



## First Revision No. 600-NFPA 1900-2021 [ Global Input ]

Delete the 1901 extract citations in the following sections:

4.13.5.2	
4.14.5.1	

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Tue Jul 13 08:53:58 EDT 2021

### Committee Statement

**Committee Statement:** These extract citations are being deleted since 1901 has now been consolidated into NFPA 1900.

**Response Message:** FR-600-NFPA 1900-2021



## First Revision No. 121-NFPA 1900-2021 [ New Section after 4.1.3.2 ]

### 4.1.4 Units of Measure.

#### 4.1.4.1

The units of measure in Chapters 4 through 6 shall be presented in the International System (SI) of units followed by US customary units (inch-pound units) in parentheses.

#### 4.1.4.2

Either set of values can be used, but the same set of values (either US customary units of SI units) shall be used consistently.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Wed Jan 27 12:18:44 EST 2021

### Committee Statement

**Committee Statement:** This change would bring the statement of units in line with the rest of the document. Chapters 1-3, 7-63, and the corresponding annex material all have the units stated in US customary units followed by the corresponding SI units.

It appear that in most cases, the units in these chapters were originally developed in US units and then converted to SI units.

**Response Message:** FR-121-NFPA 1900-2021

Public Input No. 1003-NFPA 1900-2020 [New Section after 4.1.3.2]



**First Revision No. 143-NFPA 1900-2021 [ Section No. 4.2.1.2 ]**



**4.2.1.2**

Vehicles shall comply with Table 4.2.1.2(a), Table 4.2.1.2(b), Table 4.2.1.2(c), Table 4.2.1.2(d), and other requirements in this chapter.

Table 4.2.1.2(a) Fully Loaded Vehicle Performance Parameters (SI Units)

<b><u>Performance Parameters</u></b>	<b><u>Minimum Usable Capacity</u></b>		
	<b><u>Vehicle Water Tank Capacity <math>\geq 454</math> to <math>\leq 1999</math> L</u></b>	<b><u>Vehicle Water Tank Capacity <math>&gt; 1999</math> to <math>\leq 6000</math> L</u></b>	<b><u>Vehicle Water Tank Capacity <math>&gt; 6000</math> L</u></b>
Side slope stability (degrees)	30	30	30
Dynamic balance (kph), minimum speed on a (30 m) radius circle	40	35.5	35.5
Angle of approach (degrees)	25	30	30
Angle of departure (degrees)	30	30	30
Interaxle clearance (degrees)	12	12	12
Underbody clearance (cm)	33	46	46
Underaxle clearance at differential housing bowl (cm)	26.7	33.0 (26.7)	33
Diagonal opposite wheel motion (cm)	25.4	36	36
Wall-to-wall turning diameter	<Three times the vehicle's overall length	<Three times the vehicle's overall length	<Three times the vehicle's overall length
Maximum acceleration time from 0 to 80.5 kph (sec)	30	25	35
Top speed (kph)	$\geq 113$	$\geq 113$	$\geq 113$
Service brake: Stopping distance from 33 kph (m) from 64 kph (m) Percent grade holding of fully loaded vehicle: Ascending Descending Emergency brake stopping distance at 64 kph (m)	$\leq 11$ $\leq 40$ m $\geq 50$ percent % $\geq 50$ percent % $\leq 88$	$\leq 11$ $\leq 40$ m $\geq 50$ percent % $\geq 50$ percent % $\leq 88$	$\leq 12$ $\leq 49$ m $\geq 50$ percent % $\geq 50$ percent % $\leq 88$
Parking brake: Percent grade holding for the parking brake Ascending Descending	$\geq 20$ percent % $\geq 20$ percent %	$\geq 20$ percent % $\geq 20$ percent %	$\geq 20$ percent % $\geq 20$ percent %

<u>Performance Parameters</u>	<u>Minimum Usable Capacity</u>		
	<u>Vehicle Water Tank Capacity <math>\geq 454</math> to <math>\leq 1999</math> L</u>	<u>Vehicle Water Tank Capacity <math>&gt; 1999</math> to <math>\leq 6000</math> L</u>	<u>Vehicle Water Tank Capacity <math>&gt; 6000</math> L</u>
Evasive maneuver test, NATO Document AVTP 03-16W (kph)	40 <u>56</u>	40 <u>56</u>	40 <u>56</u>
"J" turn test at 46 m radius (kph)	48	48	48

Table 4.2.1.2(b) Fully Loaded Vehicle Performance Parameters (US Customary Units)

<u>Performance Parameters</u>	<u>Minimum Usable Capacity</u>		
	<u>Vehicle Water Tank Capacity <math>\geq 120</math> to <math>\leq 528</math> gal</u>	<u>Vehicle Water Tank Capacity <math>&gt; 528</math> to <math>\leq 1585</math> gal</u>	<u>Vehicle Water Tank Capacity <math>&gt; 1585</math> gal</u>
Side slope stability (degrees)	30	30	30
Dynamic balance (mph) minimum speed on a (100 ft) radius circle	25	22	22
Angle of approach (degrees)	25	30	30
Angle of departure (degrees)	30	30	30
Interaxle clearance (degrees)	9	12	12
Underbody clearance (in.)	13	18	18
Underaxle clearance at differential housing bowl (in.)	8.5	13 (10.5)	13
Diagonal opposite wheel motion (in.)	10	14	14
Wall-to-wall turning diameter	<Three times the vehicle's overall length	<Three times the vehicle's overall length	<Three times the vehicle's overall length
Maximum acceleration time from 0 to 50 mph (sec)	30	25	35
Top speed (mph)	$\geq 70$	$\geq 70$	$\geq 70$
Service brake: Stopping distance from 20 mph (ft)	$\leq 35$	$\leq 35$	$\leq 40$
from 40 mph (ft)	$\leq 131$	$\leq 131$	$\leq 160$
Percent grade holding of fully loaded vehicle: Ascending	$\geq 50$ percent %	$\geq 50$ percent %	$\geq 50$ percent %
Descending	$\geq 50$ percent %	$\geq 50$ percent %	$\geq 50$ percent %
Emergency brake stopping distance at 40 mph (ft)	$\leq 288$	$\leq 288$	$\leq 288$

<u>Performance Parameters</u>	<u>Minimum Usable Capacity</u>		
	<u>Vehicle Water Tank Capacity <math>\geq 120</math> to <math>\leq 528</math> gal</u>	<u>Vehicle Water Tank Capacity <math>&gt; 528</math> to <math>\leq 1585</math> gal</u>	<u>Vehicle Water Tank Capacity <math>&gt; 1585</math> gal</u>
Parking brake: Percent grade holding for the parking brake			
Ascending	$\geq 20$ percent %	$\geq 20$ percent %	$\geq 20$ percent %
Descending	$\geq 20$ percent %	$\geq 20$ percent %	$\geq 20$ percent %
Evasive maneuver test, NATO Document AVTP 03-16W (mph)	25 35	25 35	25 35
"J" turn test at 150 ft radius (mph)	30	30	30

Table 4.2.1.2(c) Agent System Performance Parameters (SI Units)

<u>Performance Parameters</u>	<u>Minimum Usable Capacity</u>		
	<u>Vehicle Water Tank Capacity <math>\geq 454</math> to <math>\leq 1999</math> L</u>	<u>Vehicle Water Tank Capacity <math>&gt; 1999</math> to <math>\leq 6000</math> L</u>	<u>Vehicle Water Tank Capacity <math>&gt; 6000</math> L</u>
<b>1. Water tank percent of deliverable water</b>			
a. On level ground	100 percent %	100 percent %	100 percent %
b. On 20 percent % side slope	85 percent %	85 percent %	85 percent %
c. 30 percent % ascending/descending grade	85 percent %	85 percent %	85 percent %
<b>2. Turret(s) discharge</b>	Total flow rate can be achieved with handlines	Total flow rate can be achieved using a roof turret, boom-mounted turret, bumper turret, or a combination thereof	Total flow rate can be achieved using a roof turret, boom-mounted turret, bumper turret, or a combination thereof
2a. Roof turret:			
a. Total minimum flow rate (L/min) OR	$\geq 227$ (-0%/+10%)	$\geq 2839$ (-0%/+10%)	$\geq 4731$ (-0%/+10%)
Individual flow rate of the roof turret, if used in combination with a bumper turret (L/min)	N/A	$\geq 1892$ (-0%/+10%)	$\geq 3785$ (-0%/+10%)
b. Entrained stream pattern/distances:			
i. Straight/far point (m)	$\geq 46$	$\geq 58$	$\geq 70$
ii. Dispersed/far point (m)	$\geq 15$	$\geq 20$	$\geq 21$
iii. Dispersed/width (m)	$\geq 9$	$\geq 11$	$\geq 11$
2b. Boom-mounted turret:			
a. Individual flow rate of the boom-mounted turret if used in combination with a bumper turret (L/min)	N/A	$\geq 1892$ (-0%/+10%)	$\geq 3785$ (-0%/+10%)

<b>Performance Parameters</b>	<b>Minimum Usable Capacity</b>		
	<b>Vehicle Water Tank Capacity ≥454 to ≤1999 L</b>	<b>Vehicle Water Tank Capacity &gt;1999 to ≤6000 L</b>	<b>Vehicle Water Tank Capacity &gt;6000 L</b>
b. Entrained stream pattern/distances:			
i. Straight/far point (m)	N/A	≥58	≥58
ii. Dispersed/far point (m)	N/A	≥20	≥21
iii. Dispersed/width (m)	N/A	≥11	≥11
2c. Bumper turret:	Can be used as the primary turret and must follow roof turret flows and ranges	Can be used as the primary turret and must follow roof turret flows and ranges	Can be used as the primary turret and must follow roof turret flows and ranges
a. Flow rate (L/min)	≥227 (-0%/+10%)	≥946 (-0%/+10%)	≥946 (-0%/+10%)
b. Straight entrained stream distance (m)	≥46	≥46	≥46
c. Dispersed pattern distances:			
i. Far point (m)	≥15	≥15	≥15
ii. Width (m)	≥9	≥9	≥9
iii. Near point (m)	Within 9 m of front bumper	Within 9 m of front bumper	Within 9 m of front bumper
2d. Ground sweep nozzle:	Where specified	Where specified	Where specified
a. Flow rate (L/min)	N/A	≥378 to ≤1135 (-0%/+10%)	≥378 to ≤1135 (-0%/+10%)
b. Dispersed pattern distances:			
i. Far point (m)	N/A	≥9	≥9
ii. Width (m)	N/A	≥3.5	≥3.5
2e. Undertruck nozzle flow rate (L/min)	Where specified >57 (-0%/+10%)	Where specified >57 (-0%/+10%)	Where specified >57 (-0%/+10%)
2f. Piercing nozzle flow rate (L/min)	Where specified ≥946 (-0%/+10%)	Where specified ≥946 (-0%/+10%)	Where specified ≥946 (-0%/+10%)
<b>3. Number of water-foam handlines required per vehicle (select from following)</b>	1	2	2
3a. Woven jacket water-foam handline:			
a. Nozzle flow rate (L/min)	≥360 (-0%/+10%)	≥360 (-0%/+10%)	≥360 (-0%/+10%)
b. Straight entrained stream distance (m)	≥20	≥20	≥20
c. Dispersed entrained stream pattern:			
i. Range (m)	≥6	≥6	≥6
ii. Width (m)	≥4.5	≥4.5	≥4.5
d. Hose inside diameter (mm)	≥38	≥38	≥38

<b>Performance Parameters</b>	<b>Minimum Usable Capacity</b>		
	<b>Vehicle Water Tank Capacity ≥454 to ≤1999 L</b>	<b>Vehicle Water Tank Capacity &gt;1999 to ≤6000 L</b>	<b>Vehicle Water Tank Capacity &gt;6000 L</b>
e. Hose length (m)	≥46	≥46	≥46
3b. Reeled water-foam handline:			
a. Nozzle flow rate (L/min)	360 (-0%/+10%) (≥227 for dual agent lines)	360 (-0%/+10%) (≥227 for dual agent lines)	360 (-0%/+10%) (≥227 for dual agent lines)
b. Straight entrained stream distance (m)	≥20	≥20	≥20
c. Dispersed entrained stream pattern:			
i. Range (m)	≥6	≥6	≥6
ii. Width (m)	≥4.5	≥4.5	≥4.5
d. Hose length (m)	≥46 (≥30 for dual agent lines)	≥46 (≥30 for dual agent lines)	≥46 (≥30 for dual agent lines)
<b>4. Complementary agent</b>			
a. Capacity (kg)	≥45	≥45	≥45
4a. Dry chemical handline:	Where specified	Where specified	Where specified
a. Discharge rate (kg/sec)	≥2.3	≥2.3	≥2.3
b. Range (m)	≥7.5	≥7.5	≥7.5
c. Hose length (m)	≥30	≥30	≥30
4b. Dry chemical turret:	≥454 and ≤1999 L	>1999 and ≤6000 L	Above >6000 L
a. Powder discharge rate (kg/sec)	≥7 and ≤10	≥7 and ≤10	≥7 and ≤10
b. Powder range (m)	≥30	≥30	≥30
c. Powder width (m)	≥5	≥5	≥5
d. Stream range (m)	See 2a/2c	See 2a/2c	See 2a/2c
e. Stream width (m)	≥5	≥5	≥5
4c. Dry chemical boom-mounted turret	Where specified	Where specified	Where specified
a. Discharge rate (kg/sec)	≥5.5	≥5.5 and ≤10	≥5.5 and ≤10
b. Range (m)	≥30	≥30	≥30
c. Width (m)	≥5	≥5	≥5
4d. Halogenated agent handline:	Where specified	Where specified	Where specified
a. Discharge rate (kg/sec)	≥2.3	≥2.3	≥2.3
b. Range (m)	≥7.5	≥7.5	≥7.5
c. Hose inside diameter (mm)	≥25.4	≥25.4	≥25.4
d. Hose length (m)	≥30	≥30	≥30

Table 4.2.1.2(d) Agent System Performance Parameters (US Customary Units)

<b>Performance Parameters</b>	<b>Minimum Usable Capacity</b>
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	<u>Vehicle Water Tank Capacity ≥120 to ≤528 gal</u>	<u>Vehicle Water Tank Capacity &gt;528 to ≤1585 gal</u>	<u>Vehicle Water Tank Capacity &gt;1585 gal</u>
<b>1. Water tank percent of deliverable water</b>			
a. On level ground	100 percent %	100 percent %	100 percent %
b. On 20 percent % side slope	85 percent %	85 percent %	85 percent %
c. 30 percent % ascending/descending grade	85 percent %	85 percent %	85 percent %
<b>2. Turret(s) discharge</b>	Total flow rate can be achieved with handlines	Total flow rate can be achieved using a roof turret, boom-mounted turret, bumper turret, or a combination thereof	Total flow rate can be achieved using a roof turret, boom-mounted turret, bumper turret, or a combination thereof
2a. Roof turret:			
a. Total minimum flow rate (gpm) OR	≥60 <u>(-0%/+10%)</u>	≥750 <u>(-0%/+10%)</u>	≥1250 <u>(-0%/+10%)</u>
Individual flow rate of the roof turret, if used in combination with a bumper turret (gpm)	N/A	≥500 <u>(-0%/+10%)</u>	≥1000 <u>(-0%/+10%)</u>
b. Entrained stream pattern/distances:			
i. Straight/far point (ft)	≥65	≥190	≥230
ii. Dispersed/far point (ft)	≥20	≥65	≥70
iii. Dispersed/width (ft)	≥15	≥35	≥35
2b. Boom-mounted turret:			
a. Individual flow rate of the boom-mounted turret if used in combination with a bumper turret (gpm)	N/A	≥500 <u>(-0%/+10%)</u>	≥1000 <u>(-0%/+10%)</u>
b. Entrained stream pattern/distances:			
i. Straight/far point (ft)	N/A	≥190	≥190
ii. Dispersed/far point (ft)	N/A	≥65	≥70
iii. Dispersed/width (ft)	N/A	≥35	≥35
2c. Bumper turret:	Can be used as the primary turret and must follow roof turret flows and ranges	Can be used as the primary turret and must follow roof turret flows and ranges	Can be used as the primary turret and must follow roof turret flows and ranges
a. Flow rate (gpm)	≥60 <u>(-0%/+10%)</u>	≥250 <u>(-0%/+10%)</u>	≥250 <u>(-0%/+10%)</u>
b. Straight entrained stream distance (ft)	≥65	≥150	≥150
c. Dispersed pattern distances:			
i. Far point (ft)	≥20	≥50	≥50

ii. Width (ft)	≥15	≥30	≥30
iii. Near point (ft)	Within 30 ft of front bumper	Within 30 ft of front bumper	Within 30 ft of front bumper
2d. Ground sweep nozzle:	Where specified	Where specified	Where specified
a. Flow rate (gpm)	N/A	≥100 to ≤300 (-0%/+10%)	≥100 to ≤300 (-0%/+10%)
b. Dispersed pattern distances:			
i. Far point (ft)	N/A	≥30	≥30
ii. Width (ft)	N/A	≥12	≥12
2e. Undertruck nozzle flow rate (gpm)	Where specified >15 (-0%/+10%)	Where specified >15 (-0%/+10%)	Where specified >15 (-0%/+10%)
2f. Piercing nozzle flow rate (gpm)	Where specified ≥250 (-0%/+10%)	Where specified ≥250 (-0%/+10%)	Where specified ≥250 (-0%/+10%)
<b>3. Number of water-foam handlines required per vehicle (select from following)</b>	1	2	2
3a. Woven jacket water-foam handline:			
a. Nozzle flow rate (gpm)	≥95 (-0%/+10%)	≥95 (-0%/+10%)	≥95 (-0%/+10%)
b. Straight entrained stream distance (ft)	≥65	≥65	≥65
c. Dispersed entrained stream pattern:			
i. Range (ft)	≥20	≥20	≥20
ii. Width (ft)	≥15	≥15	≥15
d. Hose inside diameter (in.)	≥1.50	≥1.50	≥1.50
e. Hose length (ft)	≥150	≥150	≥150
3b. Reeled water-foam handline:			
a. Nozzle flow rate (gpm)	95 (-0%/+10%) (≥60 for dual agent lines)	95 (-0%/+10%) (≥60 for dual agent lines)	95 (-0%/+10%) (≥60 for dual agent lines)
b. Straight entrained stream distance (ft)	≥65	≥65	≥65
c. Dispersed entrained stream pattern:			
i. Range (ft)	≥20	≥20	≥20
ii. Width (ft)	≥15	≥15	≥15
d. Hose length (ft)	≥150 (≥100 for dual agent lines)	≥150 (≥100 for dual agent lines)	≥150 (≥100 for dual agent lines)
<b>4. Complementary agent</b>			
a. Capacity (lb)	≥100	≥100	≥100
4a. Dry chemical handline:	Where specified	Where specified	Where specified
a. Discharge rate (lb/sec)	≥5	≥5	≥5
b. Range (ft)	≥25	≥25	≥25

ε b . Hose length (ft)	≥100	≥100	≥100
4b. Dry chemical turret:	≥120 and ≤528 gal	>528 and ≤1585 gal	Above >1585 gal
a. Powder discharge rate (lb/sec)	≥16 and ≤22 (>7)	≥16 and ≤22	≥16 and ≤22
b. Powder range (ft)	≥100	≥100	≥100
c. Powder width (ft)	≥17	≥17	≥17
d b . Stream range (ft)	See 2a/2c	See 2a/2c	See 2a/2c
e c . Stream width (ft)	≥17	≥17	≥17
4c. Dry chemical boom-mounted turret:	Where specified	Where specified	Where specified
a. Discharge rate (lb/sec)	≥12	≥12 and ≤22	≥12 and ≤22
b. Range (ft)	≥100	≥100	≥100
c. Width (ft)	≥17	≥17	≥17
4d. Halogenated agent handline:	Where specified	Where specified	Where specified
a. Discharge rate (lb/sec)	≥5	≥5	≥5
b. Range (ft)	≥25	≥25	≥25
ε b . Hose inside diameter (in.)	≥1.00	≥1.00	≥1.00
d c . Hose length (ft)	≥100	≥100	≥100

## Supplemental Information

<u>File Name</u>	<u>Description</u>	<u>Approved</u>
Table_4.2.1.2.docx	changes to the table from multiple PI's with track changes on. For staff use	

## Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Sat Jan 30 09:10:59 EST 2021

## Committee Statement

**Committee Statement:** For PI 844 the committee is adding the flow rate tolerances in the table to help reduce confusion on the flow rate tolerance due to the fact the flow rates are in both the requirements and test sections of the document.

For PI 845 the committee is removing the distance and pattern requirements of the commentary agents from the table. Since measuring the pattern and range of axillary agents are difficult at best to measure the task group recommends removing the requirement. These agents have a low mass and the range and wind conditions tend to dictate the distances more than the actual flow of the product the group felt the range test provide little value in the performance of the system.

For PI 846 the committee is changing the NATO lane change speed from 25 MPH to 35 MPH. This change is requested to align the NATO lane change requirements between NFPA and FAA documents.

**Response Message:** FR-143-NFPA 1900-2021

[Public Input No. 846-NFPA 1900-2020 \[Section No. 4.2.1.2\]](#)

[Public Input No. 845-NFPA 1900-2020 \[Section No. 4.2.1.2\]](#)

[Public Input No. 844-NFPA 1900-2020 \[Section No. 4.2.1.2\]](#)



## First Revision No. 100-NFPA 1900-2021 [ New Section after 4.3.1 ]

### 4.3.1.1

The manufacturer shall supply at the time of delivery the following documents in electronic format:

- (1) Component manufacturers certificates per Section 6.2
- (2) Operational test data sheets per Section 6.4
- (3) Product warranties

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:31:29 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding the requirement to supply of these documents at the time of delivery of the vehicle. These documents verify successful completion of the testing described in NFPA 414 (1900) and are the basis for confidence that the ARFF Vehicle meets the performance and safety requirements described in the NFPA Standard. These documentations verify the successful completion of these tests and serves as assurance to the customer and works to confirm that the vehicle was order as required.

**Response Message:** FR-100-NFPA 1900-2021

Public Input No. 847-NFPA 1900-2020 [New Section after 4.3.1]



## First Revision No. 101-NFPA 1900-2021 [ Section No. 4.3.5 ]

### 4.3.5 Vehicle Information Data Plate.

A data plate that contains, as a minimum, all the information presented in Figure 4.3.5 shall be installed in the cab of the vehicle.

#### Figure 4.3.5 Aircraft Rescue and Firefighting Vehicle Tilt Table Certification per NFPA 414 Chapters 1 through 6 .

Manufacturer \_\_\_\_\_  
 Vehicle (make and model year) \_\_\_\_\_ and \_\_\_\_\_  
 Drive type:  4 x 4  6 x 6  8 x 8  10 x 10  
 The vehicle was tested to \_\_\_\_ degrees in both directions (table angle).  
 Was a trip/slip rail used?  No  Yes  
 If yes, height of rail [maximum 50 mm (2 in.)] \_\_\_\_ [mm (in.)]  
 Date of test: \_\_\_\_\_

Front axle loading\* \_\_\_\_\_ [kg (lb)]  
 Second axle loading\* \_\_\_\_\_ [kg (lb)]  
 3rd axle loading\* (if applicable) \_\_\_\_\_ [kg (lb)]  
 4th axle loading\* (if applicable) \_\_\_\_\_ [kg (lb)]  
 5th axle loading\* (if applicable) \_\_\_\_\_ [kg (lb)]  
 Tire manufacturer \_\_\_\_\_  
 Tire model \_\_\_\_\_  
 Tire pressure \_\_\_\_\_ [kPa (psi)]  
 Front wheel track \_\_\_\_\_ [cm (in.)]  
 Rear wheel track \_\_\_\_\_ [cm (in.)]  
 Crew capacity \_\_\_\_\_ (Number of personnel)  
 Fuel tank capacity \_\_\_\_\_ [L (gal)]  
 Equipment allowance \_\_\_\_\_ [kg (lb)]  
 Water tank capacity \_\_\_\_\_ [L (gal)]  
 Foam tank capacity \_\_\_\_\_ [L (gal)]  
 Auxiliary agent capacity (if applicable) \_\_\_\_\_ [kg (lb)]

\*The "loading" is to be in accordance with the definition of a fully loaded vehicle as presented in NFPA 414.

Manufacturer \_\_\_\_\_  
 Vehicle (make and model year) \_\_\_\_\_ and \_\_\_\_\_  
 Drive type:  4 4  6 6  8 8  10 10  
 The vehicle was tested to \_\_\_\_ degrees in both directions (table angle).  
 Was a trip/slip rail used?  No  Yes  
 If yes, height of rail [maximum 50 mm (2 in.)] \_\_\_\_ [mm (in.)]  
 Date of test: \_\_\_\_\_

Front axle loading\* \_\_\_\_\_ [kg (lb)]  
 Second axle loading\* \_\_\_\_\_ [kg (lb)]  
 3rd axle loading\* (if applicable) \_\_\_\_\_ [kg (lb)]  
 4th axle loading\* (if applicable) \_\_\_\_\_ [kg (lb)]  
 5th axle loading\* (if applicable) \_\_\_\_\_ [kg (lb)]  
 Tire manufacturer \_\_\_\_\_  
 Tire model \_\_\_\_\_  
 Tire pressure \_\_\_\_\_ [kPa (psi)]  
 Front wheel track \_\_\_\_\_ [cm (in.)]  
 Rear wheel track \_\_\_\_\_ [cm (in.)]  
 Crew capacity \_\_\_\_\_ (Number of personnel)  
 Fuel tank capacity \_\_\_\_\_ [L (gal)]  
 Equipment allowance \_\_\_\_\_ [kg (lb)]  
 Water tank capacity \_\_\_\_\_ [L (gal)]  
 Foam tank capacity \_\_\_\_\_ [L (gal)]  
 Auxiliary agent capacity (if applicable) \_\_\_\_\_ [kg (lb)]

\*The "loading" is to be in accordance with the definition of a fully loaded vehicle as presented in Chapters 1 through 6 of NFPA 1900.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:34:33 EST 2021

### **Committee Statement**

**Committee Statement:** Reference update due to document consolidation.

**Response Message:** FR-101-NFPA 1900-2021

[Public Input No. 142-NFPA 1900-2020 \[Section No. 4.3.5\]](#)



## First Revision No. 584-NFPA 1900-2021 [ Section No. 4.5 ]

### 4.5 Engine Propulsion System .

#### 4.5.1 Performance Requirements.

##### 4.5.1.1 Engine Propulsion System Characteristics.

###### 4.5.1.1.1

The ~~vehicle engine(s)~~ vehicle's propulsion system shall have the horsepower, torque, and speed characteristics to meet and maintain all vehicular performance characteristics specified in ~~this standard Chapters 4 through 6~~ .

###### 4.5.1.1.2

The engine manufacturer shall certify that the installed engine is approved for this application.

###### 4.5.1.2\*

The fully loaded vehicle shall be able to accelerate consistently from 0 kph to 80.5 kph (0 mph to 50 mph) on dry, level concrete pavement at the operational airport within the times specified in Table 4.2.1.2(a) and Table 4.2.1.2(b).

###### 4.5.1.2.1

The maximum speed shall not be less than 112 kph (70 mph).

###### 4.5.1.2.2

The acceleration times provided in Table 4.2.1.2(a) and Table 4.2.1.2(b) shall be achieved with the ~~engine(s) and transmission(s)~~ propulsion system at the component manufacturers' recommended operating temperatures and state of charge if applicable at any ambient temperature from  $-17.8^{\circ}\text{C}$  to  $43.3^{\circ}\text{C}$  ( $0^{\circ}\text{F}$  to  $110^{\circ}\text{F}$ ) and at elevations up to 609.6 m (2000 ft) above sea level, unless a higher elevation is specified.

###### 4.5.1.2.3

For airports above 609.6 m (2000 ft), the elevation at which the vehicle operates shall ~~operate in order~~ be specified to ensure the necessary performance ~~shall be specified~~ .

###### 4.5.1.3

The vehicle also shall be capable of ascending, stopping, starting, and continuing ascent on a 40 percent grade on dry pavement at a speed up to at least 1.6 kph (1 mph) with extinguishing agents being discharged from the primary turret nozzle(s).

#### 4.5.2 Engine Cooling Systems.

##### 4.5.2.1

An engine coolant preheating device shall be provided as an aid to rapid starting and high initial engine performance.

##### 4.5.2.2

This device shall be fitted with an automatic thermostat.

##### 4.5.2.3

If the engine coolant preheating device requires electrical power from an outside source to operate, a grounded ac receptacle shall be provided to allow a pull-away connection from the local electric power supply to the engine coolant preheating device.

#### 4.5.2.3.1

The cooling system shall be designed so that the stabilized engine coolant temperature remains within the engine manufacturer's prescribed limits under all operational conditions and at all ambient temperatures identified in 4.2.1 that might be encountered at the operational airport.

#### 4.5.2.3.2

The cooling system shall be provided with an automatic thermostat for rapid engine warming.

#### 4.5.2.3.3

Where specified, radiator shutters, where furnished for cold climates, shall be ~~of the automatic type and shall be designed to open automatically upon failure.~~ both of the following:

- (1) Automatic
- (2) Designed to open automatically upon failure

### 4.5.3 Fuel System.

#### 4.5.3.1

A complete fuel system shall be installed with the engine manufacturer's approval.

#### 4.5.3.2

The fuel system shall be protected from the following:

- (1) Damage
- (2) Exhaust heat
- (3) Exposure to ground fires
- (4) Vapor lock

#### 4.5.3.3

Accessible filtration for each fuel supply line and a drain shall be provided at the bottom of the fuel tank.

#### 4.5.3.3.1

A fuel-water separator equipped with a manual drain shall be supplied where the vehicle is equipped with a diesel-fueled engine.

#### 4.5.3.3.2

The fuel-water separator shall meet the engine manufacturer's requirements.

#### 4.5.3.4

Fuel tanks shall not be installed in a manner that allows gravity feed.

### 4.5.3.5 Fuel Capacity.

#### 4.5.3.5.1

For vehicles with a water tank capacity <1999 L (<528 gal), the fuel tank shall have the capacity to provide for a minimum of 48.3 km (30 mi) of highway travel at 88.5 kph (55 mph), plus 2 hours of pumping at the full rated discharge.

#### 4.5.3.5.2

For vehicles with a water tank capacity <1999 L (<528 gal), additional fuel capacity shall be provided for a minimum of 4 hours of operation of each accessory item (such as a generator or fuel-fired heaters) that uses the common fuel tank as a source.

### 4.5.4 Exhaust System.

#### 4.5.4.1

The exhaust system shall be constructed in such a manner that exhaust discharge is directed away from any operators.

**4.5.4.1.1**

The exhaust system shall be of high-grade, rust-resistant materials.

**4.5.4.1.2**

The exhaust system shall include a muffler to reduce engine noise.

**4.5.4.2**

The exhaust system shall be protected from damage that could result from traversing rough terrain.

**4.5.4.3**

The tailpipe shall not be directed toward the ground.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Mar 06 08:33:43 EST 2021

## Committee Statement

**Committee Statement:** As electric and hybrid driveline solutions are being introduced in various markets, the method of driving an ARFF truck may be accomplished in other forms than a traditional diesel engine. To ensure that both traditional engine driven vehicles and hybrid or electrically driven vehicles meet the performance requirements of 1900, it is suggested that this new language be used. With the current wording, there may be interpretations that hybrid or electric vehicles do not need to comply with the vehicle dynamic performance requirements of 1900 since the word engine is being used. Also, OEM's in various industries are going towards using the term propulsion system. An example of this is GM renamed its GM Powertrain group to GM Global Propulsion. With the rapid change in technology in this space and this edition of NPFA 1900 being in place until 2028-ish I feel these technologies will be applicable during this time period.

**Response Message:** FR-584-NFPA 1900-2021

[Public Input No. 973-NFPA 1900-2020 \[Section No. 4.5\]](#)



## First Revision No. 103-NFPA 1900-2021 [ Section No. 4.6.1.1.18 ]

### 4.6.1.1.18

Wiring shall be uniquely identified at least every 2 ft (0.6 m) by color coding or permanent marking with a circuit function code. ~~The identification shall and~~ reference a wiring diagram. *[See NFPA 1904.]*

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:40:52 EST 2021

## Committee Statement

**Committee Statement:** Removing reference since it does not refer to a specific section and the current wording stands on its own. Also had to re-word since there are two "shall" statements in once section of text, which is not allowed per the NFPA MOS.

**Response Message:** FR-103-NFPA 1900-2021

[Public Input No. 822-NFPA 1900-2020 \[Section No. 4.6.1.1.18\]](#)

[Public Input No. 141-NFPA 1900-2020 \[Section No. 4.6.1.1.18\]](#)



## First Revision No. 104-NFPA 1900-2021 [ New Section after 4.6.1.2 ]

### **4.6.1.3** High-Voltage Electrical System.

#### **4.6.1.3.1**

Where specified, high-voltage wiring between propulsion system components exceeding 50V shall meet the requirements of SAE J1673, *High Voltage Automotive Wiring Assembly Design* .

#### **4.6.1.3.2**

Where specified, a rechargeable energy storage system shall meet the requirements of UN38.3 *Certification for Lithium Batteries* , and SAE J2929, *Electric and Hybrid Vehicle Propulsion Battery System Safety Standard — Lithium-based Rechargeable Cells* .

#### **4.6.1.3.3**

Where specified, high-voltage systems shall be labeled in accordance with SAE J2910, *Recommended Practice for the Design and Test of Hybrid Electric and Electric Trucks and Buses for Electrical Safety* .

#### **4.6.1.3.4**

Where specified, high-voltage systems shall meet high-voltage isolation requirements of SAE J2578, *Recommended Practice for General Fuel Cell Vehicle Safety* , and SAE J2344, *Guidelines for Electric Vehicle Safety*.

#### **4.6.1.3.5**

Where specified, hybrid or electric vehicles shall meet the requirements of FMVSS 305 including S5.4.1.1 *Marking of RESS*.

#### **4.6.1.3.6**

Where specified, hybrid or electric vehicles shall meet the requirements of FMVSS 305 S5.4.1.2.

#### **4.6.1.3.7**

Where specified, hybrid or electric vehicles shall include a high-voltage isolation monitor that meets the requirements of FMVSS 305, SAE J2578, *Recommended Practice for General Fuel Cell Vehicle Safety* ; UL 2231-1, *Safety for Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: General Requirements* ; and UL 2231-2, *Personnel Protection Systems for Electric Vehicle (EV) Supply Circuits: Particular Requirements for Protection Devices for Use in Charging Systems* .

#### **4.6.1.3.8**

Where specified, hybrid or electric vehicle rechargeable energy storage system shall have a high-voltage interlock in accordance with SAE J2578, *Recommended Practice for General Fuel Cell Vehicle Safety* , and SAE J2344, *Guidelines for Electric Vehicle Safety* .

#### **4.6.1.3.9**

Where specified, hybrid or electric vehicles shall meet the bonding requirements of IEC 62477-1, *Safety Requirements for Power Electronic Converter Systems and Equipment* .

## Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Mon Jan 25 16:42:53 EST 2021

## Committee Statement

**Committee Statement:** With the rapid adoption of electrified powertrains in the transportation sector, new hazards are present on vehicles that employ this technology. Battery technology in the heavy vehicle and machinery space are in to 600 to 700-volt range, thus the need for high voltage safety requirements. The proposals refer to industry standards that are being used in the automotive and off highway industries. These requirements provide an industry recognized outline of safety measures that have been effective in protecting end users, and maintenance personnel from these hazards.

**Response Message:** FR-104-NFPA 1900-2021

[Public Input No. 975-NFPA 1900-2020 \[New Section after 4.6.1.2\]](#)



## First Revision No. 105-NFPA 1900-2021 [ Section No. 4.6.1.2 ]

### 4.6.1.2 Line Voltage Electrical Systems.

The line voltage electrical systems shall be in accordance with ~~Chapter 22 of NFPA 1904~~ Chapter 25.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:43:21 EST 2021

### Committee Statement

**Committee Statement:** Updating cross reference due to document consolidation.

**Response Message:** FR-105-NFPA 1900-2021

Public Input No. 823-NFPA 1900-2020 [Section No. 4.6.1.2]

Public Input No. 140-NFPA 1900-2020 [Section No. 4.6.1.2]



## First Revision No. 106-NFPA 1900-2021 [ Section No. 4.6.4.5 ]

### 4.6.4.5

The unit shall be provided with a grounded ac receptacle plug to allow a pull-away connection from the local electrical power supply to the battery charger/conditioner.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:44:36 EST 2021

## Committee Statement

**Committee Statement:** According to the National Electrical Code article 100, a receptacle is the point at an outlet of a wiring system where current is taken to supply equipment. A plug is the device that takes the current. Whether pull-away or auto-eject, the connection on the vehicle would be a plug (probably recessed), not a receptacle.

**Response Message:** FR-106-NFPA 1900-2021

[Public Input No. 143-NFPA 1900-2020 \[Section No. 4.6.4.5\]](#)



## First Revision No. 107-NFPA 1900-2021 [ Section No. 4.7.4.2 ]

### 4.7.4.2\*

Where a 10 × 8 vehicle is used, only 8 of the 10 wheels shall be required to be powered.

#### A.4.7.4.2

Vehicle types are designated as 4 × 4, 6 × 6, and so forth. These designations indicate the number of wheels on the vehicle and the number of wheels that propel or drive the vehicle. The term *wheel* in this context means either a single tire or a set of dual tires operating as one tire.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Mon Jan 25 16:45:15 EST 2021

### Committee Statement

**Committee Statement:** The definition of "Vehicle Type" was dropped because the term is never used. The information from that definition and its annex is being moved here which is the only reference to this terminology.

**Response Message:** FR-107-NFPA 1900-2021

Public Input No. 168-NFPA 1900-2020 [Section No. 4.7.4.2]



## First Revision No. 586-NFPA 1900-2021 [ Section No. 4.13.3.6 ]

### 4.13.3.6\*

Cabs on apparatus with a GVWR greater than 11,800 kg (26,000 lb) shall meet the requirements of one of the following sets of standards:

- (1) SAE J2420, *COE Frontal Strength Evaluation — Dynamic Loading Heavy Trucks*, and SAE J2422, *Cab Roof Strength Evaluation — Quasi-Static Loading Heavy Trucks*
- (2) ECE Regulation number 29, *Uniform Provisions Concerning the Approval of Vehicles with Regard to the Protection of the Occupants of the Cab of a Commercial Vehicle*

[ ~~1901:~~ 17.3.2 ]

#### A.4.13.3.6

The US standards developed by SAE and the United Nations ECE regulation mirror each other except that SAE J2422, *Cab Roof Strength Evaluation — Quasi-Static Loading Heavy Trucks*, requires a roof preload impact prior to the roof crush. The ECE standard was established in 1958, while the SAE standards did not add performance criteria until 2003. Both the SAE and ECE standards are viable minimum measures of cab integrity. Manufacturers may can test in excess of the standards.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Sat Mar 06 08:50:27 EST 2021

## Committee Statement

**Committee Statement:** This change is to remove the cross reference since it is part of this document (17.3.2)

**Response Message:** FR-586-NFPA 1900-2021



## First Revision No. 466-NFPA 1900-2021 [ Section No. 4.13.7 ]

### 4.13.7\*

Where specified, a monitoring and data acquisition system (MADAS) shall be installed for the collection of various performance measurements to monitor, as a minimum, the following:

- Vehicle speed
- Vehicle heading
- Lateral acceleration
- Vertical acceleration
- Longitudinal acceleration and deceleration
- Engine rpm
- Throttle position
- Steering input
- Vehicle braking input (pedal position and brake pressure)
- Date, time, and location for all data collected

### A.4.13.7

The data acquisition system should be designed to accommodate ARFF-specific requirements for on- and off-road, high-shock, high-contaminant operating environments, and the extremely high data sampling rates that are utilized to provide enough data to historically analyze an accident or incident and for enhancement of driver training and vehicle maintenance information.

### 4.13.7.1

The data acquisition system shall be capable of storing the measurements and the time intervals, starting at least 120 seconds before and ending at least 15 seconds after any serious incident.

### 4.13.7.2

The data acquisition system shall be designed so that the data being recorded will not be lost or overwritten immediately after the incident due to the use of an emergency shutoff or a master electrical disconnect switch.

### 4.13.7 Onboard Data Management and Communications Equipment.

The purchaser shall specify what the contractor needs to provide in terms of onboard data management and communications equipment for the apparatus.

### 4.13.7.1

For each category of equipment listed in 4.13.7.5, the purchaser shall specify what equipment the contractor is to supply and install.

### 4.13.7.2

For each category of equipment listed in 4.13.7.5, the purchaser shall specify what purchaser-supplied equipment the contractor is to install.

### 4.13.7.3\*

For each category of equipment listed in 4.13.7.5 , the purchaser shall specify what accommodations such as space, power, antenna bases, and so on the contractor is to provide to support purchaser-installed equipment.

#### **A.4.13.7.3**

If equipment is going to be installed after delivery, such as radio or data communications equipment, it might be a good idea to consult with the future installer for what accommodations they would like to have the apparatus manufacturer provide to make their work easier.

#### **4.13.7.4**

For each category of equipment listed in 4.13.7.5 , the purchaser shall specify if no equipment in that category is to be supplied or installed, or have any accommodations provided.

**4.13.7.5**

The purchaser shall provide the information identified in 4.13.7.1 through 4.13.7.4 for the following:

(1)\* MADAS

**A.4.13.7.5(1)** \_

Where specified, a monitoring and data acquisition system (MADAS) should be installed for the collection of various performance measurements to monitor, as a minimum, the following:

- (1) Vehicle speed
- (2) Vehicle heading
- (3) Lateral acceleration
- (4) Vertical acceleration
- (5) Longitudinal acceleration and deceleration
- (6) Engine rpm
- (7) Throttle position
- (8) Steering input
- (9) Vehicle braking input (pedal position and brake pressure)
- (10) Date, time, and location for all data collected

The data acquisition system should be capable of storing the measurements and the time intervals, starting at least 120 seconds before and ending at least 15 seconds after any serious incident.

The data acquisition system should be designed so that the data being recorded will not be lost or overwritten immediately after the incident due to the use of an emergency shutoff or a master electrical disconnect switch.

- (2) Mobile data terminals or other computer equipment
- (3) Traffic preemption equipment
- (4)\* Vehicle data recorder

**A.4.13.7.5(4)** \_

If a vehicle data recorder (VDR) is provided, it should have the following minimum capabilities:

- (1) The VDR should be capable of recording the data shown in Table A.4.13.7.5(4)(a) 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 Table A.4.13.7.5(4)(b) .
- (4) When the memory capacity is reached, the system should erase the oldest data first.

Table A.4.13.7.5(4)(a) VDR Data

<u>Data</u>	<u>Unit of Measure</u>
<u>Vehicle speed</u>	<u>mph</u>
<u>Acceleration (from speedometer)</u>	<u>mph/sec</u>
<u>Deceleration (from speedometer)</u>	<u>mph/sec</u>
<u>Engine speed</u>	<u>rpm</u>
<u>Engine throttle position</u>	<u>% of full throttle</u>
<u>Antilock braking system event</u>	<u>on/off</u>
<u>Seat occupied status</u>	<u>Occupied: yes/no by position</u>
<u>Seat belt status</u>	<u>Buckled: yes/no by position</u>
<u>Master optical warning device switch</u>	<u>on/off</u>
<u>Time</u>	<u>24-hour clock</u>
<u>Date</u>	<u>year/month/day</u>

Table A.4.13.7.5(4)(b) VDR Summary Data

<u>Data</u>	<u>Unit of Measure</u>
<u>Maximum vehicle speed</u>	<u>mph</u>
<u>Maximum acceleration (from speedometer)</u>	<u>mph/sec</u>
<u>Maximum deceleration (from speedometer)</u>	<u>mph/sec</u>
<u>Maximum engine speed</u>	<u>rpm</u>
<u>Maximum engine throttle position</u>	<u>% of full throttle</u>
<u>Antilock braking system event</u>	<u>on/off</u>
<u>Seat occupied with seat belt unbuckled</u>	<u>yes/no by position at 30 sec into minute</u>
<u>Master optical warning device switch</u>	<u>on/off at 30 sec into minute</u>
<u>Time</u>	<u>24-hour clock</u>
<u>Date</u>	<u>year/month/day</u>

All data stored in the VDR should be uploadable by the user to a computer or fire department management/engineering system via cable, Wi-Fi, data channel, cellular data, or other technology.

As a minimum, the user should have the capability to view the data as follows:

- (1) Raw second-by-second data over a specified data/time range
- (2) Daily log for the time the engine is running for a given date (minute-by-minute output of all values)

- (3) Weekly summary (i.e., maximum values each hour for each day of the week).
- (4) Monthly summary (i.e., maximum values each day for each day of the month).

(5)\* V2X communications

**A.4.13.7.5(5) \_**

V2X (i.e., vehicle to everything) communications provide information from a vehicle to other systems. This can include communications through dedicated short-range communications; cellular communications; WLAN; WiFi (in station); and, in the case of emergency vehicles, existing radio network data channels. Vehicles can communicate with other vehicles (V2V), infrastructure such as traffic signals and other fixed infrastructure (V2I), pedestrians (V2P), networks (V2N), devices such as smartphone apps or other portable devices (V2D), power grids (V2G), and other systems such as maintenance/engineering departments and other technologies. This is a rapidly growing and developing area of technology with almost unlimited possibilities to improve safety and efficiency. Purchasers need to research available equipment and capabilities, and then direct the contractor to provide the capabilities desired. There are many standards related to these communications, including NFPA 950 .

## Supplemental Information

<u>File Name</u>	<u>Description</u> <u>Approved</u>
414_ch_4.13.7_portion_of_1900_Onboard_Comms_3_1_21.docx	For staff use

## Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Thu Feb 25 14:55:37 EST 2021

## Committee Statement

**Committee Statement:** The AIR AAA committee is moving the MADAS requirements to the Appendix since it is an optional piece of equipment that can get specified and not a minimum requirement. The text is being replaced by a generic requirement for data management and communications equipment. The committee wants to provide guidance on what needs to be specified for optional communications equipment, including MADAS. There are many decisions to be made around onboard data management and communications equipment. Depending on a number of factors, the purchaser may want the contractor to supply and install the equipment, the purchaser may supply equipment and ask the contractor to install the equipment, equipment may be installed after the vehicle is delivered, or the purchaser may decide some equipment is not needed for their department. This section calls for the information to be provided by the purchaser to allow the contractor to meet the requirements of the purchaser. These decisions include not only who provides and/or installs the equipment but also what requirements in terms of space, power provisions, antenna bases and cables, and other provisions should be designed into the vehicle even if the purchaser will install, or have installed, the equipment after delivery of the finished apparatus.

**Response** FR-466-NFPA 1900-2021

**Message:**

[Public Input No. 969-NFPA 1900-2020 \[New Section after A.4.1.1.1\]](#)

[Public Input No. 848-NFPA 1900-2020 \[Section No. 4.13.7\]](#)



## First Revision No. 108-NFPA 1900-2021 [ Section No. 4.14.5.2 ]

### 4.14.5.2

Exterior access handrails shall be constructed of or covered with a slip-resistant, noncorrosive material. [ ~~1901: 18.8.2~~ ] [ 1900: 15.8.1 ]

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:46:32 EST 2021

### Committee Statement

**Committee Statement:** Updating the reference document since 1901 is being consolidated to 1900.

**Response Message:** FR-108-NFPA 1900-2021

[Public Input No. 824-NFPA 1900-2020 \[Section No. 4.14.5.2\]](#)



## First Revision No. 109-NFPA 1900-2021 [ Section No. 4.15.1 ]

### 4.15.1

For ARFF purposes, vehicles using primary extinguishing agents shall be tested in accordance with all requirements of NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:47:04 EST 2021

### Committee Statement

**Committee Statement:** Reference update due to document consolidation.

**Response Message:** FR-109-NFPA 1900-2021

Public Input No. 144-NFPA 1900-2020 [Section No. 4.15.1]



## First Revision No. 110-NFPA 1900-2021 [ New Section after 4.16.5 ]

### **4.16.5.6**

Any 3 in. (75 mm) or larger intake valve to the water pump, except the tank-to-pump valve, shall be a slow-operating valve.

### **Submitter Information Verification**

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:48:23 EST 2021

### **Committee Statement**

**Committee Statement:** When supplying water to a truck through a nurse vehicle, there is the risk of water hammer in the piping system due to inrush of water. A slow operating valve will reduce this affect.

**Response Message:** FR-110-NFPA 1900-2021

[Public Input No. 972-NFPA 1900-2020 \[New Section after 4.16.5\]](#)



## First Revision No. 111-NFPA 1900-2021 [ Section No. 4.18.1.1 ]

### 4.18.1.1

The purchaser shall specify the percent concentrate foam system to be provided ~~and that it for~~ it to have a working capacity sufficient for two tanks of water at the maximum tolerance specified in NFPA 412 ~~, Section 5.2~~ Section 28.2 of NFPA 460 .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:48:55 EST 2021

### Committee Statement

**Committee Statement:** Updating reference since NFPA 412 is being consolidated into 460.

**Response Message:** FR-111-NFPA 1900-2021

[Public Input No. 145-NFPA 1900-2020 \[Section No. 4.18.1.1\]](#)

[Public Input No. 825-NFPA 1900-2020 \[Section No. 4.18.1.1\]](#)



## First Revision No. 112-NFPA 1900-2021 [ Section No. 4.18.4.2 ]

### 4.18.4.2

The proportioning system shall be accurate to provide for the discharge of finished foam within the range specified in NFPA 412 ,Chapter 5. Chapter 28 of NFPA 460 .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Jan 25 16:50:18 EST 2021

### Committee Statement

**Committee Statement:** Updating the reference document and chapter since NFPA 412 is being consolidated into NFPA 460.

**Response Message:** FR-112-NFPA 1900-2021

[Public Input No. 146-NFPA 1900-2020 \[Section No. 4.18.4.2\]](#)

[Public Input No. 826-NFPA 1900-2020 \[Section No. 4.18.4.2\]](#)



## First Revision No. 113-NFPA 1900-2021 [ New Section after 4.18.4.3 ]

### 4.18.4.4

If an input-based foam test system is specified with the vehicle it shall be one approved by the AHJ.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Mon Jan 25 16:51:23 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding a requirement for input-based foam test with the intent that the AHJ will reference the FAA testing on these systems. The FAA test center is the only organization to have tested input-based foam test systems. These systems have tested both output-based foam testing along with the input-based methods and compared them. The FAA has made recommendations for official use in the USA based on this testing. These recommendations are in FAA Cert Alert 19-02.

**Response Message:** FR-113-NFPA 1900-2021

Public Input No. 859-NFPA 1900-2020 [New Section after 4.18.4.3]



**First Revision No. 114-NFPA 1900-2021 [ Section No. 4.20.6 [Excluding any Sub-Sections] ]**



If the boom-mounted turret is on a rotational base, it shall meet the following design and functional requirements:

- (1) The boom-mounted turret shall meet the requirements of ~~4.4.1.3 and 4.4.1.5~~ 6.3.22, 6.4.1 , and 6.4.12 while in the stowed position.
- (2) The vehicle shall achieve a 20 percent side slope, with the boom fully elevated and the nozzle rotated uphill at maximum horizontal rotation while discharging at maximum flow rate.
- (3) The vehicle shall be provided with an interlock or warning system and placards in full view of the driver/operator to provide the operational limitations during all phases of operation.
- (4) Flow rates shall be in accordance with Table 4.2.1.2(c) and Table 4.2.1.2(d) for major vehicles.
- (5) If the boom-mounted turret is intended to be the primary turret it shall meet the primary water-foam agent turret discharge requirements of Table 4.2.1.2(c) and Table 4.2.1.2(d) for the applicable vehicle class while in the bedded position.
- (6) The boom-mounted turret shall meet the foam-quality standard of NFPA 412 Chapters 1, through 3, and 27 through 29 of NFPA 460 for the applicable foam applicator and foam type.
- (7) The boom-mounted turret shall function during ARFF operations without the need for outriggers or other ground contact stabilizers that would render the vehicle immobile or hinder its maneuverability.
- (8) The boom-mounted turret shall have a deployment time from the bedded position to the maximum height and start the application of agent within 30 seconds.
- (9) The high rise, telescoping, ~~and/~~ or articulating movement of the boom/tower shall be accomplished with not more than two adjacent lever controls. ~~and be permitted to be manual or automated for preselected positioning of the elevation and reach.~~
- (10) ~~The high rise, telescoping, or articulating movement of the boom/tower shall~~ be permitted to be manual or automated for preselected positioning of the elevation and reach.
- (11) If automated, these functions shall be provided with a manual override positioning capability.
- (12) The boom-mounted turret shall be capable of applying agent to any interior area of the most current wide-body jet, so as not to impede evacuation and for safety considerations of the vehicle operator.
- (13) The device shall be capable of positioning the nozzle within 0.6 m (2 ft) of ground level in front of the vehicle. ~~and be capable of applying agent to the interior of the aircraft through cargo bay door openings, passenger doorways, and emergency exits on the type of aircraft being protected while the aircraft is in either the gear-up or gear-down landing position.~~
- (14) ~~The device shall~~ be capable of applying agent to the interior of the aircraft through cargo bay door openings, passenger doorways, and emergency exits on the type of aircraft being protected while the aircraft is in either the gear-up or gear-down landing position.
- (15) The boom-mounted turret shall have a range of motion so as to permit positioning of the nozzle to direct a firefighting agent stream at least 90 degrees to the longitudinal axis of the fuselage for interior fire extinguishment.
- (16) The turret/boom mechanism shall be capable of providing for horizontal movement along the aircraft of at least 30 degrees left and right of the vehicle centerline so as not to require repositioning or movement of the ARFF vehicle.
- (17) This horizontal rotation shall be accomplished without the deployment of stabilizers or outriggers that might cause a delay in positioning or emergency movement of the rescue vehicle.
- (18) The primary turret shall have backup systems to allow for override of the single-lever boom control and hydraulic system (or other power source) if the primary system becomes

disabled.

- (19) The driver/operator shall be able to see the boom, as it is rising to its maximum height, from a seated position by means of a camera or direct line of sight.
- (20) A means of visually identifying the boom extension available shall be provided either by an external marking on the boom or a display in the cab visible to the vehicle operator.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Wed Jan 27 11:57:49 EST 2021

## Committee Statement

**Committee Statement:** The committee is making these changes in order to update the reference sections to the Chapter 6 testing requirements. Updating the referenced sections will correlate that the prototype test for primary nozzle flow rate testing and the production side slope and primary flow rate testing shall be accomplished with the boom in the stowed position to eliminate any confusion. Also, to update referenced document due to consolidation.

**Response Message:** FR-114-NFPA 1900-2021

[Public Input No. 855-NFPA 1900-2020 \[Section No. 4.20.6\]](#)

[Public Input No. 147-NFPA 1900-2020 \[Section No. 4.20.6 \[Excluding any Sub-Sections\]\]](#)



## First Revision No. 115-NFPA 1900-2021 [ Section No. 4.20.7 ]

### 4.20.7

If the boom-mounted turret is on a nonrotational base, it shall meet the following design and functional requirements:

- (1) ~~Meet~~ The turret shall meet the requirements of 4.4.1.3 ~~and~~ 4.4.1.5 6.3.22 , 6.4.1 , and 6.4.12 while in the stowed position.
- (2) ~~Achieve~~ The turret shall achieve a 20 percent side slope with the boom fully elevated and the nozzle fully rotated uphill at maximum horizontal rotation while discharging at maximum flow rate.
- (3) If the nonrotational boom-mounted turret is the primary turret, its flow rates shall be in accordance with Table 4.2.1.2(c) and Table 4.2.1.2(d) for major vehicles.
- (4) If the nonrotational boom-mounted turret is the primary turret, it shall meet the primary water-foam agent turret discharge requirements of Table 4.2.1.2(c) and Table 4.2.1.2(d) for the applicable vehicle class while in the bedded condition.
- (5) ~~Meet~~ The turret shall meet the foam quality standard of Chapter 28 of NFPA 412 460 , Chapter 5 .
- (6) ~~Function~~ The turret shall function during ARFF operations without the need for outriggers or other ground contact stabilizers that could render the vehicle immobile or hinder its maneuverability.
- (7) The boom shall have a deployment time from the bedded position to maximum height and start the application of agent within 30 seconds.
- (8) ~~Be~~ The turret shall be capable of applying agent through passenger doorways, to interior areas of the type of aircraft being protected.
- (9) The device shall permit the operator to position the nozzle assembly so as to be able to discharge the agent in front of the vehicle at a level that permits the operator to see over the turret discharge.
- (10) ~~Have~~ The turret shall have a range of motion so as to permit positioning of the nozzle to direct a firefighting agent stream along the longitudinal axis of the fuselage or up to 90 degrees to the longitudinal axis for interior fire extinguishing.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Wed Jan 27 12:02:00 EST 2021

## Committee Statement

**Committee Statement:** The the committee updating the reference sections to the Chapter 6 testing requirements. Updating the referenced sections will correlate that the prototype test for primary nozzle flow rate testing and the production side slope and primary flow rate testing shall be accomplished with the boom in the stowed position to eliminate any confusion.

**Response Message:** FR-115-NFPA 1900-2021

Public Input No. 148-NFPA 1900-2020 [Section No. 4.20.7]

[Public Input No. 858-NFPA 1900-2020 \[Section No. 4.20.7\]](#)



## First Revision No. 116-NFPA 1900-2021 [ Section No. 4.22.4 ]

### 4.22.4

Turrets, handlines, and ground sweeps shall discharge foam having the quality specified in NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Wed Jan 27 12:04:30 EST 2021

### Committee Statement

**Committee Statement:** Reference update due to document consolidation

**Response Message:** FR-116-NFPA 1900-2021

[Public Input No. 149-NFPA 1900-2020 \[Section No. 4.22.4\]](#)

[Public Input No. 827-NFPA 1900-2020 \[Section No. 4.22.4\]](#)



## First Revision No. 117-NFPA 1900-2021 [ Section No. 4.22.5 ]

### 4.22.5

Measurement of the expansion ratio and 25 percent drainage times shall be in accordance with the procedures outlined in Chapter 29 of NFPA 412 460 ,Chapter 6 .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Wed Jan 27 12:06:18 EST 2021

### Committee Statement

**Committee Statement:** Reference update due to document consolidation.

**Response Message:** FR-117-NFPA 1900-2021

Public Input No. 150-NFPA 1900-2020 [Section No. 4.22.5]

Public Input No. 828-NFPA 1900-2020 [Section No. 4.22.5]



## First Revision No. 118-NFPA 1900-2021 [ New Section after 4.26.2 ]

### 4.26.2.4

A certificate of compliance shall be provided with the vehicle from the siren manufacturer.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Wed Jan 27 12:08:02 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding a requirement for a certificate of compliance from the siren manufacturer. Instead of creating or duplicating siren performance specs, the task group would rather refer to the SAE spec.

**Response Message:** FR-118-NFPA 1900-2021

Public Input No. 862-NFPA 1900-2020 [New Section after 4.26.2]



## First Revision No. 119-NFPA 1900-2021 [ Section No. 4.26.2 [Excluding any Sub-Sections] ]

A warning siren shall be provided that has a sound output of not less than 95 dBA at 30.5 m (100 ft) when measured directly ahead of the siren and not less than 90 dBA at 30.5 m (100 ft), measured at 45 degrees on either side on the vehicle that meets the requirements of SAE J1849, *Emergency Vehicle Sirens*.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Wed Jan 27 12:09:19 EST 2021

### Committee Statement

**Committee Statement:** The committee is making this change as they believe that by referring to the siren performance to the SAE J1849 specification is preferable. Instead of creating or duplicating siren performance specs, the task group would rather refer to the SAE spec. This is in alignment with the requirements within other sections of this document.

**Response Message:** FR-119-NFPA 1900-2021

[Public Input No. 861-NFPA 1900-2020 \[Section No. 4.26.2 \[Excluding any Sub-Sections\]\]](#)



## First Revision No. 120-NFPA 1900-2021 [ Section No. 4.26.4.3.2 ]

### 4.26.4.3.2

The purchaser shall provide the vehicle manufacturer with the color of the light and indicate whether the emergency warning lights are to be the LED flasher type, sealed beam type, or strobe type and desired flash pattern based on the requirements of the AHJ .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Wed Jan 27 12:14:45 EST 2021

### Committee Statement

**Committee Statement:** The committee is making these changes as LED lighting is common in the industry now, so the committee does not think it is necessary to specify the type of light as a requirement in the current environment. The committee also added flash pattern as different patterns as they are used throughout the industry.

**Response Message:** FR-120-NFPA 1900-2021

[Public Input No. 863-NFPA 1900-2020 \[Section No. 4.26.4.3.2\]](#)



## First Revision No. 585-NFPA 1900-2021 [ Section No. 5.7.6.1 ]

### 5.7.6.1 Installation.

Lighting equipment shall be installed in conformity with local road regulations, where practicable, and shall include the following:

~~Headlights with upper and lower driving beams shall be provided, along with a control switch for beam selection that is readily accessible to the driver.~~

~~Dual taillights and dual stop lights shall be provided, and a minimum of one additional stop light shall be located high up on the rear of the vehicle.~~

~~Self-canceling turn signals, front and rear, with a steering column-mounted control and a visual and audible indicator shall be provided, along with a four-way flasher switch.~~

~~Adequate reflectors and marker and clearance lights shall be furnished to describe the overall length and width of the vehicle.~~

~~Engine compartment lights, nonglare type, shall be provided and arranged to illuminate both sides of the engine, with individual switches located in the engine compartment. Service lighting shall be provided for all areas described in 4.14.2(1) , 4.14.2(2) , and 4.14.2(3) , as well as for the engine compartment.~~

~~Lighting for all top-deck working areas shall be provided.~~

~~At least one backup light and an audible alarm with a minimum of 97 dBA that meet SAE J994 shall be installed in the rear of the body.~~

#### 5.7.6.1.1

Lighting equipment shall be installed in conformity with local road regulations, where practicable.

**5.7.6.1.2**

Lighting equipment installation shall also include the following:

- (1) Headlights with upper and lower driving beams shall be provided, along with a control switch for beam selection that is ~~readily~~ accessible to the driver.
- (2) Dual taillights and dual stop lights shall be provided, ~~and a minimum of one additional stop light shall be located high up on the rear of the vehicle.~~
- (3) A minimum of one additional stop light shall be located high up on the rear of the vehicle.
- (4) Self-canceling turn signals, front and rear, with a steering-column-mounted control and a visual and audible indicator shall be provided, along with a four-way flasher switch.
- (5) ~~Adequate reflectors~~ Reflectors and marker and clearance lights shall be furnished to describe the overall length and width of the vehicle.
- (6) Engine compartment lights, nonglare type, shall be provided and arranged to illuminate both sides of the engine, with individual switches located in the engine compartment. ~~Service lighting shall be provided for all areas described in 4.14.2(1), 4.14.2(2), and 4.14.2(3), as well as for the engine compartment.~~
- (7) Service lighting shall be provided for all areas described in 4.14.2(1), 4.14.2(2), and 4.14.2(3), as well as for the engine compartment.
- (8) Lighting for all top-deck working areas shall be provided.
- (9) At least one backup light and an audible alarm with a minimum of 97 dBA that meet SAE J994, *Alarm — Backup — Electric, Laboratory Performance Testing*, shall be installed in the rear of the body.

**Supplemental Information**

<u>File Name</u>	<u>Description Approved</u>
1900_FR-585_5.7.6.1.docx	For staff use

**Submitter Information Verification**

**Committee:** AIR-AAA

**Submittal Date:** Sat Mar 06 08:42:46 EST 2021

**Committee Statement**

**Committee Statement:** This change was to break out two requirements within the same subsection. I am not sure why in Terra it isn't showing, but number 6(new) was part of number 5 in the original which caused two sentences/requirements within the same sub. So the last sentence in the original number 5 is now number 6 with the remaining subs being renumbered.

**Response Message:** FR-585-NFPA 1900-2021



## First Revision No. 124-NFPA 1900-2021 [ New Section after 6.1.5 ]

### **6.1.6**

Operational tests shall be performed on every vehicle built.

### **6.1.7\***

Each manufacturer shall have in place a procedure for the frequency of calibration or cause for calibration of tools and testing devices.

### **A.6.1.7**

Manufacturers have the option of conducting calibration in house or through outside contractors.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:15:05 EST 2021

## Committee Statement

**Committee Statement:** The committee is adding a requirement clarifying what trucks need to be operationally tested. There is no guidance in the document relative to what trucks need to be operationally tested. This requirement clarifies this to end users. The committee is adding a requirement for calibration of testing tools. There is no guidance in the document relative to calibration of test equipment. The committee believes it is critical to have appropriate testing standards for equipment referenced in the standard or commonly used, such as scales, calibrated sight gauges, calibrated speedometers, calibrated water flow meter, electronic meters, gauges, data acquisition systems, inclinometers, etc. If the tools used to test vehicles are not calibrated the accuracy of the testing will be suspect.

**Response Message:** FR-124-NFPA 1900-2021

[Public Input No. 864-NFPA 1900-2020 \[New Section after 6.1\]](#)

[Public Input No. 865-NFPA 1900-2020 \[New Section after 6.1\]](#)

[Public Input No. 866-NFPA 1900-2020 \[New Section after A.6.3.5\]](#)



**First Revision No. 125-NFPA 1900-2021 [ Section No. 6.2.1 ]**

### 6.2.1

Manufacturer certification shall ~~incorporate documentation for any new technology and shall certify that any of the components on the following list are fitted for use on all ARFF vehicles~~ comply with both of the following :

~~Engine~~

~~Transmission~~

~~Axles~~

~~Transfer case~~

~~Wheels~~

~~Tires~~

~~Handline hose with couplings attached~~

~~Premixed storage container~~

~~Premixed system pressure-relief valve~~

~~Propellant gas cylinder~~

~~Propellant gas cylinder regulating device~~

~~Complementary agent storage container~~

~~Complementary agent pressure-relief device~~

- (1) Incorporate documentation for any new technology
- (2) Certify that any of the components on the following list are fitted for use on all ARFF vehicles:
  - (a) Engine
  - (b) Transmission
  - (c) Axles
  - (d) Transfer case
  - (e) Wheels
  - (f) Tires
  - (g) Handline hose with couplings attached
  - (h) Premixed storage container
  - (i) Premixed system pressure-relief valve
  - (j) Propellant gas cylinder
  - (k) Propellant gas cylinder regulating device
  - (l) Complementary agent storage container
  - (m) Complementary agent pressure-relief device
  - (n) Water tank
  - (o) Foam tank
  - (p) Hydrostatic pressure test

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:17:37 EST 2021

## Committee Statement

**Committee Statement:** The committee is adding these components to the certification list. These additional items will supply the end user with certification for the water and foam tanks and firefighting piping pressure tests as they are critical to the vehicle's performance.

**Response Message:** FR-125-NFPA 1900-2021

[Public Input No. 867-NFPA 1900-2020 \[Section No. 6.2.1\]](#)



## First Revision No. 126-NFPA 1900-2021 [ Section No. 6.3.8.1 ]

### 6.3.8.1

Test equipment shall consist of a tape measure and ~~a protractor~~ an electronic angle following device .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:18:19 EST 2021

### Committee Statement

**Committee Statement:** The committee is updating the tools used to measure angles. Vehicle OEM's are using digital angle meter to determine angles for vehicle dimensions. These are more accurate than using the human eye on a protractor.

**Response Message:** FR-126-NFPA 1900-2021

Public Input No. 868-NFPA 1900-2020 [Section No. 6.3.8.1]



## First Revision No. 127-NFPA 1900-2021 [ Section No. 6.3.10.3 ]

### 6.3.10.3

The capability of the vehicle to ascend, stop, start, and continue ascent on a 40 percent grade without interruption in the discharge rate shall be demonstrated either on an actual grade or by means of an equivalent drawbar test as follows:

- (1) Fill both the water and foam tanks with water and add dye to the foam tank .
- (2) Set the agent system to discharge in the foam mode and set the system discharge pressure for optimum performance.
- (3) Position the vehicle at the bottom of a 40 percent grade and initiate discharge at full output through the primary turret nozzles. ~~Verify that dye is apparent in the discharge stream throughout the test direction of travel .~~
- (4) Initiate the vehicle's ascent of the grade and achieve a speed of at least 1.6 kph (1 mph). During the ascent, bring the vehicle to a stop and resume the ascent at a speed of at least 1.6 kph (1 mph) without interruption in the discharge stream. Record the vehicle speed and any variation in discharge pressure.
- (5) If an actual 40 percent grade is not available, repeat 6.3.10.3(1) through 6.3.10.3(4) with the vehicle coupled to a 40 percent grade equivalent drawbar load determined as follows:
  - (a) A 40 percent grade — 21.8 degree angle
  - (b) The loaded vehicle weight × sin 21.8 degrees (0.371), which equals the necessary drawbar pull to simulate ascending a 40 percent grade
  - (c) The area of the load cell, which can be determined at the time of the test
  - (d) The load cell reading, in kPa (psi), that simulates a 40 percent grade, which can be calculated by the following:

$$\text{load cell reading} = \frac{\sin 21.8 \text{ degrees} \times \text{vehicle weight}}{\text{area of load cell}} \quad [6.3.10.3]$$

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:19:19 EST 2021

## Committee Statement

**Committee Statement:** The committee is removing the dye requirement from the test. There is no technical requirement to have the water in the foam tank dyed. Verifying that the vehicle is in foam mode and proportioning the surrogate water meets the intent of the test. Some local ordinances do not allow dye to be used in testing outside of water treatment plants. Section 4 of the test procedure was separated into three steps to eliminate multi statements.

**Response Message:** FR-127-NFPA 1900-2021

[Public Input No. 870-NFPA 1900-2020 \[Section No. 6.3.10.3\]](#)



## First Revision No. 128-NFPA 1900-2021 [ Section No. 6.3.11.3.3.4(D) ]

(D)

An alarm sounded by excessive battery discharge, as detected by the warning system required in ~~43 16 .3.4 [of NFPA 1904 ]~~, or a system voltage of less than 11.8 V dc for a 12 V nominal system, 23.6 V dc for a 24 V nominal system, or 35.4 V dc for a 42 V nominal system for more than 120 seconds shall be considered a test failure.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:21:34 EST 2021

### Committee Statement

**Committee Statement:** Update reference due to document consolidation.

**Response Message:** FR-128-NFPA 1900-2021

[Public Input No. 58-NFPA 1900-2020 \[Section No. 6.3.11.3.3.4\(D\)\]](#)

[Public Input No. 829-NFPA 1900-2020 \[Section No. 6.3.11.3.3.4\(D\)\]](#)



## First Revision No. 129-NFPA 1900-2021 [ Section No. 6.3.11.3.5 ]

### 6.3.11.3.5 Documentation.

The manufacturer shall deliver the following with the fire apparatus:

- (1) Documentation of the electrical system performance tests
- (2) A written electrical load analysis, including the following:
  - (a) The nameplate rating of the alternator
  - (b) The alternator rating under the conditions specified in ~~13.3.2~~ [of NFPA 1901 16.3.2]
  - (c) Each of the component loads specified in ~~13.3.3~~ [of NFPA 1901] 16.3.3 that make up the minimum continuous electrical load
  - (d) Additional electrical loads that, when added to the minimum continuous electrical load, determine the total continuous electrical load
  - (e) Each individual intermittent electrical load

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Fri Jan 29 14:22:44 EST 2021

### Committee Statement

**Committee Statement:** Changes made to due to document consolidation.

**Response Message:** FR-129-NFPA 1900-2021

[Public Input No. 59-NFPA 1900-2020 \[Section No. 6.3.11.3.5\]](#)

[Public Input No. 830-NFPA 1900-2020 \[Section No. 6.3.11.3.5\]](#)



## First Revision No. 130-NFPA 1900-2021 [ Section No. 6.3.14.3 ]

### 6.3.14.3

The vehicle shall be tested as follows:

- (1) ~~For a 4 × 4, drive~~ Drive the fully loaded vehicle onto 355.6 mm (14 in.) blocks positioned under the diagonally opposite front and rear wheels. For a 6 × 6, block positions correspond to axle 1 and axle 3. For an 8 × 8, block positions correspond to axle 1 and axle 4. as follows:
  - (a) For a 4 × 4, positioned under the diagonally opposite front and rear wheels.
  - (b) For a 6 × 6, positioned under the diagonally opposite wheel-block positions that correspond to axle 1 and axle 3.
  - (c) For an 8 × 8, block positioned under the diagonally opposite wheel positions that correspond to axle 1 and axle 4.
- (2) With the vehicle in the position given in 6.3.14.3(1), take the following steps:
  - (a) Inspect the vehicle ~~thoroughly~~ to ensure that there are no sheet metal interferences and that all moving parts are free to function.
  - (b) Demonstrate all systems to ensure that they function, including discharge from all orifices.

~~For vehicles with bogie type construction, add a block under the second wheel of the bogie axle(s) so that both wheels on one side of the bogie are elevated simultaneously and diagonally opposite front and rear, and then repeat 6.3.14.3(2) (a) and 6.3.14.3(2) (b).~~
- (3) Switch the blocks to the opposite sides of the truck and repeat 6.3.14.3(1) ~~through and~~ 6.3.14.3(2).

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:24:58 EST 2021

## Committee Statement

**Committee Statement:** The committee is changing to the wording to allow for more flexibility in vehicle construction and adding clarity to the test procedure and remove the bogy requirement. Since vehicles have multiple body types and arrangements, the task group felt it was better to change the wording from sheet metal to body component to account for this. The test procedure was revised to indicate how much water should be discharged from the vehicle in the test. This clarifies and reduces ambiguity from the test procedure. The third step of the procedure has been deleted since no vehicles use a walking beam suspension anymore and it no longer belonged in the document. Also, test procedure item #1 was broke into three statements to eliminate multi-statements in the procedure.

**Response** FR-130-NFPA 1900-2021

**Message:**

Public Input No. 872-NFPA 1900-2020 [Section No. 6.3.14.3]



## First Revision No. 131-NFPA 1900-2021 [ New Section after 6.3.18 ]

### 6.3.18.5

The vehicle shall be tested in a fully loaded condition with tires inflated to their operating pressure.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:26:48 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding the requirement of the vehicle being loaded to GVWR. Adding clarification to this test procedure. And with the vehicle being loaded to GVWR, it allows for all vehicle weights to be tested in a single worst-case test.

**Response Message:** FR-131-NFPA 1900-2021

Public Input No. 873-NFPA 1900-2020 [New Section after 6.3.18]



## First Revision No. 132-NFPA 1900-2021 [ Section No. 6.3.19.5 ]

### 6.3.19.5

The calculated average foam concentration shall be within the tolerance permitted in NFPA 412, ~~Section 5.2.~~ Section 28.2 of NFPA 460.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:28:48 EST 2021

### Committee Statement

**Committee Statement:** Updating cross references due to document consolidation.

**Response Message:** FR-132-NFPA 1900-2021

[Public Input No. 60-NFPA 1900-2020 \[Section No. 6.3.19.5\]](#)

[Public Input No. 831-NFPA 1900-2020 \[Section No. 6.3.19.5\]](#)



## First Revision No. 133-NFPA 1900-2021 [ Section No. 6.3.22 ]

### 6.3.22\* Primary Turret Flow Rate Test.

#### 6.3.22.1

Test equipment shall consist of the following:

- (1) Calibrated sight gauge
- (2) Liquid volume measuring device accurate to within  $\pm 1.0$  percent
- (3) Calibrated pressure gauge, if not already provided on the truck
- (4) Alternative: A stopwatch and a scale capable of measuring total vehicle weight accurate to within  $\pm 1.0$  percent of the scale capacity

#### 6.3.22.2

It shall have been verified that the vehicle's pumping system is capable of operating at full rate.

#### 6.3.22.3

The primary turret discharge rate shall be determined as follows:

- (1) Set the primary turret pattern for straight stream operation
- (2) Fill the water tank completely
- (3) Engage the pump, and operate it at design speed
- (4) Open the turret flow control valve
- (5) If necessary, at this stage perform the following procedures:
  - (a) If flow meters are used, read and record the flow rate once the discharge pressure stabilizes.
  - (b) If a sight gauge is used, read and record the tank volume in gallons while simultaneously starting a stopwatch after the discharge pressure stabilizes. ~~Read and record the tank volume in liters (gallons) when the watch is stopped after allowing flow for at least 1 minute. Determine the flow rate in L/min (gal/min) by dividing the difference in gallons by the time of discharge.~~
  - (c) Read and record the tank volume in liters (gallons) when the watch is stopped after allowing flow for at least 1 minute.
  - (d) Determine the flow rate in L/min (gal/min) by dividing the difference in gallons by the time of discharge.
  - (e) If a scale is used, record the vehicle weight prior to discharge. Start a stopwatch, and discharge water at stabilized pressure for 1 minute. Record the vehicle weight after discharge and calculate the flow rate.
- (6) Reset the primary turret pattern to the dispersed setting and repeat 6.3.22.3(2) through 6.3.22.3(5).
- (7) Reset the primary turret to the half flow rate setting (if applicable) and repeat 6.3.22.3(1) through 6.3.22.3(6).

#### 6.3.22.4

The measured turret flow rates shall equal to the specified flow in Table 4.2.1.2(c) or Table 4.2.1.2(d) rate within a tolerance of +10 percent/-0 percent.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:31:29 EST 2021

## Committee Statement

**Committee Statement:** The committee is adding the reference to the Table that has the flow rate requirements. Adding the reference to the Table add clarity to where the flow rates can be found in Chapter 4 to eliminate confusion in the flow requirements. Also separated test procedure 5 (c) into three statements to eliminate multi-statement wording.

**Response Message:** FR-133-NFPA 1900-2021

[Public Input No. 947-NFPA 1900-2020 \[Section No. 6.3.22\]](#)



## First Revision No. 134-NFPA 1900-2021 [ Section No. 6.3.23 ]

### **6.3.23** Primary Turret Pattern Test.

The primary turret pattern test shall be conducted in accordance with the requirements of NFPA 412 Chapter 29 of NFPA 460 .

#### **6.3.23.1**

The primary turret pattern ranges shall equal the specified distances in Table 4.2.1.2(c) or Table 4.2.1.2(d) .

### **Submitter Information Verification**

**Committee:** AIR-AAA

**Submission Date:** Fri Jan 29 14:33:06 EST 2021

### **Committee Statement**

**Committee Statement:** These changes were made due to updating a cross reference due to document consolidation and adding the reference to the Table that has the flow rate requirements. Adding the reference to the Table add clarity to where the pattern requirements can be found in Chapter 4 to eliminate confusion

**Response Message:** FR-134-NFPA 1900-2021

[Public Input No. 61-NFPA 1900-2020 \[Section No. 6.3.23\]](#)

[Public Input No. 832-NFPA 1900-2020 \[Section No. 6.3.23\]](#)

[Public Input No. 948-NFPA 1900-2020 \[New Section after 6.3.23\]](#)



## First Revision No. 135-NFPA 1900-2021 [ Section No. 6.3.25 ]

### 6.3.25\* Primary Turret Articulation Test.

#### 6.3.25.1

The test equipment shall consist of a tape measure, a level, and ~~a protractor~~ an electric angle following device .

#### 6.3.25.2

The water tank shall be filled prior to the test.

#### 6.3.25.2.1

The turret power-assist system, if applicable, should be fully operational.

#### 6.3.25.3

The test shall be conducted as follows:

- (1) With the turret pointed ahead, raise the turret barrel to the maximum elevated position. With a level held horizontal at the vertical rotation axis, measure the angle between the level and the turret barrel with the protractor and record.
- (2) Rotate the primary turret barrel to the right and left to the angle needed.
- (3) Place a marker 9.1 m (30 ft) in front of the vehicle. Aim the turret straight ahead with the rate control at full flow, with the pattern control in the maximum dispersed position and with the turret in the maximum depressed position. When water discharges, observe whether water strikes the marker or strikes closer to the vehicle.

#### 6.3.25.4

Turret articulation shall be considered as passing if the measurements meet or exceed the specifications.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Fri Jan 29 14:35:44 EST 2021

## Committee Statement

**Committee Statement:** The committee is updating the tools used to measure angles. Vehicle OEM's are using digital angle meter to determine angles for vehicle dimensions. These are more accurate than using the human eye on a protractor. Also separated multi-statements in the test procedure section 1 and 3.

**Response Message:** FR-135-NFPA 1900-2021

Public Input No. 949-NFPA 1900-2020 [Section No. 6.3.25]



## First Revision No. 136-NFPA 1900-2021 [ Section No. 6.3.26 ]

### **6.3.26\*** Handline Nozzle Flow Rate Test.

#### **6.3.26.1**

Test equipment shall consist of the following:

- (1) Calibrated sight gauge
- (2) Liquid volume measuring device accurate to within  $\pm 1.0$  percent
- (3) Calibrated pressure gauge, if not already provided on the truck
- (4) Alternative: A stopwatch and a scale capable of measuring total vehicle weight accurate to within  $\pm 1.0$  percent

#### **6.3.26.2**

The vehicle's pumping system shall be verified to be capable of operating at full rate.

**6.3.26.3**

The handline nozzle flow rate shall be determined as follows:

- (1) Set the handline nozzle pattern for straight stream operation.
- (2) Fill the water tank completely.
- (3) Engage the pump and operate it at design speed.
- (4) Open the handline nozzle flow control valve.
- (5) If necessary, at this stage perform the following procedures:
  - (a) If flow meters are used, read and record the flow rate once the discharge pressure stabilizes.
  - (b) If a sight gauge is used, read and record the tank volume in gallons while simultaneously starting a stopwatch after the discharge pressure stabilizes. ~~Read and record the tank volume in liters (gallons) when the watch is stopped after allowing flow for at least 5 minutes. Determine the flow rate in L/min by dividing the difference in gallons by the time of discharge.~~
  - (c) Read and record the tank volume in liters (gallons) when the watch is stopped after allowing flow for at least 5 minutes.
  - (d) Determine the flow rate in L/min by dividing the difference in gallons by the time of discharge.
  - (e) If an open-top calibrated tank is used, discharge through the nozzle until the pressure stabilizes, and then simultaneously direct the stream into the tank while starting the stopwatch. ~~Stop the stopwatch when the tank is full, and remove or shut off the nozzle. Determine the flow rate by dividing the tank volume in liters (gallons) by the fill time in minutes.~~
  - (f) Stop the stopwatch when the tank is full, and remove or shut off the nozzle.
  - (g) Determine the flow rate by dividing the tank volume in liters (gallons) by the fill time in minutes.
  - (h) If a scale is used, record the vehicle weight prior to discharge. ~~Start a stopwatch, and discharge water at stabilized pressure for 1 minute. Record the vehicle weight after discharge, and calculate flow rate.~~
  - (i) Start a stopwatch, and discharge water at stabilized pressure for 1 minute.
  - (j) Record the vehicle weight after discharge and calculate flow rate.
- (6) If the nozzle is the non-air-aspirated type, repeat 6.3.26.3(2) through 6.3.26.3(5) with the nozzle pattern setting in the fully dispersed position.

**6.3.26.4**

The measured handline nozzle flow rates shall equal the specified flow rate in Table 4.2.1.2(c) or Table 4.2.1.2(d) within a tolerance of +10 percent/-0 percent.

**Submitter Information Verification**

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:37:36 EST 2021

**Committee Statement**

**Committee Statement:** The committee is adding the reference to the Table that has the flow rate requirements. Adding the reference to the Table add clarity to where the flow rates can be found in Chapter 4 to eliminate confusion in the flow requirements. Also revised test procedures 5(b), 5(c), and 5(d) to eliminate multi-statements.

**Response** FR-136-NFPA 1900-2021

**Message:**

[Public Input No. 950-NFPA 1900-2020 \[Section No. 6.3.26\]](#)



## First Revision No. 137-NFPA 1900-2021 [ Section No. 6.3.27 ]

### **6.3.27** Handline Nozzle Pattern Test.

The handline nozzle pattern test shall be conducted in accordance with the requirements of NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 .

#### **6.3.27.1**

The handline nozzle pattern ranges shall equal the specified distances in Table 4.2.1.2(c) or Table 4.2.1.2(d) .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Fri Jan 29 14:38:51 EST 2021

### Committee Statement

**Committee Statement:** These changes were made to update the cross reference due to the document consolidation added the reference to the Table that has the flow rate requirements. Adding the reference to the Table add clarity to where the pattern requirements can be found in Chapter 4 to eliminate confusion.

**Response Message:** FR-137-NFPA 1900-2021

[Public Input No. 833-NFPA 1900-2020 \[Section No. 6.3.27\]](#)

[Public Input No. 951-NFPA 1900-2020 \[New Section after 6.3.27\]](#)

[Public Input No. 62-NFPA 1900-2020 \[Section No. 6.3.27\]](#)



## First Revision No. 138-NFPA 1900-2021 [ Section No. 6.3.29 ]

### **6.3.29** Ground Sweep/Bumper Turret Pattern Test.

The ground sweep/bumper turret pattern test shall be conducted in accordance with the requirements of NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:43:28 EST 2021

### Committee Statement

**Committee Statement:** Updating the reference since NFPA 412 is being consolidated into NFPA 460.

**Response Message:** FR-138-NFPA 1900-2021

[Public Input No. 834-NFPA 1900-2020 \[Section No. 6.3.29\]](#)

[Public Input No. 63-NFPA 1900-2020 \[Section No. 6.3.29\]](#)



## First Revision No. 139-NFPA 1900-2021 [ New Section after 6.3.30 ]

### **6.3.30.5**

The flow rate of the undertruck nozzles shall meet the flow rate specified in Table 4.2.1.2(c) or Table 4.2.1.2(d) .

### **Submitter Information Verification**

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:46:46 EST 2021

### **Committee Statement**

**Committee Statement:** The committee is adding the reference to the Table that has the flow rate requirements. Adding the reference to the Table add clarity to where the flow rates can be found in Chapter 4 to eliminate confusion in the flow requirements.

**Response Message:** FR-139-NFPA 1900-2021

Public Input No. 952-NFPA 1900-2020 [New Section after 6.3.30]



## First Revision No. 140-NFPA 1900-2021 [ Section No. 6.3.31.1 ]

### 6.3.31.1

The test equipment described in NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 shall be used for this test.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Fri Jan 29 14:47:28 EST 2021

### Committee Statement

**Committee Statement:** Updating cross references due to document consolidation.

**Response Message:** FR-140-NFPA 1900-2021

[Public Input No. 64-NFPA 1900-2020 \[Section No. 6.3.31.1\]](#)

[Public Input No. 835-NFPA 1900-2020 \[Section No. 6.3.31.1\]](#)



## First Revision No. 141-NFPA 1900-2021 [ Section No. 6.3.31.3 ]

### 6.3.31.3

The test shall be conducted as follows:

- (1) Fill the water tank and the foam tank to the top, and refill as necessary throughout the test.
- (2) Set the foam proportioning system to proportion foams at the concentration specified, and set the agent selector for the foam mode.
- (3) Set the agent system pressure relief to the recommended pressure.
- (4) Engage the agent pumps, and operate them at maximum pumping speed with all discharge outlets closed.
- (5) Test each foam delivery system first for the individual nozzle/flow rate specified in the following list and then for a total combined simultaneous discharge in accordance with NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 :
  - (a) Primary turret(s) full rate
  - (b) Primary turret(s) half rate
  - (c) Ground sweep/bumper turret
  - (d) Handline nozzles
  - (e) Undertruck nozzles

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Fri Jan 29 14:49:08 EST 2021

### Committee Statement

**Committee Statement:** Updating cross references due to document consolidation.

**Response Message:** FR-141-NFPA 1900-2021

[Public Input No. 836-NFPA 1900-2020 \[Section No. 6.3.31.3\]](#)

[Public Input No. 65-NFPA 1900-2020 \[Section No. 6.3.31.3\]](#)



## First Revision No. 142-NFPA 1900-2021 [ Section No. 6.3.31.4 ]

### 6.3.31.4

The foam concentrations measured shall fall within the permitted tolerances specified in NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 for each nozzle and for the combined simultaneous discharge.

#### 6.3.31.4.1

The foam expansion and drainage time measurements shall equal or exceed those specified in NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460 for each nozzle.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Fri Jan 29 14:50:34 EST 2021

### Committee Statement

**Committee Statement:** Updating cross references due to document consolidation.

**Response Message:** FR-142-NFPA 1900-2021

[Public Input No. 837-NFPA 1900-2020 \[Section No. 6.3.31.4\]](#)

[Public Input No. 67-NFPA 1900-2020 \[Section No. 6.3.31.4.1\]](#)



## First Revision No. 144-NFPA 1900-2021 [ Section No. 6.3.37 ]

**6.3.37\*** Complementary Agent Handline Flow Rate and Range.

### **6.3.37.1**

Test equipment shall consist of the following:

- (1) Calibrated scale or load cell with an accuracy of  $\pm 1.0$  percent
- (2) Stopwatch
- (3) Tape measure or other device for measuring distance
- (4) Calibrated anemometer
- (5) Pan containing at least  $0.09 \text{ m}^2$  ( $1 \text{ ft}^2$ ) of motor or aviation gasoline
- (6) Agent tank (if equipped with an agent tank) with a liquid level gauge with accuracy of  $\pm 1.13 \text{ kg}$  ( $2.5 \text{ lb}$ )

### **6.3.37.2**

All vehicle agent piping shall be operational.

#### **6.3.37.2.1**

The agent tank shall be empty.

#### **6.3.37.2.2**

The propellant gas tank(s) shall be fully charged and within pressure.

#### **6.3.37.2.3**

A means of lifting the agent tank(s) for weighing without loss of agent shall be provided.

#### **6.3.37.2.4**

As an alternative, the system shall be permitted to be tested outside of the vehicle.

#### **6.3.37.2.5**

Where the alternative in 6.3.37.2.4 is used, the test shall be conducted with the agent tank and related piping, fittings, valves, hose, and nozzle(s) in the same configuration in which they are installed on the vehicle.

**6.3.37.3**

The test shall be conducted in the following manner:

- (1) Using the manufacturer's recommended agent and filling procedure, charge the agent tank.
- (2) If weight discharged will be based on liquid level gauge readings, record liquid level gauge reading in 9 kg (20 lb) increments, based on weighing of agent supply cylinder, as tank is initially filled.
- (3) Ensure that all fill caps are tightened, all propellant gas lines are connected, the discharge nozzle(s) is in the closed position, and all fittings and connections are tight.
- (4) Pull all handline hose from the reel(s).
- (5) Pressurize the system using the manufacturer's recommended procedure, and open all handline nozzles until agent flow is observed. Close the nozzles.
- (6) Activate system and purge handline of air by opening the handline nozzle for approximately 1 second.
- (7) Weigh or note weight based on liquid level gauge reading, and record the agent tank as the "initial weight."
- (8) Position the handline nozzles at least 6.1 m (20 ft) from the fire pan so that they can be discharged onto a flat grade with no stream obstructions. Ignite the fuel.
- (9) ~~Select Position~~ one of the handline nozzles (nozzle 1). ~~While holding it in a position 0.9 m to 1.2 m (3 ft to 4 ft) above ground level, while simultaneously start starting the stopwatch and fully open the nozzle; then discharge discharging agent onto the fire.~~
- (10) After at least 50 percent of the contents of the tank has been discharged, shut down the nozzle and stop the stopwatch. Record the time as "elapsed discharge time no. 1."
- (11) Reweigh the agent tank, and record as "weight after first discharge."
- (12) If a second nozzle (nozzle 2) is provided, repeat 6.3.37.3(1) through 6.3.37.3(8).
- (13) While holding the two handline nozzles in a fixed horizontal position 0.9 m to 1.2 m (3 ft to 4 ft) above ground level, simultaneously start the stopwatch and fully open both nozzles.
- (14) After at least 50 percent of the contents of the tank has been discharged, simultaneously shut down both nozzles, and stop the stopwatch. Record the time as "elapsed discharge time no. 2."
- (15) Reweigh the agent tank, and record as "weight after second discharge."
- (16) Calculate the flow rate (FR) from nozzle 1 as follows:

$$FR = \frac{\text{initial weight (test 1)} - \text{initial weight (test 2)}}{(\text{elapsed discharge time no. 1})} \quad [6.3.37.3a]$$

- (17) Calculate the flow rate (FR) from nozzle 2 as follows:

$$FR = \frac{\text{weight after first discharge} - \text{weight after second discharge}}{2 \times (\text{elapsed discharge time no. 2})} \quad [6.3.37.3b]$$

- (18) If nozzle 2 is of a different configuration, repeat the fire test for this nozzle.

**6.3.37.4**

Test results shall be evaluated as follows:

- (1) The flow rate from each nozzle shall must meet the requirement.

~~The range from each nozzle shall meet or exceed the requirements as evidenced by extinguishment of the fire(s).~~

- (2) When discharged simultaneously, the flows from nozzle 1 and nozzle 2 shall must be within 10 percent of each other.

**Submitter Information Verification**

**Committee:** AIR-AAA

**Submission Date:** Sat Jan 30 09:15:55 EST 2021

**Committee Statement**

**Committee Statement:** The committee is removing the range requirement from the document. Since measuring the pattern and range of axillary agents are difficult at best to measure the task group recommends removing the requirement. These agents have a low mass and the range and wind conditions tend to dictate the distances more than the actual flow of the product the committee believes the range test provide little value in the performance of the system. Test procedure (9) was rewritten into a single sentence to eliminate multi-statement issue and removed 'shall' from the sub points in 6.3.37.4 as they are unnecessary since 'shall' is in the opening statement.

**Response Message:** FR-144-NFPA 1900-2021

[Public Input No. 953-NFPA 1900-2020 \[Section No. 6.3.37\]](#)



## First Revision No. 145-NFPA 1900-2021 [ Sections 6.3.38.3, 6.3.38.4 ]

### 6.3.38.3

The test shall be conducted in the following manner:

- (1) Using the manufacturer's recommended agent and filling procedure, charge the tank.
- (2) Ensure that all fill caps are tightened, all propellant gas lines are connected, the discharge nozzle(s) is in the closed position, and all fittings and connections are tight.
- (3) Pressurize the system using the manufacturer's recommended procedure, and open the turret discharge valve until agent is observed. Close the valve.
- (4) Weigh and record the agent tank as the "initial test weight."
- (5) Position the dry chemical turret so that it can be discharged onto a flat grade with no stream obstructions. Position the turret to obtain maximum straight stream reach.
- (6) Simultaneously, start the stopwatch and fully open the turret.
- (7) During discharge, place markers at the far point where dry chemical strikes the ground (range marker) and at either side of the widest part of the pattern (width markers), following these procedures:
  - (a) The operator(s) placing the markers shall wear safety equipment for this task.
  - (b) The agent manufacturer's material safety data sheet shall be consulted.
- (8) After discharging at least 75 percent of the contents of the tank, simultaneously stop the stopwatch and shut down the turret. Record while recording the elapsed time in seconds as discharge time.
- (9) Measure the distance from the turret to the range marker and record as the far point range.
- (10) Measure the distance between the width markers and record as the pattern width.
- (11) Reweigh the agent tank and record as the weight after discharge.
- (12) Calculate the flow rate (FR) as follows:

$$FR = \frac{\text{initial test weight} - \text{weight after discharge}}{\text{elapsed discharge time}} \quad [6.3.38.3]$$

### 6.3.38.4

~~The stream range and pattern width shall equal or exceed the requirements. The discharge flow rate shall equal the requirements in Table 4.2.1.2(a) and Table 4.2.1.2(b) Table 4.2.1.2(c) or Table 4.2.1.2(d)~~

#### ~~6.3.38.4.1~~

~~The discharge flow rate shall equal the requirements in Table 4.2.1.2(a) and Table 4.2.1.2(b) .~~

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:23:10 EST 2021

## Committee Statement

**Committee Statement:** The committee is removing the range requirement from the document. Since measuring the pattern and range of axillary agents are difficult at best to measure the task group recommends removing the requirement. These agents have a low mass and the range and wind conditions tend to dictate the distances more than the actual flow of the product the committee believes the range test provide little value in the performance of the system. Also re-wrote test procedure 6.3.38.3 (8) into a single sentence to eliminate multi-statement in this step.

**Response Message:** FR-145-NFPA 1900-2021

[Public Input No. 954-NFPA 1900-2020 \[Section No. 6.3.38\]](#)



## First Revision No. 146-NFPA 1900-2021 [ New Section after 6.3.39 ]

### 6.3.40 J Turn.

#### 6.3.40.1

Test equipment shall consist of a means of digitally recording vehicle speed at 100 Hz.

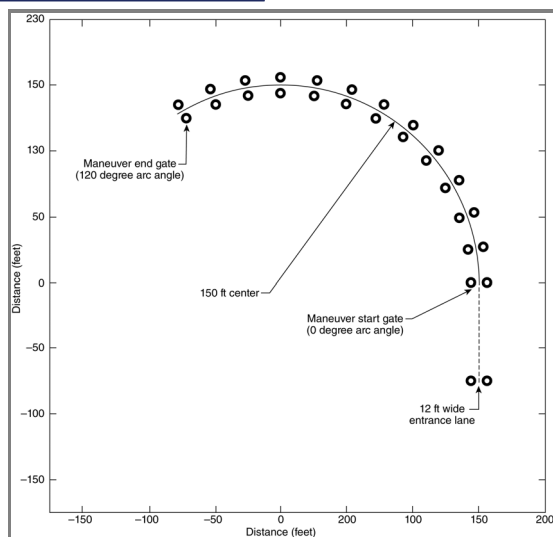
#### 6.3.40.2

The vehicle shall be tested in its fully loaded condition.

#### 6.3.40.3

The J Turn track dimensions shall meet the dimensions shown in [Figure 6.3.40.3](#) .

#### Figure 6.3.40.3 J Turn Track Dimensions.



#### 6.3.40.4 Test Procedure.

The test procedure for the J Turn track shall be as follows:

- (1) The vehicle shall enter the track at a minimum speed of 30 mph (48 kph).
- (2) The vehicle shall be driven through the course maintaining vehicle speed.
- (3) Vehicle speed shall be recorded at 100 Hz as the vehicle drives through the track.
- (4) If any outside cones are knocked down, the test shall not be counted.
- (5) The average speed of the vehicle through the track shall be in accordance with [Table 4.2.1.2\(a\)](#) and [Table 4.2.1.2\(b\)](#) .

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:27:08 EST 2021

## Committee Statement

**Committee Statement:** The committee is adding a test procedure for the j-turn as one currently does not exist in the document. Since there is no j-turn procedure, there are various methods that are used in the industry to complete this test. Adding a test procedure will ensure all vehicles are tested the same and provide consistency in the testing procedure.

**Response Message:** FR-146-NFPA 1900-2021

[Public Input No. 956-NFPA 1900-2020 \[New Section after 6.3.39\]](#)



## First Revision No. 147-NFPA 1900-2021 [ Section No. 6.3.39 ]

### **6.3.39\*** Cab Interior Noise Test.

#### **6.3.39.1**

Test equipment shall consist of a sound level meter that meets the requirements of ANSI S1.4 for Type 1 or S1A meters.

##### **6.3.39.1.1**

The sound level meter shall have been calibrated by a certified testing laboratory within the previous 12 months.

##### **6.3.39.2**

The vehicle shall be tested in its fully loaded condition with tires inflated to their recommended inflation pressure.

##### **6.3.39.2.1**

The cab doors, windows, and hatch openings shall be closed during this test.

##### **6.3.39.2.2**

The vehicle shall be driven long enough to bring the drivetrain components up to their operating temperatures prior to starting the test.

##### **6.3.39.2.3**

Thermostatically controlled shutters or cooling fans, or both, shall be allowed to function.

##### **6.3.39.2.4**

The vehicle agent system(s), the communications system, and the audible warning system and emergency warning system shall be inactive during this test.

#### **6.3.39.3**

The interior noise level of the cab shall be determined as follows:

- (1) Set the sound level meter to the A-weighting network, "fast" meter response, and position the meter adjacent to the driver's ear.
- (2) Bring the vehicle up to a road speed of 80.5 kph (50 mph) and maintain that speed while recording the noise measurements.
- (3) Repeat 6.3.39.3(1) and 6.3.39.3(2) until four readings have been taken, bringing the vehicle to rest between each measurement. If any of the noise measurements differ from the others by more than 2 dBA, they should be replaced by another measurement, since they could be the result of extraneous ambient noises or equipment/measurement error.
- (4) Average the four readings.

#### **6.3.39.4**

The average of the recorded noise readings shall be less than or equal to the cab interior noise level specification specified in 4.13.3.3.

##### **6.3.39.4.1**

~~Halon 1211 systems shall not be tested.~~

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:28:15 EST 2021

### Committee Statement

**Committee Statement:** The committee is removing this requirement from the document. Since 6.3.39.2.4 states that the vehicles agent systems are to be inactive for the test, this requirement is redundant. Test procedure 6.3.39.3 (3) was broken into two statements to eliminate multi-statements.

**Response Message:** FR-147-NFPA 1900-2021

[Public Input No. 955-NFPA 1900-2020 \[Section No. 6.3.39\]](#)



## First Revision No. 148-NFPA 1900-2021 [ Section No. 6.4.1.1 ]

### 6.4.1.1

This test shall be accomplished on a every vehicle prior to the vehicle being delivered to the end user.

#### 6.4.1.1.1

It shall be accomplished with all requested equipment placed and installed as ordered by the end user.

#### 6.4.1.1.2

The tilt-table angle shall be recorded on a metal data plate affixed to the left door of the vehicle.

#### 6.4.1.1.3

The data plate shall list the following items:

- (1) Vehicle empty weight
- (2) Maximum gross weight
- (3) Special equipment installed prior to test
- (4) Front and rear axle weights with weight distribution calculation

#### 6.4.1.1.4

The actual tilt-table angle achieved in the test shall be recorded on the plate for left and right directions.

##### 6.4.1.1.4.1\*

The test shall be conducted on a tilt-table facility meeting the following SAE J2180, *A Tilt Table Procedure for Measuring the Static Rollover Threshold for Heavy Trucks*, requirements:

- (1) ~~The tilt table shall contain a suitable surface to resist truck sliding during test sequences~~ have a high-friction, ridged surface to provide enough traction force at the tire/table interface to keep the tires from sliding sideways .
- (2) The vehicle shall be restrained and tilted until the vehicle tilt or side slope angle can be positively determined.

##### **A.6.4.1.1.4.1**

SAE J2180, *A Tilt Table Procedure for Measuring the Static Rollover Threshold for Heavy Trucks* , provides OEM's a detailed procedure on how to conduct a tilt-table test on heavy trucks. There are a few details in this document that end users should be aware of. First, the vehicle should be tested in a straight line parallel to the tilt axis such that no axle centerline is offline by more than 1 in. (25 mm). Being positioned off-axis could result in one axle being higher on the table than the other(s) and could affect how the vehicle reacts as it's being tilted. Second, a vertical constraining surface might be installed on the tilt table as a safety feature. The vertical constraining surface cannot exceed 2 in. (51 mm) in height. An initial clearance of 3 to 4 in. (75 to 100 mm) between the tires and the vertical constraining surface is generally adequate to prevent contact in the normal contact of a test. This will allow the tires to not come into contact with the surface during the tilting process and have an adverse effect on the tilt performance.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:30:16 EST 2021

## Committee Statement

**Committee Statement:** The committee is revising the text to add clarify to the requirement. The committee wanted to make sure that the end users knew that all trucks built needed to be tilt tested before delivery and this working better communicated that requirement. (change to 6.4.1.1)

The committee is revising the text to add clarify to the requirement. The committee wanted to use the exact wording from SAE J2180 to describe the surface of the tilt table to provide better clarify on the deck material required for a tilt table. SAE J2180 is stabilized so the document language will not change in the future. (change to 6.4.1.1.4.1)

**Response Message:** FR-148-NFPA 1900-2021

[Public Input No. 957-NFPA 1900-2020 \[Section No. 6.4.1.1 \[Excluding any Sub-Sections\]\]](#)

[Public Input No. 958-NFPA 1900-2020 \[Section No. 6.4.1.1.4.1\]](#)

[Public Input No. 970-NFPA 1900-2020 \[New Section after A.6.4\]](#)



## First Revision No. 149-NFPA 1900-2021 [ New Section after 6.4.1.2 ]

### 6.4.1.2.2

The water and foam tanks overflows and vents shall be capped during the test to reduce the amount of water leakage during the test.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:34:05 EST 2021

## Committee Statement

**Committee Statement:** The committee is adding a requirement to cap the overflows and vents during the tilt table test. Due to the slow rate the vehicles are tipped on the tilt table test the committee want to ensure that the water and foam tanks did not spill over large amounts of water during the tilt process. This loss of water can possible alter the tilt table performance of the vehicle. Eliminating the water leakage is impractical reducing it as much as possible is desired.

**Response Message:** FR-149-NFPA 1900-2021

Public Input No. 961-NFPA 1900-2020 [New Section after 6.4.1.2]



## First Revision No. 150-NFPA 1900-2021 [ Section No. 6.4.1.6 ]

### 6.4.1.6

~~Where multiple vehicles are purchased under the same contract and built to exactly the same specifications, the purchaser shall be permitted to have a single unit or a random sample of units tested and the result(s) applied to the other identical units. If the vehicle slides and any of the wheels are in contact with the vertical constraining surface rail during the test, the truck shall be repositioned and the test repeated so the truck does not gain an advantage provided by the vertical constraining surface.~~

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:35:48 EST 2021

## Committee Statement

**Committee Statement:** The committee is deleting text as every vehicle needs to be tested completely before it leaves the manufacturer. Even though it is a large order and all being built at the same time or within the same calendar year, there could be potential issues with this. No fault of the manufacturer, but by testing all vehicles you prevent the possibility of an oversight and ensure the functionality of the vehicle before it is needed in an emergency. I feel this option opens the door for potential failure of the vehicle when it is needed most.

The committee is adding a new requirement to the tilt test procedure. The committee wanted to give end users better clarity on how the tilt table test should be run per SAE J2180 since most end users are not familiar with the SAE J2180 procedure.

**Response Message:** FR-150-NFPA 1900-2021

[Public Input No. 960-NFPA 1900-2020 \[New Section after 6.4.1\]](#)

[Public Input No. 162-NFPA 1900-2020 \[Section No. 6.4.1.6\]](#)



## First Revision No. 151-NFPA 1900-2021 [ Section No. 6.4.2.4 ]

### 6.4.2.4

The data shall be evaluated on the following basis:

- (1) The total weight of the vehicle ~~shall~~ must be less than or equal to the vehicle manufacturer's gross vehicle weight rating.
- (2) The difference between the heaviest loaded axle and the lightest loaded axle ~~shall~~ must be less than or equal to the maximum difference permitted in the specification.
- (3) The difference between the tire weights on any given axle ~~shall~~ must be less than or equal to the maximum difference permitted in the specification.
- (4) The data must be supplied showing each axle weight, difference in weight between axles, and the percentage difference between axles.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:38:02 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding a requirement to clarify what data from the weight distribution test needs to be given to end users. The requirement clarifies that the weight distribution data needs for each vehicle needs to be given to the end users as part of the operation tests that are done on each production vehicle. Also changes 'shall' to 'must' in points 1, 2, and 3 since shall is in the opening statements and covers all other points.

**Response Message:** FR-151-NFPA 1900-2021

[Public Input No. 962-NFPA 1900-2020 \[Section No. 6.4.2.4\]](#)



## First Revision No. 152-NFPA 1900-2021 [ Section No. 6.4.3.2 ]

### 6.4.3.2

Instrumentation shall consist of both a fifth wheel device, or equivalent, designed to measure and record (at least ~~visibility~~ visibly, as a minimum) vehicle speed and time from the time the vehicle begins to move until it reaches a predetermined top speed; and a secondary, GPS-based speed-measuring device to verify .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:38:56 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding a requirement for a secondary device to measure speed. The requirement requires the use of a secondary speed measuring device to correlate the primary means of recording vehicle speed.

**Response Message:** FR-152-NFPA 1900-2021

[Public Input No. 964-NFPA 1900-2020 \[Section No. 6.4.3.2\]](#)



## First Revision No. 153-NFPA 1900-2021 [ Section No. 6.4.4.1 ]

### 6.4.4.1

Instrumentation shall consist of both the vehicle's speedometer as installed by the manufacturer at the time of delivery and a secondary, GPS-based speed-measuring device to verify speed .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:39:42 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding a requirement for a secondary device to measure speed. The requirement requires the use of a secondary speed measuring device to correlate the primary means of recording vehicle speed.

**Response Message:** FR-153-NFPA 1900-2021

[Public Input No. 966-NFPA 1900-2020 \[Section No. 6.4.4.1\]](#)



## First Revision No. 154-NFPA 1900-2021 [ Section No. 6.4.5.1 ]

### 6.4.5.1

Instrumentation shall consist of the vehicle's speedometer, as installed by the manufacturer, ;  
a secondary, GPS-based speed-measuring device to verify speed; and a tape measure.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:40:32 EST 2021

### Committee Statement

**Committee Statement:** The committee is adding a requirement for a secondary device to measure speed. The requirement requires the use of a secondary speed measuring device to correlate the primary means of recording vehicle speed.

**Response Message:** FR-154-NFPA 1900-2021

Public Input No. 967-NFPA 1900-2020 [Section No. 6.4.5.1]



## First Revision No. 155-NFPA 1900-2021 [ Section No. 6.4.11.1 ]

### 6.4.11.1

The test equipment described in [NFPA 412 Chapters 1 through 3, and 27 through 29 of NFPA 460](#) shall be used for this test.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:42:01 EST 2021

### Committee Statement

**Committee Statement:** This change was made due to the document consolidation.

**Response Message:** FR-155-NFPA 1900-2021

[Public Input No. 68-NFPA 1900-2020 \[Section No. 6.4.11.1\]](#)

[Public Input No. 838-NFPA 1900-2020 \[Section No. 6.4.11.1\]](#)



## First Revision No. 156-NFPA 1900-2021 [ Section No. 6.4.11.3 ]

### 6.4.11.3

The test shall be conducted as follows:

- (1) Fill the water and foam tank to the top and refill as necessary throughout the test.
- (2) Set the foam proportioning system to proportion foams at the concentration specified, and set the agent selector for the foam mode.
- (3) Set the agent system pressure relief to the recommended pressure.
- (4) Engage the agent pumps and bring them up to maximum pumping speed with all discharge outlets closed.
- (5) Test each foam delivery system in accordance with NFPA-412 Chapters 1 through 3, and 27 through 29 of NFPA 460 for the individual nozzle/flow rate as follows:
  - (a) Primary turret(s) full rate
  - (b) Primary turret(s) half rate
  - (c) Ground sweep/bumper turret
  - (d) Handline nozzles
  - (e) Undertruck nozzles

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:44:10 EST 2021

### Committee Statement

**Committee Statement:** Update references due to document consolidation.

Note that TerraView did not render this well. The only change is the document number.

**Response Message:** FR-156-NFPA 1900-2021

Public Input No. 69-NFPA 1900-2020 [Section No. 6.4.11.3]



## First Revision No. 157-NFPA 1900-2021 [ Section No. 6.4.11.4 ]

### 6.4.11.4

The foam concentrations measured shall fall within the permitted tolerances specified in NFPA 412 Chapters 1 through 3, and 27 through 29 of [NFPA 460](#) for each nozzle.

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Sat Jan 30 09:44:54 EST 2021

### Committee Statement

**Committee Statement:** This change was made due to the document consolidation.

**Response Message:** FR-157-NFPA 1900-2021

[Public Input No. 70-NFPA 1900-2020 \[Section No. 6.4.11.4\]](#)

[Public Input No. 839-NFPA 1900-2020 \[Section No. 6.4.11.4\]](#)



## First Revision No. 465-NFPA 1900-2021 [ Section No. A.4.1.1.1 ]

### A.4.1.1.1

The basic NFPA recommendations on the use and provision of this equipment are contained in NFPA 402 [440](#) and NFPA 403 [460](#) . Field testing procedures for aircraft rescue and firefighting vehicles utilizing foam are provided in NFPA 412 [460](#) .

### Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Thu Feb 25 14:39:00 EST 2021

### Committee Statement

**Committee Statement:** These changes are being made due to document consolidation.

**Response Message:** FR-465-NFPA 1900-2021

[Public Input No. 121-NFPA 1900-2020 \[Section No. A.4.1.1.1\]](#)

[Public Input No. 840-NFPA 1900-2020 \[Section No. A.4.1.1.1\]](#)



**First Revision No. 562-NFPA 1900-2021 [ Section No. A.4.2.5 ]**



**A.4.2.5**

The following is a list of available options that can be ordered from ARFF vehicle manufacturers:

- (1) General ARFF vehicle options:
  - (a) Winterization system providing sufficient insulation and heating capacity, by means of hot circulating liquids and/or forced-air exchangers, to permit satisfactory operation of the vehicle and firefighting systems for a period of at least 4 hours at ambient temperatures as low as  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ) with the vehicle fully operational and the engine running. At the end of the 4-hour period, the vehicle should be capable of successfully discharging its agent(s). The winterization system should not detract from the performance of the vehicle and firefighting system in ambient temperatures up to  $-43.5^{\circ}\text{C}$  ( $-46.3^{\circ}\text{F}$ ).
  - (b) Pintle-hook-type towing connection rated at 13,607 kg (30,000 lb) gross trailer weight, attached to the vehicle's frame at the rear of the vehicle
  - (c) Roll-up-type compartment doors (other than service doors)
  - (d) Windshield deluge system (see 4.13.4.6)
  - (e) Training video tape covering the operation of the vehicle
  - (f) Navigation system of a driver's enhanced vision system (DEVS) (see 4.13.4.7)
  - (g) Monitoring and data acquisition system (MADAS) (see 4.13.7)
- (2) Dimensional, safety, and stability enhancement options:
  - (a) Added payload capacity (GVWR) to carry special equipment where the purchaser identifies added equipment
  - (b) Increased overall width of the vehicle to facilitate increased performance and maneuverability with no concern for movement on public highway(s)
  - (c) Audiovisual devices that meet or exceed the field of vision provided by wide-angle mirrors
- (3) Engine(s) with related options:
  - (a) Engine that operates at necessary performance above 609.6 m (2000 ft) elevation
  - (b) Radiator shutters (see 4.5.2.3.3)
  - (c) Engine coolant filter
  - (d) Silicone coolant and heater hoses
  - (e) Heated diesel fuel-water separator
  - (f) Automatic drain(s) for the diesel fuel-water separator
  - (g) Auxiliary fuel tank(s) commensurate with need to meet local requirements
  - (h) Stainless steel exhaust systems and muffler(s)
- (4) Vehicle electrical and lighting options:
  - (a) Automatic eject-type electrical receptacles
  - (b) On-board battery charger/conditioner (see 4.6.4)
  - (c) Line voltage electrical systems in accordance with NFPA-1901, Chapter-22 25
  - (d) High-intensity spotlight(s) on the left and right side of the windshield, hand adjustable type, with controls for beam adjustment inside the truck cab
  - (e) High-intensity spotlight(s) mounted on the primary turret nozzle(s), with controls located in the cab instrument group
  - (f) Two high-intensity floodlights, mounted on each side of the vehicle
  - (g) Two high-intensity fog-type driving lights mounted on the front bumper

- (h) Two high-intensity driving lights mounted on the front bumper
  - (i) Two high-intensity floodlights on the rear of the vehicle
  - (j) Map lights on each side of the dash; a control switch on the instrument group panel in the cab for control of the lights
  - (k) Rotating beacon-type lights on the top roof deck and visible for 360 degrees in the horizontal plane; a control switch on the instrument group panel in the cab for control of the light
  - (l) Strobe-type light(s) on the top roof deck and visible for 360 degrees in the horizontal plane; a control switch on the instrument group panel in the cab for control of the light(s)
  - (m) Fused radio electrical connection in the cab adjacent to the radio mounting location (power ratings to be provided by purchaser)
- (5) Suspension, mobility, and tire options:
- (a) Reduced underaxle and underbody clearances to provide a more stable performance on pavement when the vehicle suspension is designed to permit instantaneous adjustment to the required height for off-pavement travel
  - (b) Tag or other nonpowered axle(s) to assist in weight distribution and/or stability requirements
  - (c) Vehicle stability systems
  - (d) Passive or active suspension components to increase the stability of the vehicle while decreasing the rollover threshold
  - (e) Spare tire(s)
  - (f) Bead locks on tires and rims
  - (g) Run-flat devices in all tires and wheels mounted on the vehicle
  - (h) Rear-wheel steering system
- (6) Vehicle brake options:
- (a) Air brake reservoirs drain valve(s) actuated by the driver from a location or compartment not requiring a creeper to access the actuator
  - (b) Auto-eject-type connectors air connection used to ~~change~~ charge brake air tanks from an external air source
- (7) Vehicle cab operating and driving options:
- (a) Tilt and telescoping steering wheel
  - (b) Supplementary designated seat positions for additional crew members
  - (c) Quick access passage to the roof
  - (d) Cab air-conditioning meeting current automotive-truck and environmental protection standards for vehicle air-conditioning (acceptable pass/fail criteria not changed by the use of air-conditioning)
  - (e) Air-suspension-type driver [passenger(s)] seat(s), with vertical, fore, and aft adjustment
  - (f) Crew seat back(s), with storage of self-contained breathing apparatus (SCBA) with quick-release-type holders incorporated into the seat cushion
- (8) Firefighting systems' options:
- (a) Water tank design that allows access with each baffled compartment of the tank for internal and external inspection/service
  - (b) Automatic foam proportioning system, permitting use of 3 percent and 6 percent foam

- concentrates automatically when selected (change of proportioning plates not required)
- (c) Electronic foam proportioning system
  - (d) Foam tank drain valve(s), drain line, and hose that facilitate draining the tank into specified container(s) positioned on the ground within 3 m (10 ft) in either horizontal direction of the foam tank drainage system
  - (e) Manually operated roof turret with controls located in the cab, the operation force of the controls requiring less than 134.4 N (30 ft-lb) including in-cab indicator of turret elevation and azimuth
  - (f) Manually operated roof turret with controls located on the cab roof platform, the operation force of the controls requiring less than 224 N (50 ft-lb)
  - (g) Turret controls located in the cab or on the roof platform
  - (h) Manual override of roof turret functions in the cab not exceeding 134.4 N (30 ft-lb) operation forces
  - (i) Turret(s) controls accessible both to the driver and the crew member
  - (j) Turret(s) equipped with an auxiliary agent discharge (*see 4.25.1*)
  - (k) Boom-mounted-type primary turret (*see 4.20.6*)
  - (l) Color camera mounted on the boom-mounted turret (*see 4.20.6*)
  - (m) Video recorder for color and/or FLIR camera(s)
  - (n) Aircraft skin penetrator/agent applicator mounted on the boom-mounted turret (*see 4.20.6*)
  - (o) Pre-connect handlines and nozzles (water/foam/combined/auxiliary agent/mounted parallel entrained streams)
  - (p) Bumper turret (*see Section 4.22*)
  - (q) High-capacity bumper turret
  - (r) Two or more undertruck nozzles (*see 4.22.1 and 4.22.3*)
  - (s) Fire system pressure gauge/light/warning on the cab instrument panel grouping and/or on the side structural control panel
  - (t) Foam-liquid tank level gauge/light/warning on the cab instrument panel grouping
  - (u) Remote foam/water liquid level gauge/light/warning on the side panel and/or supply/service locations
  - (v) Bumper turret and/or ground sweep valve controls located in the cab
  - (w) Undertruck nozzle valve control in the cab
  - (x) Auxiliary agent pressurization control on the cab instrument grouping
  - (y) Remote mounted instrument and control panel (structural panel)

## Submitter Information Verification

**Committee:** AIR-AAA

**Submission Date:** Mon Mar 01 10:47:21 EST 2021

## Committee Statement

**Committee Statement:** The only changes to this section of text are to update the cross reference from NFPA 1901, chapter 22 to NFPA 1900, chapter 25 and to correct a typo in 6(b) from change to charge.

**Response** FR-562-NFPA 1900-2021

**Message:**

[Public Input No. 122-NFPA 1900-2020 \[Section No. A.4.2.5\]](#)

[Public Input No. 841-NFPA 1900-2020 \[Section No. A.4.2.5\]](#)

[Public Input No. 123-NFPA 1900-2020 \[Section No. A.4.2.5\]](#)



**First Revision No. 563-NFPA 1900-2021 [ Section No. A.4.4.1 ]**



**A.4.4.1**

The carrying capacity of a vehicle is one of the least understood features of design and one of the most important. All vehicles are designed for a maximum GVWR or maximum total weight, which should not be exceeded by the apparatus manufacturer or by the purchaser after the vehicle has been placed in service. For tractor-drawn vehicles, the in-service weight of the apparatus should not exceed the gross combination weight rating (GCWR). There are many factors that make up the rated GVWR, including the design of the springs or suspension system, the rated axle capacity, the rated tire and wheel loading, and the distribution of the weight between the front and rear wheels.

**Water Tank.** One of the most critical factors is the size of the water tank. Water weighs approximately 8.3 lb/gal (1 kg/L). A value of 10 lb/gal (1.2 kg/L) can be used when estimating the weight of the tank and its water, making a 500 gal (2000 L) tank and its water about 5000 lb (2400 kg).

**Miscellaneous Equipment.** If the finished apparatus is not to be overloaded, the purchaser should provide the contractor with the weight of equipment to be carried if it is in excess of the allowance shown in Table 12.1.2 of NFPA 1901 – (See Section 4.3 of NFPA 1901.) determined by the purchaser and contractor.

**Large Compartment Capacity.** Purchasers should specify the equipment to be carried on the vehicle and should work closely with the vehicle manufacturer to ensure that the compartment capacity and GVWR are sufficient to carry the intended equipment.

FAMA provides a worksheet for use by purchasers to calculate the portable equipment weight and volumetric requirements.

This volume does not include space occupied by generators, reels, air systems, ladders, hose, and so forth, that are not in the miscellaneous equipment allowance. Total equipment weight varies significantly depending on the density of the equipment and how tightly the fire department chooses to pack it.

**Overloading.** Overloading of the vehicle by the manufacturer through design or by the purchaser adding a great deal of equipment after the vehicle is in service will materially reduce the life of the vehicle and will undoubtedly result in increased maintenance costs, particularly with respect to transmissions, clutches, and brakes. Overloading can also seriously affect handling characteristics, making steering particularly difficult.

**Underloading.** Brake equipment on heavy vehicles can be sensitive to the weight distribution of the vehicle. Specifying a GVWR significantly greater than the intended in-service weight can lead to poor brake performance, chatter, and squeal. Purchasers who specify configurations with limited compartment volume on a high-capacity chassis should consult the manufacturer to ensure that a vehicle with an underloaded condition will not result.

Fire apparatus should be able to perform its intended service under adverse conditions that might require operation off paved streets or roads. Chassis components should be selected with the rigors of service in mind.

It is important to consider the need to conserve weight and space on initial-response ARFF vehicles. Rapid response, acceleration, top speed, and vehicle stability are vital to the mission.

It is, therefore, preferable that tools and equipment above what is necessary to perform initial operations be transported by other means, as needed.

The purchaser should specify the particular item required for the following:

- (1) One ground ladder that meets the requirements of NFPA 1931
- (2) One section of hose of minimum 63.5 mm (2½ in.) diameter for tank fill
- (3) Appropriate spanner wrenches for the fittings on the vehicle
- (4) One hydrant wrench or other wrench necessary to activate the local water supply
- (5) A SCBA meeting the requirements of NFPA 1981 and NFPA 1500 available for each assigned firefighter
- (6) Skin penetrator/agent applicator
- (7) Appropriate wheel chocks

- (8) 30.5 m (100 ft) of utility rope
- (9) Two axes, non-wedge type
- (10) Fire-resistant blanket
- (11) Bolt cutters, minimum 609.6 mm (24 in.)
- (12) Multipurpose, forcible entry tool
- (13) Intrinsically safe handlight(s)
- (14) Two harness cutting tools
- (15) Hook, grab, or salvage tool
- (16) First aid kit
- (17) 1.8 kg (4 lb) hammer

For a detailed discussion of rescue tools, see NFPA 402 [440](#) .

It is important that additional features such as structural firefighting equipment do not interfere with the basic ability of the vehicle to perform its primary aircraft rescue and firefighting function. It is considered preferable to have separate vehicles for structural firefighting equipped with the needed complement of hose and tools, since the quantity of such equipment carried on an aircraft rescue and firefighting vehicle needs to be limited to conserve weight and space.

## Submitter Information Verification

**Committee:** AIR-AAA

**Submittal Date:** Mon Mar 01 10:51:12 EST 2021

## Committee Statement

**Committee Statement:** These changes were made to update a cross reference and to address material that didn't exist.

**Response Message:** FR-563-NFPA 1900-2021

[Public Input No. 842-NFPA 1900-2020 \[Section No. A.4.4.1\]](#)

[Public Input No. 125-NFPA 1900-2020 \[Section No. A.4.4.1\]](#)

[Public Input No. 124-NFPA 1900-2020 \[Section No. A.4.4.1\]](#)



## First Revision No. 123-NFPA 1900-2021 [ Chapter B ]

### ~~B-deleted~~ Line Voltage Electrical Systems (NFPA 414)-DELETED

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

*The following material is extracted from Chapter 22 of the 2016 edition of NFPA 1901 and is included here as a convenience for users of this standard.*

#### ~~B.1~~ Application.

~~Where any part of a line voltage electrical system is provided as a fixed installation, the applicable requirements of this chapter shall apply.~~

#### ~~B.2~~ General Requirements.

##### ~~B.2.1~~ Stability.

###### ~~B.2.1.1~~

~~Any fixed line voltage power source producing alternating current (ac) shall produce electric power at 60 Hz  $\pm$ 3 Hz when producing power at all levels between no load and full rated power.~~

###### ~~B.2.1.2~~

~~Any fixed line voltage power source shall produce electric power at the rated voltage  $\pm$ 10 percent when producing power at all levels between no load and full rated power.~~

##### ~~B.2.2~~

~~The maximum voltage supplied to portable equipment shall not exceed 275 volts to ground. Higher voltage shall be permitted only when used to operate fixed wired, permanently mounted equipment on the apparatus.~~

##### ~~B.2.3~~ Conformance with *National Electrical Code* <sup>®</sup> :

###### ~~B.2.3.1~~

~~All components, equipment, and installation procedures shall conform to *NFPA 70* except where superseded by the requirements of this chapter.~~

###### ~~B.2.3.2~~

~~Where the requirements of this chapter differ from those in *NFPA 70*, the requirements in this chapter shall apply.~~

##### ~~B.2.4~~

~~When available, line voltage electrical system equipment and materials included on the apparatus shall be listed and used only in the manner for which they have been listed.~~

##### ~~B.2.5~~

~~All equipment and materials shall be installed in accordance with the manufacturer's instructions.~~

##### ~~B.2.6~~ Location Ratings.

###### ~~B.2.6.1~~

~~Any equipment used in a dry location shall be listed for dry locations.~~

###### ~~B.2.6.2~~

~~Any equipment used in a wet location shall be listed for wet locations.~~

**B.2.6.3**

Any equipment, except a PTO-driven generator, used in an underbody or underchassis location that is subject to road spray shall be either listed as Type 4 or mounted in an enclosure that is listed as Type 4.

**B.2.6.4**

If a PTO-driven generator is located in an underbody or underchassis location, the installation shall include a shield to prevent road spray from splashing directly on the generator.

**B.3 Grounding and Bonding.****B.3.1 Grounding.**

Grounding shall be in accordance with Section 250.34(A) and 250.34(B) of *NFPA 70*.

**B.3.1.1**

Ungrounded systems shall not be used.

**B.3.1.2**

Only stranded or braided copper conductors shall be used for grounding and bonding.

**B.3.1.3**

The grounded current-carrying conductor (neutral) shall be insulated from the equipment-grounding conductors and from the equipment enclosures and other grounded parts.

**B.3.1.4**

The neutral conductor shall be colored white or gray in accordance with 200.6, "Means of Identifying Grounded Conductors," of *NFPA 70*.

**B.3.1.5**

Any bonding screws, straps, or buses in the distribution panelboard or in other system components between the neutral and equipment-grounding conductor shall be removed and discarded.

**B.3.2 Bonding. [1901:22.3.2]****B.3.2.1**

The neutral conductor of the power source shall be bonded to the vehicle frame.

**B.3.2.2**

The neutral bonding connection shall occur only at the power source.

**B.3.2.3**

In addition to the bonding required for the low-voltage return current, each body and each driving or crew compartment enclosure shall be bonded to the vehicle frame by a copper conductor.

**B.3.2.3.1**

The conductor shall have a minimum ampere rating, as defined in Section 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*, of 115 percent of the rated ampere on the power source specification label.

**B.3.2.3.2**

A single conductor that is sized to meet the low-voltage and line-voltage requirements shall be permitted to be used.

**B.3.3 Ground Fault Circuit Interrupters.**

**B.3.3.1**

In special service vehicles incorporating a lavatory, sink, toilet, shower, or tub, 120 V, 15 or 20-A receptacles within 6 ft (1.8 m) of these fixtures shall have ground fault circuit interrupter (GFCI) protection.

**B.3.3.2**

GFCIs integrated into outlets or circuit breakers or as stand-alone devices shall be permitted to be used in situations other than those described in B.3.3.1.

**B.4 Power Source General Requirements.**

The following requirements in B.4.1 through B.4.10 shall apply to all line voltage power sources.

**B.4.1**

All power source system mechanical and electrical components shall be sized to support the continuous duty nameplate rating of the power source.

**B.4.2**

The power source shall be shielded from contamination that would prevent the power source from operating within its design specifications.

**B.4.3 Power Source Rating.****B.4.3.1**

For power sources of 8 kW or larger, the power source manufacturer shall declare the continuous duty rating that the power source can provide when installed on fire apparatus according to the manufacturer's instructions and run at 49°C (120°F) air intake temperature at 600 m (2000 ft) above sea level.

**B.4.3.2**

The rating on the power source specification label shall not exceed the declared rating from the power source manufacturer.

**B.4.4**

Access shall be provided to permit both routine maintenance and removal of the power source for major servicing.

**B.4.5**

The power source shall be located such that neither it nor its mounting brackets interfere with the routine maintenance of the fire apparatus.

**B.4.6 Instrumentation.****B.4.6.1**

If the power source is rated at less than 3 kW, a "Power On" indicator shall be provided.

**B.4.6.2**

If the power source is rated at 3 kW or more but less than 8 kW, a voltmeter shall be provided.

**B.4.6.3**

If the power source is rated at 8 kW or more, the following instrumentation shall be provided at an operator's panel:

Voltmeter

Current meters for each ungrounded leg

Frequency (Hz) meter

Power source hour meter

**B.4.6.4**

The instrumentation shall be permanently mounted at an operator's panel.

**B.4.6.4.1**

The instruments shall be located in a plane facing the operator.

**B.4.6.4.2**

Gauges, switches, or other instruments on this panel shall each have a label to indicate their function.

**B.4.6.4.3**

The instruments and other line voltage equipment and controls shall be protected from mechanical damage and not obstructed by tool mounting or equipment storage.

**B.4.7**

An instruction plate(s) that provides the operator with the essential power source operating instructions, including the power-up and power-down sequence, shall be permanently attached to the apparatus at any point where such operations can take place.

**B.4.8 Operation.**

**B.4.8.1**

Provisions shall be made for placing the generator drive system in operation using controls and switches that are identified and within convenient reach of the operator.

**B.4.8.2**

Any control device used in the generator system power train between the engine and the generator shall be equipped with a means to prevent unintentional movement of the control device from its set position in the power generation mode.

**B.4.9**

If there is permanent wiring on the apparatus that is designed to be connected to the power source, a power source specification label that is permanently attached to the apparatus at the operator's control station shall provide the operator with the information detailed in Figure B.4.9.

**Figure B.4.9 Power Source Specifications Label.**

**QUESTIONNAIRE**

1. Chassis Make \_\_\_\_\_ Model \_\_\_\_\_  
 Type Drive: 4 x 4, 6 x 6, 8 x 8, 10 x 10

2. Weights

	Front axle (bogies) kg (lbs)	Rear axle (bogies) kg (lbs)	Total kg (lbs)
Vehicle Empty	_____	_____	_____
With crew	_____	_____	_____
Expendable payload	_____	_____	_____
Total	_____	_____	_____
Average load per tire	_____	_____	_____

4. Gross Vehicle Weight Rating \_\_\_\_\_ kg (lb)

5. Dimensions (See figures on page 3 of questionnaire.)  
 Dimensions taken with:  
 Vehicle fully loaded @ \_\_\_\_\_ kg (lb)  
 Tire inflation pressure @ \_\_\_\_\_ kg (lb)  
 Overall length \_\_\_\_\_ mm (in.); Overall width \_\_\_\_\_ mm (in.)  
 Overall height \_\_\_\_\_ mm (in.)  
 Underchassis clearance: Front \_\_\_\_\_ mm (in.); Rear \_\_\_\_\_ mm (in.)  
 Interaxle clearance: Front \_\_\_\_\_ degrees  
 Underchassis clearance: \_\_\_\_\_ mm (in.)  
 Angle of Approach \_\_\_\_\_ degrees; Departure \_\_\_\_\_ degrees  
 Front bumper to center front wheels \_\_\_\_\_ mm (in.)  
 Chassis wheelbase \_\_\_\_\_ mm (in.)  
 Center rear wheels to rear bumper \_\_\_\_\_ mm (in.)

6. Engine Make \_\_\_\_\_ Model \_\_\_\_\_ Location \_\_\_\_\_  
 Number of cylinders \_\_\_\_\_  
 Piston displacement \_\_\_\_\_ mm<sup>3</sup> (in.<sup>3</sup>)  
 Maximum brake horsepower:  
 Gross \_\_\_\_\_ @ \_\_\_\_\_ rpm  
 Net \_\_\_\_\_ @ \_\_\_\_\_ rpm  
 Maximum torque:  
 Gross \_\_\_\_\_ @ \_\_\_\_\_ rpm  
 Net \_\_\_\_\_ @ \_\_\_\_\_ rpm  
 Governor: Make \_\_\_\_\_ Type \_\_\_\_\_  
 Maximum governed speed \_\_\_\_\_ rpm

7. Clutch, Fluid Coupling, Torque Converter  
 Clutch: Make \_\_\_\_\_ Model \_\_\_\_\_  
 Type \_\_\_\_\_  
 Rated torque capacity \_\_\_\_\_ N (lb-ft)  
 Fluid coupling: Make \_\_\_\_\_ Model \_\_\_\_\_  
 Rated capacity \_\_\_\_\_ hp

Torque converter: Make \_\_\_\_\_ Model \_\_\_\_\_  
 Stall torque ratio \_\_\_\_\_ to 1  
 Rated capacity \_\_\_\_\_ hp

8. Transmission Make \_\_\_\_\_ Model \_\_\_\_\_ Type \_\_\_\_\_  
 Maximum rated input torque capacity \_\_\_\_\_ N (lb-ft)  
 Number of speeds: Forward \_\_\_\_\_ Revers \_\_\_\_\_  
 Speed \_\_\_\_\_ Gear ratio \_\_\_\_\_ kph (mph) @ engine-governed rpm

9. Transfer Case Make \_\_\_\_\_ Model \_\_\_\_\_  
 Transfer case: Make \_\_\_\_\_ Model \_\_\_\_\_  
 Maximum rated input torque capacity \_\_\_\_\_ N (lb-ft)  
 Gear ratio: High range \_\_\_\_\_ Low range \_\_\_\_\_  
 Type drive to front and rear axles (bogies) \_\_\_\_\_  
 Center differential or compensating device:  
 Make \_\_\_\_\_  
 Model \_\_\_\_\_  
 Type: Automatic locking \_\_\_\_\_  
 None \_\_\_\_\_  
 Driver selective locking \_\_\_\_\_  
 Direct drive:  
 Type: Connected at all times \_\_\_\_\_  
 Driver selective disconnect \_\_\_\_\_

10. Front Drive Side \_\_\_\_\_ Bogie \_\_\_\_\_  
 Make \_\_\_\_\_ Model \_\_\_\_\_ Gear ratio \_\_\_\_\_ to 1  
 Type drive: Single reduction \_\_\_\_\_  
 Double reduction \_\_\_\_\_  
 If double reduction, type final reduction:  
 Spur gears at differential \_\_\_\_\_  
 Internal gears at hubs \_\_\_\_\_  
 Steering drive ends: Make \_\_\_\_\_ Model \_\_\_\_\_  
 Type: Constant velocity \_\_\_\_\_  
 Curban \_\_\_\_\_

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**B.4.10**

~~The power source, at any load, shall not produce a noise level that exceeds 90 dBA in any driving compartment, crew compartment, or onboard command area with windows and doors closed, or at any operator's station on the apparatus.~~

**B.5 Power Source Type Specific Requirements.****B.5.1 Direct Drive (PTO) Generators.**

~~If the generator is driven by any type of PTO, it shall meet the requirements of B.5.1.1 through B.5.1.3 .~~

**B.5.1.1**

~~The transmission's PTO port and PTO, or the split shaft PTO, and all associated drive shaft components shall be rated to support the continuous duty torque requirements of the generator's continuous duty rating as stated on the power source nameplate.~~

**B.5.1.2**

~~The direct drive generator shall be mounted so that it does not change the ramp breakover angle, angle of departure, or angle of approach as defined by other components, and it shall not extend into the ground clearance area.~~

**B.5.1.3**

~~The direct drive generator shall be mounted away from exhaust and muffler areas or provided with a heat shield to reduce operating temperatures in the generator area.~~

**B.5.2 Hydraulically Driven Generators.**

~~If the generator is driven using hydraulic components, it shall meet the requirements of B.5.2.1 through B.5.2.5 .~~

**B.5.2.1**

~~The means can be a mechanical, hydraulic, or electronic device.~~

**B.5.2.2**

~~If the hydraulic generator system is not capable of output as stated on the power source specification label at all engine speeds, an automatic engine speed control system shall be provided.~~

**B.5.2.3**

~~If the apparatus is equipped with a fire pump driven by the chassis engine, the generator shall be capable of output as stated on the power source specification label with the engine at idle.~~

**B.5.2.4 Hydraulic Components.****B.5.2.4.1**

~~A hydraulic system filter and strainer shall be provided and shall be located in a readily accessible area.~~

**B.5.2.4.2**

~~Hydraulic hose shall meet the hydraulic pump manufacturer's recommendations for pressure, size, vacuum, and abrasion resistance.~~

**B.5.2.4.3**

~~Hydraulic fittings shall meet the hydraulic pump manufacturer's recommendations for pressure, size, and the type of hose used.~~

**B.5.2.5**

~~Where the hydraulic hose comes into contact with other surfaces, the hose shall be protected from chafing.~~

**B.5.3 Fixed Auxiliary Engine Driven Generators.**

~~If the generator is driven by a fixed auxiliary engine, it shall meet the requirements of B.5.3.1 through B.5.3.9.4 .~~

#### **B.5.3.1**

~~The generator shall be installed so that fumes, vapors, heat, and vibrations do not enter the driving or crew compartment.~~

#### **B.5.3.2**

~~Generators rated at 8 kW or more shall be equipped with a high-temperature automatic shutdown system and a low-oil (pressure or level) automatic shutdown system.~~

#### **B.5.3.3**

~~The generator shall be installed in accordance with the generator manufacturer's requirements for ventilation and service accessibility.~~

#### **B.5.3.4**

~~If the generator is installed in a compartment and the compartment doors must be open during its operation, the generator shall be equipped with an interlock system to prevent its operation if the doors are not open, or the compartment shall be equipped with a high-temperature alarm.~~

#### **B.5.3.5**

~~If the generator is installed in a compartment on a slide tray and the slide tray must be in the extended or out-of-position during operation, an interlock shall be provided to prevent operation unless the tray is in the correct position, or the compartment shall be equipped with a high-temperature alarm.~~

#### **B.5.3.6**

~~Permanently installed generators shall have readily accessible engine oil drain provisions or piping to a remote location for oil changing.~~

#### **B.5.3.7**

~~If the generator is located in a position on the apparatus where the operator cannot see the instrumentation and operate the controls while standing at ground level or positioned at a specifically designated operator station, an operating panel with the required instrumentation, start and stop controls, and other controls necessary for safe operation shall be provided at a remote operator's panel.~~

#### **B.5.3.8 Fuel Systems.**

##### **B.5.3.8.1**

~~Fuel lines shall be protected from chafing at all wear points.~~

##### **B.5.3.8.2**

~~If the fuel source is shared with the apparatus engine, a separate fuel pickup system shall be provided that is arranged to ensure that the generator cannot utilize more than 75 percent of the fuel tank's capacity.~~

##### **B.5.3.9 Exhaust System.**

###### **B.5.3.9.1**

~~The exhaust piping and discharge shall be located or shielded to prevent thermal damage to the apparatus or equipment.~~

###### **B.5.3.9.2**

~~The exhaust shall be piped to the exterior of the vehicle and discharged at a location away from any operator's position.~~

###### **B.5.3.9.3**

~~Where parts of the exhaust system are exposed so that they can cause injury to operating personnel, protective guards shall be provided.~~

**B.5.3.9.4**

~~Silencing devices shall be provided and shall not create exhaust backpressure that exceeds the limits specified by the engine manufacturer.~~

**B.5.4 Belt-Driven Power Sources.**

~~If the power source is belt driven, it shall meet the requirements of B.5.4.1 through B.5.4.3 .~~

**B.5.4.1**

~~A means shall be provided to mechanically engage and disengage the generator or alternator rotation or to electronically stop the production of electricity from the generator or alternator.~~

**B.5.4.2**

~~A voltmeter shall be provided at an operator's panel for any system of this type.~~

**B.5.4.3**

~~The belt drive system shall be rated to drive the generator or alternator at the nameplate rating.~~

**B.5.5 Line Voltage Power Derived from the Apparatus Low Voltage Power Supply Systems.**

~~If the power source derives its input energy from the apparatus low voltage electrical system, it shall meet the requirements of B.5.5.1 and B.5.5.2 .~~

**B.5.5.1**

~~The low voltage power supply system shall be installed in compliance with the requirements of NFPA 1901, Chapter 13.~~

**B.5.5.2**

~~The alternator and/or battery system shall be adequate to provide power for continuous operation for a minimum of 2 hours at full output.~~

**B.5.6 Power Sources Requiring Elevated Engine Speed.**

~~If the power source requires the chassis engine to be operating at a specific fixed speed or a specific speed range, it shall meet the requirements of B.5.6.1 through B.5.6.3 .~~

**B.5.6.1**

~~The main propulsion engine shall have a governor capable of maintaining the engine speed within the limits required by the power source to meet the frequency control, voltage control, and power output specifications.~~

**B.5.6.2**

~~An interlock shall prevent engagement of the generator unless the parking brake is engaged and the transmission is in neutral or not connected to the drive wheels.~~

**B.5.6.3**

~~Where the chassis engine drives the generator and electronic engine throttle controls are provided, an interlock shall prevent engine speed control from any other source that would interfere with the generator while the generator is operating.~~

**B.5.7 Power Sources Requiring the Chassis Transmission to Be in a Specific Gear.**

~~If the power source requires the chassis transmission be in a specific gear when producing line voltage power, it shall meet the requirements of B.5.7.1 and B.5.7.2 .~~

**B.5.7.1**

~~A label indicating the chassis transmission shift selector position to be used for generator operation shall be provided in the driving compartment and located so that it can be read from the driver's position.~~

**B.5.7.2**

~~Interlocks shall be provided that prevent advancement of the engine throttle for generator operation unless the transmission is in the correct gear.~~

**B.5.8 Generators.**

~~If the power source is mechanically driven, it shall comply with Article 445, "Generators," of NFPA 70 .~~

**B.5.9 Chassis Engine-Driven Generators.**

~~Where the generator is driven by the chassis engine, the requirements in B.5.9.1 through B.5.9.3 shall apply.~~

**B.5.9.1**

~~Unless the generator is always engaged, a "Generator Engaged" indicator shall be provided in the driving compartment to indicate that the generator shift has been successfully completed.~~

**B.5.9.2**

~~Unless the generator is always engaged and operating, an "OK to Operate Generator" indicator shall be provided in the driving compartment to indicate that the generator is engaged (if not always engaged), the transmission is in the proper gear (if required, automatic transmissions only), and the parking brake is engaged (if applicable).~~

**B.5.9.3**

~~An interlock system shall be provided to prevent advancement of the engine speed in the driving compartment or at any operator's panel unless the parking brake is engaged, and the transmission is in neutral or the output of the transmission is correctly connected to a pump or generator instead of the drive wheels.~~

**B.5.10 Waveform Created Electronically.**

~~If the power output waveform is electronically created, the purchaser shall specify whether modified sine wave or pure sine wave output is required.~~

**B.6 Portable Generator Installations.**

~~The generator shall comply with Article 445, "Generators," of NFPA 70 .~~

**B.6.1**

~~Any portable generator that can be operated while mounted on the apparatus shall be as follows:~~

~~Installed so that fumes, vapors, heat, excessive noise, and vibrations do not enter interior driving or crew compartments or damage the generator during operation~~

~~Have the exhaust outlet located so that exhaust is directed away from any operator station located on the apparatus and guarded to protect the operator~~

**B.6.2**

~~If the portable generator is remotely mounted, it shall have a remote operator's control station that shall provide a means for starting and stopping the generator and monitoring the same instrumentation as is required for fixed power sources.~~

**B.6.3 Wiring for Portable Generator Installations.**

~~Wiring installed for the purpose of facilitating the distribution of power from a portable generator installation to fixed wiring on the apparatus shall conform to the additional requirements of B.6.3.1 through B.6.3.5~~

**B.6.3.1**

~~Circuit conductors shall be sized in relation to the power source specification label rating and shall be protected by an overcurrent device commensurate with their amperage capacities.~~

**B.6.3.2**

~~There shall be a single output connector cord with all of the conductors in the cord sized to carry a minimum of 115 percent of the nameplate amperage.~~

**B.6.3.3**

~~If there is not an overcurrent protection device at the power source, the output connector cord shall not exceed 1830 mm (72 in.) in length and shall be connected to an overcurrent protection device.~~

**B.6.3.4**

~~The rating of an external main overcurrent protection device shall equal the rated amperage on the power source specification label or the next larger available size overcurrent protection device where so recommended by the power source manufacturer.~~

**B.6.3.5**

~~If a connecting plug is required, it shall be sized in relation to the system and conform to NEMA configurations for plugs.~~

**B.7 Line Voltage Supplied from an External Source.****B.7.1**

~~If the apparatus is equipped with a fixed power inlet (shoreline inlet), it shall be a permanently mounted inlet (male-recessed type with cover), sized in accordance with the anticipated load, and wired directly to the system or device to be powered or wired to a transfer switch where required by B.7.2 .~~

**B.7.1.1**

~~The protective ground from the shoreline inlet shall be bonded to the vehicle frame.~~

**B.7.2 Transfer Switch Switch Applications.****B.7.2.1**

~~A transfer switch shall be required to isolate one power source from the other where a circuit(s) is intended to be supplied from more than one power source.~~

**B.7.2.2**

~~Transfer equipment, including transfer switches, shall operate such that all ungrounded conductors of one power source are disconnected before any ungrounded conductors of the second power source are connected.~~

**B.7.2.3**

~~The neutral conductor shall be switched through the transfer switch.~~

**B.7.3**

The apparatus shall have a label permanently affixed at the power inlet that indicates the information shown in Figure B.7.3.

**Figure B.7.3 Shorepower Inlet Label.**

Differential or compensating device:		Rims, type	Front	Rear
Make	Model	Single piece		
Type: Automatic locking		Multiple pieces		
Driver selective type		Rim size (mm) (in.)		
Nonlocking		Loadfly rating		
Maximum rated input torque capacity _____ N (lbf)		Maximum load (kg) (lb)		
Maximum rated load on tires at ground _____ kg (lb)		Inflation pressure (kPa) (psi)		
Axle tread _____ mm (in.); Bogie wheelbase _____ mm (in.)		Tire, type		
11. Rear Drive		Bias ply		
Axle		Radial		
Bogie		Tube		
Make _____ Model _____ Gear ratio _____ to 1		Tubeless		
Type drive: Single reduction		Tire tread design		
Double reduction		14. Electrical System		
If double reduction, type final reduction:		Voltage: Lighting _____ Starting _____		
Spir gears at differential		Alternator: Make _____ Model _____ Voltage _____		
Internal gears at hubs		Capacity rating at engine-governed speed _____		
Differential or compensating device:		Capacity rating at 50 percent engine-governed speed _____		
Make _____ Model _____		Batteries: Make _____ Model _____ Number _____		
Type: Automatic locking		Capacity, each _____ amp-hr @ 20-hr		
Driver selective type		Rate, each cold-cranking amp @ -17.8°C (0°F)		
Nonlocking		Starter: Make _____ Model _____		
Maximum rated input torque capacity _____ N (lbf)		Onboard complementary battery charge		
Maximum rated load on tires at ground _____ kg (lb)		Onboard complementary compressor _____ volts		
Axle tread _____ mm (in.); Bogie wheelbase _____ mm (in.)		External battery charging connection _____ volts		
12. Suspension		Engine coolant preheating connection _____ volts		
Suspension, type	Front	Rear		
Leaf spring				
Coil spring				
Torsion bar				
Air cushion				
Diagonally opposite wheel motion				
Axle motion, before bottoming from level loaded position				
Shock absorbers				
Unsprung weight at full load _____ percent				
13. Wheels, Tires, and Rims				
Configuration	Front	Rear		
Singles				
Deals				
Wheels, type				
Disc				
Spike				
Wheels, construction				
Steel				
Aluminum				
14. Electrical System				
Voltage: Lighting _____ Starting _____				
Alternator: Make _____ Model _____ Voltage _____				
Capacity rating at engine-governed speed _____				
Capacity rating at 50 percent engine-governed speed _____				
Batteries: Make _____ Model _____ Number _____				
Capacity, each _____ amp-hr @ 20-hr				
Rate, each cold-cranking amp @ -17.8°C (0°F)				
Starter: Make _____ Model _____				
Onboard complementary battery charge				
Onboard complementary compressor _____ volts				
External battery charging connection _____ volts				
Engine coolant preheating connection _____ volts				
Electrical system radio suppressed				
15. Fuel System				
Fuel Pump: Mechanical, number _____				
Electrical, number _____				
Fuel tank capacity _____ L (gals); Location _____				
16. Exhaust System				
Muffler				
Construction of system _____				
Location of exhaust discharge _____				
17. Air System				
Compressor capacity _____ cfm				
Air reservoir capacity _____ mm <sup>3</sup> (in. <sup>3</sup> )				
Quick buildup time _____				
Air dryer: Make _____ Model _____				
18. Service Brakes				
Make _____ Number _____				
Front, type: Internal shoe				
Disc braking area _____ mm <sup>2</sup> (in. <sup>2</sup> )				
Brake application system				
Make _____				

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**B.8 Power Supply Assembly.****B.8.1**

The conductors used in the power supply assembly between the output terminals of the power source and the main overcurrent protection device shall not exceed 4 m (12 ft) in length.

**B.8.2**

All power supply assembly conductors, including neutral and grounding conductors, shall have an equivalent amperage rating and shall be sized to carry not less than 115 percent of the amperage of the nameplate current rating of the power source.

**B.8.3**

If the power supply assembly connects to the vibrating part of a generator (not a connection on the base), the conductors shall be flexible cord or other fine-stranded conductors enclosed in metallic or nonmetallic liquidtight flexible conduit rated for wet locations and temperatures not less than 90°C (194°F).

**B.9 Overcurrent Protection.**

Manually resettable overcurrent devices shall be installed to protect the line voltage electrical system components.

**B.9.1 Power Source Protection.**

A main overcurrent protection device shall be provided that is either incorporated in the power source or connected to the power source by a power supply assembly.

**B.9.1.1**

The size of the main overcurrent protection device shall not exceed 100 percent of the rated amperage stated on the power source specification label or the rating of the next larger available size overcurrent protection device, where so recommended by the power source manufacturer.

**B.9.1.2**

If the main overcurrent protection device is subject to road spray, the unit shall be housed in a Type 4-rated enclosure.

**B.9.2 Branch-Circuit Overcurrent Protection.**

Overcurrent protection devices shall be provided for each individual circuit and shall be sized at not less than 15 amps in accordance with Section 240.4, "Protection of Conductors," of *NEPA 70*.

**B.9.2.1**

Any panelboard shall have a main breaker where the panel has six or more individual branch circuits or the power source is rated 8 kW or larger.

**B.9.2.2**

Each overcurrent protection device shall be marked with a label to identify the function of the circuit it protects.

**B.9.2.3**

Dedicated circuits shall be provided for any large appliance or device (air conditioning units, large motors, etc.) that requires 60 percent or more of the rated capacity of the circuit to which it is connected, and that circuit shall serve no other purpose.

**B.9.3**

All fixed power sources shall be hardwired to a permanently mounted panelboard unless one of the following conditions exists:

All line voltage power connections are made through receptacles on the power source and the receptacles are protected by integrated overcurrent devices.

Only one circuit is hardwired to the power source, which is protected by an integrated overcurrent device.

**B.9.3.1**

The panel shall be visible and located so that there is unimpeded access to the panelboard controls.

**B.9.3.2**

All panelboards shall be designed for use in their intended location.

**B.9.3.3**

The panel(s) shall be protected from mechanical damage, tool mounting, and equipment storage.

**B.9.3.4**

Where the power source is 120/240 V and 120 V loads are connected, the apparatus manufacturer or line voltage system installer shall consider load balancing to the extent that it is possible.

**B.10 Wiring Methods.**

Fixed wiring systems shall be limited to the following:

Metallic or nonmetallic liquidtight flexible conduit rated at temperatures not less than 90°C (194°F) with stranded copper wire rated for wet locations and temperatures not less than 90°C (194°F)

Type SOW, SOOW, SEOW, or SEOOW flexible cord rated at 600 V and at temperatures not less than 90°C (194°F)

**B.10.1**

~~Electrical cord or conduit shall not be attached to chassis suspension components, water or fuel lines, air or air brake lines, fire pump piping, hydraulic lines, exhaust system components, or low-voltage wiring and shall be arranged as follows:~~

~~Separated by a minimum distance of 300 mm (12 in.) from exhaust piping or shielded from such piping~~

~~Separated from fuel lines by a minimum distance of 150 mm (6 in.)~~

**B.10.2**

~~A means shall be provided to allow "flexing" between the driving and crew compartment, the body, and other areas or equipment whose movement would stress the wiring.~~

**B.10.3**

~~Electrical cord or conduit shall be supported within 150 mm (6 in.) of any junction box and at a minimum of every 600 mm (24 in.) of run.~~

**B.10.3.1**

~~Supports shall be made of nonmetallic materials or of corrosion-resistant or corrosion-protected metal.~~

**B.10.3.2**

~~All supports shall be of a design that does not cut or abrade the conduit or cord and shall be mechanically fastened to the apparatus.~~

**B.10.4**

~~Only fittings and components listed for the type of cord or conduit being installed shall be used.~~

**B.10.5**

~~Splices shall be made in a listed junction box or in accordance with Section 110.14(B) of *NFPA 70*, and be in an accessible location that can be exposed without damaging the structure or finish of the vehicle.~~

**B.10.6 Additional Requirements for Flexible Cord Installations.****B.10.6.1**

~~Where flexible cord is used in any location where it could be damaged, it shall be protected by installation in conduit, enclosures, or guards.~~

**B.10.6.2**

~~Where flexible cord penetrates a metal surface, rubber or plastic grommets or bushings shall be installed.~~

**B.10.7 Wiring Identification.****B.10.7.1**

~~Each line-voltage circuit originating from the main panelboard shall be identified.~~

**B.10.7.2**

~~The wire or circuit identification either shall reference a wiring diagram or wire list or shall indicate the final termination point of the circuit.~~

**B.10.7.3**

~~Where prewiring for future power sources or devices exists, the unterminated ends shall be marked with a label showing their wire size and intended function.~~

**B.11 Wiring System Components.****B.11.1**

~~Only stranded copper conductors with an insulation rated for temperatures of at least 90°C (194°F) and wet locations shall be used.~~

#### **B.11.1.1**

~~Conductors in flexible cord shall be sized in accordance with Table 400.5(A) of *NFPA 70*.~~

#### **B.11.1.2**

~~Conductors used in conduit shall be sized in accordance with 310.15, "Ampacities for Conductors Rated 0–2000 Volts," of *NFPA 70*.~~

#### **B.11.1.3**

~~Aluminum or copper-clad aluminum conductors shall not be used.~~

#### **B.11.2**

~~All boxes shall conform to and be mounted in accordance with Article 314, "Outlet, Device, Pull, and Junction Boxes; Conduit Bodies; Fittings; and Manholes," of *NFPA 70*.~~

#### **B.11.2.1**

~~All boxes shall be accessible using ordinary hand tools.~~

#### **B.11.2.2**

~~Boxes shall not be permitted behind welded or pop-riveted panels.~~

#### **B.11.2.3**

~~The maximum number of conductors permitted in any box shall be in accordance with Section 314.16, "Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies," of *NFPA 70*.~~

#### **B.11.3**

~~All wiring connections and terminations shall provide a positive mechanical and electrical connection.~~

#### **B.11.3.1**

~~Connectors shall be installed in accordance with the manufacturer's instructions.~~

#### **B.11.3.2**

~~Wire nuts or insulation displacement and insulation-piercing connectors shall not be used.~~

#### **B.11.4**

~~Each switch shall indicate the position of its contact points (i.e., open or closed) and shall be rated for the continuous operation of the load being controlled.~~

#### **B.11.4.1**

~~All switches shall be marked with a label indicating the function of the switch.~~

#### **B.11.4.2**

~~Circuit breakers used as switches shall be "switch rated" (SWD) or better.~~

#### **B.11.4.3**

~~Switches shall simultaneously open all associated line voltage conductors.~~

#### **B.11.4.4**

~~Switching of the neutral conductor alone shall not be permitted.~~

#### **B.11.4.5**

~~Line voltage circuits controlled by low-voltage circuits shall be wired through properly rated relays in listed enclosures that control all nongrounded current-carrying conductors~~

#### **B.11.5 Receptacles and Inlet Devices**

##### **B.11.5.1 Wet and Dry Locations.**

**B.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 Section 406.8, "Receptacles in Damp or Wet Locations," of *NEPA 70*.

**B.11.5.1.2**

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

**B.11.5.1.3**

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

**B.11.5.2**

All receptacles located in a dry location shall be of the grounding type and shall be at least 300 mm (12 in.) above the interior floor height.

**B.11.5.3**

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

**B.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.

**B.11.5.5 Receptacle Label.****B.11.5.5.1**

Each receptacle shall be marked with a label indicating the nominal line voltage (120 volts or 240 volts) and the current rating in amps of the circuit.

**B.11.5.5.2**

If the receptacle is dc or other than single phase, that information shall also be marked on the label.

**B.11.5.6**

All receptacles and electrical inlet devices shall be listed to UL 498, *Standard for Safety Attachment Plugs and Receptacles*, or other recognized performance standards.

**B.11.5.7**

Receptacles used for dc voltages shall be rated for dc service.

**B.12 Cord Reels.**

All permanently mounted cord reels shall be rated for continuous duty and installed to be accessible for removal, cord access, maintenance, and servicing.

**B.12.1**

The power rewind cord reel spool area shall be visible to the operator during the rewind operation, or the reel spool shall be encapsulated to prevent cord from spooling off the reel.

**B.12.2**

Rollers or guides shall be provided, where required, to prevent damage to the cord at reel spools or compartment openings.

**B.12.3 Rewind Provision.****B.12.3.1**

Manually operated reels shall have a hand crank.

**B.12.3.2**

~~Power rewind-type reels shall have the control in a position where the operator can observe the rewinding operation. If a reel is in an enclosure or out of direct view, the cord entry point to the enclosure shall be visible to the operator of the reel control.~~

**B.12.3.3**

~~The rewind control or crank shall not be more than 1830 mm (72 in.) above the operator's standing position.~~

**B.12.3.4**

~~The rewind control shall be marked with a label indicating its function and shall be guarded to prevent accidental operation.~~

**B.12.4**

~~The reel shall be designed to hold 110 percent of the capacity needed for the intended cord length.~~

**B.12.5**

~~The wire size shall be in accordance with *NFPA 70*, Table 400.5(A), but in no case shall it be smaller than 12 AWG.~~

**B.12.6**

~~Electrical cord shall be Type SEOOW, Type SOOW, or Type STOOW.~~

**B.12.7**

~~A label that indicates the following information shall be provided in a visible location adjacent to any permanently connected reel:~~

- ~~Current rating~~
- ~~Current type~~
- ~~Phase~~
- ~~Voltage~~
- ~~Total cord length~~

**B.12.8**

~~Where a power distribution box is hardwired to the end of a cord that is stored on a fixed cord reel or other fixed storage means, the requirements in B.12.8.1 through B.12.8.6 shall apply.~~

**B.12.8.1**

~~The remote power distribution box shall be listed for use in a wet location.~~

**B.12.8.2**

~~The distribution box shall be as follows:~~

- ~~Protected from corrosion~~
- ~~Capable of being carried with a gloved hand~~
- ~~Designed to keep the exterior electrical components above 51 mm (2 in.) of standing water~~

**B.12.8.3**

~~Inlets, receptacles, circuit breakers, or GFCI devices shall not be mounted on the top surface of the horizontal plane.~~

**B.12.8.4**

~~Branch circuit breakers shall be installed in the remote power distribution box if the overcurrent device protecting the feed cord to the box is too large to protect the wiring supplying the devices plugged onto the distribution box.~~

**B.12.8.5**

~~Remote power distribution boxes shall have a light on the box to indicate the power is on.~~

**B.12.8.5.1**

~~The light shall be visible in a 360-degree plane from a minimum of 60 m (200 ft) in complete darkness.~~

**B.12.8.5.2**

~~The light shall be mechanically protected to prevent damage.~~

**B.12.8.6**

~~The hardwired portable cord connection to the box shall have strain relief and meet the intended usage requirements.~~

**B.13 Scene Lighting Systems.**

~~Where fixed scene lights are supplied, the requirements in B.13.1 through B.13.4 shall apply.~~

**B.13.1**

~~All scene lights shall be provided with a lens or a means for preventing damage from water spray and shall be listed for wet location usage.~~

**B.13.2 Handle on Lights.****B.13.2.1**

~~If the light is adjustable, a handle shall be provided.~~

**B.13.2.2**

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

**B.13.3**

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

**B.13.4**

~~If manually operated floodlights are not operable from the ground, access steps that meet the requirements of Section 15.7 [of NFPA 1901] and handrails that meet the requirements of Section 15.8 [of NFPA 1901] shall be provided to allow the user to reach the floodlights.~~

**B.14 Power-Operated Light Mast.****B.14.1 General.****B.14.1.1**

~~The mast shall be designed to sustain the intended tip load with at least a 125-percent safety factor.~~

**B.14.1.2**

~~The mast shall withstand a minimum of a 80-kph (50-mph) wind in a raised, unguyed position.~~

**B.14.2 Installation and Operational Requirements.****B.14.2.1**

~~The mast shall be capable of being raised within 2 minutes.~~

**B.14.2.2**

Where the installation precludes the operator from seeing the light in its nested position, a means shall be provided to allow the operator to align the light for nesting when the operator is at the operator's position.

**B.14.2.3**

Appropriate warning labels on the hazards of electrocution shall be installed.

**B.14.2.4**

A means shall be provided to prevent operations that could cause damage to the power supply conductors.

**B.14.2.5**

In the event of a failure of the light tower's raising system while the tower is deployed or being deployed, a means shall be provided to limit the rate of descent in order to prevent injury to equipment or personnel.

**B.14.2.6**

A secondary means of control shall be provided to allow for emergency lowering of the mast.

**B.14.2.7**

Where the tower is powered by the chassis air brake system, the air supply shall be from an auxiliary air circuit that is equipped with a pressure protection valve and an auxiliary air tank(s).

**B.14.2.8**

An automatic de-energizing means shall be provided so there is no electrical power to the mast or to the light wiring when the mast is in a stowed position.

**B.14.2.9**

The hazard warning light required in Section 13.11 [of NFPA 1901 ] shall be illuminated whenever the light tower is not in the stowed position.

**B.14.2.10**

The operational envelope of the mast shall be automatically illuminated whenever the mast assembly is being raised, lowered, or rotated.

**B.14.3 Labeling.****B.14.3.1**

An instruction plate showing the operation of the mast and operational warning signs shall be provided at the operator's position.

**B.14.3.2**

A label shall be provided at the operator's position to indicate the following:

Extended tower height from the ground

Bulb replacement data

**B.15 Electrical System Testing.****B.15.1**

The wiring and associated equipment shall be tested by the apparatus manufacturer or the installer of the line voltage system.

**B.15.2 Dielectric Voltage Withstand Test.****B.15.2.1**

The wiring and permanently connected devices and equipment shall be subjected to a dielectric voltage withstand test at 900 volts for 1 minute.

**B.15.2.2**

The testing shall be performed after all body work has been completed.

**B.15.2.3**

The test shall be conducted as follows:

Isolate the power source from the panel board and disconnect any solid-state low-voltage components.

Connect one lead of the dielectric tester to all the hot and neutral buses tied together.

Connect the other lead to the fire apparatus frame or body.

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

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

**B.15.3**

The electrical polarity of all permanently wired equipment, cord reels, and receptacles shall be tested to verify that wiring connections have been properly made.

**B.15.4**

Electrical continuity shall be verified from the chassis or body to all line voltage electrical enclosures, light housings, motor housings, light poles, switch boxes, and receptacle ground connections that are accessible to firefighters in normal operations.

**B.15.5**

If the apparatus is equipped with a transfer switch, it shall be tested to verify operation and that all nongrounded conductors are switched.

**B.15.6**

Electrical light towers, floodlights, motors, fixed appliances, and portable generators shall be operated at their full rating or capacity for 30 minutes to ensure proper operation.

**B.15.7 Certification Test of Power Source.****B.15.7.1**

The apparatus manufacturer or installer of the power source shall perform a certification test on the power source.

**B.15.7.2**

The testing of the power source shall be witnessed, and the results of the tests of the power source shall be certified by an independent third-party certification organization.

**B.15.7.3 Test Procedure.****B.15.7.3.1**

The prime mover shall be started from a cold start condition, and the unloaded voltage and frequency shall be recorded.

**B.15.7.3.2**

The line voltage electrical system shall be loaded to at least 100 percent of the continuous rated wattage stated on the power source specification label. Testing with a resistive load bank shall be permitted.

**B.15.7.3.3**

The power source shall be operated in the manner specified by the apparatus manufacturer as documented on instruction plates or in operation manuals.

**B.15.7.3.4**

The power source shall be operated at a minimum of 100 percent of the continuous rated wattage as stated on the power source specification label for a minimum of 2 hours.

**B.15.7.3.4.1**

~~The load shall be adjusted to maintain the output wattage at or above the continuous rated wattage during the entire 2-hour test.~~

**B.15.7.3.4.2**

~~The following conditions shall be recorded at least every  $\frac{1}{2}$  hour during the test:~~

~~The power source output voltage, frequency, and amperes~~

~~The prime mover's oil pressure, water temperature, and transmission temperature, if applicable~~

~~The power source hydraulic fluid temperature, if applicable~~

~~The ambient temperature and power source air inlet temperature~~

**B.15.7.3.4.3**

~~The following conditions shall be recorded once during the test for power sources driven by dedicated auxiliary internal combustion engines:~~

~~Altitude~~

~~Barometric pressure~~

~~Relative humidity~~

**B.15.7.3.5**

~~If the generator is driven by the chassis engine and the generator allows for operation at variable speeds, the chassis engine speed shall be reduced to the lowest rpm allowed for generator operation and the voltage and frequency shall be recorded.~~

**B.15.7.3.6**

~~The load shall be removed, and the unloaded voltage and frequency shall be recorded.~~

**B.15.7.3.7**

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

**B.15.7.3.8**

~~Frequency shall be maintained within  $\pm 3$  Hz of the frequency stated on the power source specification label during the entire test.~~

**B.15.7.3.9**

~~The total continuous electrical loads, excluding those loads associated with the equipment defined in B.15.7.3.11.2, shall be applied during the testing unless an auxiliary engine drives the power source.~~

**B.15.7.3.10 Concurrent Pumping.****B.15.7.3.10.1**

~~If the apparatus is equipped with a fire pump, the 2-hour certification test of the power source shall be completed with the fire pump pumping at 100 percent capacity at 1000 kPa (150 psi) net pump pressure.~~

**B.15.7.3.10.2**

~~The test shall be permitted to be run concurrently with the pump certification test required in 16.13.1 of NFPA 1901.~~

**B.15.7.3.10.3**

~~Running the pump during testing of portable generators connected to fixed wiring on the apparatus shall not be required unless the generator is mounted in an area subjected to a rise in ambient temperature greater than 17°C (30°F) from the vehicle engine, pump, or other heat source.~~

**B.15.7.3.11** ~~Prime Mover–Driven Accessories.~~**B.15.7.3.11.1**

~~Accessories driven by the power source prime mover shall not be functionally disconnected or otherwise rendered inoperative during the line voltage electrical tests.~~

**B.15.7.3.11.2**

~~The following devices shall be permitted to be turned off or not operating during the fixed power source test:~~

~~Aerial hydraulic pump~~

~~Foam pump~~

~~Hydraulically driven equipment other than a hydraulically driven line voltage generator~~

~~Winch~~

~~Windshield wipers~~

~~Four-way hazard flashers~~

~~Compressed air foam system (CAFS) compressor~~

**B.15.7.3.12**

~~If the line voltage power is derived from the fire apparatus's low-voltage system and is the primary source for line voltage, the power source shall not be shed by a load management system during the 2-hour test.~~

**B.15.8**

~~The results of each test shall be recorded on an appropriate form and provided with the delivery of the fire apparatus.~~

## Submitter Information Verification

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## Committee Statement

**Committee Statement:** The committee is deleting Appendix B as the material is now already in this document due to the consolidation. That document has been incorporated into the new 1900 with the 414 text. So, the reference in Chapter 4 of 1901 will be changed to reference the new Chapter in 1900 and there is no need to reprint that chapter anymore.

**Response Message:** FR-123-NFPA 1900-2021

[Public Input No. 971-NFPA 1900-2020 \[Chapter B\]](#)

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