating.

(6) A complete weight analysis shows the fire apparatus is not over individual axle rating or total GVWR.

(7) The fire pump meets or exceeds its original pump rating.

(8) The water tank and baffles are not corroded or distorted.

(9) If the apparatus is equipped with an aerial device, a complete test to original specifications has been conducted and certified by a certified testing laboratory.

(10) If so equipped, the generator and line voltage accessories have been tested and meet the current standard.

D.5 Refurbishing or Replacing Fire Apparatus. Fire department administrators and fire chiefs should exercise special care when evaluating the cost of refurbishing or updating an apparatus versus the cost of a new fire apparatus. Apparatus that are refurbished should comply with the requirements of

NFPA 1912. A thorough cost-benefit analysis of the value of upgrading or refurbishing a fire apparatus should be conducted. In many instances, it will be found that refurbishing costs will greatly exceed the current value of similar apparatus.

Some factors to consider and evaluate when determining whether to refurbish or replace a fire apparatus include the following:

(1) What is the true condition of the existing apparatus? Has it been in a major accident, or has something else happened to it that would make spending significant money on it ill advised?

(2) What advancements in design, safety, and technology have improved the efficiency and safety of personnel?

(3) Does the current apparatus meet the program needs of the area it is serving? Is it designed for the way the fire department operates today and is expected to operate in the foreseeable future, or is the apparatus functionally obsolete? Can it carry everything that is needed to do the job without being overloaded?

(4) If the apparatus is refurbished, will it provide the level of safety and operational capability of a new fire apparatus?

It should be kept in mind that in many cases, refurbishing does not mean increasing the GVWR, so it is not possible to add a larger water tank or additional foam agent tanks or to carry massive amounts of additional equipment.

Enclosing personnel riding areas might add enough weight to the chassis that existing equipment loads need to be reduced to avoid overloading the chassis.

(5) What is the anticipated cost per year to operate the apparatus if it were refurbished? What would the cost per year be for a new apparatus? Insurance costs, downtime costs, maintenance costs, depreciation, reliability, and the safety of the users and the public all have to be considered. At what rate are those costs rising each year? Are parts still readily available for all the components on the apparatus?

A refurbished 15-year-old apparatus still has 15-year-old parts in it. How long could the fire department operate without the apparatus if it suddenly needed major repairs?

(6) Is there a current trade-in value that will be gone tomorrow?

Most apparatus over 12 years old have little trade-in value. Are there creative financing plans or leasing options that can provide a new fire apparatus for little more than the cost of refurbishing or maintaining an older apparatus?

D.6 Conclusion. A fire apparatus is an emergency vehicle that must be relied on to transport fire fighters safely to and from an incident and to operate reliably and properly to support the mission of the fire department. A piece of fire apparatus that breaks down at any time during an emergency operation not only compromises the success of the operation but might jeopardize the safety of the fire fighters relying on that apparatus to support their role in the operation. An old, worn-out, or poorly maintained fire apparatus has no role in providing emergency services to a community.