The ROP letter ballot for NFPA 414 A2011 is attached. The ballot is for formally voting on whether or not you concur with the committee’s actions on the proposals. Reasons must accompany all negative and abstention ballots.

Please do not vote negatively because of editorial errors. However, please bring such errors to my attention for action.

Please complete and return your ballot as soon as possible but no later than Thursday, March 18, 2010. As noted on the ballot form, please return the ballot to Stacey Van Zandt either via e-mail to svanzandt@nfpa.org or via fax to 617.984.7056. You may also mail your ballot to the attention of Stacey Van Zandt at NFPA, 1 Batterymarch Park, Quincy, MA 02169.

The return of ballots is required by the Regulations Governing Committee Projects.

Attachment
414-1 Log #CP5
(Entire Document)  Final Action: Accept in Principle

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Review entire document to: 1) Update any extracted material by preparing separate proposals to
do so, and 2) review and update references to other organizations documents, by preparing proposal(s) as required.
Substantiation: To conform to the NFPA Regulations Governing Committee Projects.
Committee Meeting Action: Accept in Principle
Committee Statement: The committee has reviewed the entire document and has made the changes in individual
proposals.

414-2 Log #126
(Entire Document)  Final Action: Reject

Submitter: Marty Huffman, Rosenbauer
Recommendation: Revise text to read as follows:
NFPA 414 in its entirety
Substantiation: The entire document should be updated to reflect FAA Advisory Circular 150/5220-10D and ICAO
requirements.
Committee Meeting Action: Reject
Committee Statement: Submitter requests that this be withdrawn.

414-3 Log #CP6
(1.2.1)  Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
1.2.1 The purpose of this standard is to specify features and components that, when assembled, produce an efficient
and capable fire-fighting vehicle for both on-pavement and off-pavement performance. Off-pavement capability is
important to ensure timely and effective response of these vehicles to aircraft accident sites located off paved surfaces.
The fire-fighting vehicle capabilities contained in this document are considered to be the minimum acceptable for proper
performance of these vehicles.

Substantiation: This was to comply with the Manual of Style.
Committee Meeting Action: Accept

414-4 Log #CP7
(1.2.3, 1.2.4, and 1.2.5 (New) )  Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new section and text to read as follows:
1.2.3 Equivalency. Nothing in this standard is intended to prevent the use of systems, methods, or devices of
equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety over those prescribed by this
standard.
1.2.4 Technical documentation shall be submitted to the authority having jurisdiction to demonstrate equivalency.
1.2.5 The system, method, or device employed shall be demonstrated to meet the acceptance criteria for the intended
purpose to the authority having jurisdiction.
Substantiation: The committee has chosen to add an equivalency statement to this document to provide further options
for the end user.
Committee Meeting Action: Accept
414-5  Log #CP8  Final Action: Accept
(1.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove section 1.3 and renumber as 4.1 and renumber Chapter 4 accordingly.
Substantiation: This section does not belong in the administrative chapters of this document and has been moved to
where the committee feels it belongs.
Committee Meeting Action: Accept

414-6  Log #26  Final Action: Reject
(1.3.3.3)

Recommendation: New text to read as follows:
The paint, including the primer, shall be applied in accordance with the paint manufacturer's recommendation. Orange
peel and uneven coating of paint will not be accepted.
Substantiation: Phoenix has received two ARFF apparatus now that the paint was orange peeled and uneven. The
manufacture claims there is no standard for this. When paying over a million dollars per apparatus the paint should be at
least average quality and not sub-standard.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local issue and the purchaser should make this request when
establishing the vehicle specifications.

414-7  Log #42  Final Action: Reject
(1.3.5)

Recommendation: New and revise text to read as follows:
1.3.5 Vehicle Information Data Plate. A data plate contains all the information presented in Figure 1.3.5, as actual for said vehicle, shall be installed in the cab of the vehicle.
Substantiation: Gives the owner the exact amounts and not just said amounts.
Committee Meeting Action: Reject
Committee Statement: The committee notes that the manufacturer is to provide rated capacity.
1.3.6 Vehicle/Driver Safety Data Plate

Vehicle Weight Full
Vehicle Weight Empty
Vehicle Height
Vehicle Width

Submittor: Gary T. Schott, Omaha Airport Authority / Rep. ARFF Working Group

Recommendation: New text to read as follows:

A vehicle/driver safety data plate should be placed on the dash where it can be easily seen by the driver. It should contain some basic vehicle safety facts as stated above for quick reference. This will assist drivers responding off airport into local communities on mutual aid responses where there may be unexpected bridges, overpasses with questionable height and width restrictions, etc. This easily seen data will assist in quick decision making for additional response safety.

Committee Meeting Action: Reject

Committee Statement: The committee feels that this is something the purchaser should request when purchasing the vehicle as well as this is a local issue rather than something that should be part of a requirement.

414-9 Log #128

Submittor: Joseph A. Wright, ARFF Technical Services, Inc.

Recommendation: Insert new text to read as follows:

The use of Compressed Air Foam Systems is permitted by the AHJ, on smaller combined agent vehicles provided the foam quality is delivered as the finished mixed air and foam, at an expansion rate of between >8 to <12 foam concentration as tested by NFPA 412 Foam test procedures.

Submittor: Compressed Air Foam Systems for ARFF applications have been tested successfully by the FAA, USAF, US Marines. These CAFS systems have been installed on many of the smaller combined agent vehicles without any problems for the last decade. There has been no published guidelines or recommendation on what operational expansion ratios that these systems should be producing the foam.

This is not original material; its reference/source is as follows:

Earlier version of 414 document.

Committee Meeting Action: Reject

Committee Statement: The committee feels that this requirement is not appropriate for this document as this is not used or defined within this document and is handled in several other NFPA documents. The committee also noted that the expansion rates that are listed are not accurate extractions from the agencies that were listed in the submitters substantiation.

414-10 Log #129
(2.1 and 2.2) Final Action: Reject

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Revise the text to read as follows:

2.1 General.
Remove the implied wording:
The documents or portions thereof listed in this chapter are referenced within this standard and shall be considered part of the requirements of this document.
Insert the following wording instead:
The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. When a particular item or chapter are applicable it will be so noted.

2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

Substantiation: There are several reasons for not adopting a standard in total they are as follows;

a. The committee’s intention should have not been to adopt the reference documents in total. Specific chapters and parts of these documents are all that are needed.

b. Adopting all these other referenced standards in total raises the cost to produce that airport specialized vehicle because you are adopting items that are not necessary for making an on airport response vehicle.

c. The various standards are updated at different times than our document, so you end up referencing things to the latest standard and this committee may not have reviewed new requirements for inclusion into our documents.

d. If committee or some individual feels there is a need to reference a particular chapter or item from another standard document, that chapter or item only should be referenced by page chapter and item not the whole document that way we can be assured that we are not by reference including items that are not necessary for inclusion on an airport response vehicle.

Committee Meeting Action: Reject
Committee Statement: The submitter was proposing changes to NFPA boiler plate language that can't be changed. There was also some misunderstanding about what Chapter 2 is accomplishing, which was explained to the committee during the deliberations of this proposal.

414-11 Log #CP239
(2.2) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

2.2 NFPA Publications.
National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

Substantiation: The committee is updating the edition dates of the documents listed in this section and has chosen to remove the reference to NFPA 1901 from this section and place it in section 2.4.
Committee Meeting Action: Accept

Printed on 2/26/2010 4
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

2.3.5 SAE Publications.
Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.
SAE J1908, Electrical Grounding Practice, 1996.
SAE J2180, A Tilt Table Procedure for Measuring the Static Rollover Threshold for Heavy Trucks, 1993.

Substantiation: The committee has made this change to update the references that are used within this document.
Committee Meeting Action: Accept
3.3.15 insert renumber Commerically Available Chassis-a vehicle chassis which is usually provided to apparatus manufacturers from a OEM chassis provider, that generally includes an engine, cab, transmission, chassis frame, steering, braking and transmission rear and front differential, instrument panel and some of the electrical system. The apparatus manufacturer than completes the vehicle by providing the body storage compartment, and fire protection package. This chassis must be certified to be constructed with materials and components for the intended use by the apparatus manufacture and chassis supplier.

3.3.16 Commericilly Available Chassis Combined Agent Vehicle-Built on a commercially available OEM chassis, finished by a Fire Apparatus Manufacturer (FAM) this smaller category of combined agent vehicles shall encompass the range of water capacity commencing at 454 L (120 gal) and extending to 1999 L (528 gal). In addition to carrying foam as a primary agent, either dry chemical or Halogenated clean extinguishing agent also shall be carried as an auxiliary agent.

Substantiation: Although the some of the performance characteristics of this class of vehicles is contained within the document there is limited information contained within the document that states what these vehicles are or why there are even utilized on many airports.

This proposal attempts to describe what a commercial available chassis vehicle is by definition.

Committee Meeting Action: Reject
Committee Statement: The committee feels that this proposed changed is not a definition and does not belong in this section of the document. The committee is unclear as to what the submitters intent is with this proposal and the definition is not used within this document.

NEW DEFINITION: An Interior Access Vehicle (IAV) is a specialized Aircraft Rescue and Firefighting vehicle capable of aiding firefighters, rescue personnel, or security in gaining access to aircraft doorways from the ground. An IAV can also be capable of aiding during aircraft passenger deplaning or evacuations during emergencies.

Substantiation: A definition is needed on what is an Interior Access Vehicle and basic capabilities. This could go in Chapter 3 as a definition or could be inserted as a new Scope or Purpose at the beginning of Chapter 5.

Committee Meeting Action: Accept in Principle
Committee Statement: The committee feels that this definition is will better serve the end user of this document.
414-16 Log #CP150 Final Action: Accept
(3.3.x Readily Accessible (New))

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new definition to read as follows:

3.3.X Readily Accessible. Able to be located, reached, serviced, or removed without removing other components or parts of the apparatus and without the need to use special tools to open enclosures.[1901:2009]

Substantiation: The committee chose to extract this definition from the 2009 edition of NFPA 1901 for use in this document.
Committee Meeting Action: Accept

414-17 Log #2 Final Action: Reject
(3.3.10 ARFF Chassis)

Submitter: Grady North, Crash Rescue Equipment Service, Inc.
Recommendation: Revise text as follows:

3.3.10 ARFF Chassis. The assembled frame, engine, drive train, and tires of a vehicle. A commercial chassis consists of the cab, frame, engine, drive train and tires of a chassis that is commercially available for other vocational applications. A commercial chassis is generally used for ARFF vehicle water tank capacity 120 to 528 gallons when a commercial chassis is used, the GVWR shall not exceed 26,000 lbs.

Substantiation: Commercial chassis are used almost exclusively for ARFF vehicles with water tank capacity 120 to 528 gallons. A formal definition would assist to clarify where other paragraphs need to be amended to accommodate these types of chassis. For reference, the Federal Government uses the follow description: Chassis Cab – an incomplete vehicle, with completed occupant compartment, that requires only the addition of cargo-carrying, work performing, or load-bearing components to perform its intended functions. (49CFR568.3) Also, section 4.11.4.4 has a foot note referencing a "small commercial chassis" without defining exactly what that is.

Committee Meeting Action: Reject
Committee Statement: The committee feels that this definition would be too restrictive and they feel that the current definition used is more than adequate.

414-18 Log #62 Final Action: Reject
(3.3.10 ARFF Chassis)

Submitter: Jason Shively, Oshkosh Corporation
Recommendation: Revise text to read as follows:

3.3.10 ARFF Chassis. The assembled consists of a frame, engine, drive train, and tires of a vehicle. Can be OEM assembled or commercially purchased.

Substantiation: Larger capacity (1,500 gallons) ARFF vehicles use chassis that are typically designed and assembled by the manufacturer of the vehicle. Smaller capacity (1,500 gallons) ARFF vehicles use chassis that are commercially purchased. ARFF vehicles with water tank capacity 120 to 528 gallons almost always use commercial chassis. Section 4.11.4.4 has a note referring to a "small commercial chassis" but no further explanation or definition exists in this Standard.

Committee Meeting Action: Reject
Committee Statement: See committee action and committee statement on 414-17 (Log #2).
414-19     Log #CP2             Final Action: Reject  
(3.3.15 Center of Gravity)  

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,  
Recommendation: Adopt the preferred definition from the NFPA Glossary of Terms as follows:  
3.3.15 Center of Gravity. The point at which the entire weight of the fire apparatus is considered to be concentrated so that, if supported at this point, the apparatus would remain in equilibrium in any position. [1901, 2009]  
Substantiation: This definition is the preferred definition from the Glossary of Terms. Changing the secondary definition to the preferred definition complies with the Glossary of Terms Project.  

Committee Meeting Action: Reject  
Committee Statement: The definition that is currently in use is specific to this document and the one proposed contains language that is not used within this document.  

414-20     Log #CP9             Final Action: Accept  
(3.3.17 Component Manufacturer's Certification)  

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,  
Recommendation: Modify text to read as follows:  
3.3.17 Component Manufacturer's Certification. A signed application approval furnished by the component vehicle manufacturer certifying that the components are approved as being properly installed or applied, or both, in the vehicle for its intended use, or the components comply with the respective construction criteria.  
Substantiation: The committee made this change to comply with the Manual of Style.  
Committee Meeting Action: Accept  

414-21     Log #CP3             Final Action: Accept  
(3.3.27.1 Aqueous Film-Forming Form (AFFF) Concentrate)  

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,  
Recommendation: Adopt the preferred definition from the NFPA Glossary of Terms as follows:  
3.3.27.1 Aqueous Film-Forming Foam (AFFF) Concentrate. A concentrate based on fluorinated surfactants plus foam stabilizers and usually diluted with water to a 1 percent, 3 percent, or 6 percent solution. [11, 2005]  
Substantiation: This definition is the preferred definition from the Glossary of Terms. Changing the secondary definition to the preferred definition complies with the Glossary of Terms Project.  
Committee Meeting Action: Accept
Technical Committee on Aircraft Rescue and Fire Fighting,

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Adopt the preferred definition from the NFPA Glossary of Terms as follows:

3.3.34 Halogenated Agents. A liquefied gas extinguishing agent that extinguishes fire by chemically interrupting the combustion reaction between fuel and oxygen. Halogenated agents leave no residue. [402, 2008]

Substantiation: This definition is the preferred definition from the Glossary of Terms. Changing the secondary definition to the preferred definition complies with the Glossary of Terms Project.

Committee Meeting Action: Accept in Principle


New text to read as follows:

The manufacture shall have obtain an End Product Questionnaire (EPQ) from the engine, transmission, axle, water pump, water tank/agent tank, cooling system, suspension and brake manufactures that they all agree and authorized the said combination of components together in this application.

This prevents manufactures of matching components that will not properly work together and could cause damage or safety issues to the apparatus and crew on board or prevent it from operating correctly during an emergency. This we also experienced in the late 1990’s with the same truck that overheated and engine manufacture never authorized the cooling system with the engine and transmission. Manufacture then had to redesigned the apparatus cooling system before engine manufacture would accept the installation.

Committee Meeting Action: Reject

Committee Statement: This issue was addressed in Proposal 414-312 (Log #41).
414-24  Log #131  
(4.1(c) and (d) (New) )  
Final Action: Reject

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Insert additional wording where it is appropriate and renumber as required:
4.1.(c) and (d)
Combined Agent Vehicles
Foam Turret Patterns

Substantiation: 4.1(c) and (d) lack performance requirements for small turrets utilized on class 2 and class 3 vehicles in present tables.
This is not original material; its reference/source is as follows:
Earlier version of 414 document.
Committee Meeting Action: Reject
Committee Statement: The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.

414-25  Log #136  
(4.1.x (New) )  
Final Action: Reject

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Add to table to show as follows:

***Insert Table 4.1.X.X here***

Substantiation: Current tables have acceleration times the same for all three classes of vehicles as one speed, although smaller class one vehicle is lighter and thus capable of higher acceleration speed this should be changed.
Committee Meeting Action: Reject
Committee Statement: The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.
Table 4-1. Acceleration Times for Combined Agent Vehicles

<table>
<thead>
<tr>
<th>Vehicle Class</th>
<th>Maximum Acceleration Time (0 km/h to 80 km/h)</th>
<th>Maximum Acceleration Time (0 mph to 50 mph)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sec.</td>
<td>Sec.</td>
</tr>
<tr>
<td>1</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>2</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>
414-26 Log #32
(4.1.1) Final Action: Reject

Recommendation: Revise text to read as follows:
4.1.1 The design criteria for the standard vehicles described by this document consider temperature extremes ranging from 0°C to 43.3°C (32°F to 110°F). For cold weather operation where temperatures periodically range from 40°F to 0°C (40°F to 32°F) or lower, some type of winterization system is to be specified by the purchaser. Vehicles shall comply with Table 4.1.1(a), Table 4.1.1(b), Table 4.1.1(c), Table 4.1.1(d), and other requirements in this chapter.

Substantiation: In the warmer climates of the United States temperatures reach in excess of 130°F on the taxiways and runways. We had experienced problems with a manufacture in the late 1990’s due to an overheating issue. We were told then that the vehicle was only rated to 110°F and they were not responsible. There are many other airports besides Phoenix that reach higher temperatures than 110°F.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local or individual option and should be specified by the purchaser.

414-27 Log #CP10 Final Action: Accept
(4.1.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.1.1 The design criteria for the standard vehicles described by this document consider temperature extremes ranging from 0°C to 43.3°C (32°F to 110°F). For cold weather operation where temperatures periodically range from -40°C to 0°C (-40°F to 32°F) or lower, some type of winterization system is to be specified by the purchaser. Vehicles shall comply with Table 4.1.1(a), Table 4.1.1(b), Table 4.1.1(c), Table 4.1.1(d), and other requirements in this chapter.

Substantiation: The committee as removed an unenforceable term as per the Manual of Style.
Committee Meeting Action: Accept

414-28 Log #59 Final Action: Accept in Principle
(Table 4.1.1(a) and (b))

Submitter: Jason Shively, Oshkosh Corporation
Recommendation: Revise text to read as follows:
Table 4.1.1(a) & (b) Angle of Approach (degrees) θ for Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal.
Substantiation: ARFF vehicles with water tank capacity ≥ 120 to ≤ 528 gallons almost always use commercial chassis. Available commercial chassis from the factory can not meet the 30 degree requirement. Commercial chassis manufacturers have standard tire size, suspension, cab, and bumper designs that dictate the angle of approach. The commercial chassis frame location with the required towing connection at the front of the vehicle (Section 4.8), requires an angle of approach equal to 20 degrees.
Committee Meeting Action: Accept in Principle
Revise text to read as follows:
Table 4.1.1(a) & (b) Angle of Approach (degrees) θ for Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal.
Committee Statement: The committee has corrected a typographical error with the submitters proposed change. Also with the submitter at the meeting the committee agrees to the submitters intent but felt that 25 was a more appropriate number.
414-29 Log #65 (Table 4.1.1(a) and (b))
Final Action: Accept in Principle

Submitter: Jason Shively, Oshkosh Corporation
Recommendation: Revise text to read as follows:
   Table 4.1.1(a) & (b) Interaxle Clearance (degrees) ±8 for Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal.
Substantiation: ARFF vehicles with water tank capacity ≥ 120 to ≤ 528 gallons almost always use commercial chassis. Available commercial chassis cannot meet the 12° requirement. Commercial chassis manufacturers have standard tire size, suspension, and cab sizes that dictate the front interaxle clearance.
Committee Meeting Action: Accept in Principle
Committee Statement: See committee action and committee statement on 414-31 (Log #17).

414-30 Log #34 (4.1.1(b))
Final Action: Reject

Recommendation: New text to read as follows:
   Add in the chart under braking that the apparatus shall be able to brake 10 times back to back in a panic mode without brake fade.
Substantiation: At our airport we have a minimum of nine hard brakes to go from our north station to the center of the south runway. We have had our older trucks with out disc brakes fail to stop after as little as three hard brake applications. To have a 60,000 lb to 118,000 lb truck unable to stop and run into an aircraft or other vehicle or not to be able to slow for a corner is a dangerous situation. Some airports might only have one or two brakes whereas others have more than ten. Besides the monetary amount of loss the life loss would be unacceptable.
Committee Meeting Action: Reject
Committee Statement: "Panic Mode" is not a defined or used term within this document and the committee is unclear as to what the submitter's intent.

414-31 Log #17
(Table 4.1.1(b))
Final Action: Accept in Principle

Submitter: Grady North, Crash Rescue Equipment Service, Inc.
Recommendation: Revise text as follows:

<table>
<thead>
<tr>
<th>Table 4.1.1(b) [Vehicle Water Tank Capacity &gt; 120 to &lt; 525 gal] Interaxle Clearance (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
</tbody>
</table>

Substantiation: Commercial chassis are used almost exclusively for Vehicle Water Tank Capacity > 120 to < 525 gal cannot meet a 12 degree interaxle clearance. Tire/wheel size and frame height are the primary factors that cannot be changed by the Final Stage manufacturer to affect the interaxle clearance – body panels and running boards can be changed in design. Commercial chassis under 26,000 lbs. GVWR typically have hydraulic brakes. Federal Motor Vehicle Safety Standards (FMVSS 105 Hydraulic Brakes) requires that chassis manufacturers test for compliance to this standard with specific tire brands and tread patterns. The Incomplete Vehicle Manual supplied with the commercial chassis lists specific tire/rim sizes that can be used with that chassis. Any alteration of the tire/wheel sizes by the Final Stage manufacturer could affect compliance with FMVSS 105. For example, the 225/70R19.5 wheels and tires on a 19,500 lb. GVWR commercial chassis has a frame height of about 32” with an overall tire diameter of 31”. This yields only about 9 degrees of interaxle clearance. It would require extremely large wheel and tires on small commercial chassis to achieve the 12 degrees of interaxle clearance even if it did not violate Federal regulations. It is also noted that the same interaxle clearance of 12 degrees for a small truck carrying 120 gallons of water is also specified for a large ARFF vehicle carrying over 1585 gallons of water.

From a safety standpoint, commercial chassis are limited to an overall width of 102” or less in order to comply with Federal and state legal restrictions for use on Interstate and state highways. If it were possible to increase the wheel/rim size on commercial vehicles to comply with the 12 degrees interaxle clearance requirement, it would significantly increase the vertical center of gravity. Thus making it difficult to meet the 30 degree side slope stability test and increasing the roll-over potential.

Committee Meeting Action: Accept in Principle
Revise text as follows:

<table>
<thead>
<tr>
<th>Table 4.1.1(b) [Vehicle Water Tank Capacity &gt; 120 to &lt; 525 gal] Interaxle Clearance (degrees)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
</tr>
</tbody>
</table>

Committee Statement: While the committee agrees with the submitters proposed change in interaxle clearance it was noted that there was an error as the gallonage should be 528 and not 525, as noted on the submitters proposal.

414-32 Log #18
(Table 4.1.1(b))
Final Action: Reject

Submitter: Grady North, Crash Rescue Equipment Service, Inc.
Recommendation: Revise text as follows:

Top speed (mph) >70 65

Substantiation: The top speed listed in Table 4.1.1(b) is inconsistent with section 4.3.1.2.1 “The maximum speed shall not be less than 104.6 kph (65 mph) and the testing criteria listed in sections 6.4.4 Top Speed

6.4.4.1 Test facilities shall consist of a dry, paved, level surface suitable for achieving a vehicle speed of at least 104.6 kph (65 mph) and bringing the vehicle to a safe stop.

6.4.4.4 The test shall be conducted in the following manner:

(1) Accelerate the vehicle to a speed of at least 104.6 kph (65 mph)

(2) To compensate for wind conditions and slope, repeat the test in the opposing direction.

(3) If 104.6 kph (65 mph) cannot be achieved in one of the directions, repeat (1) and (2), accelerating the vehicle to its maximum speed in each direction; record the speeds and average the two numbers.

6.4.4.5 The test shall be considered successful if the average top speed equals or exceeds 104.6 kph (65).

Alternatively, the above sections could be amended to read 70 mph instead of 65 mph.

Committee Meeting Action: Reject
Committee Statement: This was corrected in an errata however it was missed in some areas and will be corrected with this revision.
Submitters: Grady North, Crash Rescue Equipment Service, Inc.

Recommendation: Revise text as follows:

**Table 4.1.1(b)** [Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal] Underaxle clearance at differential housing bowl (in.)

<table>
<thead>
<tr>
<th></th>
<th>(ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>8.5</td>
</tr>
</tbody>
</table>

Substantiation: Commercial chassis are used almost exclusively for Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal cannot meet a 10.5" underaxle clearance. Tire/wheel size is the primary factor in determining the underaxle bowl clearance. Commercial chassis under 26,000 lbs. GVWR typically have hydraulic brakes. Federal Motor Vehicle Safety Standards (FMVSS 105 Hydraulic Brakes) requires that chassis manufacturers test for compliance to this standard with specific tire brands and tread patterns. The Incomplete Vehicle Manual supplied with the commercial chassis lists specific tire/rim sizes that can be used with that chassis. Any alteration of the tire/wheel sizes by the Final Stage manufacturer could affect compliance with FMVSS 105. For example, the 225/70R19.5 wheels and tires on a 19,500 lb. GVWR commercial chassis have an overall diameter of 31". However, this yields only about 8.5" or underaxle bowl clearance. The 10.00R20 tires and wheels of a 35,000 lb. GVWR commercial chassis have an overall diameter of 41". However, this only yields an underaxle bowl clearance of about 9.5". It would require extremely large wheel and tires on small commercial chassis to achieve the 10.5" underaxle bowl clearance even if it did not violate Federal regulations. It is also noted that the same underaxle bowl clearance of 10.5" for a small truck carrying 120 gallons of water is also specified for a large ARFF vehicle carrying up to 1585 gallons of water equipped with an active suspension system.

From a safety standpoint, commercial chassis are limited to an overall width of 102" or less in order to comply with Federal and state legal restrictions for use on Interstate and state highways. If it were possible to increase the wheel/rim size on commercial vehicles to comply with the 10.5" underaxle requirement, it would significantly increase the vertical center of gravity. Thus making it difficult to meet the 30 degree side slope stability test and increasing the roll-over potential.

Committee Meeting Action: Accept in Principle

Revise text as follows:

**Table 4.1.1(b)** [Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal] Underaxle clearance at differential housing bowl (in.)

<table>
<thead>
<tr>
<th></th>
<th>(ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>8.5</td>
</tr>
</tbody>
</table>

Committee Statement: While the committee agrees with the submitters proposed change there was noted to be a typographical error in his proposal that the committee has corrected.

Submitters: Jason Shively, Oshkosh Corporation

Recommendation: Revise text to read as follows:

**Table 4.1.1(b)** [Vehicle Water Tank Capacity ≥ 120 to ≤ 528 gal] Underaxle clearance at differential housing bowl (in.)

<table>
<thead>
<tr>
<th></th>
<th>(ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.5</td>
</tr>
<tr>
<td></td>
<td>8</td>
</tr>
</tbody>
</table>

Substantiation: ARFF vehicles with water tank capacity ≥ 120 to ≤ 528 gallons almost always use commercial chassis. Available commercial chassis can not meet the 10.5" requirement. Commercial chassis manufactures have standard tire size, suspension, and cab sizes that dictate the underaxle clearance.

Committee Meeting Action: Accept in Principle

Committee Statement: See committee action and committee statement on 414-33 (Log #19).
414-35  Log #53
(Table 4.1.1(c), 2a.b. i, ii, and iii)

Submitter: Kevin J. Petit, Akron Brass Company
Recommendation: Revise text to read as follows:
Table 4.1.1(c), 2a.b.
i. Straight/far point (ft): ≥46 23 m
ii. Dispersed/far point (ft): ≥45 12 m
iii. Dispersed/width (ft) ≥9 4 m
Substantiation: For the minimum flow rate of 227 lpm specified in 4.1.1(c)2.a.a., the stream and dispersed pattern distances are not achievable. Testing indicates the values reported in (3) above are reasonable for nozzles designed for turret applications.
Committee Meeting Action: Reject
Committee Statement: These numbers were already corrected and addressed by the committee in Proposal 414-43 (Log #21).

414-36  Log #37
(4.1.1(d))

Recommendation: New text to read as follows:
Add under 3e Hose length(ft) ≥ 200'
Substantiation: Distance to aircraft and then up to the door and down the fuselage a minimum of 200’ is required. We have two dedicated handlines of 300’ to make the distance on large wide body aircraft. With only 150’ you barely get inside the fuselage.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local specification and is not appropriate to require this on all ARFF vehicles.

414-37  Log #44
(4.1.1(d))

Recommendation: New text to read as follows:
Add under 3b.d. Hose length(ft) ≥ 150’ for dual agent woven jacket lines.
Substantiation: Due to the distance to aircraft you can use a two hoses with woven jacket lines for the dual line and be able to flow both agents correctly. Gives the apparatus a room with out being on top of the aircraft.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local specification and is not appropriate to require this on all ARFF vehicles.

NFPA 414

414-38  Log #61
(414.1.1(d))

Final Action: Accept in Principle

Submitter: Jason Shively, Oshkosh Corporation

Recommendation: Revise text to read as follows:

Table 4.1.1(d), 2.c.b  Straight/far point (ft) ≥ 150
Table 4.1.1(d), 2.c.c.i  Dispersed/far point (ft) ≥ 50
Table 4.1.1(d), 2.c.c.ii  Dispersed/width (ft) ≥ 15

Substantiation: The current discharge distances can not be met at a minimum flow rate of 60 gpm [Table 4.1.1(d) 2a.a]. According to a turret manufacturer, to get a cast distance of 150 feet, the water flow would need to be 250 gpm. The proposed distances are aligned with handline distances [Table 4.1.1(d) 3a.b & c] and should also align with roof turret distances.

Committee Meeting Action: Accept in Principle
Committee Statement: See committee action and committee statement on 414-43 (Log #20).

414-39  Log #63
(414.1.1(d))

Final Action: Reject

Submitter: Jason Shively, Oshkosh Corporation

Recommendation: Revise text to read as follows:

Table 4.1.1(d), 4b. [Vehicle Water Tank Capacity ≥ 120 to ≤ 528 gal] a. Discharge rate (lb/sec) ≥ 16 and ≤ 22

greater than or equal to 8

Substantiation: Vehicles with water tank capacity ≥ 120 to ≤ 528 gal have turret discharge capacities lower than larger vehicles and are more aligned with handline capacities. This is true for water as it is for dry chemical. Dry chemical discharge capacities are lower for the smaller vehicles because that is what is commercially available. The proposed discharge rate could be adopted from the FAA Circular 150/5220-10D, Section 4.13, Table 2 which requires ≥ 8 lbs/sec.

Committee Meeting Action: Reject
Committee Statement: See committee action and committee statement on 414-44 (Log #1).

414-40  Log #67
(414.1.1(d))

Final Action: Accept in Principle

Submitter: Jason Shively, Oshkosh Corporation

Recommendation: Revise text to read as follows:

Table 4.1.1(d), 2.a.b.i  Straight/far point (ft) ≥ 150
Table 4.1.1(d), 2.a.b.ii  Dispersed/far point (ft) ≥ 50
Table 4.1.1(d), 2.a.b.iii  Dispersed/width (ft) ≥ 15

Substantiation: The current discharge distances can not be met at a minimum flow rate of 60 gpm [Table 4.1.1(d) 2a.a]. According to a turret manufacturer, to get a cast distance of 150 feet, the water flow would need to be 250 gpm. The proposed distances are aligned with handline distances [Table 4.1.1(d) 3a.b & c] and align with bumper turret distances.

Committee Meeting Action: Accept in Principle
Committee Statement: See committee action on 414-43 (Log #21).
414-41 Log #54
(Table 4.1.1(d), 2a.b. i, ii, and iii)
Final Action: Reject

Submitter: Kevin J. Petit, Akron Brass Company
Recommendation: Revise text to read as follows:
Table 4.1.1(d), 2a.b.
  i. Straight/far point (ft): ≥150 ft
  ii. Dispersed/far point (ft): ≥50 ft
  III. Dispersed/width (ft) ≥30 ft

Substantiation: For the minimum flow rate of 60 gpm specified in 4.1.1(d)2.a.a., the stream and dispersed pattern
distances are not achievable. Testing indicates the values reported in (3) above are reasonable for nozzles designed
for turret applications.

Committee Meeting Action: Reject
Committee Statement: These numbers were already corrected and addressed by the committee in Proposal 414-43
(Log #21).

414-42 Log #20
(Table 4.1.1(d), 2a.b. i., ii., and iii.)
Final Action: Accept

Submitter: Grady North, Crash Rescue Equipment Service, Inc.
Recommendation: Revise text as follows:
Table 4.1.1(d), 2a.b.
  i. Straight/far point (ft) ≥65 ft
  ii. Dispersed/far point (ft) ≥20 ft
  iii. Dispersed/width (ft) ≥15 ft

Substantiation: At the specified minimum flow as listed in Table 4.1.1(d) [Vehicle Water Tank Capacity ≥ 120 to ≤ 525
gal] 2a. Roof Turret: a. of ≥ 60 gpm, it is not physically possible for a stream to meet the straight stream far point,
dispersed far point or dispersed width. In fact, it is not possible at 100 gpm. This change matches the handline nozzle
discharge requirements at 95 gpm (60 gpm for dual agent lines) of ≥ 65 ft for straight stream far point, ≥ 20 ft. for the
dispersed range and ≥ 15 ft. for the dispersed width. The performance requirements as currently stated would require a
minimum flow of approximately 250 gpm for the Roof Turret.

Committee Meeting Action: Accept

414-43 Log #21
(Table 4.1.1(d), 2c.b. i. and ii.)
Final Action: Accept

Submitter: Grady North, Crash Rescue Equipment Service, Inc.
Recommendation: Revise text as follows:
Table 4.1.1(d), 2c.
  b. Straight stream distance (ft) ≥65 ft
  c.i. Dispersed/far point (ft) ≥20 ft
  c.ii Dispersed/width (ft) ≥15 ft

Substantiation: At the specified minimum flow as listed in Table 4.1.1(d) [Vehicle Water Tank Capacity ≥ 120 to ≤ 525
gal] 2c. Bumper Turret: a. of ≥ 60 gpm, it is not physically possible for a stream to meet the straight stream far point,
dispersed far point or dispersed width. In fact, it is not possible at 100 gpm. This change matches the handline nozzle
discharge requirements at 95 gpm (60 gpm for dual agent lines) of ≥ 65 ft for straight stream far point, ≥ 20 ft. for the
dispersed range and ≥ 15 ft. for the dispersed width. The performance requirements as currently stated would require a
minimum flow of approximately 250 gpm for the Bumper Turret.

Committee Meeting Action: Accept
Revise text as follows:

**Table 4.1.1.(d)4.b.a. [Vehicle Water Tank Capacity ≥ 120 to ≤ 528 gal]**
a. Discharge rate (lb/sec) >16 and ≤ 22 (7)

4.23.1.1 The dry chemical turret performance shall be in accordance with Table 4.1.1(c) and Table 4.1.1(d). Where entrained dry chemical discharge is specified for water tank capacity under 528 gallons the dry chemical flow rate shown in parentheses in Table 4.1.11(c) and 4.1.1(d).

**Substantiation:** Currently the flow rates for the primary turret (Vehicle Water Tank Capacity ≥ 120 to ≤ 525 gal) are as low as 60 gpm. This flow rate is comparable to handline nozzles. The physical design of entrained dry chemical nozzles under 250 gpm does not allow for a large passageway for the dry chemical discharge. Entrained dry chemical nozzles are usually discharged in small bursts allowing the water/foam stream to carry the dry powder to the target. Separate dry chemical nozzles require a larger mass flow in order to achieve discharge distance. The text change will allow users to specify small entrained dry chemical nozzles for turret application while maintaining the option for separate water/foam and dry chemical nozzles.

**Committee Meeting Action:** Accept
Submitter: Joseph A. Wright, ARFF Technical Services, Inc.

Recommendation: Insert new 4.1.2 to read as follows: There are two types of fire fighting vehicles which are generally used for making the aviation emergency response by definition they are either considered Combined Agent vehicle or a Major ARFF Vehicle.

- a. Built on a commercially available chassis, by a Fire Apparatus Manufacturer (AFM) this smaller category of Combined Agent Vehicle shall encompass the range of water capacity commencing at 454 L (120 gal) and extending to 1999 L (528 gal). In addition to carrying foam as a primary agent, either dry chemical or Halogenated clean extinguishing agent also shall be carried as an auxiliary agent.

- b. Major ARFF Vehicles built by Original Equipment Manufactures (OEM) including the chassis, cab, body and fire package, having greater than >1999 L or 528 gal, vehicle water Tank capacity In addition to carrying foam as a primary agent, either dry chemical or Halogenated clean extinguishing agent also shall be carried as an auxiliary agent.

Substantiation: Although there are some of the performance characteristics of the smaller class of vehicles contained within the document there is limited information contained within the document that states that there are smaller combined agent vehicles utilized as well Major ARFF Vehicle on airports Therefore this type of vehicle needs to be acknowledged and information needs to be explained and provided within the document. Specific to these smaller combined agent vehicles.

Committee Meeting Action: Reject

Committee Statement: The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.
414-47 Log #133
(4.1.2) Final Action: Reject

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: 4.1 General
New 4.1.2. new Insert-5-1.2 renumbered
The following quantities of water and auxiliary agent shall establish the class of vehicle:
Table 5-1.2 Commercially Available Chassis Combined Agent Vehicle Classes

***Insert Table 4.1.2 here***

Substantiation: Although there are some of the performance characteristics of the smaller class of vehicles contained within the document there is limited information contained within the document on the distinct different vehicle classes which there are three. When the committee eliminated the combined agent chapter in the early 1990’s they eliminated all three classes and blocked them into one category and they are distinct different vehicles with slightly different characteristics. Therefore this information needs to be explained and provided within the document.

5-1.2 The following quantities of water and auxiliary agent shall establish the class of vehicle:
Table 5-1.2 Commercially Available Chassis Combined Agent Vehicle Classes
Minimum Water
Capacity Minimum Auxiliary Agent

Committee Meeting Action: Reject
Committee Statement: The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.
<table>
<thead>
<tr>
<th>Class</th>
<th>(L)</th>
<th>(G)</th>
<th>(kg)</th>
<th>(lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>454</td>
<td>120</td>
<td>204</td>
<td>450</td>
</tr>
<tr>
<td>2</td>
<td>122</td>
<td>324</td>
<td>204</td>
<td>450</td>
</tr>
<tr>
<td>3</td>
<td>199</td>
<td>528</td>
<td>204</td>
<td>450</td>
</tr>
</tbody>
</table>
414-48  Log #134  Final Action: Reject
(4.1.2 and Table 4.1.2 (New))

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation:  4.1 General.
New 4.1.2 new Insert 5.1.2 renumbered
The following quantities of water and auxiliary agent shall establish the class of vehicle:
Table 5.1.2 Commercially Available Chassis Combined Agent Vehicle Classes

<table>
<thead>
<tr>
<th>Minimum Water Capacity Minimum Auxiliary Agent</th>
</tr>
</thead>
</table>

The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.

Substantiation: Although there are some of the performance characteristics of the smaller class of vehicles contained within the document there is limited information contained within the document on the distinct different vehicle classes, therefore there needs to be four tables installed in the document to illustrate these classes of combined agent vehicles.
The following quantities of water and auxiliary agent shall establish the class of vehicle:
Table 5-1.2 Commercially Available Chassis Combined Agent Vehicle Classes

<table>
<thead>
<tr>
<th>Minimum Water</th>
</tr>
</thead>
</table>

Committee Meeting Action:  Reject
Committee Statement: The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.
<table>
<thead>
<tr>
<th>Class</th>
<th>Minimum Water Capacity (L)</th>
<th>Minimum Auxiliary Agent (G)</th>
<th>(kg)</th>
<th>(lb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>454</td>
<td>120</td>
<td>204</td>
<td>450</td>
</tr>
<tr>
<td>2</td>
<td>1226</td>
<td>324</td>
<td>204</td>
<td>450</td>
</tr>
<tr>
<td>3</td>
<td>1999</td>
<td>528</td>
<td>204</td>
<td>450</td>
</tr>
</tbody>
</table>
### 4.X.1(a) Fully Loaded Vehicle Performance Parameters For Commercial Available Chassis (SI Units)

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Commercially Available Chassis</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Side slope stability (degrees)</td>
<td></td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Dynamic balance (kph), minimum speed on a (30 m) radius circle</td>
<td></td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>Angle of approach (degrees)</td>
<td></td>
<td>27*</td>
<td>27*</td>
<td>30</td>
</tr>
<tr>
<td>Interaxle clearance (degrees)</td>
<td></td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Underbody clearance (cm)</td>
<td></td>
<td>30.5</td>
<td>30.5</td>
<td>33</td>
</tr>
<tr>
<td>Underaxle clearance at differential housing bowl (cm)</td>
<td></td>
<td>26.7**</td>
<td>26.7**</td>
<td>26.7</td>
</tr>
<tr>
<td>Diagonal opposite wheel motion</td>
<td></td>
<td>25.4</td>
<td>25.4</td>
<td>25.4</td>
</tr>
<tr>
<td>Wall-to-wall turning diameter</td>
<td></td>
<td>&lt;Three times the vehicle’s overall length</td>
<td>&lt;Three times the vehicle’s overall length</td>
<td>&lt;Three times the vehicle’s overall length</td>
</tr>
<tr>
<td>Maximum acceleration time from 0 to 80.5 kph (see)</td>
<td></td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Top speed (kph)</td>
<td></td>
<td>113</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Service brake:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stopping distance from 33 kph (m)</td>
<td></td>
<td>&lt;11</td>
<td>&lt;11</td>
<td>&lt;11</td>
</tr>
<tr>
<td>From 64 kph (m)</td>
<td></td>
<td>&lt;40m</td>
<td>&lt;40m</td>
<td>&lt;40m</td>
</tr>
<tr>
<td>Percent grand holding of fully loaded vehicle:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ascending</td>
<td></td>
<td>50 percent</td>
<td>50 percent</td>
<td>50 percent</td>
</tr>
<tr>
<td>Descending</td>
<td></td>
<td>&gt;20 percent</td>
<td>&gt;20 percent</td>
<td>&gt;20 percent</td>
</tr>
<tr>
<td>Emergency brake stopping distance at 64 kph (m)</td>
<td></td>
<td>&lt;88m</td>
<td>&lt;88m</td>
<td>&lt;88m</td>
</tr>
<tr>
<td>Evasive maneuver test, NATO Document AVTP 03-16W (kph)</td>
<td></td>
<td>40</td>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>“J” turn test at 46 m radius (kph)</td>
<td></td>
<td>48</td>
<td>48</td>
<td>48</td>
</tr>
</tbody>
</table>

*Fuel Tanks or Chassis heights cannot be modified in commercially available chassis for this class of vehicles to meet 30 degree approach or departure angle.

**Must have skid protection if it cannot be met with commercially available chassis.
### 4.X.1(b) Fully Loaded Vehicle Performance Parameters (U.S. Customary Units)

**Minimum Usable Capacity**

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vehicle Water Tank Capacity</td>
<td>&gt;120 Gallon</td>
<td>&lt;324 Gallons</td>
<td>&lt;528 Gallons</td>
</tr>
<tr>
<td>Side slope stability (degrees)</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Dynamic balance (kph), minimum speed on a (30 m) radius circle</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Angle of approach (degrees)</td>
<td>27*</td>
<td>27*</td>
<td>30</td>
</tr>
<tr>
<td>Interaxle clearance (degrees)</td>
<td>12</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Underbody clearance (in.)</td>
<td>12</td>
<td>12</td>
<td>13</td>
</tr>
<tr>
<td>Underaxle clearance at differential housing bowl (in.)</td>
<td>8</td>
<td>8</td>
<td>10.5</td>
</tr>
<tr>
<td>Diagonal opposite wheel motion (in)</td>
<td>10</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Wall-to-wall turning diameter</td>
<td>&lt;Three times the vehicle’s overall length</td>
<td>&lt;Three times the vehicle’s overall length</td>
<td>&lt;Three times the vehicle’s overall length</td>
</tr>
<tr>
<td>Maximum acceleration time from 0 to 50 mph (sec)</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>Top speed (mph)</td>
<td>113</td>
<td>113</td>
<td>113</td>
</tr>
<tr>
<td>Service brake: Stopping distance from 20 mph (ft)</td>
<td>&lt;35</td>
<td>&lt;35</td>
<td>&lt;35</td>
</tr>
<tr>
<td>From 40 mph (ft)</td>
<td>&lt;131</td>
<td>&lt;131</td>
<td>&lt;131</td>
</tr>
<tr>
<td>Percent grade holding of fully loaded vehicle: Ascending</td>
<td>50 percent</td>
<td>50 percent</td>
<td>50 percent</td>
</tr>
<tr>
<td>Descending</td>
<td>50 percent</td>
<td>50 percent</td>
<td>50 percent</td>
</tr>
<tr>
<td>Emergency brake stopping distance at 40 mph (ft)</td>
<td>&lt;288</td>
<td>&lt;288</td>
<td>&lt;288</td>
</tr>
<tr>
<td>Parking brake: Percent grade holding for the parking brake Ascending</td>
<td>&gt;20 percent</td>
<td>&gt;20 percent</td>
<td>&gt;20 percent</td>
</tr>
<tr>
<td>Descending</td>
<td>&gt;20 percent</td>
<td>&gt;20 percent</td>
<td>&gt;20 percent</td>
</tr>
<tr>
<td>Evasive maneuver test, NATO Document AVTP 03-16W (mph)</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>“J” turn test at 46 m radius (mph)</td>
<td>30</td>
<td>30</td>
<td>30</td>
</tr>
</tbody>
</table>

*Fuel Tanks or Chassis heights cannot be modified in commercially available chassis for this class of vehicles to meet 30-degree approach or departure angle.

**Must have skid plate protection if it cannot be met with commercially available chassis.
### Minimum Usable Capacity

<table>
<thead>
<tr>
<th>Performance Parameters</th>
<th>Commercially Available Chassis</th>
<th>Class 1</th>
<th>Class 2</th>
<th>Class 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Vehicle Water Tank Capacity</td>
<td>&gt;454 L</td>
<td>&lt;1226 L</td>
<td>&lt;1999 L</td>
</tr>
<tr>
<td>1. Water tank percent of deliverable water</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. On level ground</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>b. On 20 percent side slope</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>c. 30 percent ascending/descending grade</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>2. Turret discharge-Roof or Bumper* Preferred</td>
<td>*Total flow rate can be achieved with handlines</td>
<td>*Total flow rate can be achieved with handlines</td>
<td>*Total flow rate can be achieved with handlines</td>
<td></td>
</tr>
<tr>
<td>a. total minimum flow rate (lpm) OR</td>
<td>&gt;227</td>
<td>&gt;227</td>
<td>&gt;360</td>
<td></td>
</tr>
<tr>
<td>b. Stream Pattern Distance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I. Straight/far point (m)</td>
<td>&gt;20</td>
<td>&gt;20</td>
<td>&gt;29</td>
<td></td>
</tr>
<tr>
<td>II. Dispersed/far point (m)</td>
<td>&gt;9</td>
<td>&gt;9</td>
<td>&gt;9</td>
<td></td>
</tr>
<tr>
<td>III. Dispersed/width (ft)</td>
<td>&gt;6</td>
<td>&gt;6</td>
<td>&gt;9</td>
<td></td>
</tr>
<tr>
<td>IV. Near Point (ft)</td>
<td>&gt;6</td>
<td>&gt;6</td>
<td>&gt;9</td>
<td></td>
</tr>
<tr>
<td>b. Total minimum flow rate with Compressed Air Foam Turret (lpm)</td>
<td>&gt;151</td>
<td>&gt;151</td>
<td>&gt;227 or &gt;360 When specified</td>
<td></td>
</tr>
<tr>
<td>i. Straight/far point (m)</td>
<td>&gt;20</td>
<td>&gt;20</td>
<td>&gt;23 or &gt;30 When specified</td>
<td></td>
</tr>
<tr>
<td>c. Under-truck Nozzle (lpm)</td>
<td></td>
<td>&gt;360 When Specified&gt;56</td>
<td></td>
<td></td>
</tr>
<tr>
<td>d. Piercing nozzle flow rate (gpm)</td>
<td>&gt;227 When Specified</td>
<td>&gt;227 When Specified</td>
<td>&gt;360 When Specified</td>
<td></td>
</tr>
<tr>
<td>3. Number of water/foam handlines required per vehicle (select from following)</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3a. Woven jacket water/foam hand line:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Nozzle Flow rate (lpm)</td>
<td>227</td>
<td>227</td>
<td>360</td>
<td></td>
</tr>
<tr>
<td>b. Straight Stream Far Point (m)</td>
<td>&gt;16</td>
<td>&gt;16</td>
<td>&gt;20</td>
<td></td>
</tr>
<tr>
<td>c. Dispersed Stream:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Range (m)</td>
<td>&gt;6</td>
<td>&gt;6</td>
<td>&gt;6</td>
<td></td>
</tr>
<tr>
<td>ii. Width (m)</td>
<td>&gt;4.5</td>
<td>&gt;4.5</td>
<td>&gt;4.5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------------</td>
<td>--------</td>
<td>--------</td>
<td>--------</td>
<td></td>
</tr>
<tr>
<td>d. Hose inside Diameter (cm)</td>
<td>&gt;3.8</td>
<td>&gt;3.8</td>
<td>&gt;3.8</td>
<td></td>
</tr>
<tr>
<td>e. Hose Length (m)</td>
<td>46 minimum</td>
<td>46 minimum</td>
<td>46 minimum</td>
<td></td>
</tr>
<tr>
<td>4.a. Reeled Water Foam Hand line:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Nozzle Flow Rate (lpm)</td>
<td>&gt;227</td>
<td>&gt;227</td>
<td>&gt;360-227 For Dual Agent Handlines</td>
<td></td>
</tr>
<tr>
<td>f. Straight Stream Far Point (mt)</td>
<td>&gt;16</td>
<td>&gt;16</td>
<td>&gt;20</td>
<td></td>
</tr>
<tr>
<td>g. Dispersed Stream:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>i. Range (m)</td>
<td>&gt;20</td>
<td>&gt;20</td>
<td>&gt;20</td>
<td></td>
</tr>
<tr>
<td>ii. Width (m)</td>
<td>&gt;15</td>
<td>&gt;15</td>
<td>&gt;15</td>
<td></td>
</tr>
<tr>
<td>h. Hose inside Diameter (cm)</td>
<td>&gt;3.8</td>
<td>&gt;3.8</td>
<td>&gt;3.8</td>
<td></td>
</tr>
<tr>
<td>i. Hose Length (ft)</td>
<td>46 minimum</td>
<td>46 minimum</td>
<td>46 minimum (&gt;30 m for dual agents lines)</td>
<td></td>
</tr>
<tr>
<td>5. Compressed Air Foam Handline:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Nozzle Flow Rate: Straight Bore</td>
<td>&gt;151</td>
<td>&gt;227</td>
<td>&gt;360</td>
<td></td>
</tr>
<tr>
<td>b. Far Range (m)</td>
<td>&gt;20</td>
<td>&gt;23</td>
<td>&gt;30</td>
<td></td>
</tr>
<tr>
<td>6. Complementary Agent</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Capacity (kg)</td>
<td>&gt;45</td>
<td>&gt;45</td>
<td>&gt;45</td>
<td></td>
</tr>
<tr>
<td>6a. Dry chemical handline:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Discharge rate (kg/sec)</td>
<td>&gt;2.3</td>
<td>&gt;2.3</td>
<td>&gt;2.3</td>
<td></td>
</tr>
<tr>
<td>b. Range (m)</td>
<td>28</td>
<td>28</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>c. Hose length (mi)</td>
<td>&gt;30</td>
<td>&gt;30</td>
<td>&gt;30</td>
<td></td>
</tr>
</tbody>
</table>
4.X.1(d) Agent Performance Parameters For Commercial Available Chassis (U.S. Customary Units)

<table>
<thead>
<tr>
<th>Minimum Usable Capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Commercially Available Chassis</strong></td>
</tr>
<tr>
<td><strong>Performance Parameters</strong></td>
</tr>
<tr>
<td>1. Water tank percent of deliverable water</td>
</tr>
<tr>
<td>a. On level ground</td>
</tr>
<tr>
<td>b. On 20 percent side slope</td>
</tr>
<tr>
<td>c. 30 percent ascending/descending grade</td>
</tr>
<tr>
<td>2. Turret discharge-Roof or Bumper preferred</td>
</tr>
<tr>
<td>a. Total minimum flow rate (lpm) OR</td>
</tr>
<tr>
<td>b. Stream Pattern Distance</td>
</tr>
<tr>
<td>V. Straight/far point (ft)</td>
</tr>
<tr>
<td>VI. Dispersed/far point (ft)</td>
</tr>
<tr>
<td>VII. Dispersed/width (ft)</td>
</tr>
<tr>
<td>VIII. Near Point (ft)</td>
</tr>
<tr>
<td>b. Total minimum flow rate with Compressed Air Foam Turret (gpm)</td>
</tr>
<tr>
<td>i. Straight/far point (ft)</td>
</tr>
<tr>
<td>c. Under-truck Nozzle (gpm)</td>
</tr>
<tr>
<td>2d. Piercing nozzle flow rate (gpm)</td>
</tr>
<tr>
<td>3. Number of water/foam handlines required per vehicle (select from following)</td>
</tr>
<tr>
<td>3a. Woven jacket water/foam handline:</td>
</tr>
<tr>
<td>j. Nozzle Flow Rate (gpm)</td>
</tr>
<tr>
<td>k. Straight Stream Far Point (ft)</td>
</tr>
<tr>
<td>l. Dispersed Stream:</td>
</tr>
<tr>
<td>i. Range (ft)</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>i. Width(ft)</td>
</tr>
<tr>
<td>m. Hose inside Diameter (in.)</td>
</tr>
<tr>
<td>n. Hose Length (ft)</td>
</tr>
<tr>
<td>4.a. Reeled Water/Foam Hand line:</td>
</tr>
<tr>
<td>b. Nozzle Flow Rate (gpm)</td>
</tr>
<tr>
<td>o. Straight Stream Far Point (ft)</td>
</tr>
<tr>
<td>p. Dispersed Stream:</td>
</tr>
<tr>
<td>i. Range (ft)</td>
</tr>
<tr>
<td>ii. Width (ft)</td>
</tr>
<tr>
<td>q. Hose inside Diameter (in)</td>
</tr>
<tr>
<td>r. Hose Length (ft)</td>
</tr>
<tr>
<td>5. Compressed Air Foam Handline:</td>
</tr>
<tr>
<td>c. Nozzle Flow Rate: Straight Bore</td>
</tr>
<tr>
<td>d. far Range (ft)</td>
</tr>
<tr>
<td>6. complementary Agent</td>
</tr>
<tr>
<td>a. Capacity (lb)</td>
</tr>
<tr>
<td>6a. Dry chemical handline:</td>
</tr>
<tr>
<td>a. Discharge rate (lb/sec)</td>
</tr>
<tr>
<td>b. Range (ft)</td>
</tr>
<tr>
<td>c. Hose length (ft)</td>
</tr>
<tr>
<td>7a. Halogenated</td>
</tr>
<tr>
<td>Agent Handline:</td>
</tr>
<tr>
<td>---------------------------------</td>
</tr>
<tr>
<td>e. Discharge Rate (lb/sec)</td>
</tr>
<tr>
<td>f. Range</td>
</tr>
<tr>
<td>g. Hose Inside Diameter (in)</td>
</tr>
<tr>
<td>h. Hose Length</td>
</tr>
</tbody>
</table>
Joseph A. Wright, ARFF Technical Services, Inc.

**New** 4.1.2.XX Insert the following information pertaining to small combined agent vehicles into existing tables or provide new table as provided in alternative proposal.

### 4.1.2.2.1 Combined Agent Vehicle applicable performance characteristics:

Underchassis clearance of the vehicle shall allow mobility in soft soils and rough terrain. The minimum dimensions shall be as follows:

- (a) Angle of approach — 30 degrees;
- (b) Angle of departure — 30 degrees; *27° degrees minimum without modification*;
- (c) Interaxle clearance angle — 12 degrees;
- (d) Underaxle clearance — Classes 1 and 2, 20.3-cm, (8-in);
- (f) Under axle differential housing bowl; 25.4-cm, (10.5 in);
- (e) Underbody clearance, Classes 1 and 2 — 13 in. (33.0 cm);
- (g) Underbody clearance, Class 3, 10 in. (26.7 cm);
- (h) Underbody clearance, Class 3, 18 in. (45.7 cm);

* Modifications to the OEM’s chassis or fuel tanks shall not be made to commercially available chassis to reach 30° departure angle.

**Substantiation**: Although there are some of the performance characteristics of the smaller class of vehicles contained within the document there is limited information contained within the document on the district different vehicle classes, therefore this information needs to be added to the existing performance tables or alternative tables need to be added.

The following quantities of water and auxiliary agent shall establish the class of vehicle:

**Table 5-1.2 Commercially Available Chassis Combined Agent Vehicle Classes**

<table>
<thead>
<tr>
<th>Minimum Water Capacity</th>
<th>Minimum Auxiliary Agent</th>
</tr>
</thead>
</table>

* The submitter noted that this information was once part of this document and was removed in a previous revision but feels that the requirements needed to be brought back into the document due to the changing needs of the end user. The committee deliberated openly on this issue for some time and concluded that this information could be restrictive and impose limits that are unnecessary on the purchaser with respect to the particular vehicle they were drafting specifications for.

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**Technical Committee on Aircraft Rescue and Fire Fighting,**

*Modify text to read as follows:*

The actual gross vehicle weight of a fully staffed, loaded, and equipped vehicle ready for service shall not exceed the manufacturer’s tested weight rating as recorded on the vehicle information data plate.

**Substantiation**: The committee as removed an unenforceable term as per the Manual of Style.

**Committee Meeting Action**: Accept
414-51  Log #CP12
(4.2.1.2)
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.2.1.2* The weight shall be distributed as equally as practical over the axles and tires of the fully loaded vehicle.
Substantiation: The committee as removed an unenforceable term as per the Manual of Style.
Committee Meeting Action: Accept

414-52  Log #4
(4.2.1.2.2)
Submitter: Grady North, Crash Rescue Equipment Service, Inc.
Recommendation: Revise text as follows:
4.2.1.2.2 The difference in weight between any two axles shall not exceed 10 percent of the weight of the heaviest axle if the heavy axle is a rear axle. This requirement shall not apply to small commercial vehicles with a capacity of < 528 gallons.
Substantiation: Virtually all chassis used to manufacture vehicles with a water tank capacity ≥ 120 to ≤ 528 gallon are commercial type with dual rear wheels. Paragraph 4.7.5 allows dual wheels to be used on vehicles with capacity up to 500 gallons. However, if dual rear wheels are used and paragraph 4.2.1.2.1 is required “The difference in weight between tires on any axle shall not exceed 5% of the average tire weight for that axle”, the difference in weight between axles could be 50% or more. Currently it is not possible to comply with paragraph 4.2.1.2.2 if paragraph 4.7.5 is used.
Committee Meeting Action: Accept

414-53  Log #60
(4.2.1.2.2)
Submitter: Jason Shively, Oshkosh Corporation
Recommendation: New text to read as follows:
4.2.1.2.2 The difference in weight between any two axles shall not exceed 10 percent of the weight of the heaviest axle if the heavy axle is a rear axle. This requirement shall be exempt from commercial chassis vehicles with water tank capacity of < 1,528 gallons.
Substantiation: The use of a commercial chassis limits the design flexibility for the vehicle manufacturer to meet this specification. For example, the water would need to be on top or inside the cab of a commercial chassis vehicle with a water tank capacity ≥ 120 to ≤ 528 gallon to meet this specification. The FAA Advisory Circular 150/5220-10D already recognizes this issue and makes this specification exempt for vehicles with a water tank capacity of < 1,500 gallons.
Committee Meeting Action: Accept in Principle
Committee Statement: See committee action on 414-52 (Log #4).
414-54  Log #137
(4.2.1.2.2)

Final Action: Reject

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation:  Insert new wording

4.2.1.2.2 The difference in weight between any two axles shall not exceed 10 percent of the weight of the heaviest axle if the heavy axle is a rear axle. This requirement shall not apply to small commercial vehicles with a capacity of < 528 gallons. Commercially available chassis combined agent vehicles may have dual wheels per axles side to maintain the vehicles rear axle weight capability.

Substantiation: Commercially available dual rear wheeled, axles are commonly used in the fire fighting industry for various forms of smaller gross weight vehicles such as rescue vehicles, ambulances, hazmat, and mini-pumpers. These types of dual rear wheel combined agent vehicles, can be found in successful use throughout the airport fire fighting industry at airports worldwide as a low cost alternative to purchases Major ARFF Vehicles to meet their ARFF mission response requirements.

This is not original material; its reference/source is as follows:
Earlier version of 414 document.
Committee Meeting Action: Reject
Committee Statement: This was rejected as it is a repeat of Proposal 414-52 (Log #4), in concept, for which the committee acted on.

414-55  Log #47
(4.2.1.2.4)

Final Action: Reject

Recommendation: New text to read as follows:

4.2.1.2.4 Under no circumstances shall the axle and tire manufacturers’ ratings be exceeded. This includes length of time traveled and distance traveled. If it will not meet the ability of the apparatus, then a placard must be placed in drivers view of the tires limitation and actions needed to be taken for extended travel.

Substantiation: These apparatus could be required to travel distances of more than 50 miles at highway speed. If the tire has a restriction it should placard on dash showing limitations and actions needed to be taken.

Committee Meeting Action: Reject
Committee Statement: The committee notes that this is a local preference and the information written on the side wall of the tire is sufficient and adequate for the driver.
The vehicle also shall be driven on a steering pad around a circle and the steering wheel rotation shall increase with acceleration of speed to ensure the vehicle does not exhibit oversteer characteristics. (See 6.3.2.4 for test requirements.)

Substantiation: The statement implies that the test must be performed on all vehicles. However, the test reference 6.3.2.4 is in the section for Prototype Vehicle Tests. If in fact the test is required with every vehicle, the test section 6.3.2.4 should be moved to section 6.4 Operational Tests.

Committee Meeting Action: Accept in Principle

Modify text to read as follows:

The vehicle also shall be driven on a steering pad around a circle and the steering wheel rotation shall increase with acceleration of speed to ensure the vehicle does not exhibit oversteer characteristics. (See 6.3.2.4 for test requirements.)

Committee Statement: While the committee agrees with the submitters intent, the change in text provides further clarification and direction.

The committee agreed with the submitters intent, the change in text provides further clarification and direction.

Technical Committee on Aircraft Rescue and Fire Fighting,

Delete text and associated annex material for 4.2.2.2 and A.4.2.2.2.

The committee felt that this information was no longer needed in this document.

Committee Meeting Action: Accept
414-59    Log #CP15  Final Action: Accept
(4.2.2.3.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.2.2.3.1 The vehicle shall be constructed so that a seated driver, having an eye reference point of 80.7 cm (31¾ in.)
above the seat cushion and 30.5 cm (12 in.) forward from the seat back, shall be able:
(1) to see the ground 6.1 m (20 ft) ahead of the vehicle
(2) To have a field of vision of at least 5 degrees above the horizontal plane.
(3) Have a field of vision in the horizontal plane of at least 90 degrees on each side from the straight ahead position
(4) Not to have its vision obstructed by by more than 7 degrees per obstruction.
Substantiation: This was change was done to follow the Manual of Style.
Committee Meeting Action: Accept

414-60    Log #CP16  Final Action: Accept
(4.2.2.3.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Delete existing text and renumber accordingly:
4.2.2.3.2 The field of vision in the horizontal plane shall be at least 90 degrees on each side from the straight ahead
position and shall not create an obstruction of more than 7 degrees per obstruction.
Substantiation: These requirements were part of the change in text in Proposal 414-356 (Log #15).
Committee Meeting Action: Accept

414-61    Log #CP1  Final Action: Reject
(4.3.1.2.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Revise text to read as follows:
4.3.1.2.1 The maximum speed shall not be less than 104.6 kph (65 mph).
Substantiation: 4.3.1.2.1 should be updated to the values listed in Table 4.1.1(b).
This is not original material; its reference/source is as follows:
Terry Seaborn
Committee Meeting Action: Reject
Committee Statement: This has already been corrected by an errata.

414-62    Log #36  Final Action: Reject
(4.3.1.1)

Recommendation: New text to read as follows:
4.3.1.1 All automatic engine safety shutdowns shall be disabled to prevent shutdown while pumping. The engine
programming shall be so that it pumps till it seize.
Substantiation: The ARFF Vehicle is used as a pumper when fire personnel use the hand-lines on it for interior attack.
Not only is it an interior attack, it is in a confined space surround by large amounts of hazardous and flammable liquids.
If it cannot pump like a pumper, we should pull all hand-lines off them and not risk a fire-fighters life.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local specification and is not appropriate to require this on all
ARFF vehicles.
The apparatus must pass the NFPA pump test as a pumper. The apparatus shall be able to maintain the ability to perform a pump test annually for the life of the apparatus.

Substantiation: The ARFF Vehicle is used as a pumper when fire personnel use the hand-lines on it for interior attack. Not only is it an interior attack, it is in a confined space surround by large amounts of hazardous and flammable liquids. If it cannot perform a pump test, we should pull all hand-lines off them and not risk a fire-fighters life.

Committee Meeting Action: Reject

Committee Statement: The committee feels that pump test requirement is not appropriate and within the scope of this document.

The vehicle engine(s) shall have sufficient horsepower, torque, and speed characteristics to meet and maintain all vehicular performance characteristics specified in this standard.

This change was to follow the Manual of Style.

The acceleration times provided in Table 4.1.1(a) and Table 4.1.1(b) shall be achieved with the engine and transmission at their normal operating temperatures at any ambient temperature from -17.8°C to 43.3°C (0°F to 110°F) and at elevations up to 609.6 m (2000 ft) above sea level, unless a higher elevation is specified.

To be consistent with all of NFPA 414-07 if revised.

The committee feels that this is a local specification that they purchaser should make when ordering the vehicle.

The acceleration times provided in Table 4.1.1(a) and Table 4.1.1(b) shall be achieved with the engine(s) and transmission(s) at their normal the component manufacturers recommended operating temperatures at any ambient temperature from -17.8°C to 43.3°C (0°F to 110°F) and at elevations up to 609.6 m (2000 ft) above sea level, unless a higher elevation is specified.

This change was to comply with the Manual of Style.

The committee feels that this is a local specification that they purchaser should make when ordering the vehicle.
414-67  Log #138
(4.3.1.2.2.x (New))

**Final Action:** Reject

**Submitter:** Joseph A. Wright, ARFF Technical Services, Inc.

**Recommendation:** New 4.3.1.2.2.X. The maximum speed shall not be less than 104.6 km/h, (65 mph). Safety Note: If any vehicle accelerates from 0 km/h to 80.5 km/h, (0 mph to 50 mph) in less than 20 seconds, it shall meet the tilt table parameters of 35 degrees side slope as a minimum for all classes.

**Substantiation:** This statement was originally contained in the earlier document under combined agent vehicles. Since some manufactures are offering very high horsepower to weight ratio vehicles these vehicles should meet a tilt table angle of >35 degrees to assure the stability of the vehicle.

This is not original material; its reference/source is as follows:

Earlier version of 414 document.

Committee Meeting Action: Reject

**Committee Statement:** The submitter provided no conclusive data to support the submitters proposed change.

414-68  Log #CP20
(4.3.3.1)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.3.3.1 A complete fuel system shall be installed with the engine manufacturer's approval. shall include a fuel pump, fuel filtration, and flexible fuel lines, where necessary, that shall be protected from damage, exhaust heat, and exposure to ground fires.

**Substantiation:** This change was done to follow the Manual of Style.

Committee Meeting Action: Accept

414-69  Log #CP19
(4.3.3.2)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Delete existing section and renumber accordingly.

**Substantiation:** The committee feels that this requirement is has been already met in other requirements within this document.

Committee Meeting Action: Accept
414-70 Log #CP21 Final Action: Accept
(4.3.3.2)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Add new section to read as follows:

4.3.3.2 The fuel system shall be protected from:

(a) damage
(b) exhaust heat
(c) exposure to ground fires.
(d) vapor lock.

**Substantiation:** This section was re-written to follow the Manual of Style.

**Committee Meeting Action:** Accept

414-71 Log #CP23 Final Action: Accept
(4.3.3.3)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follow:

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

**Substantiation:** This change is to comply with the Manual of Style.

**Committee Meeting Action:** Accept

414-72 Log #6 Final Action: Accept
(4.3.3.1)

**Submitter:** Grady North, Crash Rescue Equipment Service, Inc.

**Recommendation:** Revise text as follows:

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

**Substantiation:** The requirement for a heated fuel water separator is listed as an option in A.4.1.5 (3) (e). If it is considered an option, it should not be mandatory in the body of the standard.

**Committee Meeting Action:** Accept

414-73 Log #64 Final Action: Accept in Principle
(4.3.3.1)

**Submitter:** Jason Shively, Oshkosh Corporation

**Recommendation:** Revise text to read as follows:

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

**Substantiation:** Commercial chassis typically used for vehicle water tank capacity > 120 to < 528 gal do not offer heated separators. OEM’s do not want to invalidate a chassis’ warranty or take on the liability of replacing a manufacturer’s component that may effect how the chassis runs.

**Committee Meeting Action:** Accept in Principle

**Committee Statement:** See committee action on 414-72 (Log #6).
414-74  Log #CP22
(4.3.3.5.1)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.3.3.5.1 The fuel tank shall have **sufficient** 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.

**Substantiation:** This change was to follow the Manual of Style.

**Committee Meeting Action:** Accept

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414-75  Log #CP24
(4.3.4.1)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.3.4.1 The exhaust system shall be of a size that avoids undue back pressure and shall be located and constructed in such a manner that entrance of exhaust discharge is directed away from any operators. Gases into the cab is minimized under all conditions of operation.

**Substantiation:** This change was to comply with the Manual of Style.

**Committee Meeting Action:** Accept

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414-76  Log #CP25
(4.3.4.3)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.3.4.3 The tail pipe shall be designed to discharge upward or to the rear and shall not be directed toward the ground.

**Substantiation:** The committee made this change to comply with the Manual of Style and for simplification.

**Committee Meeting Action:** Accept
Low-voltage electrical systems and warning devices shall comply with NFPA 1901, Chapter 13. (See Annex B.)

Any low voltage electrical systems or warning devices installed on the fire apparatus shall be appropriate for the mounting location and intended electrical load and shall meet the specific requirements of this section. [1901:2009]

Wiring.

All electrical circuit feeder wiring supplied and installed by the fire apparatus manufacturer shall meet the requirements of 4.4.1.1.2 through 4.4.1.1.23.

4.4.1.1.2 The circuit feeder wire shall be stranded copper or copper alloy conductors of a gauge rated to carry 125 percent of the maximum current for which the circuit is protected. [1901:2009]

4.4.1.1.3 Voltage drops in all wiring from the power source to the using device shall not exceed 10 percent. [1901:2009]

4.4.1.1.4 The use of star washers for circuit ground connections shall not be permitted.

4.4.1.1.5 All circuits shall otherwise be wired in conformance with SAE J1292, Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring. [1901:2009]

4.4.1.1.6 Wiring and Wire Harness Construction. [1901:2009]

4.4.1.1.7 All insulated wire and cable shall conform to SAE J1127, Low Voltage Battery Cable, or SAE J1128, Low Voltage Primary Cable, type SXL, GXL, or TXL. [1901:2009]

4.4.1.1.8 All conductors shall be constructed in accordance with SAE J1127 or SAE J1128, except where good engineering practice dictates special strand construction. [1901:2009]

4.4.1.1.9 Conductor materials and stranding, other than copper, shall be permitted if all applicable requirements for physical, electrical, and environmental conditions are met as dictated by the end application. [1901:2009]

4.4.1.1.10 Physical and dimensional values of conductor insulation shall be in conformance with the requirements of SAE J1127 or SAE J1128, except where good engineering practice dictates special conductor insulation. [1901:2009]

4.4.1.1.11 The overall covering of conductors shall be moisture-resistant loom or braid that has a minimum continuous rating of 194°F (90°C) except where good engineering practice dictates special consideration for loom installations exposed to higher temperatures. [1901:2009]

4.4.1.1.12 The overall covering of jacketed cables shall be moisture resistant and have a minimum continuous temperature rating of 194°F (90°C), except where good engineering practice dictates special consideration for cable installations exposed to higher temperatures. [1901:2009]

4.4.1.1.13 All wiring connections and terminations shall use a method that provides a positive mechanical and electrical connection. [1901:2009]
4.4.1.14 The wiring connections and terminations shall be installed in accordance with the device manufacturer’s instructions. [1901:2009]

4.4.1.15 All ungrounded electrical terminals shall have protective covers or be in enclosures. [1901:2009]

4.4.1.16 Wire nut, insulation displacement, and insulation piercing connections shall not be used. [1901:2009]

4.4.1.17 Wiring shall be restrained to prevent damage caused by chafing or ice buildup and protected against heat, liquid contaminants, or other environmental factors. [1901:2009]

4.4.1.18 Wiring shall be uniquely identified at least every 2 ft (0.6 m) by color coding or permanent marking with a circuit function code. [1901:2009]

4.4.1.19 Circuits shall be provided with properly rated low voltage overcurrent protective devices. [1901:2009]

4.4.1.20 Such devices shall be readily accessible and protected against heat in excess of the overcurrent device’s design range, mechanical damage, and water spray. [1901:2009]

4.4.1.21 Circuit protection shall be accomplished by utilizing fuses, circuit breakers, fusible links, or solid state equivalent devices. [1901:2009]

4.4.1.22 If a mechanical-type device is used, it shall conform to one of the following SAE standards:
   (1) SAE J156, Fusible Links
   (2) SAE J553, Circuit Breakers
   (3) SAE J554, Electric Fuses (Cartridge Type)
   (4) SAE J1888, High Current Time Lag Electric Fuses
   (5) SAE J2077, Miniature Blade Type Electrical Fuses [1901:2009]

4.4.1.23 Switches, relays, terminals, and connectors shall have a direct current (dc) rating of 125 percent of maximum current for which the circuit is protected. [1901:2009]

Committee Statement: The committee has chosen to extract the text from NFPA 1901 so it was easier to maintain the specific requirements that have been added. This is also in part due to the fact that if future revisions of NFPA 1901 result in a change in the original text, this committee does not necessarily have to change this text.
414-80 Log #CP28
(4.4.7) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.4.7 Radio suppression of the electrical system shall be in accordance with SAE J551/12 or an equivalent radio suppression standard.

Substantiation: The committee has made this change to reflect a change in the reference.
Committee Meeting Action: Accept

414-81 Log #CP29
(4.5.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.5.1 The entire drivetrain shall be designed and rated by the component manufacturer as having sufficient capacity to slip the wheels of the static-loaded vehicle on a surface having a coefficient of friction of 0.8.
Substantiation: The committee has made this change to comply with the Manual of Style and also this change reflects that the engine is not part of this requirement.
Committee Meeting Action: Accept

414-82 Log #45
(4.5.2) Final Action: Reject

Recommendation: New text to read as follows:
4.5.2 The transmission shall be matched to the engine properly and shall be approved for the application. This will be stated in the End Product Questionnaire.
Substantiation: Again to make for sure all manufactures of the components are in agreement and authorize use of.
Committee Meeting Action: Reject
Committee Statement: See committee action on 414-312 (Log #41).

414-83 Log #CP30
(4.5.2) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.5.2 The transmission shall be matched to the engine properly and shall be approved by its manufacturer for the application.
Substantiation: The committee made this change to comply with the Manual of Style.
Committee Meeting Action: Accept
414-84  Log #8  Final Action: Accept in Principle

(4.5.6)

**Submitter:** Grady North, Crash Rescue Equipment Service, Inc.

**Recommendation:** Revise text as follows:

4.5.6 All traction-increasing devices shall be operated by a single control for driving simplicity. This requirement shall not apply to small commercial vehicles with a capacity of < 528 gallons.

**Substantiation:** Many small commercial chassis used for ARFF vehicles under 528 gallons utilize manual locking hubs on the front axle. These are generally left in the "locked" position for normal airport operations. However, if they are disengaged for long highway travel, it cannot be accomplished with a single lever.

**Committee Meeting Action:** Accept in Principle

Revise text as follows:

4.5.6 All traction-increasing devices shall be operated by a single control for driving simplicity. This requirement shall not apply to small commercial vehicles with a capacity of < 528 gallons.

**Committee Statement:** The committee agrees with the submitters intent but feels that using the term "small commercial" could possibly eliminate some vehicles from this requirement.

414-85  Log #CP31  Final Action: Accept

(4.5.7.1)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.5.7.1 Front and rear axles shall have adequate the capacity to carry the Gross Axle Weight Rating (GAWR) maximum imposed load under all intended operating conditions.

**Substantiation:** The committee has made this change to comply with the Manual of Style and to provide further clarification to the requirement.

**Committee Meeting Action:** Accept

414-86  Log #CP32  Final Action: Accept

(4.7.1)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.7.1 Vehicles shall be required to meet the specified paved surface performance while still providing off-pavement performance compatible with the conditions encountered at the operational airport, and tires shall be selected accordingly.

**Substantiation:** The committee has made this change to comply with the Manual of Style.

**Committee Meeting Action:** Accept
To optimize flotation under soft ground conditions, tires of larger diameter or width, or both, than is needed for bearing weight only shall be specified. Similarly, the lowest tire pressure compatible with the high-speed performance requirements also shall be specified.

Substantiation: The committee has chosen to remove this requirement from the main portion of the document and add it as an annex item.

Committee Meeting Action: Accept

Vehicle and tire manufacturers shall be consulted for the tread design most suitable for the specific soil composition at individual airports.

Only new tires shall be mounted on the vehicles; retreads shall not be permitted.

Substantiation: The committee has made this change to comply with the Manual of Style and to also remove information that was deemed unnecessary for this document.

Committee Meeting Action: Accept

All wheels on the vehicles of more than 528 gallon capacity shall be of the single-wheel type, with all rims, tires, and wheels of an identical size and the same tire tread design. This requirement shall not apply to vehicles with a capacity of up to 500 gallons.

Substantiation: This change was to comply with the Manual of Style and to update information regarding the gallonage capacity.

Committee Meeting Action: Accept

Rims, tires, and wheels shall be certified by their respective manufacturers as having sufficient capacity to meet the specified performance. and shall be certified for not less than 42.9 km (25 mi) of continuous operation at 96.5 kph (60 mph) when inflated at the normal operational pressure.

Substantiation: The committee has made this change to comply with the Manual of Style.

Committee Meeting Action: Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new text and number accordingly to read as follows:
4.7.7 Tires shall be certified by its respective manufacturer for not less than 42.9 km (25 mi) of continuous operation at 96.5 kph (60 mph) when inflated at the operational pressure.

Substantiation: This text was added as it was part of another section that needed to be broken apart due to having more than one requirement within that section.
Committee Meeting Action: Accept

Submitter: Marty Huffman, Rosenbauer
Recommendation: New text to read as follows:
4.9.1* The braking system shall feature service, emergency, and parking brake systems. Service brakes shall be of the power-actuation air, hydraulic, or air-over-hydraulic type. Expanding shoe and drum brakes or caliper disc brakes shall be furnished. A brake chamber shall be provided for each wheel and shall be mounted so that no part of the brake chamber projects below the axle bowl. An ABS braking system shall be provided on the vehicle. Selection of components used in the braking system shall be at the discretion of the manufacturer and shall be designed to meet the performance requirements of Table 4.1.1 Fully Loaded Vehicle Performance Parameters.

Substantiation: Each manufacturer has specific design and engineering requirements that may be specific and unique to that manufacturer’s processes. If a braking system meets the performance requirements as described in 414 (or similar documents) and meet DOT or FMVSS standards, the selection of the components utilized should be left to the manufacturer’s discretion. Allowing end users to specify components represent major engineering changes to the vehicle and would be restrictive which could effectively reduce competition. ARFF vehicles are heavily engineered to select components that fit within a manufacturer’s design and build processes and the changing of these components should be up to the specific manufacturer based on their design and engineering processes.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this text is redundant and is located in other sections of the document.

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.9.1* The braking system shall comply to FMVSS 121 feature service, emergency, and parking brake systems. Service brakes shall be of the power-actuation air, hydraulic, or air-over-hydraulic type. Expanding shoe and drum brakes or caliper disc brakes shall be furnished. A brake chamber shall be provided for each wheel and shall be mounted so that no part of the brake chamber projects below the axle bowl. An ABS braking system shall be provided on the vehicle:
1) No part of the brake chambers shall project below the axle bowls.
2) The air system shall have the capacity for quick buildup from 0 kPa (0psi) to release spring brakes within 15 seconds.

Substantiation: This change was made to comply to the Manual of Style as there were more than one requirement within this section.
Committee Meeting Action: Accept
An emergency brake system shall be provided that is applied and released by the driver from the cab and is capable of modulation by means of the service brake control. When a single failure in the service brake system of a part designed to contain compressed air or brake fluid occurs, other than failure of a common valve, manifold, brake fluid housing, or brake chamber housing, the vehicle shall stop within no more than 87.8 m (288 ft) at 64.4 kph (40 mph) without any part of the vehicle leaving a dry, hard, approximately level roadway that has a width equal to the vehicle width plus 1.2 m (4 ft).

Substantiation: The committee has deleted this text as they feel that this requirement would have already been met with adhering to other requirements within this document.

Committee Meeting Action: Accept
414-97  Log #CP43
(4.10.2) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.10.2 The power steering system shall have sufficient capacity so that no more than 66.7 N (15 lbf) pull is needed on the steering wheel rim in order to turn the steering linkage from stop to stop with the fully loaded vehicle stationary on a dry, level, paved surface with the engine at idle.

Substantiation: This change was made to comply with the Manual of Style and unenforceable terms.
Committee Meeting Action: Accept

414-98  Log #78
(4.10.4 (New)) Final Action: Accept in Principle

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:
NEW PARAGRAPH: If specified by the purchaser, a rear-wheel steering (RWS) system may be used on 6x6, 8x8, 10x8, or 10x10 vehicles to improve the vehicle clearance circle radius and tire wear of the most rear axle tires. The rear axle tires shall turn to a range of 5 to 7 degrees using a mechanical or electrical system that shall be proportioned to the steering wheel input.
Substantiation: The FAA has tested their research ARFF vehicle with rear wheel steering and documented the improvements in vehicle clearance circle radius (turning circle diameter) and improved tire wear. The FAA has published a Technical Note (DOT/FAA/AR-TN08-43), Test and Evaluation of Rear-Wheel Steering for Aircraft Rescue and Firefighting Vehicles.
Committee Meeting Action: Accept in Principle
Add New text to read as follows:
4.10.4 If specified by the purchaser, a rear-wheel steering (RWS) system may be used on 6x6, 8x8, 10x8, or 10x10 vehicles to improve the vehicle clearance circle radius and tire wear of the most rear axle tires. The rear axle tires shall turn to a range of 5 to 7 degrees using a mechanical or electrical system that shall be proportioned to the steering wheel input.
Committee Statement: The committee agrees with the submitters intent but had to make some changes in order to comply with the Manual of Style.

414-99  Log #25
(4.11.1) Final Action: Reject

Submitter: Gary T. Schott, Omaha Airport Authority / Rep. ARFF Working Group
Recommendation: Revise text to read as follows:
After 5th Sentence of 4.11.1 add: ARFF Vehicles shall include specially designed air bag systems for ARFF crew positions within the cab. These bags designed within industry standards either incorporated into seat belts, overhead, or dash mounted.
Substantiation: See the article from the Pittsburgh Post Gazette, Thursday, November 16, 2006. This article describes how aircraft have incorporated air bag systems within private and commercial aircraft. Like systems can also be designed into ARFF vehicles.
Note: Supporting material is available for review at NFPA Headquarters.
This is not original material; its reference-source is as follows:
Committee Meeting Action: Reject
Committee Statement: While the committee recognizes the fact that occupant safety within the vehicle is of high priority, there lacks the any current manufacturing of such products in ARFF vehicles.
The cab shall be fully enclosed (i.e., floor, roof, and four sides).

Seating for the crew shall be restricted to the cab.

The maximum number of crew seat positions provided in the cab designated by the manufacturer shall be labeled in the cab.

As a minimum, seat positions shall be provided for the driver and for an additional crew member.

Three-point seat belts equipped with a single hand hookup shall be provided for each of the designated seating positions.

Space shall be provided for all instrument controls and equipment specified without hindering the crew.

Doors shall be provided on each side of the cab with steps and handrails to allow rapid entrance and exit from the cab while wearing full protective equipment.

Each door shall be equipped with a restraint device(s) to prevent the door from being sprung open by wind or jet blast.

Substantiation: The committee has broken apart the original text in 4.11.1 to comply with the Manual of Style. It was noted that there were multiple requirements within the same section and that needed to be corrected.

Committee Meeting Action: Accept

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The cab shall meet the visibility requirements of 4.2.2.3

Interior cab reflections from exterior and interior lighting shall be minimized.

The windshield shall be of shatterproof safety glass.

All other windows shall be constructed of safety glass.

The cab shall be provided with wide gutters to prevent foam and water from dripping on the windshield and side windows.

Where equipped with a primary turret having manual controls above the cab the roof shall be designed with a quick access to the primary turret(s).

Substantiation: The committee has broken apart the original text in 4.11.2 to comply with the Manual of Style. It was noted that there were multiple requirements within the same section and that needed to be corrected.

Committee Meeting Action: Accept
**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify existing text to read as follows:

4.11.3 Cab Construction

4.11.3.1 The cab shall be weatherproof.

4.11.3.2 The cab shall be fully insulated thermally and acoustically with a fire-resistant material.

4.11.3.3 The cab interior noise level at any seated position shall not exceed 85 dBA while driving at 80.5 kph (50 mph) on a level hard surface without warning devices operating.

4.11.3.4 While stationary, discharging water or foam from the high-volume turrets with exterior warning devices operating the maximum limit shall be 90 dBA.

4.11.3.5 The cab shall be permitted to be of the unitized rigid body and frame structure or a separate unit that is flexibly mounted on the main vehicle frame.

4.11.3.6 Cabs on apparatus with a GVWR greater than 26,000 lb (11,800 kg) 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 [1901:2009]

**Substantiation:** The committee has broken apart the original text in 4.11.3 to comply with the Manual of Style. It was noted that there were multiple requirements within the same section and that needed to be corrected.

**Committee Meeting Action:** Accept

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**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify existing text to read as follows:

4.11.4.1 The minimum number of instruments, warning lights, and controls consistent with the safe and efficient operation of the vehicle, chassis, and fire-fighting system shall be provided.

4.11.4.1.1 All chassis instruments and warning lights shall be grouped together on a panel in front of the driver.

4.11.4.1.2 All fire-fighting system instruments, warning lights, and controls shall be grouped together by function to provide accessibility and high visibility for the driver and crew members.

**Substantiation:** The committee has broken apart the original text in 4.11.4.1 to comply with the Manual of Style. It was noted that there were multiple requirements within the same section and that needed to be corrected.

**Committee Meeting Action:** Accept

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**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify existing text to read as follows:

4.11.4.2 All instruments and controls shall be illuminated, and backlighting shall be used where practical.

**Substantiation:** This change was made to comply with the Manual of Style.

**Committee Meeting Action:** Accept
Modify existing text to read as follows:

4.11.4.3 Groupings of both the chassis and fire-fighting system instruments, warning lights, and controls shall be accessible for servicing, easily removable as a unit or shall be on a panel hinged for back access by the use of quick disconnect fittings for all electrical, air, and hydraulic circuits.

Substantiation: This change was made to comply with the Manual of Style.
Committee Meeting Action: Accept

Delete the following text and renumber:

(14) Inclinometer and a lateral G-force indicator; or an electronic stability control system; or both (Applies to Class 4 & 5 vehicles only)

Substantiation: The committee feels that this requirement is redundant as it has already been addressed in Proposal 414-127 (Log #CP219).
Committee Meeting Action: Accept

Revise text to read as follows:

The following instruments or warning lights, or both, shall be provided as a minimum: (15) Forward looking infrared (FLIR) monitor.

Substantiation: No substantiation provided by the submitter.
Committee Meeting Action: Reject

414-109 Log #108
(4.11.4.5)
Final Action: Reject

Submitter: Marty Huffman, Rosenbauer
Recommendation: Delete text to read as follows:

4.11.4.5 The cab shall have all the necessary controls within easy reach of the driver for the full operation of the vehicle and the pumping system. The following cab controls shall be provided: (9) Bumper turret controls or ground sweep valve control, where specified.

Substination: Reference to “ground sweep control” should be removed as it is confusing in description. ARFF vehicles are equipped with roof turrets, bumper turrets and under truck nozzles (typically). The term “ground sweep” is misleading in that it is an obsolete term referring to fixed devices mounted to the front of the vehicle. These “sweeps” were non-movable and were common on ARFF vehicles in the 50s and 60s but have been replaced with the term “bumper turret” which more adequately describes the turrets found on modern ARFF vehicles. Term should also be revised as some refer to under-truck nozzles as “ground sweeps” thus creating confusion when specifying the vehicle.

Committee Meeting Action: Reject
Committee Statement: This option is currently in use and by removing it the committee felt that this could be restrictive.

414-110 Log #CP93
(4.11.4.5)
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify existing text to read as follows:

4.11.4.5 The cab shall have all the necessary following controls within easy reach of the driver for the full operation of the vehicle and the pumping system: The following cab controls shall be provided:

Substination: This change was made to comply with the Manual of Style.
Committee Meeting Action: Accept

414-111 Log #109
(4.11.4.6)
Final Action: Reject

Submitter: Marty Huffman, Rosenbauer
Recommendation: Delete text to read as follows:

4.11.4.6 Where specified, a windshield deluge system shall be included to cool the windshield and to provide operator visibility during fire-fighting operations. It shall be designed to flood the windshield with clear water when activated. Clear water shall be discharged under sufficient pressure and in a pattern that ensures the driver/operator’s field of vision can be kept clear of foam solution where used in conjunction with the windshield wiper. The windshield wipers shall be energized automatically whenever the deluge system is operated.

Substination: When windshield wipers are automatically activated with the deluge system, the time it takes for water to be discharged onto the surface of the windshield can be up to 15 seconds during which time the wipers are activated and running across a dry surface which can scratch the windshield in dusty climates and cause undue wear and tear to the wiper motor assembly. The verbiage for the wipers to automatically activate with the deluge system should be deleted.

Committee Meeting Action: Reject
Committee Statement: The committee did not want to remove this requirement from the document as they feel it could cause further damage to the vehicle wipers or windshield.
Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

4.11.4.6 Where specified, a windshield deluge system be:
   a) Designed to flood the windshield with clear water
   b) Shall be included to cool the windshield and to provide operator visibility during fire-fighting operations.
   c) Shall be energized automatically whenever the deluge system is operated.

It shall be designed to flood the windshield with clear water when activated. Clear water shall be discharged under sufficient pressure and in a pattern that ensures the driver/operator’s field of vision can be kept clear of foam solution where used in conjunction with the windshield wiper. The windshield wipers shall be energized automatically whenever the deluge system is operated.

Substantiation: This change was made to comply with the Manual of Style and broken apart as there were multiple requirements within one section.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Delete following text from the document:

4.11.4.7.1 The ARFF vehicle’s position shall be displayed on a moving map display that shall be mounted in the cab. The vehicle’s position shall be displayed within an accuracy of 2 m (6.56 ft), as well as the direction of travel. The map shall automatically pan and reorient itself to show the area around the vehicle.

Substantiation: The committee has chosen to delete this section and text as it is proposing new text with that contains further information in Proposal 414-289 (Log #97).

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Add new text to read as follows:

4.11.4.7.1 The DEVS system must meet or exceed the following requirements as outlined in FAA Advisory Circular AC No. 150/5210-19A.
   1) Chapter 1 Section 2, Subsection b) Part (2) Navigation
   2) Chapter 2 Full Sections 5-7, 16-19, 21,
   3) Chapter 2, Full Sections 16-19.

4.11.4.7.2 Where specified, the DEVS navigation system as described in Section 4.11.4.7.1 shall include a tracking and on board information system that meets or exceeds the following requirements as outlined in FAA Advisory Circular No. 150/5210-19A.
   1) Chapter 1 Section 2, Subsection b) Part (3) Tracking
   2) Chapter 2, All - Note, a duplicate or second Navigation system as described in Section 4.11.4.7.1 is not required, a duplicate or second FLIR system as described in 4.11.4.8 is not required)

Substantiation: The committee has chosen to add this to further clarify how to meet the requirement.

Committee Meeting Action: Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

4.11.4.8* A low-visibility enhanced vision system shall be installed in the vehicle. This system shall consist of a FLIR camera, monitor, and controlling devices, and shall provide the operator with a thermal image to provide assistance in driving under low-visibility conditions.

Forward Looking Infrared (FLIR) system that meets or exceeds the following requirements as outlined in FAA Advisory Circular No. 150/5210-19A.

1) Chapter 1 Section 2, Subsection b) Part (1) Vision Enhancement
2) Chapter 2 Full Sections 6, 7, 10, 11, and 12

Substantiation: The committee has made this change to comply with the Manual of Style as well as to provide the purchaser and end user with further clarification on the requirement.

Committee Meeting Action: Accept
414-118   Log #33            Final Action: Reject
(4.11.5.1)

Recommendation: New text to read as follows:

4.11.5.1 The following equipment shall be provided in or on the cab, as applicable: (a) Heater/defroster (2) Driver’s suspension seat with vertical, fore and aft adjustment, with seat belt (The use of nonsuspension driver’s seat shall be permitted where recommended by the manufacturer.) (3) Crew seats with individual retractable seat belts (4) Windshield washers appropriate for removing foam (5) Windshield wipers appropriate for removing foam (6) Siren (7) Horn (8) Sun visors, interior transparent (9) Outside rearview mirrors, as specified in 4.2.2.4(10) Interior lighting (11) Provisions for mounting self-contained breathing apparatus (SCBA) of the type specified by the purchaser at each crew seat position (12) Low-visibility forward-looking infrared device meeting suggested specifications contained in Section E.4 or equivalent (13) rear facing camera and monitor activated by transmission reverse gear or manually by driver.

Substantiation: Allows the driver to back up safely when he is alone. Small vehicle and personnel cannot be seen by operator using mirrors alone.

Committee Meeting Action: Reject
Committee Statement: The committee has already addressed this in Proposal 414-214 (Log #29).

414-119   Log #35            Final Action: Reject
(4.11.5.1(11) (New))

Recommendation: New text to read as follows:

4.11.5.1 The following equipment shall be provided in or on the cab, as applicable:

(11) Provisions for mounting self-contained breathing apparatus (SCBA) of the type specified by the purchaser at each crew seat position. In addition to the crew’s individual SCBA’s there shall be 1 in-line respirator for the driver to use. It shall be mounted so the driver may don the face piece and drive with out wearing the SCBA.

Substantiation: All fire personnel must wear a SCBA in above ground, below ground in a area that is contaminated, or an area that may become contaminated. As we all know that the driver will be working in a contaminated area and the vent system on the apparatus may bring smoke into the cab. We have furnished all of our trucks this way since 1997. It should be a standard for all apparatus on the fireground.

Committee Meeting Action: Reject
Committee Statement: The committee feels that this would be an individual requirement and not a vehicle specification and that it is covered in other standards.
414-120  Log #31
(4.11.5.1(8))  Final Action: Accept in Principle

Recommendation: New text to read as follows:
4.11.5.1 The following equipment shall be provided in or on the cab, as applicable:
(8) Sun Visor, interior transparent including overhead windows with a adjustable shade (like Oshkosh, Rosenbauer, KME, etc.) to protect driver and crew from sun.
Substantiation: Due to the climate of Arizona and other southern states, the sun beats down on the personnel heads in the cab. The sun also binds the driver from above. A pull down mechanical or automated shutter would prevent this.
Committee Meeting Action: Accept in Principle
New text to read as follows:
4.11.5.1 The following equipment shall be provided in or on the cab, as applicable:
(8) A device inside the cab that is designed Sun Visor, interior transparent including overhead windows with a adjustable shade (like Oshkosh, Rosenbauer, KME, etc.) to protect driver and crew from the glare and light from the sun.
Committee Statement: While the committee agrees with the submitters intent to require that visual protection from the sun be provided, the committee felt the need to remove any reference to a specific manufacturer within the requirement.

414-121  Log #110
(4.11.5.2)  Final Action: Accept in Principle

Submitter: Marty Huffman, Rosenbauer
Recommendation: Revise text to read as follows:
4.11.5.2 Where tools, equipment, or self-contained breathing apparatus (SCBA) are carried within enclosed seating areas of fire department vehicles, such items shall be secured by either a positive mechanical means of holding the item in its stored position or in a compartment with a positive latching door. The means for holding the item in place or in the compartment shall be designed to minimize injury to persons in the enclosed area of the vehicle caused by loose equipment during travel and, in the event of an accident, a rapid deceleration or a rapid acceleration. End users shall be responsible for complying with this requirement if they mount equipment in the seating area.
Substantiation: Although manufacturers are aware of the requirements for properly mounting equipment it should be made clear that the end user is ultimately responsible for the safe storage of equipment stored in the crew compartment. Because FAA has made "loose equipment" a separate item, OEMs may not provide all means by which a piece of equipment may be mounted or stored on the vehicle thus shifting the burden to the end user who should be made aware that they are responsible for the safe mounting of equipment on the ARFF apparatus in compliance with this section.
Committee Meeting Action: Accept in Principle
Committee Statement: See committee action on 414-122 (Log #CP99)

414-122  Log #CP99  Final Action: Accept
(4.11.5.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.11.5.2 Tools, equipment, or self-contained breathing apparatus (SCBA) carried within enclosed seating areas of the vehicle(s), shall be mounted on fastening devices, and required by the end users compliance, to minimize injury to persons in the enclosed area of the vehicle caused by loose equipment during travel and, in the event of an accident, a rapid deceleration or a rapid acceleration.
Substantiation: The changes in text were to comply with the Manual of Style.
Committee Meeting Action: Accept
<table>
<thead>
<tr>
<th>Log #</th>
<th>Final Action</th>
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<tbody>
<tr>
<td>CP100</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting</td>
<td>Modify text to read as follows: Signs visible from each seated position that state “Occupants must be seated and wearing a seat belt when apparatus is in motion” shall be provided. Such signs shall be visible from each seated position. An accident prevention sign shall be located at the rear step area of the vehicle, if it exists. It shall warn personnel that standing on the step while the vehicle is in motion is prohibited.</td>
<td>The committee made this change to comply with the Manual of Style.</td>
<td>Accept</td>
</tr>
<tr>
<td>CP101</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting</td>
<td>Modify text to read as follows: 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. The 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.</td>
<td>The committee made this change to comply with the Manual of Style as there were multiple requirements within one section.</td>
<td>Accept</td>
</tr>
<tr>
<td>CP102</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting</td>
<td>Add new text and section to read as follows: 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.</td>
<td>This text was added from previous text as the original text was split apart so that it could comply with the Manual of Style.</td>
<td>Accept</td>
</tr>
</tbody>
</table>
414-126  Log #111  Final Action: Reject
(4.11.8)

Submitter: Marty Huffman, Rosenbauer
Recommendation: New text to read as follows:

4.11.8 A lateral acceleration indicator that is adjustable for sensitivity and that provides both visual and audio signals and warnings to the driver shall be provided. (Applies to Class 4 & 5 vehicles only)

Substantiation: A lateral accelerometer is not necessary for Class 1, 2 and 3 vehicles as the potential for roll over is relatively low and the vast majority of rollovers have been with the class 4 and 5 vehicles (see FAA rollover research document to verify data). The addition of lateral accelerometer alert type systems adds additional cost to vehicles that may be unnecessary because of the low incidence of rollover in these types of vehicles. This requirement should be for class 4 and 5 vehicles only or at the least included in the document as an optional item.

Committee Meeting Action: Reject
Committee Statement: The committee feels that this requirement would be too restrictive as it specifically makes mention to classes of vehicles and is not applied to all classes.

414-127  Log #CP219  Final Action: Accept
(4.11.8)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.11.8* If a lateral acceleration indicator that is provided it shall be adjustable for sensitivity and that provides both visual and audio warning signals and warnings to the driver shall be provided.

Substantiation: The committee has made this change to provide further clarification to the requirement as well as make some editorial changes.
Committee Meeting Action: Accept

414-128  Log #CP103  Final Action: Accept
(4.12.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.12.1 The body shall be constructed of materials that are of the lightest weight consistent with the strength necessary for off-pavement operation over rough terrain and where exposed to excess heat and . The body shall be permitted to be of the unitized-with-chassis-rigid-structure type, or it shall be permitted to be flexibly mounted on the vehicle chassis. It also shall include front and rear fenders or wheel wells. Body panels shall be removable where necessary to provide access to the interior of the vehicle.

Substantiation: The committee made this change in order to comply with the Manual of Style since there were multiple requirements within the same section.
Committee Meeting Action: Accept
414-129  Log #CP104
(4.12.2)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.12.2 Access doors shall be provided for those areas of the interior of the vehicle that are inspected frequently, to include but not limited to: In particular, access doors of sufficient size and number shall be provided for access to the following:

1) Engine
2) Pump
3) Foam proportioning system
4) Battery storage
5) Fluid reservoirs

Other areas that need to be accessible for inspection or maintenance shall be open or shall have removable panels.

**Substantiation:** This change was made to comply with the Manual of Style.

**Committee Meeting Action:** Accept

414-130  Log #CP105
(4.12.3)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.12.3 Compartments for storage of equipment and tools to be carried on the vehicle shall be
a) weather resistant
b) self-draining
c) lighted

**Substantiation:** This change was made to comply with the Manual of Style.

**Committee Meeting Action:** Accept

414-131  Log #CP106
(4.12.4)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.12.4 A working deck, that is reinforced and constructed of, or covered with, a slip-resistant material, shall be provided and shall be reinforced adequately to allow the crew to perform its duties in the primary turret area, cab hatch area, water tank top fill area and foam–liquid top fill area, and in other areas where access to complementary or installed equipment is necessary. The working deck shall be constructed of, or covered with, a slip-resistant material.

**Substantiation:** This change was made to comply with the Manual of Style as it was noted there were multiple requirements within the same section.

**Committee Meeting Action:** Accept
414-132     Log #30     Final Action: Reject

(4.12.5)

Recommendation: New text to read as follows:

4.12.5 Handrails and bulwarks on the top of the apparatus shall be a minimum of 32 inches tall.

Substantiation: When the handrails and bulwarks are lower than this height there is the possibility that the personnel will be tripped rather than supported to prevent going over the side.

Committee Meeting Action: Reject
Committee Statement: The committee recognizes the intent of the submitters proposal as the submitter was able to explain this in person to the committee, however there lacks the scientific data to support the minimum of 32 in. tall in the requirement.

414-133     Log #27     Final Action: Reject

(4.12.5 (New))

Recommendation: New text to read as follows:

4.12.5 Handrails and bulwarks on the top of the apparatus shall be a minimum of 32 inches tall.

Substantiation: When the handrails and bulwarks are lower than this height there is the possibility that the personnel will be tripped rather than supported to prevent going over the side.

Committee Meeting Action: Reject
Committee Statement: The committee recognizes the intent of the submitters proposal as the submitter was able to explain this in person to the committee, however there lacks the scientific data to support the minimum of 32 in. tall in the requirement.

414-134     Log #CP107     Final Action: Accept

(4.12.5 through 4.12.5.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.12.5 Handrails or bulwarks shall be provided where necessary for the safety and convenience of the crew. Rails and stanchions shall be braced strongly and constructed of a material that is durable and resists corrosion. Handrails shall be constructed of, or covered with, a slip-resistant material.

4.12.5.1 Access handrails or handholds shall be provided at each entrance to a driving or crew compartment and at each position where steps or ladders for climbing are located.[1901:2009]

4.12.5.2 Exterior access handrails shall be constructed of or covered with a slip-resistant, non corrosive material. [1901:2009]

4.12.5.3 Exterior access handrails shall be between 1 in. and 1 in. (25 mm and 42 mm) in diameter and have a minimum clearance between the handrails and any surface of at least 2 in. (50 mm).[1901:2009]

Substantiation: The committee has made this change in order to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept
Modify text to read as follows:

4.12.6 Steps or ladders shall be provided for access to the top fill area.
4.12.6.1 The lowermost step(s) shall be permitted to extend below the angle of approach or departure or ground clearance limits if it is designed to swing clear.
4.12.6.2 All other steps shall be rigidly constructed. All steps shall be and constructed of, or covered with, a slip-resistant material.
4.12.6.3 The lowermost step(s) shall be no more than 558.8 mm (22 in.) above level ground when the vehicle is fully loaded.
4.12.6.4 Adequate Lighting shall be provided to illuminate steps and walkways.

Substantiation: This change was made to comply with the Manual of Style as it there are multiple requirements within the same section.
Committee Meeting Action: Accept

A heavy duty front bumper shall be mounted on the vehicle and secure to the frame structure. The front bumper must protect the bumper turret from going through a knock out panel, fence or other structure.

Substantiation: This prevents the turret and plumbing from being torn off the vehicle. Otherwise the vehicle could become unusable.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local specification that they purchaser should make when ordering the vehicle.

4.12.7 A heavy-duty front bumper shall be mounted on the vehicle to protect the fire fighting components, and secured to the frame structure.

Substantiation: This change was made to comply with the Manual of Style as it there are multiple requirements within the same section.
Committee Meeting Action: Accept
414-138 Log #CP110

(4.12.8 through 4.12.8.3) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:

4.12.8 Vehicle numbering, lettering, and minimum 20.3 cm (8 in.) wide reflective striping shall be provided in accordance with ASTM D 4956.

4.12.8.2 Striping shall be placed on at least 60 percent of the perimeter length of each side, width, and rear.

4.12.8.3 At least 40 percent of the perimeter width of the front of the vehicle shall have the reflective stripe

Substantiation: This change was made to comply with the Manual of Style as it there are multiple requirements within the same section.

Committee Meeting Action: Accept

414-139 Log #CP111

(4.12.9 through 4.12.9.2) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:

4.12.9 Attachments shall be provided for all tools, equipment, and other items that the purchaser specifies to be furnished on the vehicle.

4.12.9.1 Equipment holders shall be attached firmly and designed so that equipment remains in place under all operating conditions.

4.12.9.2 The equipment holders shall allow for the equipment to be readily accessible and removable quickly for use.

Substantiation: This change was made to comply with the Manual of Style as it there are multiple requirements within the same section.

Committee Meeting Action: Accept

414-140 Log #112

(4.12.10) Final Action: Accept in Principle

Submitter: Marty Huffman, Rosenbauer
Recommendation: Revise text to read as follows:

4.12.10* Each storage compartment identified by the vehicle manufacturer for use by the purchaser shall be labeled with tested weight. Compartment loading shall not be exceeded as identified at the time of vehicle manufacture. Provision shall be made for mounting tools and equipment, as specified by the purchaser, on the truck. Special tools for servicing the vehicle, fire suppression system, and any of the auxiliary equipment shall be identified specifically by the vehicle manufacturer and furnished as necessary by the vehicle manufacturer. Altering locations of tools and equipment will have an effect on vehicle stability.

Substantiation: Original statement can lead purchasers to believe any tool could be included and as such if the OEM (Original Equipment Manufacturer) determines a specific or specialized tool is required in order to properly and safely operate or repair the vehicle than that tool shall be identified and supplied w/ the vehicle by the OEM.

Committee Meeting Action: Accept in Principle
Committee Statement: See committee action on 414-141 (Log #CP112)
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.12.10* Each storage compartment identified by the vehicle manufacturer for use by the purchaser shall be labeled with tested weight.
4.12.11 Compartment loading shall not be exceeded as identified at the time of vehicle manufacture.
4.12.12 Provisions shall be made for mounting tools and equipment, as specified by the purchaser, on the truck.
4.12.13 Special tools for servicing the vehicle, fire suppression system, and any of the auxiliary equipment shall be identified specifically by the vehicle manufacturer and furnished as necessary by the vehicle manufacturer.
4.12.14 Altering locations of tools and equipment shall not be permitted as this action will have an effect on vehicle stability.

Substantiation: This change was made to comply with the Manual of Style as it there are multiple requirements within the same section.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.13.1 For ARFF purposes, vehicles using primary extinguishing agents shall be tested in accordance with all requirements contained in NFPA 412.

Substantiation: This change was made to be clarify that all the requirement of NFPA 412 must be met.
Committee Meeting Action: Accept

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Add new text as follows:
4.13.1.x For these commercially available chassis combined agent vehicles compressed foam systems can be specified provided they delivery mixed air and foam at a rate between >8 to <12 foam concentration.

Substantiation: This provision allows for the use of compressed air foam systems on smaller combined agent vehicles, at rates successfully tested by both the Federal Aviation Administration and the United States Air Force and the US Marine Corp.

This is not original material; its reference/source is as follows:
Earlier version of 414 document.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this requirement is not appropriate for this document as this is not used or defined within this document and is handled in several other NFPA documents. The committee also noted that the expansion rates that are listed are not accurate extractions from the agencies that were listed in the submitters substantiation.
Modify text and add annex item to read as follows:

4.13.3* All components of the agent systems, including such items as the tanks, piping, fill troughs, and screens, shall be made of materials resistant to corrosion by the primary agent, primary agent/water solution, water, and, where specified, the complementary agent.

A.4.13.3 These items could include the tanks, piping, fill troughs, and screens.

Substantiation: This change was made to comply with the Manual of Style and to move items that are not requirements into a new annex item for this section.

Committee Meeting Action: Accept

The water pump(s) shall be constructed of corrosion resistant metal bronze and shall be of the single-stage or multiple-stage centrifugal type and shall be designed for dependable emergency service. This prevents early corrosion of the pump. We have to rebuild all of our pumps with in 5-7 years. By switching to bronze they have been extended up to ten years. The bronze is more resistant to the water and the foam chemical agents.

The committee feels that this is a localized user specification and should not be part of a minimum requirement within this document.

Committee Meeting Action: Reject

The water pump(s) shall be constructed of corrosion resistant metals and shall be of the single-stage or multiple-stage centrifugal type and shall be designed for dependable emergency service. Pumps shall be designed carefully and built in accordance with good modern practice. Pumps shall be gravity primed from the vehicle tank. The pump and piping system shall be designed to eliminate the entrapment of air. Selection of number of stages and materials used in the construction of the pump shall be at the manufacturers discretion.

Each manufacturer has specific design and engineering requirements that may be specific and unique to that manufacturer’s processes. Performance of the pump in its ARFF application should be the overriding requirement. Determination of the number of stages and the materials required are based on specific design elements employed by a manufacturer and thus the design and construction, as well as the materials used, in the construction of ARFF fire pumps should be left to the manufacturer’s discretion. Advances in pump technology and material selections have resulted in new materials and or techniques being introduced in the construction of fire pumps. Allowing end users to specify components represent major engineering changes to the vehicle and would be restrictive, which would effectively reduce competition. ARFF vehicles are heavily engineered to select components that fit within a manufacturers design and build processes and the changing of these components should be up to the specific manufacturer based on their design and engineering processes.

Committee Meeting Action: Accept in Principle

Committee Statement: See committee action on 414-147 (Log #CP115)
414-147  Log #CP115
(4.14.1.1 through 4.14.1.1.3)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify and add new text to read as follows:

4.14.1.1 The water pump(s) shall be constructed of corrosion-resistant metals and shall be of the single-stage or multiple-stage centrifugal type agreed upon by the end user and manufacturer, and shall be designed for dependable emergency service.
4.14.1.1.1 Pumps shall be designed carefully and built in accordance with good modern practice.
4.14.1.1.2 Pumps shall be gravity primed from the vehicle tank.
4.14.1.1.3 The pump and piping system shall be designed to eliminate the entrapment of air.

Substantiation: This change was made to comply with the Manual of Style as it there are multiple requirements within the same section.
Committee Meeting Action: Accept

414-148  Log #CP116
(4.14.2.1 through 4.14.2.1.4)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.14.2.1 The pump(s) drive shall allow operation of the pump(s) and simultaneous operation of the vehicle.
4.14.2.1.1 The pump(s) shall not be affected by changes in transmission ratios or the actuation of clutches in the vehicle drive.
4.14.2.1.2 The design of the drive system and controls shall prevent damage to the drive and shall minimize lurching of the vehicle when the vehicle drive is engaged during pumping operations.
4.14.2.1.3 The pump(s) drive system shall be capable of absorbing the maximum torque delivered by the engine to the pump(s) and withstanding the engagement of the pump(s) at all engine and vehicle speeds and under all operating conditions.
4.14.2.1.4 The operation of the pump(s) shall not, under any conditions, cause the engine to stall or cause more than a slight and momentary reduction in engine speed and consequent drop in pump pressure.

Substantiation: The committee made this change to comply with the Manual of Style as it was found that this section contained more than one requirement in this section.
Committee Meeting Action: Accept
While pumping at rated capacity, the drive shall allow controlled vehicle operation at speeds from 0 kph to a minimum of 16.1 kph (0 mph to a minimum of 10 mph) in forward direction and 0 kph to a minimum of 8 kph (0 mph to a minimum of 5 mph) in rearward direction.

During shifting from forward to rearward drive, the pumping system shall maintain the preset discharge pressure.

The pump(s) drive shall have sufficient power capacity to provide the pump(s) discharge requirements of 4.14.1.3 while the vehicle is being propelled under all operating conditions where a fire-fighting capability is needed.

The committee made this change to comply with the Manual of Style as it was found that this section contained more than one requirement in this section.

Committee Meeting Action: Accept

If an independent engine is used to drive the pump(s), it shall have operate with the same fuel and electrical system as the chassis engine. and shall be equipped with an air cleaner, a replaceable element oil filter, a full pressure lubricating system, and an overspeed governing device to prevent engine damage. The engine also shall be provided with a cooling system that meets the requirements of 4.3.2:

The committee made this change to comply with the Manual of Style as well as removed some requirements that they felt were redundant and/or unnecessary.

Committee Meeting Action: Accept

The tank-to-pump system shall be designed for efficient flow at the pumping rates required by 4.14.1.3. The pump suction line(s) shall be of large diameter and of the shortest length consistent with the most suitable pump location.

Where specified a drain shall be at the lowest point with a valve for draining all of the liquid from the pumping system where desired. Tank-to-pump lines and valves shall be constructed of corrosion-resistant materials.

The committee made this change to comply with the Manual of Style as well as removed some requirements that they felt were redundant and/or unnecessary.

Committee Meeting Action: Accept
414-152   Log #CP120       (4.14.5.1 and 4.14.5.2)
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.14.5.1 Union or rubber-gasketed fittings shall be provided where necessary to facilitate removal of piping. All piping, couplings, and valves shall be sized for necessary flow with minimum restriction and pressure loss. Material for all piping, couplings, and valves shall be selected to avoid corrosive or galvanic action.
4.14.5.2 Piping shall be mounted securely and provided with flexible couplings to minimize stress. Union or rubber-gasketed fittings shall be provided where necessary to facilitate removal of piping.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-153   Log #CP121       (4.14.5.4)
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.14.5.4 All water system piping shall be tested on the tank-to-pump side of the pump piping shall be leak free, to detect possible leakage. All water and foam solution discharge piping, together with the agent pump(s), shall be tested at 50 percent above the system operating pressure.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-154   Log #CP122       (4.14.5.5 (New))
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new text and section to read as follows:
4.14.5.5 All water and foam solution discharge piping, together with the agent pump(s), shall be tested at 50 percent above the system operating pressure.
Substantiation: The committee has added this text as it was part of another section that contained multiple requirements within the same section.
Committee Meeting Action: Accept
Subcommittee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

4.14.6 Overheat Protection. An automatic system with a visual alarm line shall be provided from the water pump discharge and, if applicable, from the foam pump discharge to prevent overheating of the pumps while engaged and operating at zero discharge. The overheat protection system shall be automatic and operate a visual alarm if an overheating situation occurs.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

Subcommittee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

4.15.2.1 The tank shall be constructed to resist all forms of deterioration that could be caused by the water and foam concentrate while affording the structural integrity necessary for off-road operation. The tank shall have longitudinal and transverse baffles. The construction and connections shall be made to prevent the possibility of galvanic corrosion of dissimilar metals.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
The tank shall be equipped with easily removable manhole covers over the tank discharge. Tanks shall be designed to allow for internal and external inspection and service. Internal inspection of agent tanks if needed, should be performed ONLY by qualified inspectors. A large capacity drain connection shall be installed at the bottom of the sump. Modern poly tanks are designed to preclude the need for internal inspection and as such are not provided with "manhole" covers. Modern safety practices (as in the need for confined space training and practices to be employed) make internal inspection of the tank unnecessary and could be potentially hazardous to personnel performing an inspection. If an agent tank needs internal inspection it should only be done by qualified and properly trained inspection personnel. Because of modern ARFF agent tank design and construction routine internal inspections are not needed.

Committee Meeting Action: Reject
Committee Statement: The committee feels this to be too restrictive and noted there is no clear definition as to what a "qualified" inspector would be.

The tank shall:

a) be equipped with removable manhole covers over the tank discharge.

b) be designed to allow for internal and external inspection and service.

c) have longitudinal and transverse baffles.

d) have a minimum 2.5 inches capacity drain connection shall be installed at the bottom of the sump.

The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

Provisions shall be made for necessary overflow and venting. Venting shall be sized to allow agent discharge at the maximum design flow rate without danger of tank collapse and shall be sized to allow rapid and complete filling without exceeding the internal pressure design limit of the tank. Additionally, overflows shall be designed to prevent loss of water from the tank during normal maneuvering and tilt table testing to direct the discharge of overflow water directly to the ground.

Overflows shall resist or prevent the loss of water during all maneuvering as well as tilt table testing. Loss of water during tilt table testing is critical to having a high center of gravity in vehicle testing worse case scenarios.

This is not original material; its reference/source is as follows:

Earlier version of 414 document.

Committee Meeting Action: Accept in Principle
Committee Statement: See committee action on 414-161 (Log #CP127).
Subdivider: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.15.2.3 Provisions shall be made for necessary overflow and venting.
4.15.2.3.1 Venting shall be sized to allow agent discharge at the maximum design flow rate without danger of tank collapse.
4.15.2.3.2 Vents and shall be sized to allow rapid and complete filling without exceeding the internal pressure design limit of the tank.
4.15.2.3.3 Additionally, Overflows shall be designed to prevent loss of water from the tank during normal maneuvering and to direct the discharge of overflow water directly to the ground.
4.15.2.3.4 Water loss shall be less than one percent of the water capacity during the tilt table testing.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections are not new text, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept

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Subdivider: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.15.2.4 The water tank shall be:
a) mounted in a manner that limits the transfer of the torsional strains from the chassis frame to the tank during off-pavement driving
b) separate and distinct from the crew compartment, engine compartment, and chassis
c) able to be removed as a unit
d) permitted as to be an integral part of unitized rigid body construction

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections are not new text, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept

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Subdivider: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.15.2.5 The water tank shall be equipped with at least one top fill opening of not less than 20.3 cm (8 in.) internal diameter.
4.15.2.5.1 The water tank top fill shall be equipped with an easily removable strainer of 6.4 mm (¼ in.) mesh construction.
4.15.2.5.2 The water tank top fill opening shall be equipped with a cap designed to prevent spillage.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections are not new text, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept
414-164  Log #CP130  Final Action: Accept
(4.15.3.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.15.3.3 The connection(s) shall be provided with strainers of 6.4 mm (¼ in.) mesh. and shall have check valves or shall be constructed so that water is not lost from the tank when connection or disconnection is made.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-165  Log #51  Final Action: Reject
(4.15.3.5 (New) )

Submitter: Gary T. Schott, Omaha Airport Authority
Recommendation: New text to read as follows:
4.15.3.5 Tanks and intakes shall be sized and built to withstand intake water pressures up to 150 PSIG or have some mechanical means of adjustment or pressure displacement.
Substantiation: Many local water pressures from one city to the other are often found to be much higher than usual. Places like Omaha at 125 PSIG which is the seasonal adjustable water pressure and the higher pressures in Colorado Springs require fire and ARFF vehicles to be able to accept these higher pressures. Intake pressures as stated currently in 4.15.3.4 state and the labels over the intake “80 PSI Max”.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is a local issue and should be handled by the purchaser and is also looking for further information regarding the requirement the submitter has proposed.

414-166  Log #CP131  Final Action: Accept
(4.15.3.5 (New) )

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new section and text to read as follows:
4.15.3.5 The tank connections shall have check valves or shall be constructed so that water is not lost from the tank when connection or disconnection is made.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text, it is existing text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.1.1 The purchaser shall specify the percent concentrate foam system to be provided. The foam–liquid concentrate tank(s) shall have a working capacity sufficient for two tanks of water at the maximum tolerance specified in NFPA 412 Chapter 5.2.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section as well as note what part of NFPA 412 the committee was referring to.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.1.2 Foam–liquid concentrate tanks shall be permitted to be of either the rigid or flexible type. The tank(s) shall be designed for compatibility with the foam concentrate being used and shall resist all forms of deterioration that could be caused by the foam concentrate or water.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

Submitter: Marty Huffman, Rosenbauer
Recommendation: Revise text to read as follows:
4.16.1.3 Tanks shall be designed to allow for internal and external inspection and service. A large capacity drain connection shall be installed at the bottom of the sump.
Substantiation: The first sentence should be deleted as internal inspection requires personnel to be certified in confined space training and presents liability issues.
Committee Meeting Action: Reject
Committee Statement: The committee notes that this has been addressed in an earlier proposal with regards to the fact that there is no clear definition, or use within this document, as to what a required certifications one must hold to perform such inspections.
414-170  Log #117  Final Action: Reject

(4.16.1.3)

Submitter: Marty Huffman, Rosenbauer

Recommendation: Revise text to read as follows:

4.16.1.3 Tanks shall be designed to allow for internal and external inspection and service. Internal inspection of agent tanks if needed should be performed by qualified inspectors ONLY. A large capacity drain connection shall be installed at the bottom of the sump.

Substantiation: Modern poly tanks are designed to preclude the need for internal inspection and as such are not provided with “manhole” covers. Modern safety practices (as in the need for confined space training and practices to be employed) make internal inspection of the tank unnecessary and could be potentially hazardous to personnel performing an inspection. If an agent tank needs internal inspection it should only be done by qualified and properly trained inspection personnel. Because of modern ARFF agent tank design and construction routine internal inspections are not needed.

Committee Meeting Action: Reject

Committee Statement: The committee feels that the current requirement provides the best means of application.

414-171  Log #CP134  Final Action: Accept

(4.16.1.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

4.16.1.3 Tanks shall be designed to allow for internal and external inspection and service. A large capacity drain connection shall be installed at the bottom of the sump.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

414-172  Log #CP135  Final Action: Accept

(4.16.1.5 through 4.16.1.5.4)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text and add new sections to read as follows:

4.16.1.5 If separate from the water tank, the foam–liquid tank shall be mounted in a manner that limits the transfer of the torsional strains from the chassis frame to the tank during off-pavement driving.

4.16.1.5.1 The foam-liquid tank shall be separate and distinct from the crew compartment, engine compartment, and chassis and shall be easily removable as a unit.

4.16.1.5.2 Foam–liquid tanks used as an integral part of unitized rigid body construction shall be permitted.

4.16.1.5.3 A flexible tank shall be structurally supported to resist tearing independently of the fluid levels in either the water or foam tanks.

4.16.1.5.4 The structural support shall not be dependent on the fluid level in either the water or foam tanks.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept
414-173  Log #CP136  Final Action: Accept
(4.16.1.6)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.1.6 A top fill trough shall:
 a) be provided and shall be
 b) be equipped with a mesh screen constructed of noncorrosive materials and container openers to allow emptying 18.9
   L (5 gal) foam–liquid concentrate containers into the storage tank(s) at a rapid rate regardless of water tank level. The
   trough shall
 c) be connected to the foam–liquid storage tank(s) with a fill line designed to introduce foam–liquid concentrate near the
   bottom of the tank(s) to minimize foaming within the storage tank.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple
requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing
text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept

414-174  Log #CP137  Final Action: Accept
(4.16.1.7)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.1.7 The tank fill connection(s) shall:
 a) be provided in a position where it can be reached, but not to exceed five(5) feet, easily from the ground to allow the
   pumping of foam–liquid concentrate into the storage tank(s)
 b) The connection(s) shall be provided with strainers of 6.4 mm (¼ in.) mesh and shall have check valves or shall be
   constructed so that foam is not lost from the tank when connection or disconnection is made.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple
requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing
text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept

414-175  Log #CP138  Final Action: Accept
(4.16.1.8)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.1.8 Where flexible tanks are used, the supply system shall:
 a) be designed so that the flexible tanks are not subject to excess pressure. The supply system shall
 b) be capable of delivering foam–liquid at a rate at least equal to or greater than the maximum discharge rate of the
   foam system.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple
requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing
text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept
The tank(s) shall:

a) be vented adequately to allow for rapid and complete filing without the buildup of excessive pressure and to
b) allow emptying of the tank at the maximum design flow rate without danger of collapse.

c) The vent outlets shall be directed to the ground to prevent spillage of foam–liquid concentrate on vehicle components.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept

The foam–liquid concentrate piping shall be of material resistant to corrosion by foam–liquid concentrates addressed in this standard.

Care shall be taken that combinations of dissimilar metals that produce galvanic corrosion are not selected or that such dissimilar metals are electrically insulated.

Where plastic piping is used, it shall be fabricated from unplasticized resins, unless it has been demonstrated that the stipulated plasticizer does not adversely affect the performance characteristics of the foam–liquid concentrates addressed in this standard.

The plastic pipe shall be permitted to be reinforced with glass fibers.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept

The foam–liquid concentrate piping shall be adequately sized to allow the maximum required flow rate and shall be arranged to prevent water from entering the foam tank.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept
414-179 Log #CP142
(4.16.3.3 (New))
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new text to read as follows:
4.16.3.3 The foam–liquid concentrate piping shall be arranged to prevent water from entering the foam tank.

Substantiation: The committee has added this new section and text as a result of a change in text in log number 141 in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-180 Log #CP143
(4.16.4.1)
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.4.1 The foam concentrate proportioning system shall provide a means of controlling the ratio of foam concentrate to the quantity of water in the foam solution being discharged from all orifices normally used for aircraft fire-fighting operations.

Substantiation: This change was made to comply with the Manual of Style.
Committee Meeting Action: Accept

414-181 Log #CP144
(4.16.4.2)
Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.16.4.2 The proportioning system shall be sufficiently accurate to provide for the discharge of finished foam within the range specified in NFPA 412, chapter 5.

Substantiation: This change was made to comply with the Manual of Style and to specify what part of NFPA 412 the committee was referring to.
Committee Meeting Action: Accept
<table>
<thead>
<tr>
<th>Log #</th>
<th>Submitter</th>
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<tr>
<td>115</td>
<td>Marty Huffman, Rosenbauer</td>
<td>Revise text to read as follows: 4.16.4.3 Each nozzle shall have minimum foam discharge patterns, from a dispersed stream of 4.6 m (15 ft) in width and 6.1 m (20 ft) in range to a straight foam stream with a 19.8 m (65 ft) range. Insert wording: (and shall meet the discharge parameters described in table 4.1.1)</td>
<td>Statement as written conflicts with the verbiage in table 4.1.1 and should be changed to match the table requirements.</td>
<td>Accept in Principle</td>
<td>Accept in Principle</td>
</tr>
<tr>
<td>145</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting</td>
<td>Modify text to read as follows: 4.17.1 Premixed — Pump System. 4.17.1.1 Where premix solution in the main water tank is selected as the means of proportioning foam to water, the foam solution used shall be aqueous film-forming foam (AFFF) only. Care shall be exercised that the premixed solution is mixed to exact proportions. 4.17.1.2 Where premix solution is used, operation of the vehicle fire-fighting system shall conform to the requirements of Sections 4.14 and 4.15. A.4.17.1.1 Care should be exercised that the premixed solution is mixed to exact proportions.</td>
<td>The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.</td>
<td>Accept</td>
<td>Accept</td>
</tr>
<tr>
<td>146</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting</td>
<td>Modify text to read as follows: 4.17.2.1.1 The storage container(s) and for liquid agent(s) shall be marked, designed for pressurization, shall and be constructed in accordance with the ASME Boiler and Pressure Vessel Code, and shall be so marked.</td>
<td>The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.</td>
<td>Accept</td>
<td>Accept</td>
</tr>
</tbody>
</table>
414-185  Log #CP147  Final Action: Accept
(4.17.2.1.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.17.2.1.2 The material of construction shall be resistant to corrosion by the AFFF agent to be stored, or a suitable lining material shall be provided.

Substantiation: This change was to comply with the Manual of Style and the use of an unenforceable term.
Committee Meeting Action: Accept

414-186  Log #CP148  Final Action: Accept
(4.17.2.1.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.17.2.1.3 An American Society of Mechanical Engineers (ASME)-approved pressure relief valve and a pressure gauge that indicates the internal pressure of the agent storage container at all times of adequate capacity shall be provided on the container and set to prevent pressures in excess of the maximum allowable design working pressure. A pressure gauge shall be provided that indicates the internal pressure of the agent storage container at all times.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-187  Log #CP149  Final Action: Accept
(4.17.2.1.4 through 4.17.2.1.4.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:

4.17.2.1.4 A readily accessible fill opening of sufficient size to allow ease in filling, and stirring if necessary, shall be provided.
4.17.2.1.4.1 The fill opening shall be in compliance with ASME or local codes and in no case shall be less than 76.2 mm (3 in.) in diameter.
4.17.2.1.4.2 Filling shall be accomplished without the removal of any of the extinguisher piping or any major component.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept
414-188  Log #141  Final Action: Accept in Principle
(4.17.2.1.5)

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Insert additional wording:
4.17.2.1.5 A means shall be provided to determine the contents of the container such as a premeasured and suitably marked dip-stick, as a guide in recharging partial loads.
Substantiation: A pre-measured dip stick is important to maintain consistency in the quality of the foam concentration.
This is not original material; its reference/source is as follows:
Earlier version of 414 document.
Committee Meeting Action: Accept in Principle
Insert additional wording and annex item:
4.17.2.1.5* A means shall be provided to determine the contents of the container such as a premeasured and suitably marked dip-stick, as a guide in recharging partial loads.
A.4.17.2.1.5 Means to guide in recharging partial loads can be; suitably marked dipstick and/or level gauge approved for the application.
Committee Statement: The committee feels this should be an annex item to provide information as to what may be used to accomplish the directed task.

414-189  Log #142  Final Action: Reject
(4.17.2.2.1)

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Insert additional wording:
4.17.2.2.1 The propellant gas shall be dry nitrogen or dry compressed air and provided in sufficient quantity to expel the fire-fighting agent as well as to purge all piping and hose lines after use. A Re-service pressurization system shall be provided for re-servicing.
a. When specified a remote re-service port with appropriate valves and pressure gauges shall be installed to allow the re-service of the pressure bottles without their removal.
b. A remote re-service kit including hose and re-service fitting, overpressure relief valve shall be provided with the truck if the re-service system is specified.
c. Appropriate instructions for re-servicing the vehicles pressurized bottle source shall be provided on a placard close to the re-service point.
Substantiation: It is difficult and time consuming to remove pressurized vessels from any ARFF vehicle even if aided by a lifting device. Many departments are now successfully utilizing in vehicle re-servicing system to rapidly replace depleted propellant from pressurized bottles. In most cases the vehicle can be put back into service as quickly as extinguishing agent, and dry chemical can be reinstall into the service vessels because of the utilization of in vehicle re-servicing.
This is not original material; its reference/source is as follows:
Earlier version of 414 document.
Committee Meeting Action: Reject
Committee Statement: The committee feels that this is part of the individual specification process that the purchaser should make and would be inappropriate to make this a requirement for all to meet.
414-190 Log #CP151
(4.17.2.2.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.17.2.2.1 The propellant gas shall be dry nitrogen or dry compressed air and provided in sufficient quantity to expel
the fire-fighting agent as well as to purge all piping and hose lines after use.

Substantiation: This change was to comply with the Manual of Style and the use of an unenforceable term.
Committee Meeting Action: Accept

414-191 Log #CP153
(4.17.2.2.2) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.17.2.2.2 All propellant gas cylinders and valves shall be constructed and marked in accordance with U.S.
Department of Transportation (DOT) requirements or regulations. Cylinders shall bear the DOT marking.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within
the same section.
Committee Meeting Action: Accept

414-192 Log #143
(4.17.2.3) Final Action: Accept in Principle

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.
Recommendation: Insert additional wording:
4.17.2.2.3 The design of the propellant source shall provide for quick and easy replacement after each use. A
Pressure Tank lifting device shall be delivered with the vehicle to lift/transport the high pressure cylinder when removal
is required from the truck.

Substantiation: Pressure tanks are heavy and numerous fire fighters have been hurt in handling accidents when trying
to remove and service these pressure vessels.

This is not original material; its reference/source is as follows:
Earlier version of 414 document.
Committee Meeting Action: Accept in Principle
Add new section and text to read as follows:
4.17.2.2.3 The design of the propellant source shall provide for quick and easy replacement after each use. A
Pressure Tank lifting device shall be delivered with the vehicle to lift/transport the high pressure cylinder when removal
is required from the truck.

Committee Statement: The changes the committee has made was to bring the text in line with the Manual of Style as
well as to provide further clarification of the requirement that was being included in the document.
414-193  Log #CP154  Final Action: Accept
(4.17.2.2.4)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.17.2.2.4 A pressure gauge that indicates shall be provided and shall indicate the pressure of the propellant gas source at all times shall be provided.
Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-194  Log #CP155  Final Action: Accept
(4.17.2.2.6)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.17.2.2.6 The cylinder valve shall be capable of being opened by quick-acting control and shall also be suitable for permit remote operation.
Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-195  Log #CP152  Final Action: Accept
(4.17.2.2.7 (New))

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new text and section to read as follows:
4.17.2.2.7 The propellant gas supply shall be sized to provide the capability to expel the fire-fighting agent as well as to purge all piping and hose lines after use.
Substantiation: The committee has added this requirement to clarify the expectations of the propellant gas supply.
Committee Meeting Action: Accept

414-196  Log #CP156  Final Action: Accept
(4.17.2.3.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.17.2.3.1 Pressure regulation shall be designed to reduce the normal cylinder pressure automatically and to hold the propellant gas pressure at the designed operating pressure of the liquid agent container(s).
Substantiation: This change was made to comply with the Manual of Style and the use of unenforceable terms.
Committee Meeting Action: Accept
Modify text and add new sections to read as follows:

All propellant piping and fittings shall:

a) conform to the appropriate ASME document and shall
b) be designed to withstand the working pressure of the system.

The design of the piping and valving shall provide the desired flow of gas into the system and the minimum amount of restriction from the liquid agent container(s) to the hose connection.

Where more than one hose line is provided, piping and fittings shall be sized and designed so that there is equal flow to each line, regardless of the number of lines placed in operation.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept

Modify text to read as follows:

Provisions shall be made for:

a) purging all piping and hose of the liquid after use without discharging the liquid agent remaining in the container(s)
Provisions also shall be made for
b) the depressurization of the liquid agent container(s) without the loss of the remainder of the liquid agent.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

Modify text to read as follows:

Readily accessible drains shall be provided to allow complete draining of the system. Drains shall be easily accessible and shall not require the removal of panels, doors, or components for access.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept
Modify text and add new sections to read as follows:

4.17.2.4.1 All valves shall be of the quarter-turn, quick-opening ball type.
4.17.2.4.2 Controls shall be arranged for simultaneous charging of the liquid agent and dry chemical systems.
4.17.2.4.3 Valves on the gas cylinder specified in 4.17.2.2.2 shall not be required to be of the quarter-turn, quick-opening ball type.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept

Modify text to read as follows:

4.17.2.4.5 Identical quick-acting controls shall be provided to be operated by the driver to pressurize the liquid agent system from the cab of the vehicle and the unit.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

Insert new wording:

4.17.2.4.8 A system schematic shall be available
a. A schematic shall be available for easy reference at or close to the system operation access point in the body compartment area.
b. This schematic shall include both liquid/foam, dry chemical and/or Halogenated agent flow as well as pneumatic pressurize of nitrogen or air flow.

Substantiation: A schematic of the system is necessary close or at the system for field service reference.
414-203  Log #23  Final Action: Reject

(4.18)

Submitter: Gary T. Schott, Omaha Airport Authority / Rep. ARFF Working Group
Recommendation: New text to read as follows:
Insert New Para within 4.18: When using the Roof Turret at full flow bumper turret will automatically reduce its discharge rate to half flow. When using the bumper turret at full flow the roof turret will automatically reduce its rate to half flow.
Substantiation: Vehicles can now be specified with two primary nozzles. In order to insure drivers do not unknowingly empty their vehicle too quickly the following precautions should be added.
Committee Meeting Action: Reject
Committee Statement: The discharge time is covered by the FAA Part 139.

414-204  Log #CP162  Final Action: Accept

(4.18.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.18.1 Aircraft rescue and fire-fighting vehicles shall have at least one or two primary turret nozzles with a discharge rate tolerance of +10%/-0 percent.
Substantiation: The committee made this change as the original text was confusing as it did not require that it have a minimum requirement for the number of primary turret nozzles.
Committee Meeting Action: Accept

414-205  Log #CP163  Final Action: Accept

(4.18.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.18.2 Turret nozzles with liquid flow rates of 2839 L/min (750 gpm) or more shall be of the dual discharge type and arranged to allow selection of either 50 percent or 100 percent of the turret capacity. The primary turret discharge rates shall have a tolerance of +10%/-0 percent.
Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
414-206 Log #CP164
(4.18.4 through 4.18.4.3)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.18.4 The purchaser shall specify whether a manually operated or a power-assisted turret shall be provided:
4.18.4.1 Where a manually operated turret is specified:
   a) controls shall be in the cab
   b) operation force shall be less than 133.4 N (30 lbf) and
   c) an indication of turret elevation and azimuth shall be provided.
4.18.4.2 Where a power-assisted turret is specified:
   a) controls shall be in the cab
   b) operation force shall be less than 133.4 N (30 lbf)
   c) an indicator of turret elevation and azimuth shall be provided; and
   d) where specified, a manual override, or secondary parallel controls powered by an alternate source of all roof turret movement functions shall be provided in the cab
   e) the secondary, parallel controls shall be capable of operating the turret with a failed primary control system
   f) the manual override operation force shall be less than 133.4 N (30 lbf).
4.18.4.3 Where the turret control is at the platform, operation forces shall be less than 222.4 N (50 lbf).

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.
Committee Meeting Action: Accept

414-207 Log #CP165
(4.18.5)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.18.5 Turrets shall be capable of:
   a) being elevated at least 45 degrees above the horizontal
   b) discharging agent within 9.1 m (30 ft) in front of the vehicle at full output using a dispersed stream.
   c) where a single turret is used on a vehicle, it shall be capable of being rotated not less than 90 degrees to either side, with total traverse not less than 180 degrees.
   d) where two turrets are used on a vehicle, stops shall be provided so that neither turret can interfere with the other turret.
   e) turret controls for both foam and dry chemical turrets shall be accessible both to the driver and the crew member
Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
If the primary turret is of the extendable type, it shall meet the following design and functional requirements:

1) The primary turret shall comply with Chapter 20 of NFPA 1901 and shall meet the requirements of 4.2.1.3 and 4.2.1.4 of this standard while in the stowed position.

2) The vehicle shall achieve a 20 percent side slope, with the extendable turret 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 4.1.1(c) and Table 4.1.1(d) for major vehicles.

5) The primary turret shall meet the primary water–foam agent turret discharge requirements of Table 4.1.1(c) and Table 4.1.1(d) for the applicable vehicle class while in the bedded position.

6) The primary turret shall meet the foam quality standard of NFPA 412 for the applicable foam applicator and foam type.

7) The primary 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 primary turret shall achieve the elevation and reach needed to service the highest engine for the type of aircraft being protected and start application within 30 seconds of activation of the deployment cycle.

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 pre-selected positioning of the elevation and reach.

10) If automated, these functions shall be provided with a manual override positioning capability.

11) The primary 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. In addition:

12) 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.

13) The primary turret shall have a range of motion so as to permit positioning of the nozzle to direct a fire-fighting agent stream at least 90 degrees to the longitudinal axis of the fuselage for interior fire extinguishment.

14) 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.

15) This horizontal rotation must be accomplished without the deployment of stabilizers or outriggers that might cause a delay in positioning or emergency movement of the rescue vehicle.

16) 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.

Substantiation: The committee has made these changes to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text, unless otherwise noted, it is existing text that was a result of the need to comply with the Manual of Style.

Committee Meeting Action: Accept
414-209 Log #CP217

(4.18.6) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

4.18.6* If the primary turret is of the extendable type, it shall meet the following design and functional requirements:
(1) The primary turret shall comply with Chapter 20 of NFPA 1901 and shall meet the requirements of 4.2.1.3 and
4.2.1.4 of this standard while in the stowed position.

Substantiation: The committee has chosen to remove the direct reference to a specific chapter of NFPA 1901 as those
requirements would then become part of the requirements of this document. In removing the direct reference it also
makes the requirements less restrictive in this document and will allow for future requirements that are specific to ARFF
vehicles.

Committee Meeting Action: Accept
414-210 Log #10 Final Action: Reject
(4.18.6)(1)

**Submitter:** Grady North, Crash Rescue Equipment Service, Inc.

**Recommendation:** Revise text as follows:

4.18.6 (1) The primary turret shall comply with Chapter 20 of NFPA 1901 and shall meet the requirements of 4.2.1.3 and 4.2.1.4 of this standard while in the stowed position.

Add (10) Capacity: The primary turret shall be capable of delivering a minimum water stream of 1000 gpm (4000 L/min) at 100 psi (700 kPa) form the water nozzle with the booms or sections and nozzle positioned in any configuration permitted by the manufacturer. The monitor shall be powered so as to allow the operator to control its aimed position. A preset relief valve capable of protecting the waterway system by relieving pressure through the dumping of water to the environment shall be provided. A 1.5” (38 mm) minimum drain valve shall be provided at the low point of the waterway system.

(11) Control Devices: Controls shall be provided at the driver’s or operator’s position, lighted, marked with a label, and conveniently arranged. These controls shall allow the operator to perform the following:

1. Elevate and lower the aerial device.
2. Extend and retract the aerial device, if applicable.
3. Rotate the aerial device in either direction, if applicable.

A method shall be provided to prevent unintentional movement of the aerial device. Each control shall allow the operator to regulate the speed of elevation, extension, and rotation of the aerial device within the limits determined by the manufacturer and this standard. Each control shall be arranged so it can be operated by an operator with a gloved hand without disturbing any other control(s). All controls regulating the movement of the aerial device shall automatically return to the neutral position upon release by the operator. When electric over hydraulic aerial device controls are incorporated, a readily accessible, manual means of overriding the electric controls shall be provided.

(12) Safety: Lighting shall be provided at the base of the aerial device and shall be arranged to illuminate the aerial device in any position of operation. A spotlight of not less than 75,000 cp (950,000 lumens) or a floodlight of not less than 850 cp (10,500 lumens) shall be provided on the monitor nozzle to illuminate the effect of the fire stream. Where the design of the aerial device incorporates a knuckle, the knuckle shall be as follows:

1. Equipped with position lights or continuously illuminated by boom lights
2. Painted with reflective paint or provided with reflective striping

(13) Hydraulic System: The nonsealing moving parts of all hydraulic components whose failure results in motion of the aerial device shall have a minimum bursting strength of four times the maximum operating pressure to which the component is subjected. Dynamic sealing parts of all hydraulic component whose failure results in motion of the aerial device shall not begin to extrude or otherwise fail at pressure at or below two times the maximum operating pressure to which the component is subjected. Static sealing parts of all hydraulic components whose failure results in motion of the aerial device shall have a minimum bursting strength of four times the maximum operating pressure to which the component is subjected. All hydraulic hose, tubing and fittings shall have a minimum bursting strength of at least three times the maximum operating pressure to which the components are subjected. All other hydraulic components shall have a minimum bursting strength of at least two time the maximum operating pressure to which the components are subjected. The hydraulic system shall be provided with an oil pressure gauge.

(14) Hydraulic Reservoir: A means for checking and filling the hydraulic reservoir shall be readily accessible. The fill location shall be conspicuously marked with a label that reads “Hydraulic Oil Only”. The manufacturer shall provide instructions for checking and filling the hydraulic reservoir. The hydraulic system components shall be capable of maintaining, under all operating conditions, oil cleanliness and temperature that comply with the component manufacturer’s recommendations.

(15) Structure: All structural load-supporting elements of the aerial device that are made of a ductile material shall have a design stress of not more that 50 percent of the minimum yield strength of the material based on the combination of the rated capacity and the dead load, which is equivalent to a 2:1 safety factor. All structural load-supporting elements of the aerial device that are made of a nonductile material shall have a design stress of not more that 50 percent of the minimum ultimate strength of the material based on the combination of the rated capacity and the dead load, which is equivalent to a 5:1 safety factor. Wire ropes, chains, and attaching systems used to extend and retract the booms shall have a 5:1 safety factor based on ultimate strength under all operating conditions allowed by the manufacturer. The factor of safety for the wire rope shall remain above 2:1 during any extension or retraction system stall. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1:12.

(16) Quality Control: The manufacturer and installer shall have in effect a complete and documented quality control
program that will ensure complete compliance with the requirements of this standard. The quality control program shall include 100 percent nondestructive testing (NDT) of all critical structural components of the aerial device. The procedures used for NDT shall comply with the applicable standards. All NDT procedures shall be fully documented with respect to the extent of the examination, the method of testing and the inspection techniques.

Substantiation: The reference chapter in NFPA 1901 is now Chapter 19 with the 2009 edition. NFPA 1901 and NFPA 414 are out of cycle with each other and references to the 1901 standard, even with the specified edition, can be confusing. Older editions may go out of publication before revisions can be made. The current NFPA 1901 Chapter 19 has over 340 numbered paragraphs. Only a few of these apply to extendable turrets. Without specific paragraphs referenced, it is up to the manufacturer to pick and choose which ones he wants to comply with. The additional wording submitted above is copied from NFPA 1901 that the author feels is applicable to extendable turrets. The basic aerial component descriptions seldom change in NFPA 1901 – although the paragraph numbers may change. If wording changes in subsequent NFPA 1901 editions, it can be easily updated in NFPA 414. Having specific language in NFPA 414 eliminates confusion to the buyer and insures that all manufacturers are building to the same standard.

Committee Meeting Action: Reject

Committee Statement: The committee voted to reject this proposal as it has possibly created an anti-trust situation and was felt to be far too restrictive.
The primary turret shall be capable of delivering a minimum water stream of 1000 gpm (4000 L/min) at 100 psi (700 kPa) form the water nozzle with the booms or sections and nozzle positioned in any configuration permitted by the manufacturer. The monitor shall be powered so as to allow the operator to control its aimed position. A preset relief valve capable of protecting the waterway system by relieving pressure through the dumping of water to the environment shall be provided. A 1.5” (38 mm) minimum drain valve shall be provided at the low point of the waterway system.

(11) **Control Devices**: Controls shall be provided at the driver's or operator's position, lighted, marked with a label, and conveniently arranged. These controls shall allow the operator to perform the following:

1. Elevate and lower the aerial device.
2. Extend and retract the aerial device, if applicable.
3. Rotate the aerial device in either direction, if applicable.

A method shall be provided to prevent unintentional movement of the aerial device. Each control shall allow the operator to regulate the speed of elevation, extension, and rotation of the aerial device within the limits determined by the manufacturer and this standard. Each control shall be arranged so it can be operated by an operator with a gloved hand without disturbing any other control(s). All controls regulating the movement of the aerial device shall automatically return to the neutral position upon release by the operator. When electric over hydraulic aerial device controls are incorporated, a readily accessible, manual means of overriding the electric controls shall be provided.

(12) **Safety**: Lighting shall be provided at the base of the aerial device and shall be arranged to illuminate the aerial device in any position of operation. A spotlight of not less than 75,000 cp (950,000 lumens) or a floodlight of not less than 850 cp (10,500 lumens) shall be provided on the monitor nozzle to illuminate the effect of the fire stream. Where the design of the aerial device incorporates a knuckle, the knuckle shall be as follows:

1. Equipped with position lights or continuously illuminated by boom lights
2. Painted with reflective paint or provided with reflective striping

(13) **Hydraulic System**: The nonsealing moving parts of all hydraulic components whose failure results in motion of the aerial device shall have a minimum bursting strength of four times the maximum operating pressure to which the component is subjected. Dynamic sealing parts of all hydraulic component whose failure results in motion of the aerial device shall not begin to extrude or otherwise fail at pressure at or below two times the maximum operating pressure to which the component is subjected. Static sealing parts of all hydraulic components whose failure results in motion of the aerial device shall have a minimum bursting strength of four times the maximum operating pressure to which the component is subjected. All hydraulic hose, tubing and fittings shall have a minimum bursting strength of at least three times the maximum operating pressure to which the components are subjected. All other hydraulic components shall have a minimum bursting strength of at least two time the maximum operating pressure to which the components are subjected. The hydraulic system shall be provided with an oil pressure gauge.

(14) **Hydraulic Reservoir**: A means for checking and filling the hydraulic reservoir shall be readily accessible. The fill location shall be conspicuously marked with a label that reads “Hydraulic Oil Only”. The manufacturer shall provide instructions for checking and filling the hydraulic reservoir. The hydraulic system components shall be capable of maintaining, under all operating conditions, oil cleanliness and temperature that comply with the component manufacturer's recommendations.

(15) **Structure**: All structural load-supporting elements of the aerial device that are made of a ductile material shall have a design stress of not more that 50 percent of the minimum yield strength of the material based on the combination of the rated capacity and the dead load, which is equivalent to a 2:1 safety factor. All structural load-supporting elements of the aerial device that are made of a nonductile material shall have a design stress of not more that 20 percent of the minimum ultimate strength of the material based on the combination of the rated capacity and the dead load, which is equivalent to a 5:1 safety factor. Wire ropes, chains, and attaching systems used to extend and retract the booms shall have a 5:1 safety factor based on ultimate strength under all operating conditions allowed by the manufacturer. The factor of safety for the wire rope shall remain above 2:1 during any extension or retraction system stall. The minimum ratio of the diameter of wire rope used to the diameter of the sheave used shall be 1:12.

(16) **Quality Control**: The manufacturer and installer shall have in effect a complete and documented quality control
program that will ensure complete compliance with the requirements of this standard. The quality control program shall include 100 percent nondestructive testing (NDT) of all critical structural components of the aerial device. The procedures used for NDT shall comply with the applicable standards. All NDT procedures shall be fully documented with respect to the extent of the examination, the method of testing and the inspection techniques.

Substantiation: The reference chapter in NFPA 1901 is now Chapter 19 with the 2009 edition. NFPA 1901 and NFPA 414 are out of cycle with each other and the 1901 standard, even with the specified edition, can be conflicting. Older editions may go out of publication before revisions can be made. The current NFPA 1901 Chapter 19 has over 340 numbered paragraphs. Only a few of these apply to extendable turrets. Without specific paragraphs referenced, it is up to the manufacturer to pick and choose which ones he wants to comply with. The additional wording submitted above is copied from NFPA 1901 that the author feels is applicable to extendable turrets. The basic aerial component descriptions seldom change in NFPA 1901 – although the paragraph numbers may change. If wording changes in subsequent NFPA 1901 editions, it can be easily updated in NFPA 414. Having specific language in NFPA 414 eliminates confusion to the buyer and insures that all manufacturers are building to the same standard.

Committee Meeting Action: Reject

Committee Statement: The committee voted to reject this proposal as it has possibly created an anti-trust situation and was felt to be far too restrictive.

414-212 Log #55 Final Action: Accept
(4.18.6(1))

Submitter: Grady North, Crash Rescue Equipment Service, Inc.

Recommendation: Revise text to read as follows:

(1) The primary turret shall comply with Chapter 20 Chapter 19 Sections 19.13, 19.14, 19.15, 19.16, 19.19, 19.20 and 19.22 of NFPA 1901 and shall meet the requirements of 4.2.1.3 and 4.2.1.4 of this standard while in the stowed position.

Substantiation: For the 2009 edition of NFPA 1901, water towers are now covered under Chapter 19 instead of Chapter 20. Also, there are sections in Chapter 20 that are not relevant to ARFF vehicles. Specifically: Section 19.17 Control Devices, Section 19.18 Safety and Section 19.21 Stabilization.

Committee Meeting Action: Accept
Committee Statement: See committee action on 414-209 (Log #CP217).

414-213 Log #116 Final Action: Reject
(4.18.6(6))

Submitter: Marty Huffman, Rosenbauer

Recommendation: Revise text to read as follows:

(6) The primary 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. In addition, the device shall be capable of positioning the nozzle within 6.0 m (2 ft) 1.2 m (4 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.

Substantiation: Figure should be revised to reflect new entrances to the industry in HRET technology. The turret is still in a position to make a low attack on the on the A/C. The original figures were arrived at based on existing technology and with the introduction of new penetrating technology this figure could be considered proprietary.

Committee Meeting Action: Reject
Committee Statement: The committee feels that the current requirement provides the best means of application.
414-214  Log #29  Final Action: Accept in Principle  
(4.18.6(10))

Recommendation: New text to read as follows:  
4.18.6(10) The extendable type turret shall have a video camera and monitor to view the boom at all times. This camera shall be mounted to the rear of apparatus and in an upward view so when the extendable turret is raised the operator may view the full extension and any rotation. The monitor shall be automatically turned on whenever the extendable turret is energized for movement.  
Substantiation: This prevents should help the operator to view the entire boom and to avoid rising where overhead obstructions are. It is used on one of our units here in Phoenix and makes a huge difference versus our new apparatus that does not have the camera. Small price to pay up front versus a large price for striking overhead objects.  
Committee Meeting Action: Accept in Principle  
Add new text to read as follows:  
4.18.6(10) The Driver/Operator shall be able to see the boom, as it is rising to its maximum height, from their seated position by means of a camera or direct line of sight.  
Committee Statement: While the committee agrees with the submitters intent, they felt that the proposed text would be too restrictive and the text the committee has provided accomplishes the same requirement.

414-215  Log #CP167  Final Action: Accept  
(4.18.6.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,  
Recommendation: Modify text to read as follows:  
4.18.6.2 An adjustable or dual flow rate nozzle shall be provided that will allow flow rates and patterns suitable for interior aircraft fire fighting [see Table 4.1.1(c) and Table 4.1.1(d)].  
Substantiation: This change was made to comply with the Manual of Style and the use of unenforceable terms.  
Committee Meeting Action: Accept

414-216  Log #56  Final Action: Accept in Principle  
(4.18.6.3)

Submitter: Grady North, Crash Rescue Equipment Service, Inc.  
Recommendation: Revise text to read as follows:  
4.18.6.3 Controls for the extendable turret and options shall be as specified. Where specified, the extendable turret shall be fitted with accessories and devices needed for a driver or another operator to remotely perform the interior aircraft and highest engine fire-fighting functions from their positions inside the vehicle.  
Substantiation: The original wording was confusing. Some people thought it referred to a radio remote control device for operating outside of the vehicle.  
Committee Meeting Action: Accept in Principle  
Committee Statement: The committee agrees with the submitters proposed change however see committee action on 414-217 (Log #CP168).
Submitters: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

**4.18.6.3** Controls for the extendable turret and options shall be as specified: Where specified, the extendable turret shall be fitted with controls, accessories and devices needed for a driver or another operator to remotely perform the interior aircraft and highest engine fire-fighting functions.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section

Committee Meeting Action: Accept

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Submitters: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

**4.18.6.4** Where auxiliary agent lines are specified, they shall:

a) be capable of discharging either dry chemical, or halocarbon agent, or approved equivalent through an appropriate nozzle while the device is extended out and up to its maximum operational reach

b) Auxiliary agent lines shall meet the minimum auxiliary agent flow rate and pattern requirements of Table 4.1.1(c) and Table 4.1.1(d).

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section

Committee Meeting Action: Accept

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Submitters: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:

**4.18.6.5** Where remote color optics are specified:

a) they shall be capable of sufficient resolution to permitting overall fire scene surveillance when fully extended and to provide the driver/operator with the detail needed for placement of the penetration device on the aircraft hull for proper piercing.

b) the camera and associated lighting shall be designed and installed for exterior environmental operating conditions normally encountered by ARFF vehicles.

c) a monitor 178 mm (7 in.) or larger shall be cab-mounted in a roadworthy manner and shall be viewable from readily accessible to the driver/operator position.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept
Where a skin penetrator/agent applicator is specified, it shall be movable in conjunction with the water-foam nozzle to allow proper placement of the nozzle control. Where a skin penetrator/agent applicator is specified, it shall and be capable of the minimum water-foam flow rate and pattern requirements of Table 4.1.1(c) and Table 4.1.1(d).

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

Revise text to read as follows:

4.18.6.7 (last sentence) From a bedded position, penetration and agent discharge shall take place 20 seconds after positioning the vehicle at the aircraft fuselage and providing water to the floor and ceiling levels beyond the overhead storage bin area.

Substantiation: A time limit of moving the boom from a bedded position to a piercing position and making the penetration all within 20 seconds would require extremely high boom movement speed and a very large hydraulic system. High speed movement of booms elevated 50 or 60 ft. in the air can be dangerous to the aircraft or personnel near the boom. The required high speed movement would also affect accuracy of proper boom positioning for the piercing operation that could result in failure to extinguish the fire.
Committee Meeting Action: Accept in Principle

Delete existing text and renumber:

4.18.6.7 (last sentence) From a bedded position, penetration and agent discharge shall take place 20 seconds after positioning the vehicle at the aircraft fuselage and providing water to the floor and ceiling levels beyond the overhead storage bin area.

Committee Statement: The committee has chosen to delete this entire requirement from the document as a more stringent test requirement has been addressed in Proposal 414-225 (Log #75).
The penetrating nozzle shall be capable of a minimum flow rate of 946 L/min (250 gpm). The nozzle system shall be constructed to direct or spray agent and water on both sides of the aircraft at the same time after the penetration is made. [Concept-delivery shall be multiple holes causing a spray to cover 7.6 m to 9.1 m (25 ft to 30 ft) along the fuselage left and right of the centerline of the penetration point on each side of the aircraft interior and in the aircraft aisleway.]

This proposed change in text clarifies that the spray pattern requirement is 25 ft to 30 ft on each side of the penetration point. Since the penetration is conducted perpendicular to the aircraft using the term “each side of the aircraft interior” merely states that the spray pattern has to go window to window and not down the length of the fuselage.

Committee Meeting Action: Accept in Principle

Revised text to read as follows:

The penetrating nozzle shall be capable of a minimum flow rate of 946 L/min (250 gpm). The nozzle system shall be constructed to direct or spray agent and water on both sides of the aircraft at the same time after the penetration is made. Concept-delivery shall be multiple holes causing a spray to cover an area of at least 7.6 m to 9.1 m (25 ft to 30 ft) along the length of the fuselage left and right of the centerline of the penetration point on each side of the aircraft interior and in the aircraft aisleway.

Committee Statement: The committee agrees with the submitters intent but had to make some changes to comply with the Manual of Style and they also made some changes to provide further clarification of the requirement.

The penetrating nozzle shall be capable of a minimum flow rate of 946 L/min (250 gpm). The nozzle system shall be constructed to direct or spray agent and water on both sides of the aircraft at the same time after the penetration is made. [Concept-delivery shall be multiple holes causing a spray to cover 7.6 m to 9.1 m (25 ft to 30 ft) on each side of the aircraft interior and in the aircraft aisleway.]

From a bedded position, penetration and agent discharge shall take place 20 seconds after positioning the vehicle at the aircraft fuselage and providing water to the floor and ceiling levels beyond the overhead storage bin area.

This requirement sets a performance requirement for the speed in which the penetrator is deployed and does not account for variables in operator skill or complexities in system control functions. With the boom remaining in the bedded position, the ability to penetrate the fuselage above the windows and below the overhead stowage, is only possible on limited number of smaller, regional-type aircraft and not the larger transport size aircraft. A majority of the penetration evolutions will require a multi-axis, multi-function boom operation which will take longer than 20 seconds to achieve. A performance requirement for a real world boom operation should be established. This will be proposed in another log.

Committee Meeting Action: Reject

Committee Statement: This was addressed in a previous proposal as per the submitter of this proposal.
414-224  Log #58  Final Action: Accept in Principle
(4.18.6.8)

Submitter: Grady North, Crash Rescue Equipment Service, Inc.

Recommendation: New text to read as follows:

4.18.6.8 The penetrating nozzle must be visible to the driver/operator either by direct line of sight or by remote optics for any piercing position on the aircraft as defined by the manufacturer. The penetrating nozzle must be capable of piercing the aircraft fuselage over the wing area at angles up to 30 degrees left or right of the vehicle centerline in the event that the interior fire is located in this area.

Substantiation: If the driver/operator cannot see the piercing nozzle, additional personnel (ground spotter) would be required to properly position the boom. This extra person may or may not be available at the fire scene. Communicating with a ground spotter would add to the set-up time and delay in getting agent on the fire. The wing area covers a significant portion of the fuselage. If the penetrating nozzle cannot access this area, a large percentage of the aircraft interior would not be accessible for rapid interior fire suppression.

Committee Meeting Action: Accept in Principle

New text to read as follows and renumber accordingly:

4.18.6.8 The penetrating nozzle must be visible to the driver/operator either by direct line of sight or by remote optics for any piercing position on the aircraft as defined by the manufacturer.

4.18.6.9 The penetrating nozzle must be capable of piercing the aircraft fuselage over the wing area at angles up to 30 degrees left or right of the vehicle centerline in the event that the interior fire is located in this area.

Committee Statement: The committee agrees with the submitters proposed changes but has made Manual of Style changes.

414-225  Log #75  Final Action: Accept in Principle
(4.18.6.10 and 4.18.6.11)

Submitter: Keith W. Bagot, Federal Aviation Administration (FAA)

Recommendation: New text to read as follows:

4.18.6.8 The manufacturer shall demonstrate the ability of an extendable turret with penetrating nozzle to perform a multi-axis, multi-function boom operation with penetration and agent flowing at the proper penetration point (above the windows and below the overhead stowage bins) of a single passenger deck aircraft in 45 seconds. For devices designed to reach the second level of a multi-level passenger aircraft, the same function at the second level shall be achieved in less than 60 seconds.

Substantiation: Timed deployment tests conducted at the FAA Technical Center and Tyndall AFB have provided data indicating that these time requirements are what can be expected using these technologies. This requirement sets a performance requirement for the speed in which the penetrator is deployed while accepting variables in operator skill or complexities in system control functions. The proposal states that the requirement should be demonstrated by the manufacturer to reduce the wide variability in operator proficiency between airports. The manufacturer of a system should have the most proficient operator within their company to properly demonstrate this functional requirement.

Committee Meeting Action: Accept in Principle

New text to read as follows and renumber accordingly:

4.18.6.10 The manufacturer extendable turret with penetrating nozzle shall demonstrate have the ability of an extendable turret with penetrating nozzle to perform a multi-axis, multi-function boom operation with penetration and agent flowing at the proper penetration point (above the windows and below the overhead stowage bins) of a single passenger deck aircraft in less than 45 seconds.

4.18.6.11 For devices designed to reach the second level of a multi-level passenger aircraft, the same function at the second level shall be achieved in less than 60 seconds.

Committee Statement: This needs to be renumbered based on the fact that as per Proposal 414-224 (Log #58) that section was deleted. This would then need to be renumbered and where there are two requirements an additional section needed to be created to comply with the Manual of Style.
Lightweight boom-mounted turrets shall be permitted as primary turrets. These turrets shall meet the following design and functional requirements:

1. They shall comply with Chapter 20 of NFPA 1901 and shall meet the requirements of 4.2.1.3 and 4.2.1.4 of this standard while in the stowed position.
2. They shall achieve a 20 percent side slope with the boom turret fully elevated and the nozzle fully rotated uphill at maximum horizontal rotation while discharging at maximum flow rate.
3. Flow rates shall be in accordance with Table 4.1.1(c) and Table 4.1.1(d) for major vehicles.
4. They shall meet the primary water–foam agent turret discharge requirements of Table 4.1.1(c) and Table 4.1.1(d) for the applicable vehicle class while in the bedded condition.
5. They shall meet the foam quality standard of NFPA 412, Chapter 5.
6. They shall function during ARE operations without the need for outriggers or other ground contact stabilizers that could render the vehicle immobile or hinder its maneuverability.
7. They shall achieve the elevation and reach needed to service the highest engine for the type of aircraft being protected and start application of agent within 30 seconds of activation of the deployment cycle.
8. They shall be capable of applying agent through passenger doorways, to interior areas of the type of aircraft being protected. In addition:
9. The device must 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. They shall have a range of motion so as to permit positioning of the nozzle to direct a fire-fighting agent stream along the longitudinal axis of the fuselage or up to 90 degrees to the longitudinal axis for interior fire extinguishments.

The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The committee also updated cross references.

Committee Meeting Action: Accept
Preconnected handlines shall be those handlines for discharging water or foam, or both, that are specified by the purchaser as intended for use as primary ARFF equipment. All other handlines that are installed on the vehicle shall not be considered as being preconnected handlines.

4.19.1 Preconnected handlines shall be those handlines for discharging water or foam, or both, that are specified by the purchaser as intended for use as primary ARFF equipment.

4.19.1.1 Combined agent vehicles shall have at least one preconnected handline and nozzle for each agent.

4.19.1.2 Handlines and nozzles shall be permitted to be separate or twinned together for simultaneous agent discharge.

4.19.1.3 Handlines shall be permitted to be reeled handlines as specified in Table 4.1.1(a), Table 4.1.1(b), Table 4.1.1(c), and Table 4.1.1(d).

4.19.1.4 All other handlines that are installed on the vehicle shall not be considered as being preconnected handlines.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept

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Handlines for reels shall have a minimum burst rating three times the nominal working pressure of the system and shall be able to discharge the flow required in Table 4.1.1(c) and Table 4.1.1(d) without unreeling the hose.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept

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Each handline shall:

a) be equipped with a pistol grip shutoff-type nozzle designed to discharge both foam and water in accordance with the performance criteria in Table 4.1.1(c) and Table 4.1.1(d) and shall

b) meet the requirements of NFPA 1964.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept
Each hose reel shall:

a) Be designed and positioned to allow hose reel removal by a single person from any position in a 120 degree horizontal sector. Each hose reel shall:

b) Be designed to prevent the hose from unreeling when not desired.

c) Have a power rewind with manual override shall be provided. The nozzle holder, friction brake, rewind controls, and manual valve control shall be accessible to the person using the hose reel.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

Each collapsible handline shall:

a) Be equipped with a pistol grip shutoff-type nozzle designed to discharge foam and water in accordance with the performance criteria in Table 4.1.1(c) and Table 4.1.1(d) and

b) Shall meet the requirements of NFPA 1964.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section and to provide further clarification as to what type of handlines were being referred to.

Committee Meeting Action: Accept
Hose storage areas shall:

a) Be fabricated from non corrosive material and shall be designed to drain effectively.

b) The storage area shall be smooth and free from all projections that might damage the hose.

c) No other equipment shall be mounted or located where it can obstruct the removal of the hose.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

Where a bumper turret or ground sweep nozzle(s) is provided, the controls shall be mounted inside the cab within easy reach of the driver and a crew position. Where the extendable, or boom, turret is capable of supplying agent as specified as a primary turret, as a bumper turret, or as a ground sweep nozzle(s), the requirement for a bumper turret or ground sweep nozzle(s) shall be permitted to be omitted at the option of the purchaser.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The addition of annex material is based on the fact that the statement is more of a point of information rather than a requirement.

Committee Meeting Action: Accept

Where specified, two or more undertruck nozzles shall be mounted under the truck and controlled from the cab:

A sufficient number shall be provided to protect the bottom of the vehicle and the inner sides of the wheels and tires with foam solution discharged in a spray pattern.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept
Modify text and add new sections to read as follows:

**4.20.4** Turrets, handlines, and ground sweeps shall discharge foam having the quality specified in NFPA 412. Measurement of the expansion ratio and 25 percent drainage times shall be in accordance with the procedures outlined in NFPA 412.

**4.20.5** Measurement of the expansion ratio and 25 percent drainage times shall be in accordance with the procedures outlined in NFPA 412, chapter 6.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The addition of the new 4.20.5 is not new text but rather text moved from 4.20.4 due to multiple requirements within the same section.

**Committee Meeting Action:** Accept

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Modify text and add new sections to read as follows:

**4.21.1.1** All piping and fittings shall conform to the appropriate ASME, or equivalent, code and shall be designed to withstand the working pressure of the system.

**4.21.1.1.1** The design of the piping and valving shall provide the desired flow of gas into the system and the minimum amount of restriction from the chemical container(s) to the hose connection.

**4.21.1.1.2** Where more than one hose line is provided, piping and fittings shall be sized and designed so that there is equal flow to each line, regardless of the number of lines placed in operation.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept

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Modify text and add new sections to read as follows:

**4.21.1.2** Provisions shall be made for purging all piping and hose of dry chemical after use without discharging the dry chemical remaining in the dry chemical container(s).

**4.21.1.2.1** Provisions also shall be made for the depressurization of the dry chemical container(s) without the loss of the remainder of the dry chemical.

**4.21.1.2.2** A pressure gauge shall be provided that indicates the internal pressure of the agent storage container(s) at all times.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept
Technical Committee on Aircraft Rescue and Fire Fighting,

Modify text to read as follows:

4.21.1.3 The system shall:
   a) Be designed to ensure fluidization of the dry chemical at the time of operation
   b) Include a manual operating feature Where When any design includes the movement of the chemical container(s) to fluidize the contents, such design also shall include a manual operating feature.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Modify text to read as follows:

4.21.1.6 The fill opening in the dry chemical container shall:
   a) be located so that it is easily accessible for recharging and necessitates a minimum amount of time and effort to open and close.
   b) Filling shall be Allow for filling to be accomplished without the removal of any of the extinguisher piping or any major component.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept


New text to read as follows:

A quick acting control to be operated by the driver to pressurize the dry chemical system from the cab of the vehicle in less than sixty seconds (60 seconds) shall be provided with similar control at hand-line.

Substantiation: Our vehicles take over two minute and thirty seconds. A fuselage burns through faster than that.

Committee Meeting Action: Reject

Committee Statement: No scientific substantiation given for the suggested time requirement by the submitter.
414-243  Log #CP189
Final Action: Accept
(4.21.1.7)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.21.1.7 A identical quick-acting controls to be operated by the driver shall be provided to pressurize the dry chemical agent system from the cab of the vehicle and shall be provided, with a similar control at the handline.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-244  Log #CP190
Final Action: Accept
(4.21.2.2)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.21.2.2 All propellant gas cylinders and valves shall be designed, constructed, and marked in accordance with U.S. DOT, or equivalent, requirements or regulations. Cylinders shall bear the DOT marking or equivalent markings.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-245  Log #CP191
Final Action: Accept
(4.21.2.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.21.2.3 The method of adequately pressurizing and propelling the dry chemical in the system shall provide a sufficient quantity of gas to expel the agent. The propellant gas supply shall be sized to provide the capability to expel the fire-fighting agent as well as allow the complete purging of all piping and hose lines after each use.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-246  Log #CP192
Final Action: Accept
(4.21.2.5)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.21.2.5 A pressure gauge shall be provided and shall to indicate the pressure on the propellant gas source at all times shall be provided.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
414-247 Log #CP193
(4.21.3.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.21.3.1 Pressure regulation shall be designed to reduce the normal cylinder pressure automatically and to hold the propellant gas pressure at the designed operating pressure of the dry chemical container(s).

Substantiation: This change was made to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

414-248 Log #CP194
(4.22.1.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.22.1.1 The storage container shall be designed, constructed, and marked for pressurization and shall be constructed in accordance with the ASME Boiler and Pressure Vessel Code, or equivalent, and shall be so marked.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-249 Log #CP195
(4.22.1.3, 4.22.1.3.1, and 4.21.1.3.2) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.22.1.3 A readily accessible charge coupling for filling of sufficient size to allow ease in filling shall be provided.
4.22.1.3.1 Filling shall be accomplished without the removal of any of the extinguisher piping or any major component.
4.21.1.3.2 A pressure gauge shall be provided that indicates the internal pressure of the agent storage containers at all times.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-250 Log #CP196
(4.22.2.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.22.2.1 The propellant gas shall be sized to provide in sufficient quantity the capability to expel the halogenated agent fire-fighting agents as well as to purge all piping and hose lines after use.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
Propellant gas cylinders and valves shall be designed, constructed, and marked in accordance with U.S. DOT, or equivalent, requirements or regulations. Cylinders shall bear the DOT marking or equivalent markings.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

Pipes and valves connected to the halogenated agent container shall conform to the appropriate ASME, or equivalent, code and shall be designed to withstand the working pressure of the system.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

The design of the propellant source shall be readily available for quick and easy replacement after each use.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

A pressure gauge shall be provided to indicate the pressure of the propellant gas source at all times.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
### 414-255 Log #CP201 Final Action: Accept

(4.22.3.1)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.22.3.1 An ASME-, or equivalent, approved pressure relief valve of adequate capacity shall be provided on the container and shall be set to prevent pressures in excess of the maximum design allowable working pressure.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept

### 414-256 Log #CP202 Final Action: Accept

(4.22.3.2)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

4.22.3.2 Pressure regulation shall be designed to reduce the normal cylinder pressure automatically and to hold the propellant gas pressure at the designed operating pressure of the halogenated agent container(s).

**Substantiation:** This change was made in order to comply with the Manual of Style and the use of vague or unenforceable terms.

**Committee Meeting Action:** Accept

### 414-257 Log #CP203 Final Action: Accept

(4.22.4.1, 4.22.4.1.1, and 4.22.4.1.2)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new sections to read as follows:

4.22.4.1 All piping, couplings, and valves shall be sized for necessary flow with minimal restriction and pressure loss.

4.22.4.1.1 Material for all piping, couplings, and valves shall be selected to avoid corrosive and galvanic action.

4.22.4.1.2 Piping shall be mounted securely and provided with flexible couplings to minimize stress.

**Substantiation:** This change was made in order to comply with the Manual of Style and the use of vague or unenforceable terms. The text in the new sections is not new text just existing text that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept
Technical Committee on Aircraft Rescue and Fire Fighting,

Modify text to read as follows:

4.22.4.2 All valves shall:
   a) Be of the quarter-turn type and shall
   b) Be selected for ease of operation and freedom from leakage.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Modify text to read as follows:

4.22.4.5 Provisions shall be made for:
   a) purging all piping and hose of the halogenated agent after use without discharging the halogenated agent remaining in the container(s).
   b) Provisions also shall be made for venting of the halogenated agent container without loss of the remainder of the liquid agent.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept


New text to read as follows:

A quick acting control to be operated by the driver to pressurize the halogenated system from the cab of the vehicle in less than sixty seconds (60 seconds) shall be provided with similar control at hand-line.

Substantiation: Our vehicles take over two minute and thirty seconds. A fuselage burns through faster than that.

Committee Meeting Action: Reject

Committee Statement: The committee recognizes the intent of the submitters proposal as the submitter was able to explain this in person to the committee, however there lacks the scientific data to support the time limitations.
414-261  Log #CP206
(4.22.4.6)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.22.4.6 A Identical quick-acting controls shall be provided, to be operated by the driver, to pressurize the halogenated agent system from the cab of the vehicle. A similar control shall be provided, with a similar control and at the handline.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-262  Log #CP207
(4.23.2.1, 4.23.2.1.1, and 4.23.2.1.2)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.23.2.1 Handlines for complementary agents shall have a minimum burst pressure rating three times the nominal working pressure of the system and in accordance with the performance criteria in Table 4.1.1(c) and Table 4.1.1(d).
4.23.2.1.1 The complementary agent handline shall be equipped with a nozzle that allows a fully open to a fully closed position in a single, simple movement.
4.23.2.1.2 Nozzle construction shall be of nonferrous metal or stainless steel.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-263  Log #CP208
(4.23.2.2 through 4.23.2.2.6)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and renumber to read as follows:
4.23.2.2 Multiple agent handlines and nozzles shall be designed so that each agent can be discharged separately or simultaneously, parallel or entrained.
4.23.2.2.1 The barrels shall be linked together to provide coordinated application by one operator.
4.23.2.2.2 Each reel shall be designed and positioned to allow hose line removal by a single person from any position in a 120 degree horizontal sector.
4.23.2.2.3 Each reel shall be equipped with a friction brake to prevent the hose from unreeling when not desired.
4.23.2.2.4 A power rewind with manual override shall be provided.
4.23.2.2.5 The nozzle holder, friction brake, rewind controls, and manual valve control shall be accessible to the person using the hose reel.
4.23.2.2.6 The discharge control to each handline shall be adjacent to the handline and accessible to the person using the handline.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept
414-264 Log #145
(4.23.2.2.1)
Final Action: Accept in Principle

Submitter: Joseph A. Wright, ARFF Technical Services, Inc.

Recommendation: Insert additional wording where it is appropriate:

4.23.2.2.1 Each reel shall be designed and positioned to allow hose line removal by a single person from any position in a 120 degree horizontal sector. Each reel shall be equipped with a friction brake to prevent the hose from unreeling when not desired. A power rewind with manual override shall be provided. The nozzle holder, friction brake, rewind controls, and manual valve control shall be accessible to the person using the hose reel. A backup hand crank shall be provided and stored on the vehicle.

Substantiation: Having a manual override does not do any good if there is no crack to mount to the override cranking system.

This is not original material; its reference/source is as follows:
Earlier version of 414 document.

Committee Meeting Action: Accept in Principle

Add new text to read as follows:
4.23.2.2.1 Each reel shall be designed and positioned to allow hose line removal by a single person from any position in a 120 degree horizontal sector. Each reel shall be equipped with a friction brake to prevent the hose from unreeling when not desired. A power rewind with manual override shall be provided. The nozzle holder, friction brake, rewind controls, and manual valve control shall be accessible to the person using the hose reel. A backup hand crank shall be provided and stored on the vehicle.

Committee Statement: The committee clarified that this is pertaining to having at least one hand crank as the document does not require that there be one. The submitter noted that in using "backup" it implies that there is already a hand crank on the vehicle, which there is not.

414-265 Log #12
(4.24.1(4))
Final Action: Reject

Submitter: Grady North, Crash Rescue Equipment Service, Inc.

Recommendation: Revise text as follows:

4.24.1 (4) Adequate reflectors, marker and clearance lights furnished to describe the overall length and width of the vehicle. When completed, the vehicle shall conform to Federal Motor Vehicle Standard (FMVSS) 108 – Lamps, Reflective Devices and Associated Equipment.

Substantiation: The language of the current standard is vague and could lead to broad interpretations from one manufacturer to the next. Example: what is the definition of "adequate"? The revised wording corresponds to Federal regulations regarding reflectors, marker and clearance lights.

Committee Meeting Action: Reject

Revise text as follows:

4.24.1 (4) Adequate reflectors, marker and clearance lights furnished to describe the overall length and width of the vehicle. When completed, the vehicle shall conform to Federal Motor Vehicle Standard (FMVSS) 108 – Lamps, Reflective Devices and Associated Equipment.

Committee Statement: The committee feels that the submitter's proposed change would require international agencies to conform to another standard that is specific only to the United States. They also made a Manual of Style change to the current text.
414-266     Log #118
(4.24.2) Final Action: Reject

Submitter: Marty Huffman, Rosenbauer
Recommendation: Revise text to read as follows:
4.24.2 The selector switch for the siren and horn should be deleted as this refers to structural firefighting vehicles.
Substantiation: The first sentence should be deleted as internal inspection requires personnel to be certified in confined space training and presents liability issues.
Committee Meeting Action: Reject
Committee Statement: The submitter requested to withdraw this proposed change and this is how the committee acted based on submitters request.

414-267     Log #CP209
(4.24.2 4.24.2.1, 4.24.2.2, and 4.24.2.3) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
4.24.2* 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.
4.24.2.1 The siren shall be mounted to allow maximum forward sound projection but shall being protected from foam dripping from the turret or water splashed up by the tires.
4.24.2.2 The siren unit shall consist of the following functions as minimum public address, wail, and yelp.
4.24.2.3 A selector switch shall be mounted within reach of the driver that will allow the operation of the vehicle’s horn or the siren from the horn button in the steering wheel.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-268     Log #CP210
(4.24.3) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
4.24.3 A horn shall be provided and shall be mounted at the front part of the vehicle with the control positioned so that it is readily accessible to the driver.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
Emergency warning light(s) shall be mounted on the top of the vehicle and shall be visible for 360 degrees in a horizontal plane. The mounting of the emergency warning light(s) shall also provide good visibility from the air. The purchaser shall provide the vehicle manufacturer with the proper color of the light(s) and indicate whether the emergency warning lights shall be of the LED flasher type, rotating beacon type or the strobe type.

Substantiation: LED lighting systems should be added as they are increasingly common in the industry and present significant reductions in power consumption.

Committee Meeting Action: Accept

Two alternating flashing emergency warning lights shall be mounted at the rear of the vehicle as far apart as practical. These lights shall not be mounted any higher than 1828.8 mm (72 in.) above the ground level. The purchaser shall provide the vehicle manufacturer with the proper color of the light and indicate whether the emergency warning lights shall be of the LED flasher type, sealed beam type or the strobe type.

Substantiation: LED lighting systems should be added as they are increasingly common in the industry and present significant reductions in power consumption.

Committee Meeting Action: Accept
Two alternating flashing emergency warning lights shall be mounted at the rear of the vehicle as far apart as practical.

These lights shall not be mounted any higher than 1828.8 mm (72 in.) above the ground level.

The purchaser shall provide the vehicle manufacturer with the proper color of the light and indicate whether the emergency warning lights shall be of the sealed beam type or the strobe type.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept
4.24.4.6

A non emergency flashing yellow beacon or light located on the roof for non-emergency air field operations shall be provided.

For non-emergency operations on the airport it is now recommended that a flashing yellow light be displayed on all vehicles operating on the air field operation areas.

This is not original material; its reference/source is as follows:

Earlier version of 414 document.

Committee Meeting Action: Reject

Committee Statement: This is already covered by local agencies that operate in non-emergency operations on airport property with respect to vehicles.

4.24.5.1, 4.24.5.1.1, and 4.24.5.1.2

Provisions shall be made for mounting radios.
Operation of the radios shall be from the cab.
Radios shall be mounted to allow quick servicing or replacement.

The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

4.24.6

Where furnished, air horns, an electric siren(s), and an electronic siren speaker(s) shall be mounted as low and as far forward on the apparatus as practical. Audible warning equipment shall not be mounted on the roof of the apparatus.

The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept
Technical Committee on Aircraft Rescue and Fire Fighting,

Add new section and text to read as follows:

4.24.7 Audible warning equipment shall not be mounted on the roof of the apparatus.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Modify text to read as follows:

Chapter 5 Aircraft Interior Access Vehicle

Substantiation: This change was editorial in nature as the header title for Chapter 5 is incorrect as it is currently missing the word "Aircraft".

Committee Meeting Action: Accept
Submitter: Nicholas M. Subbotin, US Federal Aviation Administration

Recommendation:

Vehicle Requirements
5.1 General.
5.2 Vehicle Requirements.
5.3 Access Stairs.
5.4 Docking Platform(s).
5.5 Performance Requirements.
5.6 Safety Requirements.
5.7 Acceptance Criteria.

Substantiation: Changing the first major section in the chapter to General to be consistent with chapters 4 and 6. The new title allows for general information to be added to the standard in the beginning of the chapter.

Removed "Stairs" to not limit the possibilities of different ways to access an aircraft. Stairs should be a sub-section of Access such as 5.3.1.

Added "Acceptance Criteria as a major section to define acceptance criteria like that of Chapter 6. Chapter 6 is not being used since Chapter 5 is mainly a stand-alone chapter unless otherwise noted.

Committee Meeting Action: Accept in Part

Revise text to read as follows:
Vehicle Requirements
5.1 General.
5.2 Vehicle Requirements.
5.3 Access Stairs.
5.4 Docking Platform(s).
5.5 Performance Requirements.
5.6 Safety Requirements.
5.7 Acceptance Criteria.

Committee Statement: The committee agrees with the all of the submitters proposed changes with the exception of the new proposed text on 5.7 since there is no identifiable acceptance criteria in this document.

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Submitter: Nicholas M. Subbotin, US Federal Aviation Administration

Recommendation: New text to read as follows:
The vehicle shall have the ability to auto level the vehicle. This can be accomplished with stabilizers and/or support jacks.

Substantiation: Provides the standard to auto level and ability to use stabilizers and/or support jacks to accomplish this task.

Committee Meeting Action: Accept in Principle

Add new text to read as follows:
5.1X From a 15 degree side slope, the vehicle shall have the ability to auto level the stairs and docking platform vehicle within 5 degrees of horizontal. This can be accomplished with stabilizers and/or support jacks.

Committee Statement: The committee agrees with the submitters concept he was proposing, however they felt that the changes they added would provide better clarity to the requirement.
414-282  Log #100  Final Action: Accept in Principle
(5.1.x (New))

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:
The vehicle shall have the ability to control the docking platform from inside the vehicle and docking platform.
Substantiation: Provides two sets of controls for maneuvering the docking platform.
Committee Meeting Action: Accept in Principle
Add new section and text to read as follows and renumber accordingly:
5.1.X The vehicle shall have the ability to control the docking platform from inside the vehicle and docking platform.
Committee Statement: The committee accepts the proposed change from the submitter, however it needed to be
numbered correctly as the submitter was unsure of where to place this proposed change within Chapter 5 of this
document.

414-283  Log #102  Final Action: Accept in Principle
(5.1.x (New))

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:
The vehicle shall be able to be controlled by one person using the controls.
Substantiation: Sets the standard to allow the vehicle to be controlled by one person.
Committee Meeting Action: Accept in Principle
Add new text to read as follows:
5.1.X The vehicle docking platform shall be able to be controlled by one person using either set of the controls.
Committee Statement: The committee changed the submitters text to provide further clarification of the requirement of
the proposed change.

414-284  Log #80  Final Action: Accept in Principle
(5.1.1)

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:
This is a stand-alone chapter and all other chapters of this standard shall not apply.
Chapters 1, 2, and 3 of this standard shall apply to this chapter. The vehicle requirements of this chapter are a
stand-alone chapter for IAV performance and acceptance criteria unless otherwise stated.
Substantiation: Chapters 1, 2, & 3 have been reviewed for any discrepancies or potential problems to include these
chapters. Major subject sections include the over Scope, Purpose, Manuals, Metal Finish, Lettering, Numbering,
Striping, Data Plate, Other NFPA Publications, and Definitions. If previous log is accepted, change proposal to:
Chapters 1, 2, and 3 of this standard shall apply to this chapter. The General, Vehicle Requirements, Access, Docking
Platform(s), Performance Requirements, Safety Requirements, and Acceptance Criteria are stand-alone standards for
this chapter unless otherwise stated.
Committee Meeting Action: Accept in Principle
Modify text to read as follows:
This is a stand-alone chapter and all other chapters of this standard shall not apply.
Chapters 4, 2, and 4 4 and 6 of this standard shall not apply to this chapter. The vehicle requirements of this chapter
are a stand-alone chapter for AIAV performance and acceptance criteria unless otherwise stated.
Committee Statement: The committee agrees with the submitters intent with this proposed change, however they
needed to make sure the proposal conformed to the Manual of Style.
This access vehicle shall have all-wheel drive and off-pavement capabilities be capable of driving on hard paved surfaces and hard compacted gravel surfaces.

**Substantiation:** There is no justification on why a vehicle of this type must be all-wheel drive (AWD). Current engineering and costs associated with requiring AWD may limit vehicles that can be used. I don’t see the current need for an IAV to have the similar driving performance capabilities as an ARFF vehicle.

**Committee Meeting Action:** Reject

**Committee Statement:** The committee felt that this proposed change in text could be misinterpreted as the two surfaces that the submitter provided were the only two surfaces that it could be driven on. It is understood that airports in different parts of the world do have varying types of surfaces and the current requirement is more appropriate for this type of vehicle.

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**Submitter:** Nicholas M. Subbotin, US Federal Aviation Administration

**Recommendation:** Revise text to read as follows:

5.1.2 This access vehicle shall have all-wheel drive and off-pavement capabilities be capable of driving on hard paved surfaces and hard compacted gravel surfaces.

**Substantiation:** This requirement should be removed as most departments we have spoken with have stated that the Interior Access Vehicle should be used on hard surfaces only as the vehicle is similar to aerial devices and should be extended on a stable hard surface. Fire Departments we have consulted with have advised that the use of this vehicle in an off road, unstable surface area would require a different tactic for gaining access to the A/C. Interior Access Vehicles have a limited application because they share common characteristics with firefighting aerial devices and as such allowing a vehicle as heavy as this vehicle to attempt to traverse off road conditions that heavy ARFF vehicles (Class 4 & 5) could potentially encounter and with the extension capabilities required, would pose a safety issue for evacuating passengers or firefighting personnel working on the vehicle. It is Rosenbauer’s position that there has not been enough data collected at this point to make valid assumptions regarding the performance of these types of vehicles. Further testing and development needs to be accomplished before mandates as to performance characteristics are set in the document. Rosenbauer research has shown that in order to meet the performance requirements for the vehicle’s aerial device the vehicle would have to be larger with more axles and probably should not be on a light truck chassis (F-550 or similar) but on a heavier style commercial chassis. Because there has been no development to our knowledge of specialized chassis for this type of device we stand by the opening statement of removing the “all wheel drive” requirements until such time as further developments in the technology are accomplished.

**Committee Meeting Action:** Reject

**Committee Statement:** The committee felt that this proposed change in text could be misinterpreted as the two surfaces that the submitter provided were the only two surfaces that it could be driven on. It is understood that airports in different parts of the world do have varying types of surfaces and the current requirement is more appropriate for this type of vehicle.
Revise text to read as follows:
The vehicle shall provide access from ground level to aircraft door sill heights of between 0.6 m (2 ft) and 2.3 m (7 feet) and the upper door sills of at least up to the lower aircraft door sills of the largest aircraft operating at the airport.

Substantiation: Although the original standard range is ideal, current engineering and costs associated with needing that range may limit vehicles that can be used or developed. The primary purpose is to serve as an access way from ground level to the doorway for aircraft without stairs. This sill height is sufficiently low enough to allow access to the lowest sill height aircraft currently in operation (e.g. DC9) that does not have its own integral stairs.

Committee Meeting Action: Accept in Part
Revise text to read as follows:
The vehicle shall provide access from ground level to aircraft door sill heights of between 0.6 m (2 ft) 2.3 m (7 feet) and the upper door sills of at least up to the lower aircraft door sills of the largest aircraft operating at the airport.
Committee Statement: While the committee agrees with the submitters intent, they feel that the text they have provided better meets the requirement.

New text to read as follows:
Steps shall be at least 55 in. wide.

Substantiation: Sets a minimum criteria for stairway width.
Committee Meeting Action: Accept in Principle
Add new text to read as follows:
5.2.3 Steps shall be at least 55 in. wide: provide a path for simultaneous egress and ingress to the aircraft.
Committee Statement: The committee agrees with the submitters intent but changed text to be less restrictive.

New text to read as follows:
Steps shall be at least 6 to 8 inches high and consistent throughout the length of stairs.

Substantiation: Sets range criteria for stairway height.
Committee Meeting Action: Reject
Committee Statement: The committee feels that dictating stair height dimensions would impose operational limitations.
Steps shall be made of all weather anti-slide safety material and threads so ascending and descending stairs can be accomplished with bare feet and high heel shoes.

Submittor: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:

Committee Meeting Action: Accept in Principle
Add new text to read as follows:

Committee Statement: The committee agrees with the intent the submitter but felt that the language provided was too complicated.

Handrails shall be provided on the access portion (i.e., stairs, ramp, etc.) leading to the docking platform including the docking platform as specified by the end user.

Submittor: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:

Committee Meeting Action: Accept in Principle
Add new text to read as follows:

Committee Statement: The committee agrees with the intent the submitter but felt that the language provided was too complicated.

The docking platform shall have a sensor warning the operator that the leading edge of the docking platform is within 6 inches from the aircraft.

Submittor: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:

Committee Meeting Action: Accept in Principle
Add new text to read as follows:

Committee Statement: The committee felt that the word choice of the submitter, sensor, is restrictive.
414-293  Log #84  Final Action: Accept in Principle
(5.3.1)

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: Revise text to read as follows:
The docking platform of the vehicle shall be sized to allow the **a Type A** aircraft door (to be fully opened, allowing fire fighters and their equipment to safely access the aircraft.
Substantiation: This defines the aircraft door to a Type A design. Type A Aircraft Door: This type is a floor level exit with a rectangular opening of not less than 42 inches wide by 72 inches high with corner radii not greater than one-sixth of the width of the exit.
Committee Meeting Action: Accept in Principle
Revise text to read as follows:
The docking platform of the vehicle shall be sized to allow the **a Type A** aircraft door to be fully opened, allowing fire fighters and their equipment to safely access the aircraft.
Committee Statement: The committee agrees with the submitters intent but had to make some changes in order to comply with the Manual of Style.

414-294  Log #94  Final Action: Reject
(5.4.x (New) )

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:
The vehicle shall pass a 5 degree tilt table with stabilizers and/or support jacks down with the docking platform fully extended to its highest height.
Substantiation: The FAA has tilt tested a stair vehicle that is being used as an ARFF rescue/support vehicle up to 15 degrees. The FAA has felt that any vehicle tilted more that 5 degrees would be a safety concern for anyone traveling up and down a access way such as stairs, ramp, etc.
Committee Meeting Action: Reject
Committee Statement: The committee is unclear as to where the submitter intended this to go and felt that is should be in 5.4.2 and not 5.4. Also the committee has addressed this in a committee proposal.

414-295  Log #85  Final Action: Accept
(5.4.1)

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: Revise text to read as follows:
The **wall-to-wall turning diameter** vehicle’s **clearance circle diameter** of the fully loaded vehicle shall be less than two times the **vehicle length** maximum overall length of the vehicle.
Substantiation: Vehicle clearance circle diameter is consistent terminology with the 6.3.13.5 standard.
Committee Meeting Action: Accept
414-296     Log #124
(5.4.1) Final Action: Reject

Submitter: Marty Huffman, Rosenbauer
Recommendation: Revise text to read as follows:
5.4.1* The wall-to-wall turning diameter of the fully loaded vehicle shall be less than **two** three times the vehicle length.
Substantiation: Statement should be changed to reflect the rest of the document. Class 1-5 vehicles are required to have a turning radius of three times the length of the vehicle. This will allow for consistency in the document and will accommodate all potential configurations of chassis to be utilized including further potential developments regarding chassis in this technology.
Committee Meeting Action: Reject
Committee Statement: This proposed change has been addressed by the committee in 414-295 (Log #85).

414-297     Log #22
(5.4.2) Final Action: Reject

Submitter: Eric D. Johansen, DFW Airport Dept. of Public Safety
Recommendation: Revise text to read as follows:
5.4.2 The vehicle shall pass a 15 degree tilt test with stairs fully extended and the platform fully loaded to the design weight capacity bedded in normal driving position.
Substantiation: Section 5.4.2 should be amended to say "stair bedded in normal driving position". Aircraft Interior Access Vehicles (AIAV) are specialized apparatus designed for use on level/semi level hard surfaces much like an aerial platform apparatus. Subjecting an AIAV to a 15 degree tilt test with stairs fully extended is to test them in a way that they are not designed to operate and should not be operated just as we do not require aerial platform apparatus to be tilt table tested with the ladder way fully extended.
Committee Meeting Action: Reject
Committee Statement: Proposed changes with stairs bedded and without the use of stabilizers, infer a response/parked configuration vs. operational performance of the vehicle. Response performance criteria not identified in NFPA 403.

414-298     Log #52
(5.4.2) Final Action: Reject

Submitter: Charles Cinquemani, Dallas/Fort Worth International Airport Board
Recommendation: Revise text to read as follows:
5.4.2 The vehicle shall pass a 15 degree tilt test with stairs fully extended and the platform fully loaded to the design weight capacity bedded in normal driving position.
Substantiation: Section 5.4.2 should be amended to say "stair bedded in normal driving position". Aircraft Interior Access vehicles (AIAV) are specialized apparatus designed for use on level/semi level hard surfaces much like an aerial platform apparatus. Subjecting an AIAV to a 15 degree tilt test with stairs fully extended is to test them in a way that they are not designed to operate and should not be operated just as we do not require aerial platform apparatus to be tilt table tested with the ladder way fully extended.
This is not original material; its reference/source is as follows:
Authored by Eric Johansen with the DFW Airport Department of Public Safety, 972-5741800
ejohansen@dfwairport.com
Committee Meeting Action: Reject
Committee Statement: See committee action and committee statement on 414-297 (Log #22).
The vehicle shall pass a 15 degree tilt test without stabilizers with the docking platform in a stowed position used for normal driving operations, stairs fully extended and the platform fully loaded to the design weight capacity.

Substantiation: The FAA has done an extensive internal review of different vehicle types that may be used as an IAV, tilt tested an air stair vehicle used for ARFF operations, and also posted a Request for Information (Solicitation Number 8283) on specialized ARFF vehicles. The 12 degree tilt performance is the minimum standard of all the vehicles that the FAA has received information on or tested. Therefore, since there are not very many IAVs or manufactures, the committee should not eliminate a vehicle that is currently being manufactured to perform the tasks asked in this chapter.

Committee Meeting Action: Reject
Committee Statement: The committee notes that there is no empirical scientific data to support the premise of “fully loaded to the designed weight capacity” (250 lbs. per sq. ft.) for this test and cannot accept the proposed changes lacking that data.

The vehicle shall pass a 15 degree tilt test with stairs fully extended and loaded to the manufacturer’s recommended weight capacity and the platform fully loaded to the design weight capacity.

Substantiation: What is the scientific basis for 15° tilt requirement? Rosenbauer has yet to see any evidence that this is a practical requirement. It is Rosenbauer’s position that this requirement be reduced to a 6° tilt table requirement consistent with the tilt requirements for aerial devices. It is also our position that there is no empirical data to support this requirement. The very nature of this device makes it as unstable as a standard aerial device because of the inherent top heavy characteristics of this type of vehicle.

Committee Meeting Action: Reject
Committee Statement: Submitter requests that this be withdrawn.

The committee has made this change to provide clarification to the requirement as well as to offer information regarding some other devices that could be used that are now noted in a new annex item.

Committee Meeting Action: Accept
414-302  Log #93  Final Action: Accept in Principle
(5.5.x (New))

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: New text to read as follows:
The load capacity per step shall be at least 500 lbs.
Substantiation: This is the current standard used for air stair vehicles.
Committee Meeting Action: Accept in Principle
New text to read as follows:
The load capacity per step shall be at least 250 lbs/sq. ft 500 lbs.
Committee Statement: The committee feels that the submitters proposed change would be too limiting, however they do agree that there should be a load capacity and have provided such a requirement.

414-303  Log #87  Final Action: Accept in Principle
(5.5.1)

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: Revise text to read as follows:
The vehicle shall be designed so that the platform can be evacuated safely in the event of power failure.
The vehicle shall be designed so that the docking platform can be evacuated safely in the event of power failure and lowered manually.
Substantiation: There should be an emergency manual way to lower the docking platform in the event of a power failure.
Committee Meeting Action: Accept in Principle
Revise text to read as follows:
The vehicle shall be designed so that the platform can be evacuated safely in the event of power failure.
The vehicle shall be designed so that the docking platform can be lowered manually and evacuated safely in the event of power failure.
Committee Statement: The committee agrees with the submitters intent but had to make some changes in order to comply with the Manual of Style and as well as provide some further clarification.

414-304  Log #CP223  Final Action: Accept
(5.5.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
5.5.1 The vehicle shall be designed so that the platform can be evacuated safely in the event of power failure.
Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

414-305  Log #88  Final Action: Accept
(5.5.2)

Submitter: Nicholas M. Subbotin, US Federal Aviation Administration
Recommendation: Revise text to read as follows:
The vehicle shall have a gap control of at least 10 degrees to either side of at the leading edge of the docking platform.
Substantiation: This is to accommodate if the docking platform is not 90 degrees to the doorsill.
Committee Meeting Action: Accept
**414-306  Log #89**  
(5.5.3.1)  
**Final Action: Reject**

**Submitter:** Nicholas M. Subbotin, US Federal Aviation Administration  
**Recommendation:** Revise text to read as follows:

> The entire docking platform shall be designed for a bearing load of 244 kg/m² (50 lb/ft²) to support a total load capacity of at least 2,500 lbs.

**Substantiation:** The proposed total load capacity is the design parameters for current air stair vehicles. The current (50lb/ft²) will limit current vehicles that are being used by ARFF.

**Committee Meeting Action:** Reject  
**Committee Statement:** The committee feels that there is Insufficient data for platform dimensions.

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**414-307  Log #90**  
(5.5.3.2)  
**Final Action: Reject**

**Submitter:** Nicholas M. Subbotin, US Federal Aviation Administration  
**Recommendation:** Revise text to read as follows:

> To verify the safety of the requirement in 5.5.3.1, a 23 kg (50 lb) weight shall be applied to each square foot area for a period of 4 hours with no platform drift.

**Substantiation:** Changing to 25 lbs will need to be changed if the previous 5.5.3.1 is agreed upon by the committee.

**Committee Meeting Action:** Reject  
**Committee Statement:** The committee feels that there is Insufficient data for platform dimensions.

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**414-308  Log #103**  
(5.7 (New))  
**Final Action: Reject**

**Submitter:** Nicholas M. Subbotin, US Federal Aviation Administration  
**Recommendation:** New text to read as follows:

> The manufacturer shall demonstrate that all the controls and docking platform height is capable of reaching the specified height by requested by the purchaser.

**Substantiation:** Before the vehicle can be accepted, the manufacture must demonstrate that all the controls work as properly intended and that the docking platform can reach the specified height requested by the purchaser.

**Committee Meeting Action:** Reject  
**Committee Statement:** This requirement will be included in a new 5.7 “Acceptance Criteria” proposal.

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**414-309  Log #CP224**  
(6.1.2)  
**Final Action: Accept**

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Modify text to read as follows:

> 6.1.2 The component manufacturer's certification shall be provided where specified in Section 6.2. The manufacturer shall and certify that the component is approved for use in the ARFF application.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept
Modify text and add new sections to read as follows:

Prototype vehicle tests shall be conducted by the manufacturer in accordance with the standardized procedures found in Section 6.3.

a) The manufacturer shall ensure that the performance requirements have been achieved with the design.
b) Calculated performance capability shall not be substituted for an actual prototype test.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

Operational tests shall be performed either at the airport or the manufacturer's facility as specified in Section 6.4. The test shall be conducted by the manufacturer on every vehicle built.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

The purchaser will know that the manufactures of the engine, transmission, power divider, pump, tires, brakes, steering components, axles, electrical and coding are all in agreement and have thoroughly tested the vehicle to be compatible.

Committee Meeting Action: Reject

Committee Statement: The committee feels that this is already accomplished based on the form in Annex D of this document.
The cooling system shall be certified by the vehicle manufacturer to satisfy all operational conditions at all ambient temperatures encountered at the operational airport for both the engine and transmission regardless of the 130 degree Fahrenheit. This would override any predetermined temperature by this A.C. The committee feels that this is a local specification that the purchaser should make when ordering the vehicle.

Subcommittee on Aircraft Rescue and Fire Fighting,

Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.1 Test facilities shall consist of an open site suitable for discharging agent that includes both level ground and measured grades of at least 20 percent and 30 percent. Access to a refill water supply shall be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Subcommittee on Aircraft Rescue and Fire Fighting,

Recommendation: Delete the following text and renumber:

6.3.1.3 The vehicle shall have had its primary turret(s) discharge rate verified prior to beginning this test to ensure that the turret(s) discharges at or above the minimum rate specified, and the accuracy of the foam metering system shall have been verified.

Substantiation: The committee has made this change as they feel the requirement would have already been met and is therefore redundant.

Committee Meeting Action: Accept

Subcommittee on Aircraft Rescue and Fire Fighting,

Recommendation: Revise text to read as follows:

6.3.1.4 (14) Divide the volume of liquid discharged from each tank on the four slope conditions by 0.75 0.85 and record.

Substantiation: Be consistent with Table 4.1.1(c) & (d) Errata no. 414-07-2.

Committee Meeting Action: Accept
技术委员会关于航空救援和消防灭火

414-317  
Log #CP229

(6.3.1.5)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

6.3.1.5 The rated or usable water tank capacity shall be the lesser of the volumes calculated in 6.3.1.4(10) or 6.3.1.4(14). The rated or usable foam tank capacity shall be the lesser of the volumes calculated in 6.3.1.4(12) or 6.3.1.4(14).

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

Committee Meeting Action: Accept

414-318  
Log #CP230

(6.3.1.6 (New))

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Add new section with text to read as follows:

6.3.1.6 The rated or usable foam tank capacity shall be the lesser of the volumes calculated in 6.3.1.4(12) or 6.3.1.4(14).

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section that this text came from. The change is a result of the existing 6.3.1.5 being split apart.

Committee Meeting Action: Accept

414-319  
Log #CP45

(6.3.2.1)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.2 Test facilities shall consist of a level site having a dry, paved surface at least 76.2 m (250 ft) in diameter that is free from loose material upon which a circle with a radius of 30.5 m (100 ft) shall be marked in a manner that can be followed easily by a driver.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

414-320  
Log #CP231

(6.3.2.4(3))

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

6.3.2.4 (3) Gradually increase the speed until the maximum safe speed, as judged by the driver, is reached.

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.

Committee Meeting Action: Accept
414-321  Log #CP232  Final Action: Accept

(6.3.2.5)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
6.3.2.5  The speed achieved shall be in accordance with Table 4.1.1(a) and Table 4.1.1(b). The truck shall not have oversteer or understeer characteristics in this test.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-322  Log #CP233  Final Action: Accept

(6.3.2.6)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
6.3.2.6  A double lane change test shall be conducted in accordance with NATO AVTP 03-160W.
   a) The vehicle shall be driven through the cones at a 40 kph (25 mph) speed without loss of control or vehicle stability in two directions. The vehicle shall not display oversteer or understeer characteristics.
   b) This test shall be accomplished for all prototype first article vehicles only.
   c) The vehicle shall be fully loaded and equipped for this test

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-323  Log #CP234  Final Action: Accept

(6.3.2.7)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
6.3.2.7  The vehicle shall demonstrate the ability to traverse the "J" turn test on smooth level pavement without the brakes being applied. The "J" turn test shall be completed and then repeated in the opposite direction.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
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**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:  
**A.6.3.3** Test facilities *shall* *should* consist of a flat measurement pad that is large enough to accommodate the entire vehicle.

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.  
**Committee Meeting Action:** Accept

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**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Modify text to read as follows:  
**6.3.3.5** Linear dimensions shall be rounded down to the nearest 12.7 mm (½ in.), and angular dimensions shall be rounded down to the nearest ½ degree and compared against the vehicle specifications.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.  
**Committee Meeting Action:** Accept

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<td>414-326</td>
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**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:  
**A.6.3.4** Test facilities *shall* *should* consist of a level site at least 6.1 m (20 ft) longer than the vehicle.

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.  
**Committee Meeting Action:** Accept

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**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Modify text to read as follows:  
**6.3.4.4**  
(2) Place a *suitable* structure on the seat cushion for locating an eye height of 806.5 mm (31¾ in.) and a position 304.8 mm (12 in.) forward from the seat back. Place the seat back in a vertical position.

**Substantiation:** The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.  
**Committee Meeting Action:** Accept
414-328  Log #CP237  Final Action: Accept
(6.3.4.5)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
6.3.4.5 The recorded values for the distance at which the line of vision meets the ground in front of the truck and the
angle of vision above the horizon shall equal or exceed the vehicle’s specification. Obstacles within the 90 degree
horizontal line of vision to the right or left shall not create an obstruction of more than 5 degrees per obstruction.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within
the same section.
Committee Meeting Action: Accept

414-329  Log #CP238  Final Action: Accept
(6.3.4.6 (New))

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Add new text and section to read:
6.3.4.6 Obstacles within the 90 degree horizontal line of vision to the right or left shall not create an obstruction of more
than 5 degrees per obstruction.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within
the same section. The text in the new section is not new text but text from the original section that needed to be
separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-330  Log #CP48  Final Action: Accept
(6.3.5.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber
accordingly:
A.6.3.5 Test facilities shall consist of a site suitable for discharging agent that includes a measured grade of 40
percent that is at least twice the vehicle’s length or a level, paved test pad adequate for an extended drawbar pull.
Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of
this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
414-331 Log #CP240 Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, 
Recommendation: Modify text to read as follows:
6.3.5.3 The vehicle shall have had its primary turret(s) discharge rate and pressure verified, with vehicle in its fully loaded condition with tires inflated to their recommended operating pressure, prior to beginning this test to ensure that the turret(s) discharges at or above the minimum rate specified. The vehicle shall be tested in its fully loaded condition with tires inflated to their recommended operating pressure.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-332 Log #CP49 Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, 
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.3.6 Test facilities shall consist of an area suitable for running the engine while the electric loads and charging rates are being measured.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-333 Log #CP241 Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, 
Recommendation: Modify text to read as follows:
6.3.6.3 The test vehicle shall:
  a) have a fully charged set of batteries.
  b) fully operational the vehicle's electric and charging systems shall be fully operational.
  c) be tested The test shall be conducted in ambient conditions temperature ranges of 10°C to 32.2°C (50°F to 90°F).
Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
414-334  Log #CP242  Final Action: Accept
(6.3.6.4(4) and 6.3.6.4(4)(d) (New) )

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new text to read as follows:

6.3.6.4
(4) Record voltage and ampere readings under the following conditions:
(a) Battery (engine off, no load).
(b) Engine at idle and all electrical devices shut off. The engine shall be allowed to run long enough after starting to
recharge the batteries prior to making these measurements.
   i. Engine at idle and all electrical loads that normally run simultaneously
turned on.
   ii. Engine at 50 percent of governed speed with all electrical loads that normally run simultaneously
turned on.
(c) Engine at governed speed with all electrical loads that normally run simultaneously
turned on.
(d) Electrical loads shall be comprised of all emergency warning lights, radios, cameras, monitors, air conditioner or
heater, and electrical accessories.

**Substantiation:** The committee made this change to comply with the Manual of Style and the use of vague or
unenforceable terms. The committee also chose to provide a requirement as to what "electrical loads" are.
**Committee Meeting Action:** Accept

414-335  Log #CP243  Final Action: Accept
(6.3.6.5)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

6.3.6.5  The electrical system performance:
   a) shall be compared against the specification at engine idle and
   b) shall also be compared at 50 percent of engine rpm.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within
the same section.
**Committee Meeting Action:** Accept

414-336  Log #CP244  Final Action: Accept
(6.3.6.6 (New) )

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Add new text and section to read as follows:

6.3.6.6  The measured voltage of the batteries shall remain above 13 volts (for a 12-volt system) and 26 volts (for a 24-volt system) at all times while the alternator is running.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within
the same section. The text in the new section is not new text but text from the original section that needed to be
separated in order to comply with the Manual of Style.
**Committee Meeting Action:** Accept
<table>
<thead>
<tr>
<th>Log #</th>
<th>Final Action: Accept</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>414-337</td>
<td>Accept</td>
<td>(6.3.7) Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly: A.6.3.7 Test facilities shall be in accordance with SAE J551/2, or the equivalent standard being used. Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser. Committee Meeting Action: Accept</td>
</tr>
<tr>
<td>414-338</td>
<td>Accept</td>
<td>(6.3.7.1 and 6.3.7.2) Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, Recommendation: Modify text to read as follows: 6.3.7.1 Test facilities shall be in accordance with SAE J551/2, or the equivalent standard being used. 6.3.7.2 Test equipment shall be in accordance with SAE J551/2, or the equivalent standard being used. Substantiation: The committee has made this change to update referenced material. Committee Meeting Action: Accept</td>
</tr>
<tr>
<td>414-339</td>
<td>Accept</td>
<td>(6.3.7.3, 6.3.7.3.1, and 6.3.7.3.2) Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, Recommendation: Modify text and add new sections to read as follows: 6.3.7.3 The vehicle shall be configured with all standard electrical features mounted and operational. 6.3.7.3.1 During the tests, all vehicle engines shall be operated at idle. And 6.3.7.3.2 All vehicle-mounted electrical devices normally functioning at the crash site shall be turned on with the following stipulations: Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style. Committee Meeting Action: Accept</td>
</tr>
<tr>
<td>414-340</td>
<td>Accept</td>
<td>(6.3.7.4 and 6.3.7.5) Submitter: Technical Committee on Aircraft Rescue and Fire Fighting, Recommendation: Modify text to read as follows: 6.3.7.4 The vehicle shall be tested in accordance with SAE J551/2, or the equivalent standard being used. 6.3.7.5 The results of the test shall be evaluated in accordance with SAE J551/2, or the equivalent standard being used. Substantiation: The committee has made this change to update referenced material. Committee Meeting Action: Accept</td>
</tr>
</tbody>
</table>
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
**A.6.3.8** Test facilities **shall** should consist of a site that includes a measured grade of 50 percent at least equal to the vehicle in length or a level, paved test pad adequate for an extended drawbar pull.

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
**6.3.8.5** The vehicle shall negotiate the grade or draw pull smoothly and safely.

**Substantiation:** The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.

Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
**A.6.3.9** Test facilities **shall** should consist of a flat test pad suitable for discharging agent and securing portable ramps under the vehicle.

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
**6.3.9.2** Test equipment shall consist of two to four 355.6 mm (14 in.) ramps with flat tops large enough for the tire footprint and graduated on both sides to allow the vehicle to ascend and descend safely.

**Substantiation:** The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.

Committee Meeting Action: Accept
414-345 Log #70
(6.3.9.2 and 6.3.9.4)

Final Action: Reject

Submitter: Jason Shively, Oshkosh Corporation

Recommendation: Revise text to read as follows:

Section 6.3.9.2 Test equipment shall consist of two to four 355.6 mm (14 in.) ramps, of specified height, with flat tops large …

Section 6.3.9.4(1) For a 4 x 4, drive the fully loaded vehicle onto 355.6 mm (14 in.) blocks positioned under …

Substantiation: Table 4.1.1(b) Diagonal opposite wheel motion listed for Vehicle Water Tank Capacity = 120 to = 525 gal is consistent with Section 6.3.9.2 and 6.3.9.4. These Sections specify 14 inch ramps where Table 4.1.1(b) specifies 10 inch. Need consistency throughout the Standard.

Committee Meeting Action: Reject

Committee Statement: The committee has chosen to reject the proposed change as the change could have possibly made the requirement too vague and confusing. The committee has also removed any vague and unenforceable terms in Proposal 414-344 (Log #CP249).

414-346 Log #CP250
(6.3.9.4.2(b))

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

(b) Demonstrate all systems to ensure that they function normally, including discharge from all orifices.

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.

Committee Meeting Action: Accept

414-347 Log #CP251
(6.3.9.5, 6.3.9.5.1, and 6.3.9.5.2)

Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text and add new sections to read as follows:

6.3.9.5 No moving part shall interfere with another.

6.3.9.5.1 If component contact should occur, it shall in no way damage the component or detract from the vehicle's ability to carry out its mission.

6.3.9.5.2 No clearance shall be permitted between any tire and its supporting surface.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

414-348  Log #CP53  Final Action: Accept

(6.3.10.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.3.10  Test facilities shall consist of any dry, smooth, level, paved surface adequate in length to reach the respective test speeds and stop safely. The test area shall be marked so that a lane equivalent in width to that of the vehicle plus 1.2 m (4 ft) is established.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-349  Log #CP253  Final Action: Accept

(6.3.10.2(4))

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
(4) Strip chart recorder suitable for recording distance traveled, vehicle speed, and the point at which actuation of the brake system occurs

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

414-350  Log #CP252  Final Action: Accept

(6.3.10.3 and 6.3.10.3.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new section to read as follows:
6.3.10.3  The vehicle shall be tested in its fully loaded condition with the brakes adjusted and the tires inflated to the vehicle manufacturer's recommended specifications.
6.3.10.3.1  The brakes shall have been adequately burnished to ensure repeatable results.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section and the use of vague or unenforceable terms. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept
Revise text as follows:

(6) Disable the front service brakes and repeat (1) through (4) at a test speed of 64.4 kph (40 mph).
(7) Reconnect the front service brakes and disable the rear service brakes and repeat (1) through (4) at a test speed of 64.4 kph (40 mph)

Items (6) and (7) shall not be applicable to commercial chassis.

Substantiation: Commercial chassis are typically equipped with hydraulic brakes that must be certified to Federal Motor Vehicle Safety Standards (FMVSS 105). These braking systems are usually a split zone type with anti-lock brakes. Any disabling of the service or parking brake system, antilock brake system, hydro-boost system or engine belt drive will be in violation of the manufacturer's certification of conformity to FMVSS standards. Driving the vehicle with front or rear brakes disconnected would be unsafe and could be in violation of these standards.

Committee Meeting Action: Accept in Principle

Revise text as follows:

(6) Disable the front service brakes and repeat (1) through (4) at a test speed of 64.4 kph (40 mph).
(7) Reconnect the front service brakes and disable the rear service brakes and repeat (1) through (4) at a test speed of 64.4 kph (40 mph)

Items (6) and (7) shall not be applicable to hydraulic brakes commercial chassis.

Committee Statement: While the committee agrees with the intent of the submitter, they have chosen to be more specific and make this applicable to "hydraulic brakes" rather than the broad category of commercial chassis.
Brake test vehicle ten times repeatedly with out cooling from a speed of forty miles per hour in a panic stop. There shall be no signs of fading, chattering or loss of braking. Our airport has nine hard brakes from the north fire station to the center of the south runway. If we had brakes that faded we would not be able to make the F.A.A. standard of four minutes allowed to pass the alert drill. We have yet to have an apparatus with drum brakes that would meet this standard. Loss of brakes could cause loss of control resulting in an accident with another vehicle, plane or by itself. Human injury or life could result from an accident like this.

Committee Meeting Action: Reject
Committee Statement: "Panic Mode" is not a defined or used term within this document and the committee is unclear as to what the submitter's intent.

Add new text as follows:

(1) Drive the vehicle onto the level test pad. Shift the transmission to neutral.
(2) Couple the vehicle to the horizontal force device so that forward drawbar force can be generated. Release the parking brake.
(3) Pull the vehicle forward at a speed of at least 1.6 kph (1mph). As the vehicle is being pulled, apply the parking brake until a 20 percent equivalent drawbar is generated. A 20 percent equivalent drawbar load is determined as follows:
(a) A 20 percent grade, 11.31 degree angle
(b) The loaded vehicle weight x sin 11.31 degrees (0.196) equals the necessary drawbar pull to simulate holding on a 20 percent grade.
(c) The area of the load cell shall be determined at the time of the test
(d) The load cell reading, in kPa (psi), that simulates a 20 percent grade, calculated by the following:
\[
\text{Load cell reading} = \frac{\text{Sin 11.31 degrees x vehicle weight}}{\text{area of load cell}}
\]

This is to correct miss-wording in the paragraph. The current wording under 6.3.11.4.1 (1), (2), (3) is a repeat of 6.3.11.6 (1), (2), (3). However, since the introductory paragraph describes the alternate method of testing the parking brake on a 20 percent grade, the description for testing service brakes on an actual 50 percent grade is not applicable.

Committee Meeting Action: Accept
The capacity of the vehicle’s service brake to hold the vehicle stationary on a 50 percent grade shall be demonstrated either on an actual grade or by means of an equivalent drawbar pull test. If an actual 50 percent grade is available, the test shall be conducted as follows:

1. Drive the vehicle in a forward direction onto the 50 percent grade, apply the service brakes, and shift the transmission to neutral.

If an actual 50 percent grade is not available, the tests shall be conducted as follows:

Substantiation: This is to correct a misprint in wording between paragraphs. Section 6.3.11 is to test service brakes on a 20 percent and 50 percent grade. Paragraphs 6.3.11.5 and 6.3.11.5.1 talk about testing service brakes on a 50 percent grade. Paragraphs 6.3.11.6 and 6.3.11.6.1 also talk about testing service brakes on a 50 percent grade. However, it would appear that these last paragraphs should be talking about testing on the 20 percent grade as evidenced by the drawbar testing description.

Committee Meeting Action: Accept

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

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.

Committee Meeting Action: Accept

414-359 Log #CP56
(6.3.13.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.3.13 Test facilities shall consist of a level site having a dry, paved surface greater than three times the vehicle's length in diameter and shall be free from loose material.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-360 Log #CP256
(6.3.13.3) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
6.3.13.3 The vehicle's steering system shall be fully operational, and the steering linkage stops shall be adjusted within the manufacturer's specified production tolerance limits.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

414-361 Log #CP57
(6.3.14.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.3.14 Test facilities shall consist of a level, open site suitable for discharging agent. Access to a refill water supply shall be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-362 Log #CP257
(6.3.14.5) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
6.3.14.5 The measured total discharge rate shall be equal to at least the sum of the minimum specified discharge rates of the nozzles used during the test. A calculated average foam concentration within the tolerance permitted for the respective foam type confirms the adequacy of the foam–liquid concentrate piping to supply foam at a rate compatible with the maximum discharge requirements of the vehicle.

Substantiation: This item was removed from this section as it did not contain a requirement that had to be met.
Committee Meeting Action: Accept

Printed on 2/26/2010
Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Add new section and text to read as follows:

**6.3.14.6** The calculated average foam concentration shall be within the tolerance permitted in NFPA 412, 5.2.

**Substantiation:** This text and section has been added as a result of the action in Proposal 414-362 (Log #CP257).

**Committee Meeting Action:** Accept

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Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.15 Test facilities shall consist of a level site with pumping or hydrant capacity, or both, sufficient to provide the water delivery rate needed to fill the water tank in 2 minutes at an inlet pressure of 551.6 kPa (80 psi).

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

**Committee Meeting Action:** Accept

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Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

The water tank shall be empty, and the water tank fill and vent system shall be fully operational for this test.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.

**Committee Meeting Action:** Accept

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Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.16 Test facilities shall consist of an open site suitable for discharging agent and draining the vehicle. Access to a refill water supply shall be required.

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

**Committee Meeting Action:** Accept
Failure to develop a clear water stream through each nozzle shall be considered evidence that the flushing system is inadequate. There shall be no evidence of feedback of clear water into the foam tank.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept

There shall be no evidence of feedback of clear water into the foam tank.

This text and section has been added as a result of the action in Proposal 414- (Log #260).
Committee Meeting Action: Accept

Test facilities should consist of a level, open site suitable for discharging agent. Access to a refill water supply should be required.

This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

The primary turret pattern test shall be conducted in accordance with the requirements of NFPA 412, and the results shall be evaluated in accordance with the vehicle specifications.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section.
Committee Meeting Action: Accept
Submitters: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.19 Test facilities shall should consist of a level, open site suitable for discharging agent. Access to a refill water supply shall should be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

Submitters: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
6.3.19.3 The water tank shall be filled prior to starting the test.
6.3.19.3.1 The water tank shall have been verified that the vehicle pump system is capable of operating at design flow and pressure.
6.3.19.3.2 The test shall be conducted with the primary turret at the full flow rate setting.
6.3.19.3.3 The turret power-assist system, if applicable, shall be fully operational.

Substantiation: The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.
Committee Meeting Action: Accept

Submitters: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.20 Test facilities shall should consist of a level, open site suitable for discharging agent. Access to a refill water supply shall should be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
Technical Committee on Aircraft Rescue and Fire Fighting,
Modify text and add new section to read as follows:

6.3.20.3 The water tank shall be filled prior to the test.
6.3.20.3.1 The turret power-assist system, if applicable, shall be fully operational.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,
Modify text to read as follows:

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

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,
Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

Test facilities shall consist of a level, open site suitable for discharging agent. Access to a refill water supply shall be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,
Modify text to read as follows:

The handline nozzle pattern test shall be conducted in accordance with the requirements of NFPA 412, and the results shall be evaluated in accordance with the vehicle specifications.

Substantiation: The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.
Committee Meeting Action: Accept
414-378  Log #CP64  Final Action: Accept  
(6.3.23.1)  

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:  
A.6.3.23 Test facilities shall consist of an open site suitable for discharging agent. Access to a refill water supply shall be required.  

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.  
**Committee Meeting Action:** Accept  

414-379  Log #CP267  Final Action: Accept  
(6.3.24)  

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Modify text to read as follows:  
6.3.24 Ground Sweep/Bumper Turret Pattern Test. The ground sweep/bumper turret pattern test shall be conducted in accordance with the requirements of NFPA 412, and the results shall be evaluated in accordance with the vehicle specifications.  

**Substantiation:** The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.  
**Committee Meeting Action:** Accept  

414-380  Log #CP65  Final Action: Accept  
(6.3.25.1)  

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:  
A.6.3.25 Test facilities shall consist of an open site suitable for discharging agent.  

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.  
**Committee Meeting Action:** Accept  

414-381  Log #CP268  Final Action: Accept  
(6.3.25.3 and 6.3.25.3.1)  

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,  
**Recommendation:** Modify text and add new section to read as follows:  
6.3.25.3 The vehicle's pump system shall be verified to be capable of operating at full rate, and  
6.3.25.3.1 The agent tanks shall be filled with water and foam, respectively.  

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.  
**Committee Meeting Action:** Accept
Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.3.26 Test facilities shall consist of an open site suitable for discharging agent. Access to a refill water supply and a foam concentrate supply shall be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new section to read as follows:
6.3.26.3 Each discharge nozzle on the vehicle shall have been individually verified as discharging at a flow rate within the tolerance specified.
6.3.26.3.1 The agent system shall have been verified as capable of operating at full rate.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new section to read as follows:
6.3.26.5 The foam concentrations measured shall fall within the permitted tolerances specified in NFPA 412 for each nozzle and for the combined simultaneous discharge.
6.3.26.5.1 The foam expansion and drainage time measurements shall equal or exceed those specified in NFPA 412 for each nozzle.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept
Technical Committee on Aircraft Rescue and Fire Fighting,

Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.27 Test facilities should consist of a flat, open area that is free from any large reflecting surfaces (such as other vehicles, signboards, or hills) within a 61 m (200 ft) radius of the vehicle.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Modify text to read as follows:

6.3.27.3 The vehicle’s siren speaker shall be mounted in its proper approved location and shall be in working order.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section and the use of vague or unenforceable terms.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.28 Test facilities should consist of an open site suitable for discharging AFFF concentrate, dry chemical, or halogenated agent.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
6.3.28.3 The vehicle extinguishing agent piping system shall be operational.
and
6.3.28.3.1 The agent tank(s) shall be empty.
6.3.28.3.2 The propellant gas tank(s) shall be fully charged and within proper pressure.
6.3.28.3.3 A means of lifting the agent tanks for weighing without loss of agent shall be provided. Alternatively,
6.3.28.3.4 As an alternative the extinguishing agent tank(s) shall be permitted to be tested outside of the vehicle.
6.3.28.3.5 Where this alternative is used, the test shall be conducted with the agent tank(s) and related piping, fittings, valves, hose, and nozzle(s) in the same configurations in which they are installed on the vehicle.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
(3) Ensure that all fill caps are tightened securely, all propellant gas lines are connected, the discharge nozzle(s) is in the closed position, and all fittings and connections are tight.

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
6.3.28.5 There shall be a sufficient supply of propellant gas to purge all discharge lines as evidenced by the emission from each nozzle of gas only. The total agent discharged shall equal or exceed the design capacity.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section and the use of vague or unenforceable terms.
Committee Meeting Action: Accept
414-391 Log #CP69 Final Action: Accept

(6.3.29.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and number
accordingly:
A.6.3.29 Test facilities shall consist of an open site suitable for discharging the AFFF solution, dry chemical, or
halogenated agent.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope
of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-392 Log #CP276 Final Action: Accept

(6.3.29.3, 6.3.29.3.1, 6.3.29.3.2, 6.3.29.3.3, and 6.3.29.3.4)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
6.3.29.3 The vehicle extinguishing agent system shall be piped to all discharge outlets with the tank(s) empty.
6.3.29.3.1 The propellant gas tank(s) shall be fully charged and at proper pressure.
6.3.29.3.2 A means for mounting a pressure gauge or transducer somewhere between the downstream (low pressure)
side of the regulator and the agent tank top shall be provided.
6.3.29.3.3 As an alternative the extinguishing agent tank(s) shall be permitted to be tested outside of the
vehicle.
6.3.29.3.4 Where this alternative is used, the test shall be conducted with the agent tank(s) and related piping, fittings,
valves, hose, and nozzle(s) in the same configuration in which they are installed on the vehicle.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within
the same section. The text in the new section is not new text but text from the original section that needed to be
separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-393 Log #CP275 Final Action: Accept

(6.3.29.4(3))

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
(3) Ensure that all fill caps are tightened securely, all propellant gas lines are connected, the discharge nozzle(s) is in
the closed position, and all fittings are tight.
Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or
unenforceable terms.
Committee Meeting Action: Accept
414-394 Log #CP277
(6.3.29.5) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new section to read as follows:
6.3.29.5 The pressure regulation system shall be capable of maintaining pressure throughout the discharge.
6.3.29.5.1 At no time shall pressure fall below or exceed the design range specified by the manufacturer.
Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-395 Log #CP70
(6.3.30.1) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.3.30 Test facilities shall consist of a level, open site suitable for discharging the agent and measuring ranges.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-396 Log #CP278
(6.3.30.3, 6.3.30.3.1, 6.3.30.3.2, 6.3.30.3.3, and 6.3.30.3.4) Final Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new section to read as follows:
6.3.30.3 All vehicle foam discharge piping shall be operational, and the premix tank shall be empty.
6.3.30.3.1 The propellant gas tank(s) shall be fully charged and within proper pressure.
6.3.30.3.2 A means of lifting the agent tank(s) for weighing without loss of agent shall be provided.
6.3.30.3.3 As an alternative, Alternatively, the system shall be permitted to be tested outside of the vehicle.
6.3.30.3.4 Where this alternative is used, the test shall be conducted with the premix tank and related piping, fittings, valves, hose, and nozzle(s) in the same configuration in which they are installed on the vehicle.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept
### 414-397 Log #CP279

(6.3.30.4(3))

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text to read as follows:

(3) Ensure that all fill caps are tightened securely, all propellant gas lines are connected, the discharge nozzle(s) is in the closed position, and all fittings and connections are tight.

**Substantiation:** The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.

**Committee Meeting Action:** Accept

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### 414-398 Log #CP71

(6.3.31.1)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.31 Test facilities **shall** consist of an open site suitable for discharging AFFF solution, dry chemical, or halogenated agent.

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

**Committee Meeting Action:** Accept

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### 414-399 Log #CP280

(6.3.31.3, 6.3.31.3.1, 6.3.31.3.2, 6.3.31.3.3, and 6.3.31.3.4)

**Final Action:** Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new sections to read as follows:

6.3.31.3 The vehicle extinguishing agent system(s) shall be fully operational.

6.3.31.3.1 The agent tank(s) shall be fully charged with the manufacturer’s recommended agent.

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

6.3.31.3.3 As an alternative, the extinguishing agent tank(s) shall be permitted to be tested outside of the vehicle.

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

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept
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(6.3.31.5 and 6.3.31.5.1)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new section to read as follows:

6.3.31.5 Any agent beyond the tank outlet shall be purged from the discharge piping and hose as evidenced by the discharge from each nozzle of gas only.

6.3.31.5.1 The depressurization or venting of the agent tank shall allow only minimal quantities of agent to escape.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept

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(6.3.32.1)

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.3.32 Test facilities shall consist of a level, open site suitable for discharging the dry chemical or halogenated agent and measuring ranges. Wind conditions shall be calm [less than 8 kph (5 mph)].

**Substantiation:** This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

**Committee Meeting Action:** Accept

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(6.3.32.3, 6.3.32.3.1, 6.3.32.3.2, 6.3.32.3.3, 6.3.32.3.4, and 6.3.32.3.5 (New))

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new sections to read as follows:

6.3.32.3 All vehicle agent piping shall be operational.

6.3.32.1 The agent tank shall be empty.

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

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

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

6.3.32.5 Where this alternative 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.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
(2) Ensure that all fill caps are tightened securely, all propellant gas lines are connected, the discharge nozzle(s) is in the closed position, and all fittings and connections are tight.

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept
(2) Ensure that all fill caps are tightened securely, all propellant gas lines are connected, the discharge nozzle(s) is in the closed position, and all fittings and connections are tight.

(7) During discharge, place markers at the far point where significant 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 proper safety equipment for this task.

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

The stream range and pattern width shall equal or exceed the requirements. The discharge flow rate shall equal the requirement.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Test facilities shall consist of a flat, open, paved area suitable for operating the vehicle at a constant speed of 80.5 kph (50 mph) that is free from any large reflecting surfaces (such as other vehicles, sign boards, or hills) within a 15.2 m (50 ft) distance of the vehicle. The wind speed shall not exceed 24.1 kph (15 mph) during the test.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
414-409  Log #CP286  
(6.3.34.2 and 6.3.34.2.1)  
Final Action: Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new section to read as follows:

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

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

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept

414-410  Log #CP288  
(6.3.34.3, 6.3.34.3.1, 6.3.34.3.2, 6.3.34.3.3, and 6.3.34.3.4)  
Final Action: Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new sections to read as follows:

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

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

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

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

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

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept

414-411  Log #CP289  
(6.4.1.1)  
Final Action: Accept

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new sections to read as follows:

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

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

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

c)  This data plate shall list the following items: vehicle empty weight, maximum gross weight, special equipment installed prior to test, and front and rear axle weights with weight distribution calculation.

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

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

**Committee Meeting Action:** Accept
### 414-412 Log #CP290

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new sections to read as follows:

6.4.1.1.1 This test shall be conducted on a tilt table facility meeting SAE J2180.

- a) This tilt table shall contain a **suitable** surface to resist truck sliding during test sequences.
- b) The vehicle shall be restrained and tilted until the vehicle tilt or side slope angle can be positively determined.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section and the use of vague or unenforceable terms.

**Committee Meeting Action:** Accept

### 414-413 Log #CP291

**Submitter:** Technical Committee on Aircraft Rescue and Fire Fighting,

**Recommendation:** Modify text and add new section to read as follows:

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

6.4.1.2.1 A **suitable** ballast shall be used in place of the crew for safety.

**Substantiation:** The change in text was to comply with the Manual of Style as there were multiple requirements within the same section and the use of vague or unenforceable terms.

**Committee Meeting Action:** Accept
6.4.1.4 The side slope capability of the vehicle shall be determined in accordance with SAE J2180, and as follows:

New-6.4.1.4.1 The vehicle shall be filled with water and foam, the storage compartments shall have maximum weight capacity simulated and/or specialized equipment is installed and in place. Each fire fighter driver and fire fighter passenger’s weight shall be simulated at 225 pounds. All other systems shall be full such as dry chemical or clean agent. The vehicles’ gross weight shall be determined and recorded prior to the vehicle being placed on the tilt table. After the completion of the tilt table test the vehicles weight shall be determined again. The difference of the beginning weight and the ending weight shall be determined and the weight loss shall not exceed 5% of the vehicles total gross weight before the tilt table test was accomplished. If the weight loss exceeds -5% the tilt table test shall be re-accomplished after the vehicle is re-serviced and measures are taken to reduce the water/foam loss.

1) Tilt the vehicle on a table to the angle specified for the vehicle being tested.
2) Once the vehicle is positioned at the required angle, check the vehicle restraints to ensure that no tension is applied.

6.4.1.5 The vehicle shall be considered to meet its side slope requirement if the vehicle can stand by itself on the grade without the use of the safety restraints and the weight loss shall not exceed 5% of the vehicles total gross weight before the tilt table test was accomplished.

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.

Substantiation: The tilt table test was established as an aid to determine the vehicles’ stability. The tilt table calculation is determined by placing a vehicle on a side slope at a specified angle. One factor that effects this stability is the center of gravity of the vehicle. If the vehicle is allowed to leak water/foam content while conducting this test a false stability determination is established. It is important to maintain the vehicle at its highest gross weight and center of gravity while these tests are being conducted.

Committee Meeting Action: Reject
Committee Statement: This test procedure is already contained throughout the document and by including it here as well would possibly create confusion.

Test facilities shall consist of an in-ground, certified weight scale large enough to accommodate the vehicle or a level test pad suitable for positioning the truck on top of portable wheel scales.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept
Test facilities shall consist of an in-ground, certified weight scale large enough to accommodate the vehicle or a level test pad suitable for positioning the truck on top of portable wheel scales.

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

Instrumentation for this test is limited to the in-ground or portable scales. The accuracy of the scales shall be ±1.0 percent of the scale capacity.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

The vehicle shall be tested in its fully loaded condition. Ballast shall be used for the crew and equipment as necessary.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Test facilities shall consist of a dry, straight, level paved surface sufficient in length to accelerate the vehicle from rest to 80.5 kph (50 mph) and then bring it to a safe stop.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add a new section to read as follows:

6.4.3.3 The vehicle shall be tested in its fully loaded condition with the engine and the transmission at their normal operating temperatures.

6.4.3.3.1 The tires shall be inflated to the manufacturer's recommended pressure.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.4.4 Test facilities should consist of a dry, paved, level surface suitable for achieving a vehicle speed of at least 104.6 kph (65 mph) and bringing the vehicle to a safe stop.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new section to read as follows:

6.4.4.3 The vehicle shall be tested in its fully loaded condition with the engine and the transmission at their normal operating temperatures.

6.4.4.3.1 The tires shall be inflated to the manufacturer's recommended pressure.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept
Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.4.5 Test facilities shall should consist of any dry, smooth, paved surface adequate in length to reach the respective test speeds and stop safely. The test area shall should be marked so that a lane that equals the width of the vehicle plus 1.2 m (4 ft) is established. A runway or taxiway with a marked centerline shall should be permitted to be used.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
6.4.5.3 The vehicle shall be tested in its fully loaded condition with the brakes adjusted to the manufacturer's recommended tolerances.
6.4.5.3.1 The tires shall be inflated to the vehicle manufacturer's recommended inflation pressure.
6.4.5.3.2 The vehicle's stopping distance shall have been certified by the vehicle manufacturer.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Delete existing text and renumber.
6.4.6.1 No special test facilities shall be required.
Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
Modify text and add new sections to read as follows:

6.4.6.3 The vehicle’s air system shall be fully operational for this test.
6.4.6.3.1 The manufacturer previously shall have established the ratio of actual to required reservoir capacity and the spring brake release pressure.
6.4.6.3.2 The test shall be conducted with the transmission in neutral and the parking brakes set.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.4.7 Test facilities shall consist of an open site suitable for discharging agent.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Modify text to read as follows:

6.4.7.3 The vehicle’s agent system shall be fully operational with all primary handlines deployed for this test, and all primary handlines shall be deployed.

Substantiation: The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.

Committee Meeting Action: Accept
Since measurements of actual flow rates are not practical accurately obtained in the field, the system shall be considered to have met the requirement in accordance with the procedures of 6.4.6.4, provided the nozzle ranges show no signs of deterioration as additional nozzles are engaged and the agent system pressure does not fluctuate by more than 10 percent where comparing the primary turret flowing by itself with the combined discharge pressure. Foam (or dyed water) shall be evident in the discharging stream from all nozzles at all times.

Substantiation: The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.
Committee Meeting Action: Accept

Foam (or dyed water) shall be evident in the discharging stream from all nozzles at all times.

The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

Test facilities shall consist of an open site suitable for discharging agent.

This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
414-432  Log #CP82  Final Action: Accept
(6.4.9.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.4.9  Test facilities shall consist of an open site suitable for discharging agent and operating the vehicle up to its maximum speed.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept

414-433  Log #CP302  Final Action: Accept
(6.4.9.5, 6.4.9.6, 6.4.9.7, and 6.4.9.8)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text and add new sections to read as follows:
6.4.9.5 During the test, there shall be no indication of proportioning, pressure, or flow rate instability.
6.4.9.6 The operation of the pump shall not, under any conditions, cause the engine to stall.
6.4.9.7 Engagement of the pump or vehicle drive shall be accomplished without introducing any unsafe vehicle dynamics that could result in injury such as severe lurching.
6.4.9.8 Dye or foam solution shall be evident while discharging from all nozzles.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

414-434  Log #CP83  Final Action: Accept
(6.4.10.1)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:
A.6.4.10  Test facilities shall consist of an appropriate area in the vehicle manufacturer's plant.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.
Committee Meeting Action: Accept
Modify text to read as follows:

6.4.10.2 Test equipment shall consist of the following:
(1) Hydraulic pressure gauge with a scale adequate for monitoring a pressure equal to 1½ times the normal agent system pressure of the vehicle
(2) Pressure charging device capable of developing a pressure equal to 1½ times the normal agent system pressure of the vehicle and sustaining it for 15 minutes or longer

Substantiation: The committee made this change to comply with the Manual of Style and the use of vague or unenforceable terms.
Committee Meeting Action: Accept

Modify text by adding new section to read as follows:

6.4.10.3 The vehicle’s agent system shall be fully assembled at the time of the test.
6.4.10.3.1 As it is sometimes desirable to perform this test before the body is completely assembled and fire-fighting system controls are in place, the agent system shall not be required to be fully operational during the hydrostatic portion of the test.

Substantiation: The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.
Committee Meeting Action: Accept

No pressure decay shall be permitted during the 15-minute test, and no discharge or tank-to-pump piping water leaks shall be permitted during or after agent system operation:

Substantiation: The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.
Committee Meeting Action: Accept
Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Add new section to read as follows:

6.4.10.6 No discharge or tank-to-pump piping water leaks shall be permitted during or after agent system operation.

Substantiation: The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Remove text and place as an annex item with modified text in the section noted and renumber accordingly:

A.6.4.11 Test facilities shall consist of an open site suitable for discharging agent. Access to a refill water supply and foam concentrate supply shall be required.

Substantiation: This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Modify text to read as follows:

6.4.11.3 Each discharge nozzle on the vehicle shall have been individually verified as discharging at a flow rate within the tolerance specified. The agent system shall have been verified as capable of operating at full rate.

Substantiation: The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.

Committee Meeting Action: Accept

Technical Committee on Aircraft Rescue and Fire Fighting,

Recommendation: Add new section to read as follows:

6.4.11.3.1 The agent system shall have been verified as capable of operating at full rate.

Substantiation: The text in the new section is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.

Committee Meeting Action: Accept
<table>
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<th>Log #</th>
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<tr>
<td>414-442</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting,</td>
<td>Remove text and place as an annex item with modified text in the section noted and renumber accordingly:</td>
<td>This change was made as it was determined that test facilities requirements is not within the scope of this document. The committee has chosen to place it in the annex as a point of information for the purchaser.</td>
</tr>
<tr>
<td>414-443</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting,</td>
<td>Modify text and add sections to read as follows:</td>
<td>The change in text was to comply with the Manual of Style as there were multiple requirements within the same section. The text in the new sections is not new text but text from the original section that needed to be separated in order to comply with the Manual of Style.</td>
</tr>
<tr>
<td>414-444</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting,</td>
<td>Modify text to read as follows:</td>
<td>The committee has made this change in order to comply with the Manual of Style as it was noted there were more than one requirement per section.</td>
</tr>
<tr>
<td>414-445</td>
<td>Accept</td>
<td>Technical Committee on Aircraft Rescue and Fire Fighting,</td>
<td>Add new section to read as follows:</td>
<td>The text in the new section is not new text but text from the original section, 6.4.12.5 that needed to be separated in order to comply with the Manual of Style.</td>
</tr>
</tbody>
</table>
A.4.1.1 For cold weather operation where temperatures periodically range below 32 deg F, some type of winterization system should be specified by the purchaser. For hot weather operation where temperatures periodically range above 110 deg F, some type of additional cooling system should be specified by the purchaser.

Substantiation: The committee added this text in order to provide the end user or purchaser some direction to address the various climates in which these vehicles might be operating and to make such adjustments to the vehicle specifications as local climates might warrant.

Committee Meeting Action: Accept

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(Mark Huffman, Rosenbauer) Delete text to read as follows:

The following is a list of available options that can be ordered from the ARFF vehicle manufacturers: (1) General ARFF vehicle options as follows: (7) Vehicle cab operating and driving options as follows: (d) FLIR heads up display located in the cab

The option of heads up display should be removed from the publication as the current technology is not robust enough and is prohibitively expensive. We know of no OEM who can supply this technology in a form that is useful at this point in time.

Substantiation: The option of heads up display should be removed from the publication as the current technology is not robust enough and is prohibitively expensive. We know of no OEM who can supply this technology in a form that is useful at this point in time.

Committee Meeting Action: Accept

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(Shively, Oshkosh Corporation) Revise text to read as follows:

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 fire-fighting systems for a period of at least 4 hours at ambient temperatures as low as -40°C (-40°F) with the vehicle fully operational and the engine running. At the end of the 4-hour period, the vehicle shall be capable of successfully discharging its agent(s). The winterization system shall not detract from the performance of the vehicle and fire-fighting system in ambient temperatures up to -43.5°C (-115°F).

Substantiation: Change ‘and’ to ‘or’ to open up the method of operation.

Committee Meeting Action: Accept in Principle

Revise text to read as follows:

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 fire-fighting systems for a period of at least 4 hours at ambient temperatures as low as -40°C (-40°F) with the vehicle fully operational and the engine running. At the end of the 4-hour period, the vehicle shall be capable of successfully discharging its agent(s). The winterization system shall not detract from the performance of the vehicle and fire-fighting system in ambient temperatures up to -43.5°C (-115°F).

Committee Statement: While the committee agrees with the submitters intent, they feel that this change in text accomplishes that.
Revise text as follows:

The manufacturer is only obligated by the standard to provide a miscellaneous equipment allowance in compliance with the minimum allowance listed in Table 12.1 of NFPA 1901 at the end of this section.

Table 12.1 of NFPA 1901 lists seven different types of apparatus with the corresponding equipment allowance. Of these apparatus types, there are 10 different equipment allowance weights. None of these apparatus fit into an ARFF vehicle description. It is not possible by the current NFPA 414 reference to determine which weight allowance should be used. In addition, there is a significant difference in the available compartment space and GVWR ratings of ARFF vehicles ranging from a minimum of 120 gallons to over 1585 gallons. It would not be reasonable to expect the same equipment to be carried on all vehicles within this range of sizes. NOTE: As further reference material, the Fire Apparatus Manufacturers Association (FAMA) provides a worksheet for use by purchasers to calculate the portable equipment weight and cubic foot requirements. (See Annex C of NFPA 1901).

Modify text to read as follows:

Purchasers should specify the equipment to be carried on the vehicle should work closely with the vehicle manufacturer to ensure that the compartment capacity and GVWR is 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.

The change was to comply with the Manual of Style as well as move some of the informational facts to the annex rather than keep them in the body of the document.

While the committee agrees with the submitters intent, that the weight of the vehicle is an essential and that the equipment on the vehicle should be at a minimum to control the overall weight of the vehicle, the committee feels the new text that is provided offers better clarity in this topic.

Modify text to read as follows:

A.4.7.4 To optimize flotation under soft ground conditions, tires of larger diameter or width, or both, than is needed for bearing weight only shall be specified. Similarly, the lowest tire pressure compatible with the high-speed performance requirements also shall be specified. Vehicle and tire manufacturers shall be consulted for the tread design most suitable for the specific soil composition at individual airports.

The change was to comply with the Manual of Style as well as move some of the informational facts to the annex rather than keep them in the body of the document.

Committee Meeting Action: Accept
Add annex item to read as follows:

A.4.11.3.6 The U.S. standards developed by SAE and the United Nations ECE regulation mirror each other except that SAE J2422 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 test in excess of the standards.[1901:2009]

Substantiation: The committee has chosen to extract this information to provide further information on the requirements.
Committee Meeting Action: Accept
A.4.18.6 The need for a primary turret is of the extendable type practical, high-rise/high-reach/elevating/extendable waterway (device) to replace conventional turrets as the principal fire extinguishing agent applicator on ARFF vehicles has been recognized for over two decades. Equipment intended to provide the capability for ARFF vehicles has been under development for the past decade, and devices that have been developed and are operationally practical in the ARFF service environment have become available.

The development of the extendable turret for aviation fire protection is a recent development. As such, the design and functional requirements, as well as the tactics and procedures for its use, are not well developed. Training curricula also need to be developed. The intent of the requirements of 4.18.6 is to provide minimum performance criteria so that there is no degradation in the basic turret performance, while allowing individual flexibility for specific user needs. These needs can be affected by the type of aircraft being protected, the ability to access the aircraft interior, and the ability to access shielded fires.

As now envisioned, the extendable turret can be used for primary agent application as part of a first-arriving vehicle. As such, the vehicle should be capable of applying agent quickly without the need to deploy supporting outriggers. In the future, other design features or functions might be incorporated. For example, man-rated devices for use in accessing the interior cabin after fire knockdown might be incorporated. These devices might or might not require stabilizing devices; depending on the function of the vehicle, the time to deploy such devices might be permitted. In any event, there should be a maximum time for total deployment of the boom/tower device. A maximum of 30 seconds is recommended. The requirements do not prohibit the development of an advanced device or a unit with a different function, recognizing that the primary turret performance should not be compromised.

It is not recommended that agent be applied from a vertically extended position before knockdown of the exterior exposure fire, unless the fire cannot otherwise be accessed. Preliminary data from demonstrations of extendable turrets, plus data from earlier turret testing, suggest that AFFF discharged at a low level is the most effective technique. The extendable turret should be designed to extend below the primary level of the cab to take advantage of low-level AFFF application. Extension of the extendable turret below the cab level also should provide advantages in accessing shielded/obstructed areas such as wheel-well incidents and “gear down” scenarios.

To improve operator efficiency, the movement of the boom/tower should be accomplished with a single lever located within the cab. Elevation/azimuth indicators are not needed if the turret is in the line of sight of the operator.

Where specified, the extendable turret should be fitted with the appropriate tools/devices needed for a driver/operator to perform interior aircraft and tail-mounted engine fire-fighting functions remotely. These could include a skin penetrator/agent applicator for penetration of the fuselage to access interior fires from outside the aircraft. Tactics and procedures for these evolutions are not well developed and should be given careful consideration, preplanning, and training, particularly for situations where surviving passengers/crew might still be in the aircraft. Where a penetrator/agent applicator is used, a minimum flow equal to two handlines (as specified in 4.16.4.3) is recommended. Airports planning to use the device for indirect attack with a skin penetrator should preplan appropriate access locations on aircraft served and the conditions under which the device is to be used.

Substantiation: This proposed change is intended to clean up the explanatory material in Annex A regarding HRETs. Much, if not all, of the material has resided in the Annex since at least the 1995 edition of NFPA 414 when the technology was still under development.

Committee Meeting Action: Accept
The proposed concept would be to penetrate above overwing window areas, above interior seat back height, and below baggage storage bins. Providing water extinguishment from ceiling to floor for a distance of 9.1 m to 12.2 m (30 ft to 40 ft) 7.6 m to 9.1 m (25 ft to 30 ft) along the fuselage left and right of the centerline of the penetration point would stop fire growth and protect the interior until other vehicles could extinguish the outside exterior fuel fire.

This proposed change corrects a discrepancy between the requirement in the body and the associated explanatory material in the Annex. Testing of a HRET penetrator spray pattern inside a building with a zero wind condition confirmed that the 25 ft to 30 ft performance requirement is the correct number.

Airports that accommodate second level aircraft such as Boeing 747s and/or Airbus A380s operating on their airport should have a vehicle that can access the upper level aircraft door sills from ground level.

The annex reference to stabilizers or similar devices should not be under the 5.1.5 standard.

The committee has chosen to delete this annex item and text as it has extracted text from NFPA 1901, that is placed within the body of this document, to address this information.
Submitter: Bob Eugene, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
C.12.5.6 All receptacles and electrical inlet devices shall be listed to ANSI/UL 498, Standard for Safety Attachment Plugs and Receptacles, or other recognized performance standards.
Substantiation: Add ANSI approval designation to UL 498.
Committee Meeting Action: Accept

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
F.1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02169-7471.

Substantiation: The committee is updating the edition dates of referenced documents.
Committee Meeting Action: Accept
414-459 Log #CP317 Final Action: Accept
(F.1.2.4)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
F.1.2.4 SAE Publications. Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096.
SAE J541, Voltage Drop for Starting Motor Circuits, 1996.
SAE J551/2, Test Limits and Methods of Measurement of Radio Disturbance Characteristics of Vehicles, Motorboats, 
and Spark-Ignited Engine-Driven Devices, 1996.
SAE J553, Circuit Breakers, 1996.
SAE J554, Electric Fuses (Cartridge Type), 1987.
SAE J575, Test Methods and Equipment for Lighting Devices and Components for Use on Vehicles Less Than 2032 
mm in Overall Width, 1992.
SAE J1127, Battery Cable, 1995.
SAE J1128, Low Tension Primary Cable, 1995.
SAE J1292, Automobile, Truck, Truck-Tractor, Trailer, and Motor Coach Wiring, 1981.
SAE J2077, Miniature Blade Type Electrical Fuses, 1990.
SAE J2180, A Tilt Table Procedure for Measuring the Static Rollover Threshold for Heavy Trucks, 1998.

Substantiation: The committee has just corrected a referenced document in this section.
Committee Meeting Action: Accept

414-460 Log #72 Final Action: Accept
(F.1.2.5)

Submitter: Bob Eugene, Underwriters Laboratories Inc.
Recommendation: Revise text to read as follows:
F.1.2.5 UL Publications. Underwriters Laboratories Inc., 333 Pfingsten Road, Northbrook, IL 60062-2096.
Substantiation: Update referenced standard to most recent revision. Add ANSI approval designation to UL 498.
Committee Meeting Action: Accept

414-461 Log #CP318 Final Action: Accept
(F.3)

Submitter: Technical Committee on Aircraft Rescue and Fire Fighting,
Recommendation: Modify text to read as follows:
F.3 References for Extracts in Informational Sections.
Substantiation: The committee is just updating the edition date of referenced material.
Committee Meeting Action: Accept

Printed on 2/26/2010