

# Advisory Circular

**Subject:** Guide Specification for Aircraft
Rescue and Fire Fighting (ARFF) Vehicles

Initiated By

**Initiated By:** AAS-300

Change:

AC No: 150/5220-10F

# 1 1 **Purpose.**

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This advisory circular (AC) provides an interactive specification that airports can use in procuring Aircraft Rescue and Fire Fighting (ARFF) vehicles.

#### 4 2 Cancellation.

AC 150/5220-10E, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles, dated June 1, 2011, is cancelled.

#### 7 **3 Scope.**

- The three main phases of the ARFF vehicle procurement process are presented in this AC, including the:
- 1. Description of the vehicle selection process,
  - 2. Selection of vehicle requirements, and
- 3. Production of a formal specification.

This AC contains information based on the minimum ARFF vehicle requirements established by Title 14 of the Code of Federal Regulations (CFR) Part 139, Certification of Airports. The AC is also based on the Federal Aviation Administration (FAA) additions, exemptions, or amendments made to National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire-Fighting Vehicles (2020 Edition), and NFPA 1901, Standard for Automotive Fire Apparatus (2016 Edition). Only ARFF vehicles and associated vehicle training equipment are discussed in this AC. Other related items, such as the communications equipment, tools, and clothing used in fire fighting, are not covered. However, that information can be found in other guidance material, such as AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing.

## 24 4 Application.

The FAA recommends the guidance and specifications in this AC for procuring ARFF vehicles. In general, use of this AC is not mandatory. However, use of this AC is

mandatory for the acquisition of ARFF vehicles through the Airport Improvement Program (AIP) or Passenger Facility Charge (PFC) Program. See Grant Assurance No. 34, *Policies, Standards, and Specifications*, and PFC Assurance No. 9, *Standards and Specifications*. For certificated airports, in the event of a conflict, Part 139 takes precedence over all other documents identified in the AC. For any allowable options requested by the user that require justification, the appropriate text will be entered in the space provided for FAA Airport District Office (ADO) or Regional staff review and approval. Additions, exceptions, amendments and options are noted, referencing applicable NFPA 414 paragraphs. Features or design details not listed as required or optional in this document are generally considered not necessary. However, special circumstances or conditions may be addressed through the FAA's Modification to Standards procedures (see FAA Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards*).

### 5 Principal Changes.

- The AC incorporates the following principal changes:
- 1. Reformatted to reflect features required and allowable when vehicles are acquired using federal financial assistance.
- 2. Deleted Classes 2 and 3.
  - 3. Deleted former Appendix A, Previous FAA Additions, Exemptions, or Amendments to NFPA 414.
- 4. Added <u>Appendix B</u>, "Checklist for Delivery Package."
  - 5. Updated reference material to NFPA 414, 2020 edition.
- 6. Changed terminology "high reach extendable turret" to "boom-mounted turret" per NFPA 414 guidelines.
- 7. Halogenated agent is now referred to as clean agent.
  - 8. 500 pounds of potassium-based dry chemical is an allowable substitution.
  - 9. Updated the format and made editorial changes throughout.

#### 6 Using this Document.

The intent of the interactivity provided in this AC is to allow its user to select the appropriate features needed to populate the associated procurement specification with the FAA-approved wording. We recommend downloading the AC to your computer so you may save your work as needed. When complete, the associated procurement specification may be printed, signed, and submitted in hardcopy form.

Hyperlinks (allowing the reader to access documents located on the internet and to maneuver within this document) are provided throughout this document and are identified with underlined text. When navigating within this document, return to the previously viewed page by pressing the "ALT" and "←" keys simultaneously.

64	7	Related Documents.
65 66		ACs and Orders referenced in the text of this AC do not include a revision letter, as they refer to the latest version.
67		1. FAA <u>AIP Handbook</u>
68		2. AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport
69 70		3. AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing
71		4. AC 150/5210-19, Driver's Enhanced Vision System (DEVS)
72 73		5. AC 150/5210-25, Performance Specification for Airport Vehicle Runway Incursion Warning Systems (RIWS)
74 75		6. FAA Order <u>5300.1</u> , <i>Modifications to Agency Airport Design, Construction, and Equipment Standards</i>
76		7. Part 139, Certification of Airports
77 78		8. NFPA 414, Standard for Aircraft Rescue and Fire-Fighting Vehicles (2020 Edition), <a href="https://www.nfpa.org/">https://www.nfpa.org/</a>
79 80		9. NFPA 1901, Standard for Automotive Fire Apparatus (2016 Edition), <a href="https://www.nfpa.org/">https://www.nfpa.org/</a>
81	8	Where to Find this AC.
82		You can view a list of all ACs at
83 84		https://www.faa.gov/regulations_policies/advisory_circulars/. You can view the Federal Aviation Regulations at https://www.faa.gov/regulations_policies/faa_regulations/.
85	9	Feedback on this AC.
86		If you have suggestions for improving this AC, you may use the Advisory Circular

John R. Dermody Director of Airport Safety and Standards

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Feedback form at the end of this AC.

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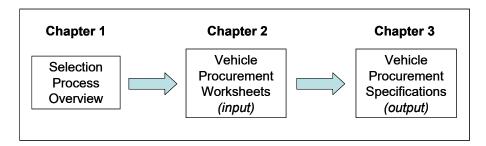
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#### **Chapter 1. THE VEHICLE SELECTION PROCESS**

#### 1.1 General.

This chapter provides an overview of the ARFF vehicle selection process. As shown in <u>Figure 1-1</u>, the considerations and requirements outlined in this chapter will be used to enter the appropriate information in <u>Chapter 2</u> (vehicle procurement worksheets) which provides the corresponding output in <u>Chapter 3</u> (vehicle procurement specifications).

Figure 1-1. Advisory Circular (AC) Flowchart



# 1.2 **Background.**

ARFF vehicles are designed to provide an invaluable service to (a) the commercial and private aviation industry, (b) safety of the passengers, and (c) the cargo they transport. The aviation industry is reliant on prompt and effective fire and rescue services during aircraft emergencies. These services include fire containment and suppression, passenger and crew rescue, airframe and cargo preservation, and maintenance of the site to aid in after-incident investigations. The vehicles that airport fire departments employ serve as the medium to deliver fire fighters, specialized tools and equipment, and fire fighting agents to the scene of an aircraft incident. ARFF vehicles are designed to perform specific functions, constructed for longevity and ease of maintenance.

#### 1.3 **ARFF Vehicle Requirements.**

The requirements for ARFF vehicles to transport specific quantities and types of fire fighting agents are established by Title 14 CFR Part 139.317, Aircraft Rescue and Firefighting: Equipment and Agents. Decision logic diagrams (Figure 1-2, Figure 1-3, and Figure 1-4) identify an airport index and the decision process concerning what vehicles and agents an airport must have as a minimum based on that index. However, there are options in Part 139.317 that allow flexibility in the configuration of fire fighting vehicle agent delivery systems. These options include a selection of the type of dry chemical agent (sodium versus potassium based), quantity by type of dry chemical agent, use of an approved clean agent in lieu of dry chemical, and a minimum of 100 gallons water/foam.

Figure 1-2. Decision Logic Diagram Summary for Index A or B Airports

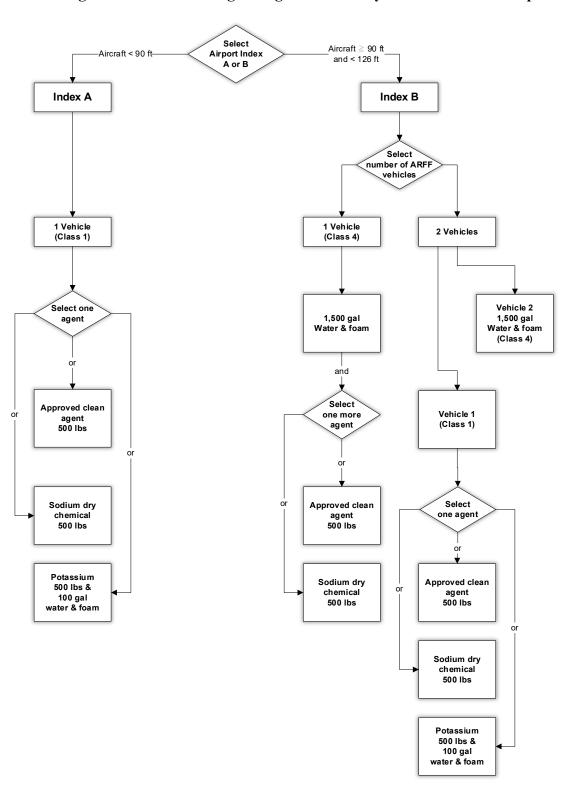


Figure 1-3. Decision Logic Diagram Summary for Index C Airports

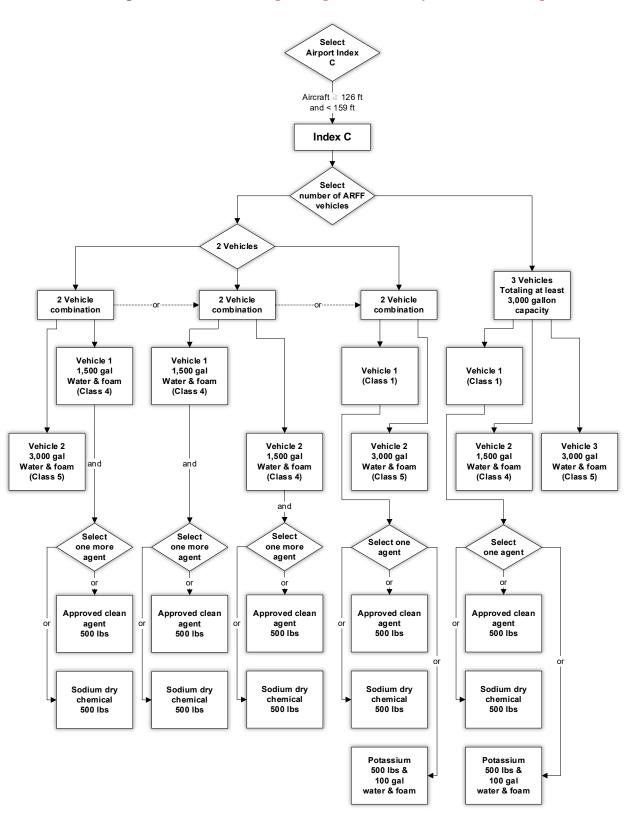
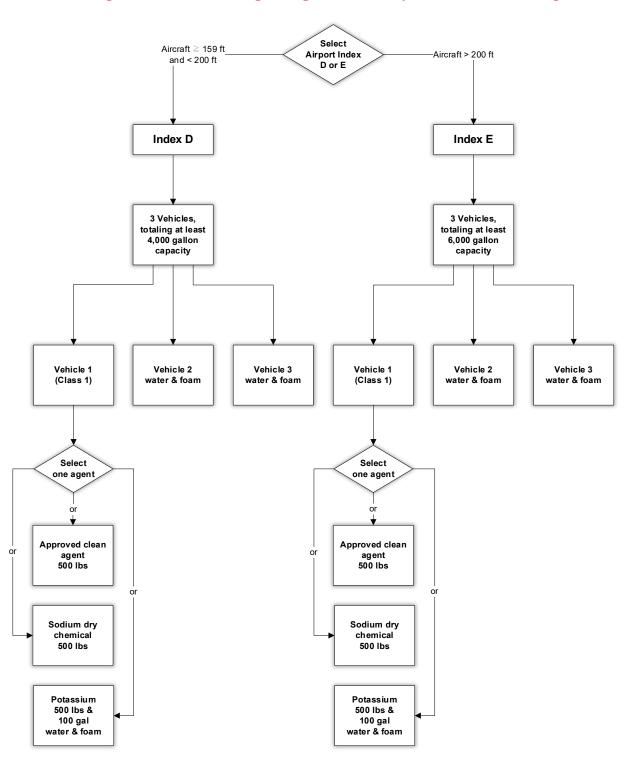


Figure 1-4. Decision Logic Diagram Summary for Index D or E Airports



- There are four (4) basic steps to establish and validate requirements for an ARFF vehicle.
  - 1. **Step 1.** Determine the need to replace an existing vehicle or procure a new vehicle. Refer to paragraph 1.4.
  - 2. **Step 2.** Determine the airport's ARFF index. Consult paragraph <u>1.5</u> of this AC and <u>Part 139.315</u>, Aircraft Rescue and Firefighting: Index Determination.
  - 3. **Step 3.** Determine the fire fighting vehicle agent requirements. Consult paragraph 1.6 of this AC and Part 139.317.
  - 4. **Step 4.** Determine the ARFF vehicle requirements based on Steps (1), (2), and (3) above by consulting paragraph <u>1.7</u> and <u>Chapter 2</u> of this AC which are based on NFPA 414.

#### 1.4 Step 1 – Determining Replacement Need.

Fire departments and manufacturers of fire fighting apparatus do not have hard and fast rules as to when a vehicle is recommended for replacement. However, the fire equipment manufacturing industry does develop, as part of their customer service focus, forecast models based on life expectancy and life cycle operating and maintenance costs. These models predict hours of operation, mileage, material wear and longevity, and operating costs. On average, an ARFF vehicle has a 15-year service life cycle or as maintenance dictates as identified by the FAA Airport Certification Safety Inspector (ACSI) and, in many cases, even longer based on an airport's level of activity. Consider the following items as relevant factors when determining fire fighting vehicle replacement (Note: See AIP Handbook to determine AIP Eligibility):

- 1. Reliability and serviceability are questionable.
- 2. Parts for repair (including after-market) are no longer available.
- 3. Annual operating cost becomes excessive.
- 4. Service life has been extended beyond the vehicle's normal field service life.
- 5. Repair cost exceeds 75% of the current estimated value of a new apparatus. All remanufactured ARFF vehicles must meet the standards of this AC. Remanufactured ARFF vehicles must not exceed 75% of the cost of new manufactured vehicles of the same class with comparable options. Remanufacturing costs that exceed 75% of a new vehicle are not considered best value engineering for federal funding.
- 6. Introduction of different design aircraft to the airport that changes the airport's ARFF index.
- 7. Relative overall age of the airport fire fighting vehicle fleet, to allow for programmed replacement over a span of years.
- 8. Vehicle model design changes that offer a significant increase in safety to the occupants of the vehicle during response.

193	1.5	Step 2 – Determining the Airport's ARFF Index.
194 195 196		An airport's ARFF index is determined by the requirements of <u>Part 139.315</u> . See <u>Part 139.5</u> for definitions of air carrier aircraft, air carrier operations, and average daily departures.
197 198		1. An airport's ARFF index is determined by a combination of two factors. These include:
199		a. The length of air carrier aircraft.
200		b. The average daily departures of air carrier aircraft.
201 202 203 204		<ol> <li>If there are five or more average daily departures of air carrier aircraft in a single Index group serving that airport, the longest Index group with an average of five or more daily departures is the Index required for the airport.</li> </ol>
205 206 207 208		ii. If there are fewer than five average daily departures of air carrier aircraft in a single Index group serving that airport, the next lower Index from the longest Index group with air carrier aircraft in it is the Index required for the airport. The minimum designated index is Index A.
209 210		2. Air carrier aircraft are grouped by length to determine an airport's index as described below:
211		a. Index A includes aircraft less than 90 feet in length.
212		b. Index B includes aircraft at least 90 feet but less than 126 feet in length.
213		c. Index C includes aircraft at least 126 feet but less than 159 feet in length.
214		d. Index D includes aircraft at least 159 feet but less than 200 feet in length.
215		e. Index E includes aircraft at least 200 feet in length.
216 217 218 219		3. See <u>Table 1-1</u> for a general sampling of various aircraft and the indices they are assigned based on their respective lengths. The list is not all inclusive and is provided to serve as an example only. To ensure accuracy, consult with airlines and/or aircraft manufacturers to obtain aircraft lengths.

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Table 1-1. Sample Aircraft Types by Airport Index

Type Aircraft*	Index A	Index B	Index C	Index D	Index E
ATR 72	X				
Beech Kingaire 200	X				
Bombardier CRJ100/200	Х				
Cessna 414	Х				
DeHavilland Dash 8	X				
Gulfstream 3	X				
Lear 55	X				
Piper Cheyenne 2	X				
Airbus A320 300		X			
BAE 146-200		X			
Boeing 737-300		X			
Bombardier CRJ700/900		X			
Embraer 170/175		X			
Embraer 190		X			
Boeing 757			X		
Boeing 737-800			X		
Bombardier CRJ1000			Х		
Embraer 195			X		
MD-88			X		
Airbus A300				X	
Airbus A330-200				Х	
Airbus A350-800				X	
Boeing 767-300				Х	
Boeing 787-8				Х	
Airbus A330-300					X
Airbus A340 300					X
Airbus A350-900					X
Airbus A380					X
Antonov AN-225					X
Boeing 747-200					
Boeing 747-8					Х
Boeing 787-9					X

<sup>\*</sup> Sources: Data has been extracted from NFPA, International Civil Aviation Organization (ICAO), FAA, and aircraft manufacturer documents to validate the aircraft placement into a specific index.

1.6 Step 3 – Determining Agent Requirements.

The minimum levels of fire fighting agents by type and quantity within a vehicle system to support a specific airport index are addressed in <u>Part 139.317</u>. The FAA's standardized ARFF vehicle classifications are Classes 1, 4, and 5. These classifications segregate vehicles by the type of fire fighting agent employed on the vehicle and the vehicle's agent carrying capacity.

#### 1.6.1 <u>Types of Fire Fighting Agents.</u>

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There are four types of fire fighting agents (either as a single agent or in combination with another agent) that are carried on ARFF vehicles. These agents can include:

- 1. Sodium-based dry chemical.
- 2. Potassium-based dry chemical.
- 3. Approved clean agents.
- 4. Water/foam.

Each ARFF vehicle is designed to be capable of carrying and delivering the specific types of fire fighting agents cited above either as a standalone system or complementary to one another. The types of agents are based on their respective extinguishing effectiveness and compatibility to complement each other, hence the term "complementary agent." NFPA refers to an "auxiliary agent." This term has the same meaning as "complementary agent" used herein.

**Table 1-2. Fire Fighting Extinguishing Agent Minimum Capacities** 

Airport	Vehicle	Minimum Rated Capacities Options		
Index	Class	Primary Agent	Complementary Agent	
A, B, C, D, E	1	500 lbs sodium-based dry chemical only	None	
A, B, C, D, E	1	100 gallons of water/foam	500 lbs potassium-based dry chemical	
A, B, C, D, E	1	100 gallons of water/foam	500 lbs approved clean agent	
A, B, C, D, E	1	100 gallons of water/foam with supplemental Compressed Air Foam System (CAFS)	500 lbs sodium-based dry chemical	
A, B, C, D, E	1	100 gallons of water/foam with supplemental CAFS	500 lbs potassium-based dry chemical	
A, B, C, D, E	1	100 gallons of water/foam with supplemental CAFS	500 lbs approved clean agent	
В	4	1500 gallons water/foam	500 lbs sodium-based dry chemical	
В	4	1500 gallons water/foam	500 lbs approved clean agent	
B, C, D, E	4	1500 gallons water/foam	500 lbs potassium-based dry chemical	
C, D, E	5	3000 gallons water/foam	500 lbs sodium-based dry chemical	
C, D, E	5	3000 gallons water/foam	500 lbs potassium-based dry chemical	
C, D, E	5	3000 gallons water/foam	500 lbs approved clean agent	
D, E	5	4500 gallons water/foam	500 lbs sodium-based dry chemical	
D, E	5	4500 gallons water/foam	500 lbs potassium-based dry chemical	
D, E	5	4500 gallons water/foam	500 lbs approved clean agent	

# 1.6.2 <u>Vehicle Agent Carrying Capacity.</u>

The agent carrying and delivery capability of an ARFF vehicle is limited by several factors. These include chassis design, engine and drive train, axle capacity, fire fighting

systems, and the manufacturer's capability to provide either a commercial or custom produced ARFF vehicle. Refer to <u>Table 1-3</u> for summaries of the three classes of ARFF vehicles and the fire fighting agent requirements for each class of vehicle.

Table 1-3. Airport Index and Vehicle Class Requirements

	Class 1	Class 4	Class 5
	100 Gallon Water/Foam	1500 Gallon Water/Foam	3000-4500 Gallon Water/Foam
	and Dry Chemical (500 lbs sodium- or 500 lbs potassium-based), or Approved Clean Agent (500 lbs)		
Airport Index	(Note 1)		(Note 1)
A	1	N/A	N/A
В	1	1 (Note 2)	N/A
	1	2	N/A
С	1	1	1 (3,000 Gallon)
D	1	1	1
E	1	N/A	2
E	1	1	1

**Note 1:** For Index A-E, a Class 1 vehicle is required (see Note 2 for exception).

Note 2: If the Class 4 vehicle has Dry Chemical/Approved Clean Agent, a Class 1 vehicle is not required for an Index B Airport. If the Class 4/5 vehicle does not have Dry Chemical/Approved Clean Agent, a Class 1 vehicle is required.

#### 1.7 Step 4 – Determining Vehicle Requirements.

These specifications incorporate NFPA 414, with additions, exceptions, and amendments cross referenced to the paragraph numbers in NFPA 414, Chapter 4, ARFF Vehicles and Chapter 6, Acceptance Criteria. Incorporated by reference are requirements of NFPA 1901 where applicable. Optional equipment cited in Annex A of NFPA 414 is not covered by these specifications except where noted. For ancillary equipment, see <u>AC 150/5210-14</u>, *Aircraft Rescue Fire Fighting Equipment, Tools and Clothing*. The three specifications aligned to the three vehicle classifications are generic in nature, describe vehicles' performance requirements and are not name brand product specific. Each contains a series of interactive worksheets, developed to be used on ©Microsoft Windows operating systems, that allows the user to select requirements

that populate the procurement specifications based on those choices. The three specifications are as follows:

#### 267 1.7.1 Class 1 ARFF Vehicle.

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This Procurement Specification covers a commercially produced 4-wheel drive, diesel engine driven ARFF vehicle for an Index A through E airport. It includes the choice of a vehicle with a minimum 500 pounds (lbs) sodium based dry chemical system, or a 500 lb approved clean agent system, or a 500 lbs potassium-based dry chemical system with 100 gallons (gal) of water/foam. The water/foam may be pre-mixed and contained in one pressurized tank or supplemented with a CAFS.

#### 274 1.7.2 Class 4 ARFF Vehicle.

This Procurement Specification covers a commercially produced diesel engine driven ARFF vehicle for an Index B, C, or D airport. It includes a 1500-gallon water/foam fire suppression system:

- 1. with a complementary 500 potassium-based or 500 lb sodium-based Dry Chemical system only,
- 2. with a complementary 500 lb Approved Clean Agent system only,

#### 281 1.7.3 Class 5 ARFF Vehicle.

This Procurement Specification covers a commercially produced diesel engine driven ARFF vehicle for an Index D or E airport. It includes a 3000 or 4500-gallon water/foam fire suppression system:

- 1. with a complementary 500 lb Dry Chemical system only,
- 2. with a complementary 500 lb Approved Clean Agent system only.

#### 287 1.7.4 Relation to NFPA Usable Capacities.

- Performance requirements for Class 1 vehicles follow the NFPA 414 performance requirements for ≥120 and ≤528 gallons.
- Performance requirements for Class 4 vehicles follow the NFPA 414 performance requirements for >528 and ≤1585 gallons.
- Performance requirements for Class 5 vehicles follow the NFPA 414 performance requirements for >1585 gallons.

**Table 1-4. Usable Capacities** 

	Water or Water/Foam Solution	Dry Chemical or Clean Agent
Class of Vehicle	Gallons (U.S.)	Pounds
1	100	500 (Sodium Based) 500 (Potassium Based) 500 (Clean Agent)
4	1,500	See Part 139.317
5	3,000 to 4,500 in 500-gallon increments	See <u>Part 139.317</u>

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# **Chapter 2. INTERACTIVE PROCUREMENT SPECIFICATION - INPUT**

#### 2.1 General.

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Interactive worksheets in this chapter are designed to allow the users to select options and provide inputs to procurement specifications based on their requirements. Chapter 3 contains specifications for Class 1, 4, and 5 ARFF vehicles. The corresponding specification will be populated automatically based on the worksheet item selections and inputs. For example, the worksheets in paragraph 2.2 populate the Class 1 specification. The document has been aligned to the performance requirements of NFPA 414 and incorporates amended criteria. Specifically, all the options that are allowed by the FAA are included. The numbering system listed in this section directly corresponds to Chapter 4 in the NFPA 414 2020 edition. To properly use this document, first refer to NFPA 414 for the base requirements, then refer to this advisory circular for any additions, exceptions, amendments or selections. When an option requires justification for funding under federal financial assistance programs, rationale must be provided by the user for the FAA Airports Regional or District Office review and approval. This document will serve as the baseline for submission of specifications for AIP and PFC funded vehicles – thus it is a specification for a commercially available vehicle without extraneous items that an airport may fund on its own. Extraneous items requested by an airport cannot be used in determining the low responsive bidder when AIP or PFC funding is used. Follow the process in Figure 2-1 to produce the required specifications. FAA submittal pages follow each specification.

**Note:** Commercially manufactured chassis used to manufacture Class 1 vehicles must comply with Federal Motor Vehicle Safety Standards (FMVSS). If the AC and FMVSS differ, the more demanding applies.

#### Figure 2-1. Specification Completion Process

Class 1 →	Worksheets	→ Review <u>Class 1 Specification</u> □	Print Class 1 Specification
Class 4 →	Worksheets	$\rightarrow$ Review <u>Class 4 Specification</u> $\square$	<b>Print Class 4 Specification</b>
Class $5 \rightarrow$	Worksheets	→ Review Class 5 Specification □	Print Class 5 Specification
			No printing at this time

For more information on the development and use of the equipment, agents, and technologies discussed in the following pages, visit the <u>FAA Airport Technology</u> <u>Research and Development Branch Home Page</u>, where detailed technical reports (i.e. Technical Notes) can be found in the <u>Aircraft Rescue and Fire Fighting Technology</u> section.

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#### **Airport Requirements Worksheet: Class 1** 2.2

Select one in each ca	Select one in each category and enter requested information				
Airport name:					
Airport POC:					
Airport Code Identifier:					
Airport address:					
Phone number:					
Grant number:					
Airport index	O A O B O C O D O E				
Primary extinguishing agent	<ul> <li>500 lb sodium-based dry chemical</li> <li>500 lb potassium-based dry chemical</li> <li>500 lb approved clean agent</li> <li>water/foam (100 gal)</li> </ul>				
Complementary extinguishing agent system	<ul> <li>500 lb sodium-based dry chemical</li> <li>500 lb potassium-based dry chemical</li> <li>500 lb approved clean agent</li> <li>none</li> </ul>				
Primary extinguishing agent discharge location	O bumper turret O roof turret O hose reel O bumper turret and hose reel				
Complementary extinguishing agent discharge location	O bumper turret O hose reel O bumper turret and hose reel O roof turret and hose reel O none				
Water/foam discharge system	O pressurized pre-mix O pressurized pre-mix plus supplemental CAFS O none				
If foam is provided, specify percent concentrate	O 3% O 6%				

Select one in each ca	Select one in each category and enter requested information				
Primary Turret Nozzle	<ul> <li>a water/foam discharge</li> <li>a complementary agent discharge mounted parallel to the water/foam discharge</li> <li>a complementary agent discharge of the entrainment type</li> <li>an approved clean agent</li> </ul>				
Hose Reel Nozzle	<ul> <li>a water/foam discharge</li> <li>a complementary agent discharge mounted parallel to the water/foam discharge</li> <li>a complementary agent discharge of the entrainment type</li> <li>an approved clean agent</li> <li>none</li> </ul>				
Cab doors	O 2 doors O 4 doors				
Cab doors lockable	O yes O no				
Compartment doors lockable	O yes O no				
Turret power	<ul> <li>manual</li> <li>power assisted with manual override</li> <li>power assisted with secondary parallel controls powered by an alternative source</li> <li>power assisted without secondary control</li> </ul>				

Standard/Specialized Equipment Requirements Worksheet

Standard Requirements	Specialized Requirements		Selection	Justification
Elevation less than 2,000 feet	Is elevation 2,000 feet or more?	00	Yes No	Enter actual elevation if over 2,000 feet: feet
Equipment capable of operating at -40° to 110°F	Is standard temperature range equipment adequate?	00	Yes over 110°F	
Tire size	Large tires	00	Yes No	
Radiator shutters	Are radiator shutters required?	0	Yes No	

	Select one:
Runway Incursion Warning Systems (RIWS)	O Yes O No
See <u>AC 150/5210-25</u> for guidance on RIWS options.	If RIWS is required, provide the following information:
Power source	Select all that apply:  O direct hardwire power connection O 12V quick plug-in O battery
System type	O preconfigured system O custom system
	If a custom RIWS system is required, provide the following information:
Check all options that apply	<ul><li>☐ custom areas</li><li>☐ additional/custom audible signals</li><li>☐ additional/custom visual signals</li></ul>
Additional features requiring justification. Check all that apply.	<ul> <li> historical tracking and vehicle trails</li> <li> zone creation</li> <li> network capability</li> <li> multiple-vehicle tracking</li> <li> document display</li> <li> system integration with:</li> <li> FOD detection equipment</li> <li> ADS-B</li> <li> ASDE-X</li> <li> DEVS</li> <li> multilateration and Airport Surface Surveillance Capability (ASSC)</li> <li> airfield maintenance and inspection programs</li> </ul>
Justification for additional RIWS features	

Select applicable subsystem(s)		Select applicable related features		
DEVS Options	☐ Low-Visibility Enhanced Vision subsystem	Driver's Enhanced Vision System (DEVS) base system		
	☐ Add navigation subsystem	If navigation subsystem is chosen, check all that apply:  □ integrated airport grid map □ incident location □ routing □ navigation support □ staging areas/scenario planning □ drawing tools □ user defined zones, routes, and areas □ CAD layers □ vehicle radio frequency (RF) data link		
	☐ Add tracking subsystem	If tracking subsystem is chosen, select message exchange time: O Enter value seconds		

**Vehicle Space Requirements Worksheet** 

Minimur requireme		Facility dimensions sufficient for fully loaded vehicle with turrets bedded?	For insufficient dimensions, enter minimum requirement:
Length	360 inches	O Yes O No	inches
Width, including mirrors	100 inches	O Yes O No	inches
Height	120 inches	O Yes O No	inches

Standard requirements	Specialized requirements	Selection / Details		
	Driver	0	Standard (hard/fixed back)	
Seat Type/ Self- Contained Breathing Apparatus (SCBA)	Turret	00	Standard (hard/fixed back) SCBA	
	#3	000	Standard (hard/fixed back) SCBA N/A	
	#4	0	Standard (hard/fixed back)	

Standard requirements	Specialized requirements		Selection / Details
		00	SCBA N/A
Self-Contained Breathing	Enter SCBA equipment manufacturer name and model number:		2216 psi 4500 psi
Apparatus (SCBA) mounting type			30-minute bottles 60-minute bottles
Mirrors	Electrically heated heads	00	Yes No
Towing Device	Туре	00	Pintle Hook Ball Mount
Emergency warning lights	Lighting type (LED)	00	rotating beacon strobe
MADAS	Monitoring and Data Acquisition System (MADAS) capability	00	Yes No
Windows	Control system	00	electric manual
Floodlights	Style to include adjustment knuckle	00	fixed telescoping
Spot, flood, and scene lights	Lighting type	000	halogen LED HID
Additional wiring (power, control,	Any that would require partial dismantling of vehicle components (e.g., cab headliner) if added after delivery.		
antenna)	Specify antennas, wire types and location of antennas and wire terminations.		
Lubrication system	Continuous duty cycle for suspension parts and other mechanical equipment joints.	00	Yes No

Provisions for storing/mounting the following equipment [quantity]:					
Only the storing/mounting will be provided by the vehicle manufacturer, not the equipment. When specifying					
provisions for storing/mounting, be mindful of the total					
	□ rope, 100 ft - 5/8" diameter				
[1]	[2]20B:C fire extinguishers: 0 1 0 2				
☐ Halligan bar – 36" [1]	☐ 30 lb Class D fire extinguisher [1]				
□ axe, flat head, fiberglass handle – 36"	☐ skin penetrator (piercing applicator)				
with mounting bracket [1]	for water or foam application,				
☐ 36" crowbar [1]	including carry case, applicator and				
□ cutter, cable [1]: ○ 24" ○ 36"	air cylinder (only if vehicle is not				
□ hacksaw, 12" [1]	equipped with a boom-mounted turret)				
□ hammer, 1¼ lb (maul) [1]	[1]				
☐ hammer, 16 oz, non-sparking [1]	□ powered firefighting hydraulic rescue				
□ hammer, sledge, 8 lb with fiberglass	tool equipped with cutter, spreader				
handle [1]	and rams [1 per station]				
☐ knife, rescue [1]	☐ heavy duty canvas hydrant bag [1]				
☐ V-blade (harness cutting tool) [2]	☐ gate valve labeled open/closed 2½" [2]				
□ pliers, side cutting, 7" [1]	☐ female gated reducing wye, 2½"				
☐ adjustable wrench, 8" [1]	female connection x (2) 1½" male				
□ locking pliers, 10" [1]	connections [1]				
□ plug, fuel line [6]	□ adjustable hydrant wrench [1]				
☐ 6 screw drivers [1 set]	☐ 2½" spanner wrenches w/bracket [2]				
☐ shears, sheet metal [1]	☐ 1" spanner wrenches w/ bracket [2]				
☐ tool bag to carry all hand tools (cutter	☐ LDH spanner wrenches w/ mounting				
through shears, above) [1]	bracket [0]				
□ blanket, fire resistant with storage	□ reducer, non-swivel – 2½" to 1½" [2]				
pouch [1]	□ double female coupling – 1½" [1]				
☐ wheel chocks – one set with mounting	□ double female coupling – 2½" [1]				
brackets [1]	□ double male coupling – 1½" [1]				
□ ladder, ≤ 24 ft overall length with	□ double male coupling – 2½" [1]				
mounting brackets [1]: ft	☐ large diameter hose (rubber /				
O extension O "A-frame"	synthetic) 25 ft [0], diameter:				
☐ rechargeable flashlights chargers to	O 4½" O larger: inch				
be mounted in cab wired into vehicle	☐ 50 ft rubber / synthetic hose, NST [6],				
electrical system for charging [2]	diameter: O 2½" O 3"				
□ pike pole, 8 ft [2]	☐ 1½" hand line nozzle [2]				
☐ pike pole with 4 ft "D" handle [1]	☐ digital refractometer [1 per station]				
☐ rescue kit, pneumatic air hammer /	☐ foam tank drum wrench tool				
chisel standard duty type, complete	[1 per station]				
with spare air cylinder, carrying case	☐ 5 gallon pail wrench [1 per station]				
and various tips [1]	☐ full spine board, 6 ft [1]				
☐ rescue saw with spare blades	☐ 18" gasoline powered fan				
[1 per station]	[1 per station]				
O 14" for A, B, C airports	☐ ARFF vehicle medical jump kit [1]				
O 16" for D, E airports					
	☐ Select none				

	Provisions for storing/mounting all Personal Protection Equipment (PPE), to be part of a matching ensemble that meets current NFPA 1971 standards:							
On	Only the storing/mounting will be provided by the vehicle manufacturer, not the equipment. When specifying provisions for storing/mounting, be mindful of the total space available; not all items will fit on one truck.							
	(	C	1	0	2	0	3	set(s) of aluminized proximity protection suit, including coat, trousers, and gloves
		C	1	0	2	0	3	pair(s) ARFF boots
		0	1	0	2	0	3	complete SCBA including 30-minute bottle, face piece and PASS device
		C	1	0	2	0	3	Nomex hood(s)
0	0	0	1	0	2	0	3	structural-style helmet(s)

Any features not provided for in the standard specification will require FAA approval of a Modification to Standards prior to work being done. Enter any additional features desired, along with justification, on the Modification to Standards page for <u>Class 1</u>.

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# 332 2.3 Airport Requirements Worksheet: Class 4

Select one in each of	ategory and enter requested information
Airport name:	
Airport POC:	
Airport Code Identifier:	
Airport address:	
Phone number:	
Grant number:	
Airport index	O B O C O D O E
Primary extinguishing agent	1500 gallons water/foam
Complementary extinguishing agent system	<ul> <li>500 lb sodium-based dry chemical</li> <li>500 lb potassium-based dry chemical</li> <li>500 lb Approved Clean agent only complementary agent system</li> </ul>
Roof turret type	<ul> <li>Single agent turret</li> <li>Dual agent turret</li> <li>Boom-mounted turret (capable of penetrating all aircraft except the second level of an aircraft with two passenger levels)</li> <li>no roof turret</li> </ul>
Bumper turret type	<ul> <li>Single agent turret</li> <li>Dual agent turret</li> <li>fixed mount low volume single rate (minimum 250 GPM) bumper turret.</li> <li>fixed mount high volume dual rate (minimum 375/750 GPM) bumper turret.</li> <li>low angle high volume dual rate (minimum 375/750 GPM) bumper turret.</li> <li>no bumper turret.</li> </ul>

Select one in each category and enter requested information			
Structural fire fighting capability *	O Yes O No		
Auxiliary generator (kilowatts)	O 10kW O 8kW		

**Note:** \* This option provides for a 'limited' structural fire fighting capability, in that an operator's panel is provided outside of the vehicle for the purpose of engaging and disengaging the fire pump, monitoring pressures, engine RPM, flow rates, controlling water distribution, and the installation of additional suction inlets (including a priming capability for drafting from a body of water or other source) and discharge outlets on the vehicle.

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\* Complementary System Options Worksheet

·	Options:					
Primary Turret Discharge Nozzle	<ul> <li>parallel to the foam solution discharge on the primary turret mounted on the cab roof.</li> <li>a combination dry chemical/ foam nozzle of the entrainment type on the primary turret mounted on the cab roof.</li> <li>a complementary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the front bumper.</li> <li>a combination dry chemical/ foam nozzle of the entrainment type on the primary turret mounted on the front bumper.</li> <li>a clean agent only discharge on the primary turret mounted on the cab roof/penetrating nozzle (extendable boom only).</li> </ul>					
Handline Type	<ul> <li>O dry chemical - 150 feet of 1-inch dry chemical hose on a reel</li> <li>O dual agent - 100 feet of twinned 1-inch dry chemical/ foam-water hose on a reel</li> <li>O clean agent - 150 feet of 1-inch clean agent hose on a reel</li> <li>O none</li> </ul>					
Cab doors lockable	O yes O no					
Compartment doors lockable	O yes O no					

Standard/Specialized Equipment Requirements Worksheet

Standard Requirements	Specialized Requirements		Selection	Justification Statement (limit 1000 characters)
Elevation less than 2,000 feet	Is elevation 2,000 feet or more?	00	Yes No	
Equipment capable of operating at 40° to 110°F	Is standard temperature range equipment adequate?	00	Yes over 110°F	
Tires and wheels	Tire bead locks	00	Yes No	
Tire size	Large tires	00	Yes No	
Additional Seats	Non-suspension type	0 000	none (2 front- row seats only) 3 <sup>rd</sup> (left side) 3 <sup>rd</sup> (right side) 3 <sup>rd</sup> and 4 <sup>th</sup>	

	Select one:
Runway Incursion Warning Systems (RIWS)	O Yes O No
See <u>AC 150/5210-25</u> for guidance on RIWS options.	If RIWS is required, provide the following information:
Power source	Select all that apply:  O direct hardwire power connection O 12V quick plug-in O battery
System type	O preconfigured system O custom system
	If a custom RIWS system is required, provide the following information:
Check all options that apply	<ul><li>☐ custom areas</li><li>☐ additional/custom audible signals</li><li>☐ additional/custom visual signals</li></ul>
Additional features requiring justification. Check all that apply.	<ul> <li> historical tracking and vehicle trails</li> <li> zone creation</li> <li> network capability</li> <li> multiple-vehicle tracking</li> <li> document display</li> <li> system integration with:</li> <li> FOD detection equipment</li> <li> ADS-B</li> <li> ASDE-X</li> <li> DEVS</li> <li> multilateration and Airport Surface</li> <li> Surveillance Capability (ASSC)</li> <li> airfield maintenance and inspection programs</li> </ul>
Justification for additional RIWS features	

Select app	licable subsystem(s)	Select applicable related features
	☐ Low-Visibility Enhanced Vision subsystem	Driver's Enhanced Vision System (DEVS) base system
Options	☐ Add navigation subsystem	If navigation subsystem is chosen, check all that apply:  integrated airport grid map incident location routing navigation support staging areas/scenario planning drawing tools user defined zones, routes, and areas CAD layers vehicle radio frequency (RF) data link
	☐ Add tracking subsystem	If tracking subsystem is chosen, select message exchange time:  O Other (enter value) seconds

**Vehicle Space Requirements Worksheet** 

M <mark>in</mark> im Requirer			Facility Dimensions Sufficient for fully loaded vehicle with turrets bedded?	For insufficient dimensions, enter minimum requirement:
Length	433 inches	0	Yes No	inches
Width, including mirrors	124 inches	00	Yes No	inches
Height	154 inches	00	Yes No	inches

Standard Requirements	Specialized Requirements	Selection	
Seat Type/ Self- Contained Breathing Apparatus (SCBA)	Driver	O Standard (hard/fixed back) O SCBA	
	Turret	O Standard (hard/fixed back) O SCBA	
	#3	O Standard (hard/fixed back) O SCBA O N/A	
	#4	O Standard (hard/fixed back) O SCBA O N/A	
	Enter SCBA equipment manufacturer name and model number:	O 2216 psi O 4500 psi	
		O 30-minute bottles O 60-minute bottles	
Mirrors	Electrically heated heads	O Yes O No	
Back-up Camera	with Monitor	O Yes O No	
Emergency warning lights	Lighting type (LED)	O rotating beacon O strobe	
MADAS	Monitoring and Data Acquisition System (MADAS) capability	O Yes O No	
Electrical Cable	Cord reel	O Yes O No	
Air Systems	Hose reel	O Yes O No	
Windows	Control system	O electric O manual	

Standard Requirements	Specialized Requirements	Selection
Floodlights	Style to include adjustment knuckle	O Fixed O Telescoping
Spot, flood, and scene lights	Lighting type	O Halogen O LED O HID
Additional wiring (power, control, antenna)	Any that would require partial dismantling of vehicle components (e.g., cab headliner) if added after delivery.  Specify antennas, wire types and location of	
Lubrication system	antennas and wire terminations.  Continuous duty cycle for suspension parts and other mechanical equipment	O Yes
System	joints.	O 140

Provisions for storing/mounting the following equipment [quantity]:			
	cle manufacturer, not the equipment. When specifying		
provisions for storing/mounting, be mindful of the total	space available; not all items will fit on one truck.		
☐ 36" axe, pick head, fiberglass handle	□ rope, 100 ft - 5/8" diameter		
[1]	[2]20B:C fire extinguishers: O 1 O 2		
☐ Halligan bar – 36" [1]	☐ 30 lb Class D fire extinguisher [1]		
□ axe, flat head, fiberglass handle – 36"	☐ skin penetrator (piercing applicator)		
with mounting bracket [1]	for water or foam application,		
☐ 36" crowbar [1]	including carry case, applicator and		
□ cutter, cable [1]: ○ 24" ○ 36"	air cylinder (only if vehicle is not		
☐ hacksaw, 12" [1]	equipped with a boom-mounted turret)		
☐ hammer, 1¼ lb (maul) [1]	[1]		
☐ hammer, 16 oz, non-sparking [1]	□ powered firefighting hydraulic rescue		
□ hammer, sledge, 8 lb with fiberglass	tool equipped with cutter, spreader		
handle [1]	and rams [1 per station]		
☐ knife, rescue [1]	☐ heavy duty canvas hydrant bag [1]		
☐ V-blade (harness cutting tool) [2]	☐ gate valve labeled open/closed 2½" [2]		
☐ pliers, side cutting, 7" [1]	☐ female gated reducing wye, 2½"		
□ adjustable wrench, 8" [1]	female connection x (2) 1½" male		
□ locking pliers, 10" [1]	connections [1]		
□ plug, fuel line [6]	□ adjustable hydrant wrench [1]		
☐ 6 screw drivers [1 set]	☐ 2½" spanner wrenches w/bracket [2]		
☐ shears, sheet metal [1]	☐ 1" spanner wrenches w/ bracket [2]		
☐ tool bag to carry all hand tools (cutter	☐ LDH spanner wrenches w/ mounting		
through shears, above) [1]	bracket [0]		
☐ blanket, fire resistant with storage	☐ reducer, non-swivel – 2½" to 1½" [2]		
pouch [1]	□ double female coupling – 1½" [1]		
□ wheel chocks – one set with mounting	□ double female coupling – 2½" [1]		
brackets [1]	□ double male coupling – 1½" [1]		
☐ ladder, ≤ 24 ft overall length with	☐ double male coupling – 2½" [1]		
mounting brackets [1]: ft	☐ large diameter hose (rubber /		
O extension O "A-frame"	synthetic) 25 ft [0], diameter:		
☐ rechargeable flashlights chargers to	O 4½" O larger: inch		
be mounted in cab wired into vehicle	☐ 50 ft rubber / synthetic hose, NST [6],		
electrical system for charging [2]	diameter: O 2½" O 3"		
□ pike pole, 8 ft [2]	□ 1½" hand line nozzle [2]		
□ pike pole with 4 ft "D" handle [1]	☐ digital refractometer [1 per station]		
☐ rescue kit, pneumatic air hammer /	☐ foam tank drum wrench tool		
chisel standard duty type, complete	[1 per station]		
with spare air cylinder, carrying case	☐ 5 gal pail wrench [1 per station]		
and various tips [1]	☐ full spine board, 6 ft [1]		
☐ 16" rescue saw with spare blades	☐ 18" gasoline powered fan		
[1 per station]	[1 per station]		
O 14" for A, B, C airports	☐ ARFF vehicle medical jump kit [1]		
O 16" for D, E airports	, , , , ,		
,	☐ Select none		

	Provisions for storing/mounting all Personal Protection Equipment (PPE), to be part of a matching ensemble that meets current NFPA 1971 standards:					
Only th	e storing/mou	ınting will be ı	provided by t	the vehicle manufacturer, not the equipment. When specifying the total space available; not all items will fit on one truck.		
	0 1	O 2	O 3	set(s) of aluminized proximity protection suit, including coat, trousers, and gloves		
	0 1	0 2	03	pair(s) ARFF boots		
	0 1	O 2	0 3	complete SCBA including 30-minute bottle, face piece and PASS device		
	0 1	O 2	O 3	Nomex hood(s)		
0 0	0 1	O 2	O 3	structural-style helmet(s)		

Any features not provided for in the standard specification will require FAA approval of a Modification to Standards prior to work being done. Enter any additional features desired along with justification on the Modification to Standards page for <u>Class 4</u>.

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Return to Class 4 worksheet page 1	
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# 344 2.4 Airport Requirements Worksheet: Class 5

Select one in each category and enter requested information					
Airport name:					
Airport POC:					
Airport Code Identifier:					
Airport address:					
Phone number:					
Grant number:					
Airport index	O D O E				
Primary extinguishing agent	O 3000 gallons water/foam O 4500 gallons water/foam				
Complementary extinguishing agent system	<ul> <li>500 lb sodium-based dry chemical.</li> <li>500 lb potassium-based dry chemical</li> <li>500 lb approved clean agent</li> </ul>				
Roof turret type	<ul> <li>Standard turret</li> <li>boom-mounted turret (capable of penetrating all aircraft except the second level of an aircraft with two passenger levels)</li> <li>boom-mounted turret (capable of penetrating the second level of an aircraft with two passenger levels), see note below *</li> <li>no roof turret</li> </ul>				
Bumper turret type	<ul> <li>Single agent turret</li> <li>Dual agent turret</li> <li>fixed mount low volume single rate (minimum 250 GPM) bumper turret.</li> <li>fixed mount high volume dual rate (minimum 600/1200 GPM) bumper turret.</li> <li>low angle high volume dual rate (minimum 600/1200 GPM) bumper turret.</li> <li>no bumper turret.</li> </ul>				

Select one in each category and enter requested information				
Structural fire fighting capability **	O Yes O No			
Auxiliary generator (kilowatts)	O 10kW O 8kW			

**Note:** \* This option only allowed for vehicles used on airports airplanes with two passenger levels operate **Note:** \*\* This option provides for a 'limited' structural fire fighting capability, in that an operator's panel is provided outside of the vehicle for the purpose of engaging and disengaging the fire pump, monitoring pressures, engine RPM, flow rates, controlling water distribution, and the installation of additional suction inlets (including a priming capability for drafting from a body of water or other source) and discharge outlets on the vehicle.

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\* Complementary System Options Worksheet

Options:					
Primary Turret Discharge Nozzle	<ul> <li>a complementary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the cab roof.</li> <li>a combination dry chemical/ foam nozzle of the entrainment type on the primary turret mounted on the cab roof.</li> <li>a complementary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the front bumper.</li> <li>a combination dry chemical/ foam nozzle of the entrainment type on the primary turret mounted on the front bumper.</li> <li>a clean agent only discharge on the primary turret mounted on the cab roof/penetrating nozzle (extendable boom only).</li> </ul>				
Handline Type	<ul> <li>dry chemical - 150 feet of 1-inch dry chemical hose on a reel</li> <li>dual agent - 100 feet of twinned 1-inch dry chemical / foam-water hose on a reel</li> <li>clean agent - 150 feet of 1-inch clean agent hose on a reel</li> <li>none</li> </ul>				
Cab doors lockable	O yes O no				
Compartment doors lockable	O yes O no				

351 Standard/Specialized Equipment Requirements Worksheet

Standard Requirements	Specialized Requirements		Selection	Justification Statement (limit 1000 characters)
Elevation less than 2,000 feet	Is elevation 2,000 feet or more?	00	Yes No	
Equipment capable of operating at 40° to 110°F	Is standard temperature range equipment adequate?	00	Yes over 110°F	
Tires and wheels	Tire bead locks	00	Yes No	
Tire size	Large tires	00	Yes No	
Additional Seats	Non-suspension type	0 000	none (2 front- row seats only) 3 <sup>rd</sup> (left side) 3 <sup>rd</sup> (right side) 3 <sup>rd</sup> and 4 <sup>th</sup>	

	Select one:
Runway Incursion Warning Systems (RIWS)	O Yes O No
See <u>AC 150/5210-25</u> for guidance on RIWS options.	If RIWS is required, provide the following information:
Power source	Select all that apply:  O direct hardwire power connection O 12V quick plug-in O battery
System type	O preconfigured system O custom system
	If a custom RIWS system is required, provide the following information:
Check all options that apply	<ul><li>☐ custom areas</li><li>☐ additional/custom audible signals</li><li>☐ additional/custom visual signals</li></ul>
Additional features requiring justification. Check all that apply.	<ul> <li> historical tracking and vehicle trails</li> <li> zone creation</li> <li> network capability</li> <li> multiple-vehicle tracking</li> <li> document display</li> <li> system integration with:</li> <li> FOD detection equipment</li> <li> ADS-B</li> <li> ASDE-X</li> <li> DEVS</li> <li> multilateration and Airport Surface Surveillance Capability (ASSC)</li> <li> airfield maintenance and inspection programs</li> </ul>
Justification for additional RIWS features	

Select app	licable subsystem(s)	Select applicable related features
DEVS Options	☐ Low-Visibility Enhanced Vision subsystem	Driver's Enhanced Vision System (DEVS) base system
	☐ Add navigation subsystem	If navigation subsystem is chosen, check all that apply:  □ integrated airport grid map □ incident location □ routing □ navigation support □ staging areas/scenario planning □ drawing tools □ user defined zones, routes, and areas □ CAD layers □ vehicle radio frequency (RF) data link
	☐ Add tracking subsystem	If tracking subsystem is chosen, select message exchange time:  O Other (enter value) seconds

**Vehicle Space Requirements Worksheet** 

M <mark>in</mark> imum Requirements		Facility Dimensions Sufficient for fully loaded vehicle with turrets bedded?		For insufficient dimensions, enter minimum vehicle length, width, and height:
Length	480 inches (for 3000 gal) 540 inches (for 4500 gal)	00	Yes No	inches
Width, including mirrors	124	0	Yes No	inches
Height	154	00	Yes No	inches

Standard Requirements	Specialized Requirements	Selection / Details
Seat Type/ Self- Contained	Driver	O Standard (hard/fixed back) O SCBA
Breathing Apparatus (SCBA)	Turret	O Standard (hard/fixed back) O SCBA

Standard Requirements	Specialized Requirements	Selection / Details
	#3	O Standard (hard/fixed back) O SCBA O N/A
	#4	O Standard (hard/fixed back) O SCBA O N/A
Self-Contained Breathing	Enter SCBA equipment manufacturer name and	O 2216 psi O 4500 psi
Apparatus (SCBA) mounting type	model number:	O 30-minute bottles O 60-minute bottles
Mirrors	Electrically heated heads	O Yes O No
Back-up Camera	With monitor	O Yes O No
Emergency warning lights	Lighting type (LED)	O rotating beacon O strobe
MADAS	Monitoring and Data Acquisition System (MADAS) capability	O Yes O No
Electrical Cable	Cord reel	O Yes O No
Air Systems	Hose reel	O Yes O No
Foam tank fill connections	Number of connections	<ul><li>1-Standard (left side)</li><li>1-Standard (right side)</li><li>Dual (both sides)</li></ul>
Windows	Control system	O electric O manual
Floodlights	Style to include adjustment knuckle	O Fixed O Telescoping

Standard Requirements	Specialized Requirements	Selection / Details
Spot, flood, and scene lights	Lighting type	O halogen O LED O HID
Additional wiring (power, control, antenna)	Any requiring partial dismantling of vehicle components (e.g., cab headliner) if added after delivery.  Specify antennas, wire types and location of antennas and wire terminations.	
Lubrication system	Continuous duty cycle for suspension parts and other mechanical equipment joints.	O Yes O No

Pr	ovis	ions for st	toring/moເ	inting all	Personal Protection Equipment (PPE), to be
					eets current NFPA 1971 standards:
					he vehicle manufacturer, not the equipment. When specifying
pro	visior	is for storing	/mounting, be	e mindful of t	he total space available; not all items will fit on one truck.
		0 1	O 2	O 3	set(s) of aluminized proximity protection suit,
					including coat, trousers, and gloves
		0 1	O 2	O 3	pair(s) ARFF boots
		0 1	O 2	O 3	complete SCBA including 30-minute bottle,
					face piece and PASS device
		0 1	O 2	O 3	Nomex hood(s)
0	0	0 1	O 2	0 3	structural-style helmet(s)

Any features not provided for in the standard specification will require FAA approval of a Modification to Standards prior to work being done. Enter any additional features desired along with justification on the Modification to Standards page for <u>Class 5</u>.

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357		Chapter 3. INTERACTIVE PROCUREMENT SPECIFICATION – OUTPUT
358	3.1	Vehicle Procurement Specification, Class 1
359		PROCUREMENT SPECIFICATION
360		Class 1
361		Aircraft Rescue and Fire Fighting (ARFF) Vehicle
362 363 364	I	<b>Scope.</b> This Procurement Specification covers a commercially produced 4-wheel drive, diesel engine driven ARFF vehicle with a minimum:
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368 369 370 371		It incorporates the delivery of combined and/or single fire fighting agents through handlines, hose reels and/or a bumper mounted turret. The ARFF vehicle is intended to carry rescue and fire fighting equipment for the purpose of rescuing aircraft passengers, preventing aircraft fire loss, and combating fires in aircraft.
372	II	Classification.
373		The ARFF vehicle covered by this Procurement Specification is classified in accordance
374		with Part 139, Certification of Airports, Section 315, Aircraft Rescue and Firefighting:
375 376		Index Determination; Section 317, Aircraft Rescue and Firefighting: Equipment and Agents; and Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5220-
377		10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.
378	II.1	Fully Loaded Vehicle.
379		Consists of the fully assembled vehicle, complete with a full complement of crew, fuel
380		and fire-fighting agent. Inflate the tires to recommended pressure. For any test that calls
381 382		for the vehicle to be "fully loaded", load each storage compartment with 250 lbs. of ballast, up to a total of 1000 lbs. Load each seat that is not occupied during the test with
383		225 lbs. of ballast seat belted into the seat. Load ballast to represent the weight of
384		complementary agent not yet on board as close to the height of the complementary agent
385		vessel as possible, taking care anticipated vehicle movement during the test will not cause
386		a shift in the ballast damaging vehicle components.
387	III	Vehicle Conformance/Performance Characteristics.
388		The ARFF vehicle will be in accordance with the applicable requirements of AC
389		150/5220-10F, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF)
390		Vehicles, and National Fire Protection Association (NFPA) 414, Standard for Aircraft
391 392		Rescue and Fire Fighting Vehicles, 2020 Edition, NFPA 1901, Standard for Automotive Fire Apparatus, 2016 Edition, except as specified herein.
<b>JJZ</b>		THE Apparatus, 2010 Eathon, except as specifical fictorii.

393 394 395 396 397	<b>Note:</b> The numbering system listed in this section directly corresponds to Chapter 4 in the NFPA 414, 2020 edition. To properly use this document, first refer to NFPA 414 for the base requirements then refer to this advisory circular for any additions, exceptions, amendments or selections. Additional references to specific paragraphs of NFPA 1901 are indicated in brackets.
398	Specific terms that apply to this AC are listed below:
399	• <b>ADDITION:</b> A new item has been added to the standard in the reference document.
400 401	• <b>EXCEPTION:</b> A restriction has been imposed on the standard in the reference document.
402 403	• <b>AMENDMENT:</b> Subject matter has been rewritten to modify part or all of the original text of the reference document.
404	• <b>SELECTION:</b> NFPA 414 requires or allows an option to be selected.
405 406	<b>Note:</b> Requirements referring to complementary agents and/or water/foam systems apply only if those systems are installed.
407	NFPA 414, Chapter 4, Aircraft Rescue and Fire-Fighting Vehicles.
408	ADDITION: 4.1 General.
409 410 411	<b>Operating terrain.</b> The vehicle will be capable of operating safely on paved roads, graded gravel roads, cross country terrain, and sandy soil environments. Cross country terrain consists of open fields, broken ground, and uneven terrain.
412	AMENDMENT: 4.1.1
413	The operating temperature range is
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width, an minimun	Space Requirements - Overall Diment and height will be as indicated below, how that is consistent with the best operation cepts needed to achieve this performate rability.	ding the overall dimensions to a onal performance of the vehicle a
	Class 1/Table 1. Vehicle Space	ce Requirements
	<b>Maximum Dimensions</b>	Class 1
Len	gth (inches)	
Wio	dth, including mirrors (inches)	
Hei	ght (inches)	
does not Vehicle	the Evasive Maneuver test at 35 MPH.  I: Table 4.1.1.2(d) Agent System Perfer apply).  Water Tank Capacity. Except where with a water tank capacity from 120 ga	noted below, the requirements for
Vehicle vehicles	Table 4.1.1.2(d) Agent System Performance apply).  Water Tank Capacity. Except where with a water tank capacity from 120 gain.  ON: Table 4.1.1.2(d) Agent System Performance approximately approximat	noted below, the requirements for llons to 528 gallons apply.
Vehicle vehicles  EXCEPTIO does not	Table 4.1.1.2(d) Agent System Performance apply).  Water Tank Capacity. Except where with a water tank capacity from 120 gain.  ON: Table 4.1.1.2(d) Agent System Performance approximately approximat	noted below, the requirements for llons to 528 gallons apply.
Vehicle vehicles  EXCEPTIC does not ltem 2a,	I: Table 4.1.1.2(d) Agent System Performs apply).  Water Tank Capacity. Except where with a water tank capacity from 120 gas.  ON: Table 4.1.1.2(d) Agent System Performs apply.  Roof Turret. This item does not apply.  I: Table 4.1.1.2(d) Agent System Performs.	noted below, the requirements for llons to 528 gallons apply. rformance Parameters (Table 4
Vehicle vehicles EXCEPTIC does not Item 2a, ADDITION does not Item 2d	I: Table 4.1.1.2(d) Agent System Performs apply).  Water Tank Capacity. Except where with a water tank capacity from 120 gas.  ON: Table 4.1.1.2(d) Agent System Performs apply.  Roof Turret. This item does not apply.  I: Table 4.1.1.2(d) Agent System Performs.	noted below, the requirements for llons to 528 gallons apply.  rformance Parameters (Table 4)  ormance Parameters (Table 4.1)  ep nozzles are not an approved on
does not Vehicle vehicles EXCEPTIC does not Item 2a, ADDITION does not Item 2d The prin	I: Table 4.1.1.2(d) Agent System Performs apply).  Water Tank Capacity. Except where with a water tank capacity from 120 gas on: Table 4.1.1.2(d) Agent System Performs apply).  Roof Turret. This item does not apply.  I: Table 4.1.1.2(d) Agent System Performs apply.  I: Table 4.1.1.2(d) Agent System Performs apply.  I: Table 4.1.1.2(d) Agent System Performs apply.  I: Ground Sweep Nozzles. Ground sweep Sweep Nozzles.	noted below, the requirements for llons to 528 gallons apply.  rformance Parameters (Table 4  ormance Parameters (Table 4.1)  ep nozzles are not an approved of
does not Vehicle vehicles  EXCEPTIC does not Item 2a,  ADDITION does not Item 2d  The print	I: Table 4.1.1.2(d) Agent System Performs apply).  Water Tank Capacity. Except where with a water tank capacity from 120 gas.  ON: Table 4.1.1.2(d) Agent System Performs apply.  Roof Turret. This item does not apply.  I: Table 4.1.1.2(d) Agent System Performs apply.  I: Table 4.1.1.2(d) Agent System Performs apply.  I: Ground Sweep Nozzles. Ground sweep agent discharge location will be the	noted below, the requirements for llons to 528 gallons apply.  rformance Parameters (Table 4  ormance Parameters (Table 4.1)  ep nozzles are not an approved of

**AMENDMENT: 4.1.5** 455 Only those options specifically identified herein may be specified. 456 457 NFPA 414, 4.2 Requirements for All Aircraft Rescue and Fire-Fighting Vehicles — Responsibility of Contractors/Suppliers. 458 **ADDITION: 4.2.1 Certification.** 459 Quality of Workmanship. The vehicle, including all parts and accessories, will be 460 fabricated in a thoroughly workmanlike manner. Particular attention will be given to 461 freedom from blemishes, burrs, defects, and sharp edges; accuracy of dimensions, radii of 462 fillets, and marking of parts and assemblies; thoroughness of welding, brazing, soldering, 463 riveting, and painting; alignment of parts; tightness of fasteners; et cetera. The vehicle 464 will be thoroughly cleaned of all foreign matter. 465 **Warranty.** The fire fighting unit system will be covered by a minimum one-year 466 warranty after delivery. The commercially purchased chassis and drive train will have a 467 minimum 3 year / 36,000-mile warranty. The warranty will accompany the vehicle 468 during delivery. All water and foam tanks will be covered by a lifetime warranty. 469 **AMENDMENT: 4.2.2 Manuals.** 470 All manuals and warranties are required to be provided in digital format on media 471 specified by the airport operator and optional hardcopy. Two complete sets of engine and 472 transmission parts, service and operator's manuals will be packed with each vehicle. 473 474 **ADDITION: 4.2.2.3 Operator's Manual.** The operator's manual will also include: 475 Safety information that is consistent with the safety standards established by the 476 Occupational Safety and Health Administration (OSHA) and NFPA. 477 Tie down procedures for transport on a low-boy trailer. 478 Warranty information and the period of the warranty coverage for the complete 479 vehicle and for any component warranty that exceeds the warranty of the complete 480 vehicle. Addresses and telephone numbers will be provided for all warranty 481 providers. 482 • A description of the post-operational procedures including, but not limited to 483 draining, flushing, and re-servicing. 484 Disabled vehicle towing procedures. 485 Procedures and equipment required for changing a tire. 486 • If the driveline is equipped with a differential locking control, a warning/caution 487

Line art drawing of the vehicle, including panoramic views (front, rear, left, and right

sides) showing basic dimensions and weights (total vehicle and individual axle

indicating the proper differential locking/un-locking procedures.

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weight for the unloaded and fully loaded vehicle). For the purposes of this AC, "unloaded" is defined as a lack of agent, occupants and compartment load, and "loaded" is defined as including agent, occupants and compartment load.

#### **ADDITION: 4.2.2.4 Service Manual.**

The service manual will contain current, voltage, and resistance data; and describe all test procedures.

The service manual will contain at least the following, where applicable:

- Fire fighting system schematic(s).
- Hydraulic schematic.
- Pneumatic schematic.
- Electrical schematic.
- Winterization schematic.
- Fuel schematic.

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• Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

### 506 **ADDITION:** 4.2.2.4.6

The service manual will contain a table of contents as well as an alphabetical subject index.

## **ADDITION: 4.2.2.5 Parts Manual.**

The parts manual will include illustrations or exploded views (as needed) to identify properly all parts, assemblies, subassemblies, and special equipment. All components of assemblies shown in illustrations or exploded views will be identified by reference numbers that correspond to the reference numbers in the parts lists. All purchased parts will be cross-referenced with the original equipment manufacturer's (OEM) name and part number. The parts identification manual will provide the description and quantity of each item used for each vehicle. The size, grade, thread dimensions, torque specifications, and special characteristics will be provided for all non-standard nuts, bolts, screws, washers, grease fittings, and similar items. The manual will contain a numerical index. The parts manual will contain a list of all of the component vendor names, addresses, and telephone numbers referenced in the parts list.

#### **ADDITION: 4.2.2.5.1**

The parts list will include any special equipment.

#### 523 **ADDITION:** 4.2.2.5.2

Any special test equipment will be identified.

525	<b>AMENDMENT: 4.2.2.5.7</b>
526 527 528	All purchased parts will be cross-referenced with the original equipment manufacturers' (OEM) name and part number. The parts manual will contain a list of all of the component vendor names, addresses, and telephone numbers referenced in the parts list.
529	NFPA 414, 4.2.3 Metal Finish.
530	<b>ADDITION: 4.2.3.1</b>
531 532 533 534 535 536 537 538	Vehicles will be painted and marked in accordance with AC 150/5210-5, <i>Painting, Marking, and Lighting of Vehicles Used on an Airport</i> . The interior finish of all compartments will be based on the manufacturer's standard production practice. This may include painting, texturing, coating or machine swirling as determined by the manufacturer. All bright metal and anodized parts, such as mirrors, horns, light bezels, tread plates, and roll-up compartment doors, will not be painted. All other paintable surfaces will be painted in the appropriate yellow-green color specified in AC 150/5210-5.
539	NFPA 414, 4.2.4 Lettering, Numbering, and Striping.
540	ADDITION: 4.2.4
541 542 543 544 545 546	<b>Lettering.</b> The manufacturer will apply the airport's 'Name' and 'Insignia' (if available) in a contrasting color or by decal on both sides of the vehicle in long radius elliptical arches above and below the lettering center line. The size of the lettering will be a minimum of $2\frac{1}{2}$ -inches to a maximum of 6-inches. Reflective lettering is allowed if the material is the same as that which is used for the reflective stripe (as specified in AC $150/5210-5$ ).
547	AMENDMENT: 4.2.4.5, 4.2.4.6
548	Vehicle numbering, lettering, and striping will conform with AC 150/5210-5.
549	ADDITION: 4.2.5 Vehicle Information Data Plate.
550 551	A second permanently marked identification plate will be securely mounted at the driver's compartment. The identification plate will contain the following information:
552	NOMENCLATURE
553	MANUFACTURER'S MAKE AND MODEL
554	.MANUFACTURER'S SERIAL NUMBER
555	VEHICLE CURB WEIGHT: lbs.
556	PAYLOAD, MAXIMUM: lbs.
557	GROSS VEHICLE WEIGHT (GVW): Ibs.
558	FUEL CAPACITY AND TYPE: gal.
559	DATE OF DELIVERY. (month and year)

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560	WARRANTY (months and miles)		
561	CONTRACT NUMBER		
562	PAINT COLOR AND NUMBER		
563 564	A single plate that combines or contains the information required for both plates is acceptable.		
565 566	AMENDMENT: Figure 4.2.5 Aircraft Rescue a Certification per NFPA 414.	nd Fire-Fighting Vehicle Tilt Table	
567	Replace NFPA 414 Figure 4.2.5 with the figur	e below.	
568	Manufacturer		
569	Vehicle Make and Model		
570	Year of Manufacture		
571	Drive Type $\Box 4 \times 4 \Box 6 \times 6$		
572	This vehicle was tested todegrees while on a tilt	table in the "pump down" position	
573	This vehicle was tested todegrees while on a tilt	table in the "pump up" position	
574	Was a trip / slip rail used? ☐ Yes ☐ No.		
575	If yes, what is the height of the rail? (Maximu	m 2 inches)	
576	Date of TestLocation of Te	st	
577	Vehicle Empty Weight (lbs.)		
578	Maximum Gross Weight (lbs.)		
579	Front axle loading*(lbs.)		
580	Rear axle loading*(lbs.)		
581	Tire manufacturer		
582	Tire model		
583	Front tire pressure(psi)		
584	Rear tire pressure(psi)		
585	Front wheel track(in.)		
586	Rear wheel track(in.)		
587	Crew capacity(Number	of personnel)	
588	Fuel tank capacity(gal.)		
589	Equipment allowance(lbs.)		
590	Water tank capacity (if applicable)(gal.)		
591	Foam tank capacity (if applicable) (gal.)		

592	Complementary agent capacity (if applicable) (lbs.)
593	*The "loading" is in accordance with the definition of a fully loaded vehicle as presented in
594	NFPA 414
595	NFPA 414, 4.3 Weights and Dimensions, 4.3.2 Dimensions.
596	ADDITION: 4.3.2.2 Field of Vision.
597	<b>Mirrors.</b> The flat mirrors will provide not less than 60° horizontal rotational viewing
598	range. To provide the driver a clear view of the area ahead of the vehicle and to
599	eliminate potential blind spots, a rectangular mirror will be installed on the lower corner
600	of each side of the windshield, having a minimum area of 35 square inches.
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605	NFPA 414, 4.4 Engine.
606	ADDITION: 4.4
607	Ensure the engine(s) and transmission operate efficiently and without detrimental effect
808	to any drive train components when lubricated with standard, commercially available
809	lubricants in keeping with the recommendations of the engine and transmission
610	manufacturers.
611	ADDITION: 4.4.1.1 Engine Characteristics.
312	Engine. The vehicle will have a turbocharged diesel engine(s) that is certified to comply
313	with the Environmental Protection Agency (EPA) and state laws for off-highway
614	emission requirements at the time of manufacture.
615	<b>AMENDMENT: 4.4.1.2.3</b>
616	Elevation. The vehicle, including the pumping system, will be designed for operation up
617	to feet above sea level.
618	ADDITION: 4.4.2 Engine Cooling Systems.
619	A label will be installed near the engine coolant reservoir reading "Engine Coolant Fill."
620	<b>SELECTION: 4.4.2.3.3</b>
621	Radiator shutters.
622	

623	NFPA 414, 4.4.3 Fuel Systems.
624	<b>ADDITION: 4.4.3.4</b>
625	Each fuel tank will have a fill opening readily accessible to personnel standing on the
626	ground and designed to prevent fuel splash while refueling. If more than one tank is
627	furnished, means will be provided to ensure equalized fuel level in both tanks. An
628	overturn fuel valve will be provided for each tank to prevent spillage in the event of a
629	rollover. Prominently label each fuel tank "Diesel Fuel Only."
630	NFPA 414, 4.4.4 Exhaust Systems.
631	<b>ADDITION: 4.4.4.1</b>
632	The muffler(s) will be constructed of aluminized steel or stainless steel. Exhaust system
633	outlet(s) will be directed upward or to the rear, away from personnel accessing equipment
634	compartments, wiring, hydraulic lines and from the engine air intake.
635	NFPA 414, 4.5 Vehicle Electrical System.
636	ADDITION: 4.5
637	The vehicle will have a 12-volt electrical and starting system.
638	The minimum continuous electrical load will include operation of the air conditioning
639	system.
640	ADDITION: 4.5.1 Electrical Systems and Warning Devices.
641	Batteries. Batteries will be of the maintenance-free type; addition of water will not be
642	required during normal service life. The battery cover and vent system will be designed
643	to prevent electrolyte loss during service and to keep the top of the battery free from
644	electrolyte.
645	Battery compartment. The batteries will be installed in a protected compartment.
646	ADDITION: 4.5.2 Battery Chargers.
647	Line voltage electrical system. A 50 foot long, three wire, 15 amp rated, 110 volt, AC
648	power cable, with straight blade (non twist-lock) connectors, will be provided.
649	AMENDMENT: 4.5.2.2, 4.5.4.5
650	The battery charger/conditioner will be powered from a covered, polarized, insulated,
651	labeled, recessed (flush mounted), male, auto-eject receptacle. The connection will be
652	located on the exterior of the vehicle at the rear or on either side of the vehicle.
653	AMENDMENT: 4.5.4
654	Battery charger or conditioner. The vehicle will have a DC taper type battery charger
655	or an automatic battery conditioner, providing a minimum 12-amp output. The
656	charger/conditioner will be permanently mounted on the vehicle in a properly ventilated,
657	accessible location. The charger/conditioner will be powered from the electrical

658 659	shoreline receptacle. A charging indicator will be installed next to the receptacle. When a battery conditioner is provided, the conditioner will monitor the battery state of charge
660	and, as necessary, automatically charge or maintain the batteries without gassing,
661	depleting fluid level, overheating, or overcharging. A slave receptacle will be provided at
662	the rear or on either side of the vehicle cab.
663	AMENDMENT: 4.5.4.1
664	Electrical shoreline connection. The battery charger will be supplied from an external
665	power source of 110 volts AC.
666	NFPA 414, 4.6 Vehicle Drive.
667	AMENDMENT: 4.6
668	<b>Transmission.</b> A fully automatic transmission will be provided.
669	ADDITION: 4.6
670	Provide an accessible means of lubrication for all moving parts requiring routine
671	lubrication. Ensure there are no pressure lubrication fittings where their normal use
672	would damage grease seals or other parts.
673	<b>ADDITION: 4.6.4.1</b>
674	If the driveline is equipped with a differential locking control, a warning/caution label
675	will be placed in view of the driver indicating the proper differential locking/un-locking
676	procedures.
677	NFPA 414, 4.7 Suspension.
678	ADDITION: 4.7
679	Suspension. Provide an off-road, high-mobility suspension system resulting in no more
680	than 0.5 acceleration at the driver's seat of the vehicle when traversing an 8-inch
681	diameter half round at 35 mph. The suspension design by which the manufacturer meets
682	the suspension performance requirements is at the manufacturer's discretion.
683	NFPA 414, 4.8 Rims, Tires, and Wheels.
684	ADDITION: 4.8
685	A spare tire and wheel assembly will be provided; however, the spare tire and wheel
686	assembly are not required to be mounted on the vehicle.
687	AMENDMENT: 4.8.2
688	Tire selection. The vehicle will be equipped with new tubeless steel belted radial tires
689	with non-directional on/off-road type tread mounted on disc wheel assemblies. Large
690	tires required.

691	AMENDMENT: 4.8.4	
692 693	<b>Tires and wheels.</b> The vehicle will be equipped with single tires and wheels on the front axle and single or dual tires and wheels on the rear.	
694	Tire and wheel assemblies will be identical at all positions.	
695	NFPA 414, 4.9 Towing Connections.	
696	AMENDMENT: 4.9	
697	The tow connections may intrude into the angle of approach and angle of departure.	
698	ADDITION: 4.9	
699 700 701	The vehicle will be provided with a towing device. The maximum towing capacity of the vehicle will be labeled on the vehicle dashboard and at the towing device location.	
702	NFPA 414, 4.10 Brakes.	
703	ADDITION: 4.10	
704 705 706 707 708 709	All components of the braking system will be installed in such a manner as to provide adequate road clearance when traveling over uneven or rough terrain, including objects liable to strike and cause damage to the brake system components. No part of the braking system will extend below the bottom of wheel rims, to ensure, in case of a flat tire, that the weight of the vehicle will be supported by the rim and the flat tire and not be imposed on any component of the braking system.	
710	NFPA 414, 4.12 Cab.	
711	ADDITION: 4.12	
712 713 714 715	The vehicle will have a cab constructed of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. The cab will have a watertight roof hatch for emergency exit out of the cab. A tilt steering column will be provided.	
716	<b>ADDITION: 4.12.1.5</b>	
717 718 719 720	<b>Seat belts.</b> Each seat will be provided with a Type 3 seat belt assembly (i.e., 3-point retractable restraint) in accordance with Code of Federal Regulations (CFR) 49 CFR 571.209. Ensure seat belts are long enough to accommodate crew members in full Personal Protective Equipment (PPE).	
721	<b>ADDITION: 4.12.1.7</b>	
722 723 724 725	Cab entry and exit features. The cab will have doors. At least one grab handle will be provided for each crew member, located inside the cab for use while the vehicle is in motion. The lowermost step(s) will be no more than 22 inches above level ground when the vehicle is fully loaded.	

ADDITION: 4.12.2 Cab Visibility.
The windshield and windows will be tinted. Each door window will be capable of being
opened far enough to facilitate emergency occupant escape in the event of a vehicle
accident. The vehicle windows will have control system.
ADDITION: 4.12.4 Instruments, Warning Lights, and Controls.
All instruments and controls will be designed to minimize windshield glare.
<b>ADDITION: 4.12.4.4</b>
<b>Instruments and warning lights.</b> The following will also be provided within convenient reach of the seated driver:
<ul> <li>Master warning light control switch,</li> </ul>
<ul> <li>Work light switch(es), and</li> </ul>
• Compartment "Door Open" warning light and intermittent alarm that sounds when a compartment door is open and the parking brakes are released or the transmission is in any position other than neutral.
ADDITION: 4.12.4.5
Power window controls.

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763	<b>SELECTION: 4.12.4.7</b>
764	<b>DEVS Option.</b> A DEVS system, including a Low-Visibility Enhanced Vision
765	Subsystem and optional systems as noted below, if any, meeting FAA Advisory Circular
766	(AC) <u>150/5210-19</u> , <i>Driver's Enhanced Vision System (DEVS)</i> , will be provided.
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778	<b>AMENDMENT: 4.12.4.7.2</b>
779	<b>DEVS System Requirements.</b> AC 150/5210-19 will be met in its entirety.
'80	AMENDMENT: 4.12.4.8, 4.12.4.9
781	FLIR System Requirements. AC 150/5210-19 will be met in its entirety.
'82	NFPA 414, 4.12.5 Equipment.
783	<b>ADDITION: 4.12.5.1(1)</b>
'84	Climate Control System. The climate control system will induct at least 60 cubic feet
85	per minute of fresh air into the cab, but will include a "recirculation" setting that prevents
786	induction of outside air. Cab mounted components will be protected from inadvertent
787	damage by personnel.
788	<b>ADDITION: 4.12.5.1(2)</b>
789	Driver's Seat. The driver's seat will be provided with a backrest and a remote-mounted
790	bracket designed to store a Self-Contained Breathing Apparatus (SCBA).

791	ADDITION: 4.12.5.1(3)
792 793 794 795	Crew Seats. The turret operator's seat, located to the right front of the driver's seat, will be a fixed (non-suspension) type. It will be provided with a backrest and a remotemounted bracket designed to store a Self-Contained Breathing Apparatus (SCBA). When a four (4) door vehicle is selected, the rear seat will be the bench type.
796	ADDITION: 4.12.5.1(4)
797 798 799	Windshield Washers. The vehicle will be equipped with a powered windshield washer system, including an electric fluid pump, a minimum one-gallon fluid container, washer nozzles mounted to the wiper arms (wet arms), and a momentary switch.
800	ADDITION: 4.12.5.1(5)
301 302 303 304 305 306	Windshield Wipers. The vehicle will be equipped with electrically powered windshield wiper(s). The wiper arm(s) and blade(s) will be of sufficient length to clear the windshield area described by Society of Automotive Engineers (SAE) J198, Windshield Wiper Systems - Trucks, Buses, and Multipurpose Vehicles. Individual wiper controls will include a minimum of two speed settings and an intermittent setting. The wiper blades will automatically return to a park position, out of the line of vision.
807	ADDITION: 4.12.5.1(8)
308 309	<b>Equipment.</b> A means or provision that is designed to protect driver and crew from overhead glare and light from the sun.
310	ADDITION: 4.12.5.1(10)
311 312	<b>Interior Lighting.</b> Cab interior light levels will be sufficient for reading maps or manuals.
813	SELECTION: 4.12.5.1(11)
314 315 316	Self-Contained Breathing Apparatus (SCBA) Mounting. The vehicle will have mounting to secure SCBA equipment from the following manufacturer:
317	<b>AMENDMENT: 4.12.5.1(12)</b>
318 319 320	<b>Forward Looking Infrared (FLIR).</b> The FLIR monitor will be located in a position where it is visible to both the seated driver and turret operator. All components of the FLIR system will be in accordance with <u>AC 150/5210-19</u> .
321	SELECTION: 4.12.7
322	Monitoring and Data Acquisition System (MADAS).
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824	<b>ADDITION: 4.12.7.2</b>
825 826 827	<b>Data Retention.</b> Design the data acquisition system 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.
828	ADDITION: 4.12.8
829	Lateral Accelerometer. The vehicle will be equipped with a lateral accelerometer.
830	NFPA 414, 4.13 Body.
831	ADDITION: 4.13
832 833 834	<b>Reduction of Potential Foreign Object Damage.</b> All loose metal parts, such as pins, will be securely attached to the vehicle with wire ropes or chains. Removable exterior access panels, if provided, will be attached with permanent captive fasteners.
835 836 837	<b>License plate bracket.</b> A lighted license plate bracket will be provided at the rear and front of the vehicle and will comply with state law. The location of the front bracket will be placed so as not to interfere with the operation of fire fighting systems.
838	The vehicle will have a corrosion-resistant body.
839 840 841 842 843 844 845	<b>Winch.</b> A winch with at least 12,000 pound-pull will be installed, recessed behind the front bumper. The winch will be electric or hydraulic powered and will have one or more forward and reverse speeds of not less than 15 feet per minute. The winch will be equipped with a minimum 125 feet of 3/8-inch galvanized aircraft cable, with 36-inch end chain and hook. The winch will include a four-way cable guide. A 10-foot minimum remote control cable will be provided for operation of the winch. If an extended bumper is used, a cover fabricated of treadplate will be installed over the winch and the space between the cab and bumper.
847	ADDITION: 4.13.3
848 849	<b>Compartments.</b> The vehicle body will have storage compartments with a minimum 20 cubic feet of enclosed storage space.
850 851 852 853 854 855	Compartment doors. Storage compartments will have clear anodized aluminum, counterbalanced, non-locking, roll-up or single hinged doors as determined by the manufacturer. Door latch handles on roll-up doors will be full-width bar type. Door straps will be provided to assist in closing the compartment doors when the rolled up or hinged door height exceeds six feet above the ground. Door locks required.
856 857 858 859	<b>Scuffplates.</b> Replaceable scuffplates will be provided at each compartment threshold to prevent body damage from sliding equipment in and out of the compartments. The scuffplates will be securely attached to the compartment threshold but will be easily replaceable in the event of damage.
860	<b>Drip rails.</b> Drip rails will be provided over each compartment door.

**Shelves.** An adjustable and removable compartment shelf will be provided for every 18 inches of each vertical storage compartment door opening. Shelving adjustments will require no more than common hand tools and will not require disassembly of fasteners. Shelves will support a minimum of 150 lbs without permanent deformation. Each shelf will be accessible to crew members standing on the ground or using a pull out and tip-down configuration for shelving over 54 inches from the ground. Access to any shelf over 54 inches from the ground will be facilitated by the installation of a pull-out step and grab rail. Each shelf will have drain holes located so as to allow for drainage of any water from the stowed equipment.

**Drainage mats.** Each compartment floor and shelf will be covered with a removable black mat designed to allow for drainage of any water from the stowed equipment.

**SCBA storage tubes.** A single compartment or tubes for storage of four SCBA bottles will be provided. If tubes are provided, two will be installed on each side of the vehicle. The tubes will be of sufficient size to accommodate the procuring agencies SCBA cylinders.

# **ADDITION: 4.13.3(3)**

Compartment lights. Waterproof white lighting sufficient to provide an average minimum illumination of 1.0 footcandle will be provided in each compartment greater than 4.0 cubic feet and having an opening greater than 144 square inches. Where a shelf is provided, this illumination will be provided both above and below the shelf. All compartments will be provided with weatherproof lights that are switched to automatically illuminate when compartment doors are opened and the vehicle master switch is in the 'on' position. Light switches will be of the magnetic (non-mechanical) type.

#### **ADDITION 4.13.4**

**Slip Resistance.** Provide a working deck that is reinforced and constructed of, or covered with, a slip-resistant material that is 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.

## **AMENDMENT: 4.13.6.3**

**Steps or ladders.** The lowermost step(s) or ladder rungs will be no more than 20 inches above level ground when the vehicle is fully loaded. A tubular style running board or custom step will be provided at each vehicle door location.

## **ADDITION: 4.13.6.4, 4.25.1**

**Ladder, step, walkway, and area lights.** Non-glare white or amber lighting will be provided at ladders and access steps where personnel work or climb during night operations. In addition, ground lighting will be provided. Ground lights will be activated when the parking brake is set in accordance with AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.* These area lights will be

controlled with three-way switches on the cab instrument panel and near the light sources. Ensure the switch located in the cab is a master switch that is turned on before auxiliary switches near the light sources are operational. **SELECTION: 4.13.12** 

# NFPA 414, 4.14 Fire-Fighting Systems and Agents.

## **ADDITION: 4.14**

**Agent system.** The fire fighting agent system may consist of a series of selected agents (dry chemical, approved clean agents, compressed air foam, and foam) as indicated in this section. The delivery system used to dispense and apply agent will comply with Class 1/Table 1, Vehicle Space Requirements, above. Multiple agent delivery systems may be used to dispense agents simultaneously. The delivery system used to dispense and apply agent for multiple agent delivery systems will comply with Class 1/Table 2, Foam/Dry Chemical/Clean Agent Simultaneous Delivery System, below. When specified, a Compressed Air Foam System (CAFS) will be provided with air injection for the foam discharges.

Compressed Air Foam System (CAFS). If installed, the CAFS will have expansion ratios of 6:1 to 10:1 with 8:1 being optimal.

Any hand line that is dedicated specifically for CAFS will have a smooth bore nozzle. Hand line discharge rates of 30 GPM and primary and auxiliary turret discharge rates of 60 GPM are permissible.

# Class 1/Table 2. Foam/Dry Chemical/Clean Agent Simultaneous Delivery System

**Note:** The agent delivery rates in this table are allowed by the FAA as a result of independent third-party demonstrations of fire suppression capability of a Foam/Dry Chemical/Clean Agent Simultaneous Delivery System.

Hand Line and Turret Performance Criteria	Class 1 Vehicles
Foam Performance	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)
Dry Chemical and Clean Agent Performance	
Hand line discharge rate	5.0 to 8.0 lbs/sec
Hand line discharge rate with foam	5.0 to 8.0 lbs/sec
Hand line discharge rate with foam and clean agent	5.0 to 6.0 lbs/sec
Dry Chemical Hand Line Range	≥ 90 ft (27.5 M)
Clean Agent Hand Line Range	≥ 40 ft
Clean Agent Inside Hose Diameter	≥ ¼ inch
Hose Length	See NFPA 414, 2020 Edition,
-	Table 4.1.1.2(d)
Turret discharge rate	≥ 16 lbs/sec
Turret Range	≥ 100 ft
Turret Width	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)

Note: The agent delivery rates in this table are allowed as a result of independent third-party demonstrations of fire suppression capability of a foam/dry chemical/clean agent simultaneous delivery. (Evaluation of Quad-Agent Small Fire Fighting System DOT\FAA\AR-TN06\13.)

957	NFPA 414, 4.15 Agent Pump(s) and Pump Drive.
958	ADDITION: 4.15
959 960 961 962 963	Intake connections. The vehicle will be equipped with one valved $2\frac{1}{2}$ -inch suction intake connection. The inlet will be capable of drafting or operating from a hydrant source located at the operator's pump panel. The $2\frac{1}{2}$ -inch intake connection will have rocker lug female National Hose threads, a quarter-turn control valve, a bleeder valve, a strainer, and a plug. All valves will be labeled "open" or "closed".
964	AMENDMENT: 4.15.1.1
965	Agent (fire) pump. The centrifugal pump will be selected by the manufacturer.
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967	<b>ADDITION: 4.15.1.1.1</b>
968 969	<b>Priming pump.</b> The vehicle will be equipped with a priming pump. For vehicles equipped with a pre-mixed pressurized foam system, a priming pump is not required.
970	ADDITION: 4.15.3 Tank-to-Pump Connections.
971	A check valve and shutoff valve will be provided in each tank to pump line.
972	<b>AMENDMENT: 4.15.4</b> Discharge Connections.
973 974 975 976	All fire pump supplied agents will be delivered to the bumper turret and preconnected handlines and/or duel agent handline hose reel. A dual agent hose reel or two 1¾ -inch discharge connections (preconnected handlines) with male National Hose threads will be provided.
977	<b>EXCEPTION: 4.15.6</b> Overheat Protection.
978 979	Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.
980	NFPA 414, 4.16 Water Tank, 4.16.1 Water Tank Capacity (if applicable).
981	AMENDMENT: 4.16.1.1
982 983 984 985	<b>Water Tank.</b> The vehicle will have a baffled foam tank with a manufacturer certified minimum capacity of at least 100 gallons. The tank will store premixed agent. A copy of the manufacturer's certification certificate will be provided for verification upon acceptance testing.
986	<b>ADDITION: 4.16.2.1</b>
987 988 989	<b>Water Tank Construction.</b> The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP). All materials used will be capable of storing foam solutions. The tank will have a lifetime warranty.

990	<b>ADDITION: 4.16.2.2</b>
991 992	<b>Tank drain.</b> The tank will incorporate a drain and drain valve. The valve will be on the left side of the vehicle and controlled by a crew member standing on the ground. The
993	drain line will be 2-inch internal diameter (I.D.) minimum. The point for discharge for
994	the water tank drain will be below the under-vehicle body panels.
995	<b>EXCEPTION: 4.16.2.2(1)</b>
996	Manhole covers. Manhole covers are not required.
997	ADDITION: 4.16.2.3.3
998 999	<b>Drains.</b> Drainage from the vent and overflow system will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.
1000	<b>ADDITION: 4.16.2.5</b>
1001	Foam Tank Top Fill Opening. The fill opening, located, may be
1002	incorporated as part of a manhole cover and will be sized to accommodate a 21/2-inch fill
1003	hose.
1004	<b>EXCEPTION: 4.16.2.6</b>
1005	This paragraph does not apply.
1006	<b>AMENDMENT: 4.16.3.2</b>
1007	Foam Tank Fill Connections. The foam tank will incorporate one 2½-inch rocker lug
1008	female National Hose thread connection on each side of the vehicle. Each connection
1009	will be fitted with a 30° or 45° turn-down fitting. The fill will allow external re-supply of
1010	the foam tank during discharge pumping operations.
1011	<b>EXCEPTION: 4.16.3.4</b>
1012	Water Tank Fill Connection Size. This paragraph does not apply.
1013	NFPA 414, 4.17 Foam System.
1014	This paragraph does not apply.
1015	NFPA 414, 4.18 Premixed Foam Solutions.
1016	ADDITION: 4.18
1017	A premixed foam solution will be used.
1018	NFPA 414, 4.19 Turret Nozzles.
1019	SELECTION: 4.19.4.1, 4.19.4.2
1020	Manually operated or power assisted turret.
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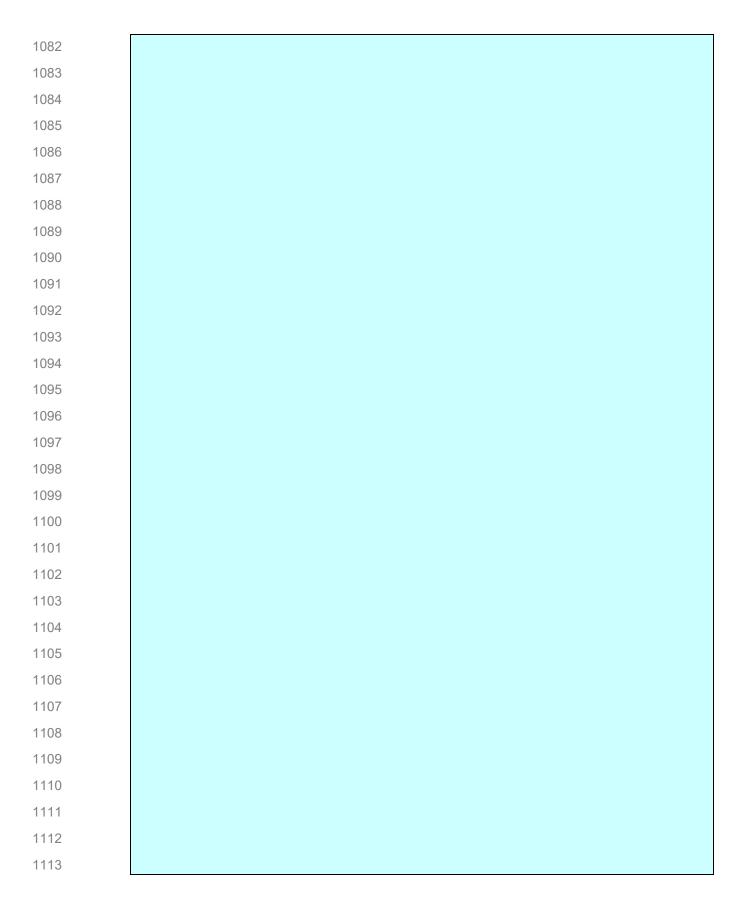
1022	SELECTION: 4.19.4.2(4)
1023 1024	Manual override or secondary parallel controls powered by an alternative source of all roof turret movement functions.
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1026	AMENDMENT: 4.19.6
1027 1028 1029	If the boom-mounted turret is on a rotational base, it will meet the following design and functional requirements: The boom-mounted turret must be equipped with a visual indicator to the operator as the inner boom section is extended.
1030	NFPA 414, 4.20 Preconnected Handlines.
1031	ADDITION: 4.20
1032 1033 1034	<b>Preconnected handlines.</b> A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. A control for charging each handline will be provided for operation.
1035	<b>AMENDMENT: 4.20.4.3</b>
1036	Hose Reel. Each hose reel will:
1037 1038	1. Be designed and positioned to allow hose reel removal by a single person from any position in a 120-degree horizontal sector.
1039	2. Be designed to prevent the hose from unreeling when not desired.
1040	3. Have power rewind with manual override.
1041	NFPA 414, 4.21 Turret, Ground Sweep, and Undertruck Nozzles.
1042	ADDITION: 4.21.1
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1050	EXCEPTION: 4.21.3
1051	Undertruck nozzles are not an approved ontion

1052	NFPA 414, 4.23 Approved Clean Agent.
1053	SELECTION: 4.23.1.1.1
1054	Reservice Kit.
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1056	NFPA 414, 4.24 Dry Chemical Turret.
1057	SELECTION: 4.24.1 Auxiliary Agent Discharge.
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1061	Agent Discharge Locations.
1062	The primary agent discharge location will be the
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1114	NFPA 414, 4.25 Lighting and Electrical Equipment.
1115	ADDITION: 4.25.1
1116	<b>Auxiliary Power Receptacles.</b> The vehicle will have 2-12-volt auxiliary power
1117	receptacles mounted adjacent to the driver and crew member positions, preferably in the
1118	instrument panel.
1119	ADDITION: 4.25.1
1120	Spot/Floodlights. Two spot/floodlights will be attached at the end of the bumper turret
1121	assembly. The lights will illuminate the area covered by the turret. The lights will be
1122	switched from inside the cab. lights will be used.
1123	Floodlights. Two floodlights with adjustment knuckles will be
1124	provided. One light will be mounted on the left and right sides of the vehicle.
1125	lights will be used.
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1129	Scene Lights. A total of four high mounted floodlights will be provided to illuminate the
1130	work areas around the vehicle. One light will be mounted on each side and two will be
1131	mounted in the rear of the vehicle. Each pair of lights will be controlled by a switch
1132	mounted on the side or rear of the vehicle. lights will be used.
1133	<b>ADDITION: 4.25.1(1)</b>
1134	Headlight Flashing System. A high beam, alternating/flashing, headlight system will be
1135	provided. The headlight flasher will be separately switched from the warning light panel.
1136	AMENDMENT: 4.25.2
1137	Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit
1138	will include volume control.
1139	<b>ADDITION: 4.25.2.1</b>
1140	The siren speaker will be rated at 100 watts minimum and will be located in a guarded
1141	position as low and as far forward on the vehicle as practical.
1142	<b>ADDITION: 4.25.2.2</b>
1143	The siren unit will consist of the following functions as a minimum: "Radio," "PA,"
1144	"Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and include a magnetic noise
1145	canceling microphone.
1146	ADDITION: 4.25.4 Exterior Emergency Warning Lights.
1147	Each apparatus will have a system of optical warning devices that meet or exceed the
1148	requirements of (NFPA 1901 – 13.8) Optical Warning Devices

1149	AΓ	DDITION: 4.25.4.1
1150 1151 1152		Optical Requirements for Larger Apparatus. If the apparatus has a bumper-to-bumper length of 25' or more or has an optical center on any optical warning device greater than 8' above the ground the requirements of NFPA 1901 – 13.8.13.2 and 13.8.13.6 apply.
1153		(NFPA 1901 – 13.8.13)
1154	AΓ	ODITION: 4.25.4.2.2
1155 1156		<b>Emergency Warning Light Color.</b> All emergency warning lights will meet the requirements of AC 150/5210-5.
1157	AΓ	ODITION: 4.25.5 Radios.
1158 1159 1160 1161		The vehicle will have two separate 30-amp circuits, with circuit breakers and at least 6-foot long wires, routed to a space provided adjacent to the driver and turret operator for purchaser provided radios and other electrical equipment. The wiring will be tagged indicating its purpose.
1162	EX	<b>EXECUTION: 4.25.5.1.2, 4.25.5.2</b>
1163		The provisioning of radios is an airport responsibility and not part of this specification.
1164 1165		<b>Note:</b> The paragraph numbering of the following provisions does not conform to the numbering in NFPA 414.
1166	IV	Product Conformance Provisions.
1167 1168	IV.1	<u>Classification of Inspections.</u> The inspection requirements specified herein are classified as follows:
1169 1170 1171 1172	IV.1.1	Performance Inspection. The vehicle will be subjected to the examinations and tests described in this Procurement Specification. The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.
1173 1174 1175 1176	IV.1.2	Conformance Inspection.  The vehicle will be subjected to the examinations and tests described in this Procurement Specification. The contractor will provide or arrange for all test equipment, personnel, and facilities.
1177 1178 1179 1180 1181	IV.2	Product Conformance.  The products provided will meet the performance characteristics of this Procurement Specification, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace. The purchaser reserves the right to require proof of such conformance.
1182 1183 1184	IV.3	Technical Proposal.  The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this Procurement Specification: a

paragraph by paragraph response to the characteristics section of this Procurement Specification will be provided. The offeror/contractor will provide two copies of their commercial descriptive catalogs with their offer as supporting reference to the itemized technical proposal. The offeror/contractor will identify all modifications made to their commercial model in order to comply with the requirements herein. The vehicle furnished will comply with the "commercial item" definition of FAR 2.101 as of the date of award. The purchaser reserves the right to require the offeror/contractor to prove that their product complies with the referenced commerciality requirements and each conformance/performance characteristics of this Procurement Specification.

# IV.4 <u>Inspection Requirements.</u>

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### IV.4.1 General Inspection Requirements.

Apparatus used in conjunction with the inspections specified herein will be laboratory precision type, calibrated at proper intervals to ensure laboratory accuracy.

#### 1198 IV.4.2 Test Rejection Criteria.

Throughout all tests specified herein, the vehicle will be closely observed for the following conditions, which will be cause for rejection:

- Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.
- Any spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any condition, except as allowed herein.
- Structural failure of any component, including permanent deformation, or evidence of impending failure.
- Evidence of excessive wear.
- Interference between the vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.
- Misalignment of components.
- Evidence of undesirable roadability characteristics, including instability in handling during cornering, braking, and while traversing all required terrain.
- Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.
- Overheating of the engine, transmission, or any other vehicle component.
- Evidence of corrosion.
  - Failure of the fire fighting system and sub-systems.

### 1218 IV.4.3 Detailed inspection requirements.

#### 1219 IV.4.3.1 Examination of product.

All component manufacturers' certifications, as well as the prototype and production/operational vehicle testing outlined in Table Class 1/Table 3, Vehicle Test

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Data, will be examined to verify compliance with the requirements herein. Attention will be given to materials, workmanship, dimensions, surface finishes, protective coatings and sealants and their application, welding, fastening, and markings. The airport may accept a manufacturer or third party certification for any/all prototype and production/operational vehicle testing performed prior to delivery that proves that the vehicle meets the required performance parameters.

The component manufacturer's certification, prototype test certifications and production vehicle test certifications will be arranged in the same order and numbering system called out in NFPA 414 and provided as part of the delivery package with each vehicle.

## Class 1/Table 3. Vehicle Test Data

NED 4 414	
NFPA 414	Test
paragraph	D. A. A. W. I. I. W. A.
6.3	Prototype Vehicle Tests
6.3.6	Rated Water and Foam Tank Capacity Test
6.3.7	Cornering Stability
	<b>Note:</b> With the modification that the evasive maneuver / double-lane
	change test is conducted at 35 mph (56 kph).
6.3.7.6	EXCEPTION: "J" Turn Test. The measure of a vehicle's ability to traverse
	a 180 degree turn at 30 mph.
6.3.8	Vehicle Dimensions
6.3.9	Driver Vision Measurement
6.3.10	Pump and Roll on a 40 Percent Grade
6.3.11	Electrical Charging System
6.3.12	Radio Suppression
6.3.13	Gradability Test
6.3.14	Body and Chassis Flexibility Test
6.3.15	Service/Emergency Brake Test
6.3.16	Service/Emergency Brake Grade Holding Test
6.3.17	Steering Control Test
6.3.18	Vehicle Clearance Circle Test
6.3.19	Agent Pump(s)/Tank Vent Discharge Test
6.3.20	Water Tank Fill and Overflow Test
6.3.21	Flushing System Test
6.3.22	Primary Turret Flow Rate Test
6.3.23	Primary Turret Pattern Test
6.3.24	Primary Turret Control Force Measurement
6.3.25	Primary Turret Articulation Test
6.3.26	Handline Nozzle Flow Rate Test
6.3.27	Handline Nozzle Pattern Test
6.3.28	Ground Sweep/Bumper Turret Flow Rate Test
6.3.29	Ground Sweep/Bumper Turret Pattern Control Test
6.3.30	Undertruck Nozzle Test
6.3.31	Foam Concentration/Foam Quality Test
6.3.32	Warning Siren Test

NFPA 414 paragraph	Test
6.3.33	Propellant Gas
6.3.34	Pressure Regulation
6.3.35	Foam Premix Piping and Valves
6.3.36	Pressurized Agent Purging and Venting
6.3.37	Complementary Agent Handline Flow Rate and Range
6.3.38	Dry Chemical Turret Flow Rate and Range
6.3.39	Cab Interior Noise Test
6.4	Operational Tests
6.4.1	Vehicle Testing, Side Slope
6.4.2	Weight / Weight Distribution
6.4.3	Acceleration.
	<b>Note:</b> With the modification that the instrumentation is a GPS-based
	electronic data collection system.
6.4.4	Top Speed
6.4.5	Brake Operational Test
6.4.6	Air System / Air Compressor Test
6.4.7	Agent Discharge Pumping Test
6.4.8	Dual Pumping System Test (As Applicable)
6.4.9	Pump and Maneuver Test
6.4.10	Hydrostatic Pressure Test
6.4.11	Foam Concentration Test
6.4.12	Primary Turret Flow Rate Test

#### 1232 V Packaging.

- 1233 V.1 Preservation, packing, and marking will be as specified in the Procurement Specification, contract or delivery order.
- 1235 V.2 Deliver the vehicle with full operational quantities of lubricants, brake and hydraulic 1236 fluids, and cooling system fluid all of which are suitable for use in the temperature range 1237 expected at the airport.
- V.3 Deliver the vehicle with one complete load of firefighting agents and propellants. One complete load is defined as all of the agents and propellants necessary for the vehicle to be fully operational. One load would include, at a minimum: one fill of a foam tank; one fill of a dry chemical tank (if applicable); one fill of a clean agent tank (if applicable); one spare nitrogen cylinder for a dry chemical system (if applicable); and one spare argon cylinder for a clean agent system (if applicable). Agents and propellants for required testing or training are not included. For the initial training period, use water in place of

1245 1246		other extinguishing agents. The manufacturer may pre-ship agents and propellants to a receiving airport to reduce overall procurement costs.
1247 1248 1249	V.4	The vehicle manufacturer will provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.
1250	VI	Training.
1251	NFPA	A 414, 4.2.2.5 Parts Manual.
1252	Al	MENDMENT: 4.2.2.5.8, 4.2.2.5.9
1253 1254 1255 1256 1257 1258 1259 1260 1261	VI.1	Two person-weeks will be provided for travel to the manufacturing facility during midbuild or final build, scheduled at the airport operator's discretion. One person-week will be provided for a mechanic to travel to the manufacturing facility for training. Upon delivery of the vehicle to the airport, the manufacturer will, at no additional cost, provide the services of a qualified technician for five consecutive days for training. This is considered sufficient time for the purchaser to adjust shift work schedules to get maximum employee attendance to training sessions at some point during the training period. During this time sufficient repetitive learning opportunities will be provided by the manufacturer to allow various shifts to complete the training requirements.
1262 1263 1264 1265 1266 1267 1268	VI.2	The technician will provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup includes operator training for the primary operators, which will give them sufficient knowledge to train other personnel in the functional use of all fire fighting and vehicle operating systems. Prior to leaving the vehicle, the technician will review the maintenance instructions with the purchaser's personnel to acquaint them with maintenance procedures as well as how to obtain support service for the vehicle.
1269 1270 1271 1272	VI.3	Training will include written operating instructions, electronic training aids (videos/power point), or other graphics that depict the step-by-step operation of the vehicle. Written instructions will include materials that can be used to train subsequent new operators.
1273	VII	Referenced Documents.
1274	VII.1	Federal Aviation Administration (FAA).
1275 1276		ACs may be obtained from the FAA website: <a href="https://www.faa.gov/regulations_policies/advisory_circulars/">https://www.faa.gov/regulations_policies/advisory_circulars/</a>
1277 1278		• AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles
1279		• AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport
1280		FAA Orders, Specifications, and Drawings may be obtained from: <a href="https://www.faa.gov/">https://www.faa.gov/</a>

1281	VII.2	<u>CFR.</u>
1282		The CFR may be obtained from <a href="https://www.ecfr.gov">https://www.ecfr.gov</a> .
1283 1284		Title 14, Code of Federal Regulations (CFR), <u>Part 139</u> , <i>Certification of Airports</i> (14 CFR <u>Part 139</u> )
1285		• Section 139.315 Aircraft Rescue and Firefighting: Index Determination.
1286		• Section 139.317 Aircraft Rescue and Firefighting: Equipment and Agents.
1287		• Section 139.319 Aircraft Rescue and Firefighting: Operational Requirements.
1288 1289		Title 49, Code of Federal Regulations (CFR), Part 393, Parts and Accessories Necessary for Safe Operation: Subpart C—Brakes.
1290 1291		Title 49, Code of Federal Regulations (CFR), Part 571, Motor Carrier Vehicle Safety Standards, Part 209, Standard No. 209, Seat Belt Assemblies.
1292	VII.3	SAE International.
1293		SAE documents may be obtained from <a href="https://www.sae.org">https://www.sae.org</a> .
1294	VII.4	National Fire Protection Association (NFPA).
1295		NFPA documents may be obtained from <a href="https://www.nfpa.org/">https://www.nfpa.org/</a> .
1296 1297		• NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2014 Edition)
1298		• NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2020 Edition)
1299		• NFPA 1901, Standard for Automotive Fire Apparatus (2016 Edition)

300	FAA Submittal (Class 1)
301 302 303	If this procurement is [subject to approval by the Federal Aviation Administration][to be funded under the Airport Improvement Program or the Passenger Facility Charge Program], the following must be provided to the appropriate FAA Airports office for review and approval.
304 305 306	This specification has been produced using the interactive Advisory Circular 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. No alterations have been made to the resultant specification.
307 308 309	[The attached request for additional items needed to address unusual requirements is submitted in accordance with FAA Order <u>5300.1</u> , <i>Modifications to Agency Airport Design, Construction, and Equipment Standards</i> .]
310	(Airport POC signature and title)

D 1.37	
Paragraph Number:	AMENDMENT: 4.1.1
	Extreme Temperature Justification
☐ Approved	☐ Disapproved:
Paragraph Number:	<b>SELECTION: 4.4.2.3.3</b>
	Radiator Shutters Justification
☐ Approved	☐ Disapproved:
Paragraph Number:	<b>ADDITION: 4.12.4.4</b>
	ICCC DIWC A 12C1E
	Justification for RIWS Additional Features
	Justification for RIWS Additional Features
	Justification for KIWS Additional Features
	Justification for KIWS Additional Features
	Justification for KIWS Additional Features
	Justification for RIWS Additional Features
□ Approved	□ Disapproved:
☐ Approved	

1343 1344 1345		of a Modification to Standards for the following items that are not provided cifications. If requesting more than four, provide additional justification
1346	Item 1:	
1347 1348 1349 1350	Justification:	
1351	☐ Approved	☐ Disapproved:
1352	Item 2:	
1353 1354 1355 1356	Justification:	
1357	☐ Approved	☐ Disapproved:
1358	Item 3:	
1359 1360 1361 1362	Justification:	
1363	☐ Approved	☐ Disapproved:
1364	Item 4:	
1365 1366 1367 1368	Justification:	
1369	□ Approved	☐ Disapproved:
1370	(FAA signature and da	nte)

<b>Note:</b> The numbering system listed in this section directly corresponds to Chapter 4 in the NFPA 414, 2020 edition. To properly use this document, first refer to NFPA 414 for
the base requirements then refer to this advisory circular for any additions, exceptions,
amendments or selections. Additional references to specific paragraphs of NFPA 1901 are indicated in brackets.
Specific terms that apply to this AC are listed below:
• <b>ADDITION:</b> A new item has been added to the standard in the reference document.
• <b>EXCEPTION:</b> A restriction has been imposed on the standard in the reference
document.
• AMENDMENT: Subject matter has been rewritten to modify part or all of the original
text of the reference document.
• <b>SELECTION:</b> NFPA 414 requires or allows an option to be selected.
NFPA 414, Chapter 4, Aircraft Rescue and Fire-Fighting Vehicles.
NFPA 414, 4.1 General.
ADDITION: 4.1
Operating terrain. The vehicle will be capable of operating safely on paved roads,
graded gravel roads, cross country terrain, and sandy soil environments. Cross country
terrain consists of open fields, broken ground, and uneven terrain.
AMENDMENT: 4.1.1

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ADDITION: Table 4.1.1.2(b) Fully Loaded Vehicle Performance Parameters (Table 4.1.1.2(a) does not apply).

**Vehicle Space Requirements - Overall Dimensions.** The maximum overall length, width, and height will be as indicated below, holding the overall dimensions to a minimum that is consistent with the best operational performance of the vehicle and the design concepts needed to achieve this performance and to provide maximum maneuverability.

Class 4/Table 1. Vehicle Space Requirements

Maximum Dimensions	Class 4
Length (inches)	
Width, including mirrors (inches)	
Height (inches)	

**AMENDMENT: Table 4.1.1.2(b) Fully Loaded Vehicle Performance Parameters.** 

Conduct the Evasive Maneuver test at 35 MPH.

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1460 1461	ADDITION: Table 4.1.1.2(d) Agent System Performance Parameters (Table 4.1.1.2(c) does not apply).
1462 1463	Item 2d, Ground Sweep Nozzles. Ground sweep nozzles are not an approved option.  The primary agent discharge location will be the
1464	The complementary agent discharge location will be the
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1468	EXCEPTION: 4.1.2
1469	Not applicable.
1470	AMENDMENT: 4.1.3
1471 1472	All Class 4 vehicles are required to carry a complementary agent in addition to the primary agent.
1473	AMENDMENT: 4.1.5
1474	Only those options specifically identified herein may be specified.
1475 1476	NFPA 414, 4.2 Requirements for All Aircraft Rescue and Fire-Fighting Vehicles — Responsibility of Contractors/Suppliers.
1477	ADDITION: 4.2.1 Certification.
1478 1479 1480 1481 1482 1483	Quality of Workmanship. The vehicle, including all parts and accessories, will be fabricated in a thoroughly workmanlike manner. Particular attention will be given to freedom from blemishes, burrs, defects, and sharp edges; accuracy of dimensions, radii of fillets, and marking of parts and assemblies; thoroughness of welding, brazing, soldering, riveting, and painting; alignment of parts; tightness of fasteners; et cetera. The vehicle will be thoroughly cleaned of all foreign matter.
1484 1485	<b>Warranty.</b> The fire fighting unit will be covered by a minimum one year warranty after delivery, unless individual items have been warranted by their manufacturer.
1486	AMENDMENT: 4.2.2 Manuals.
1487 1488 1489	All manuals are required to be provided in digital format on media specified by the airport operator and optional hardcopy. Two complete sets of engine and transmission parts, service and operator's manuals will be packed with each vehicle.
1490	ADDITION: 4.2.2.3 Operator's Manual.
1491 1492 1493 1494	The operator's manual will include all information required for the safe and efficient operation of the vehicle, including fire extinguishing systems, equipment, and any special attachments or auxiliary support equipment. As a minimum, the operator's manual will include the following:

The location and function of all controls and instruments will be illustrated and 1495 functionally described. 1496 • Safety information that is consistent with the safety standards established by the 1497 Occupational Safety and Health Administration (OSHA) and NFPA. 1498 • All operational and inspection checks and adjustments in preparation for placing the 1499 vehicle into service upon receipt from the manufacturer. 1500 1501 Tie down procedures for transport on a low-boy trailer. Warranty information and the period of the warranty coverage for the complete 1502 vehicle and for any component warranty that exceeds the warranty of the complete 1503 vehicle. Addresses and telephone numbers will be provided for all warranty 1504 providers. 1505 • General description and necessary step-by-step instructions for the operation of the 1506 vehicle and its fire extinguishing system(s) and auxiliary equipment. 1507 • A description of the post-operational procedures (draining, flushing, re-servicing, 1508 etcetera). 1509 • Daily maintenance inspection checklists that the operator is expected to perform, 1510 including basic troubleshooting procedures. 1511 Disabled vehicle towing procedures. 1512 Procedures and equipment required for changing a tire. 1513 Schedules (hours, miles, time periods) for required preventative maintenance and 1514 required periodic maintenance. 1515 • Line art drawing of the vehicle, including panoramic views (front, rear, left, and right 1516 sides) showing basic dimensions and weights (total vehicle and individual axle 1517 weight for the unloaded and fully loaded vehicle). For the purposes of this AC, 1518 "unloaded" is defined as a lack of agent, occupants and compartment load, and 1519 "loaded" is defined as including agent, occupants and compartment load. 1520 ADDITION: 4.2.2.4 Service Manual. 1521 The service manual will contain current, voltage, and resistance data; and describe all test 1522 1523 procedures. The service manual will contain at least the following, where applicable: 1524 Fire fighting system schematic(s). 1525 Hydraulic schematic. 1526 Pneumatic schematic. 1527

Electrical schematic.

• Fuel schematic.

Winterization schematic.

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• Schedules for required preventative maintenance and required periodic maintenance. 1531 • Lubrication locations, procedures, and intervals for parts of the vehicle and 1532 1533 equipment that require lubrication. **ADDITION: 4.2.2.4.6** 1534 The service manual will contain a table of contents as well as an alphabetical subject 1535 index. 1536 NFPA 414, 4.2.2.5 Parts Manual. 1537 **ADDITION: 4.2.2.5.1** 1538 The parts list will include any special equipment. 1539 **ADDITION: 4.2.2.5.2** 1540 Any special test equipment will be identified. 1541 **AMENDMENT: 4.2.2.5.7** 1542 All purchased parts will be cross-referenced with the original equipment manufacturers' 1543 (OEM) name and part number. The parts manual will contain a list of all of the 1544 component vendor names, addresses, and telephone numbers referenced in the parts list. 1545 1546 NFPA 414, 4.2.3 Metal Finish. **ADDITION: 4.2.3.1** 1547 Vehicles will be painted and marked in accordance with AC 150/5210-5, *Painting*, 1548 1549 Marking, and Lighting of Vehicles Used on an Airport. The interior finish of all compartments will be based on the manufacturer's standard production practice. This 1550 may include painting, texturing, coating or machine swirling as determined by the 1551 manufacturer. All bright metal and anodized parts, such as mirrors, horns, light bezels, 1552 tread plates, and roll-up compartment doors, will not be painted. All other paintable 1553 surfaces will be painted in the appropriate yellow-green color specified in AC 150/5210-1554 1555 5. NFPA 414, 4.2.4 Lettering, Numbering, and Striping. 1556 **ADDITION: 4.2.4** 1557 1558 **Lettering.** The manufacturer will apply the airport's 'Name' and 'Insignia' (if available) in a contrasting color or by decal on both sides of the vehicle in long radius elliptical 1559 arches above and below the lettering center line. The size of the lettering will be a 1560 minimum of 2½-inches to a maximum of 6-inches. Reflective lettering is allowed if the 1561 material is the same as that which is used for the reflective stripe (as specified in AC 1562 150/5210-5). 1563

1564	<b>AMENDMENT: 4.2.4.5, 4.2.4.6</b>
1565	Vehicle numbering, lettering, and striping will conform with AC 150/5210-5.
1566	ADDITION: 4.2.5 Vehicle Information Data Plate.
1567 1568	A second permanently marked identification plate will be securely mounted at the driver's compartment. The identification plate will contain the following information:
1569	NOMENCLATURE
1570	MANUFACTURER'S MAKE AND MODEL
1571	MANUFACTURER'S SERIAL NUMBER
1572	VEHICLE CURB WEIGHT: Ibs.
1573	PAYLOAD, MAXIMUM: lbs.
1574	GROSS VEHICLE WEIGHT (GVW): lbs.
1575	FUEL CAPACITY AND TYPE: gal.
1576	DATE OF DELIVERY. (month and year)
1577	.WARRANTY. (months and miles)
1578	CONTRACT NUMBER
1579	PAINT COLOR AND NUMBER
1580 1581	A single plate that combines or contains the information required for both plates is acceptable.
1582 1583	AMENDMENT: Figure 4.2.5 Aircraft Rescue and Fire-Fighting Vehicle Tilt Table Certification per NFPA 414.
1584	Replace NFPA 414 Figure 4.2.5 with the figure below.
1585	Manufacturer
1586	Vehicle Make and Model
1587	Year of Manufacture
1588	Drive Type $\Box 4 \times 4$ $\Box 6 \times 6$
1589	This vehicle was tested todegrees while on a tilt table in the "pump down" position
1590	This vehicle was tested todegrees while on a tilt table in the "pump up" position
1591	Was a trip / slip rail used? ☐ Yes ☐ No.
1592	If yes, what is the height of the rail? (Maximum 2 ")
1593	Date of TestLocation of Test
1594	Vehicle Empty Weight (lbs.)
1595	Maximum Gross Weight (lbs.)

1596	Special equipment installed prior to	test
1597	Front axle loading*	(Lbs.)
		(Lbs.)
1598	Rear axle loading*	(Los.)
1599	Tire manufacturer	
1600	Tire model	
1601	Front Tire pressure	(psi)
1602	Rear Tire pressure	(psi) Front wheel track(in.)
1603	Rear wheel track	(in.)
1604	Crew capacity	(Number of personnel)
1605	Fuel tank capacity	(gal.)
1606	Equipment allowance	(lb.)
1607	Water tank capacity	(gal.)
1608	Foam tank capacity	(gal)
1609	Complementary agent capacity (if a	pplicable)(lb.)
1610	*The "loading" is in accordance wi	ith the definition of a fully loaded vehicle as presented in
1611	NFPA 414	
1612	NFPA 414, 4.3 Weights and Dimensions, 4.3.2 Dimensions.	
1614	ADDITION: 4.3.2.2 Field of V	ision.
1615		rill provide not less than 60° horizontal rotational viewing
1616		a clear view of the area ahead of the vehicle and to
1617 1618	<u> -</u>	ts, a rectangular mirror will be installed on the lower corner ld, having a minimum area of 35 square inches.
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1622	<b>NFPA 414, 4.4 Engine.</b>	
1623	<b>ADDITION: 4.4</b>	
1624		nsmission operate efficiently and without detrimental effect
1625	· · · · · · · · · · · · · · · · · · ·	ts when lubricated with standard, commercially available
1626 1627	manufacturers.	e recommendations of the engine and transmission
1628		ansmission fluid filters are of the full-flow type with a
1629	replaceable spin-on element.	· · · · · · · · · · · · · · · · · · ·

1630	ADDITION: 4.4.1.1 Engine Characteristics.
1631 1632 1633	<b>Engine.</b> The vehicle will have a turbocharged diesel engine(s) that is certified to comply with the Environmental Protection Agency (EPA) and state laws for off-highway emission requirements at the time of manufacture.
1634	<b>AMENDMENT: 4.4.1.2.3</b>
1635 1636	Elevation. The vehicle, including the pumping system, will be designed for operation up to feet above sea level.
1637	ADDITION: 4.4.2 Engine Cooling Systems.
1638	A label will be installed near the engine coolant reservoir reading "Engine Coolant Fill."
1639	<b>SELECTION: 4.4.2.3.3</b>
1640	Radiator shutters.
1641	
1642	NFPA 414, 4.4.3 Fuel Systems.
1643	<b>ADDITION: 4.4.3.4</b>
1644 1645 1646 1647 1648	Each fuel tank will have a fill opening readily accessible to personnel standing on the ground and designed to prevent fuel splash while refueling. If more than one tank is furnished, means will be provided to ensure equalized fuel level in both tanks. An overturn fuel valve will be provided for each tank to prevent spillage in the event of a rollover. Prominently label each fuel tank "Diesel Fuel Only."
1649	NFPA 414, 4.4.4 Exhaust Systems.
1650	<b>ADDITION: 4.4.4.1</b>
1651 1652 1653	The muffler(s) will be constructed of aluminized steel or stainless steel. Exhaust system outlet(s) will be directed upward or to the rear, away from personnel accessing equipment compartments, wiring, hydraulic lines and from the engine air intake.
1654	NFPA 414, 4.5 Vehicle Electrical System.
1655	ADDITION: 4.5
1656	The vehicle will have a 12-volt electrical and starting system.
1657 1658	The minimum continuous electrical load will include operation of the air conditioning system.
1659	ADDITION: 4.5.1 Electrical Systems and Warning Devices.
1660 1661	<b>Batteries.</b> Batteries will be of the maintenance-free type; addition of water will not be required during normal service life. The battery cover and vent system will be designed

1662 1663	to prevent electrolyte loss during service and to keep the top of the battery free from electrolyte.
1664	Battery compartment. The batteries will be installed in a protected compartment.
1665	ADDITION: 4.5.2 Battery Chargers.
1666 1667	Line voltage electrical system. A 50 foot long, three wire, 15 amp rated, 110 volt, AC power cable, with straight blade (non twist-lock) connectors, will be provided.
1668	<b>AMENDMENT: 4.5.2.2, 4.5.4.5</b>
1669 1670 1671	The battery charger/conditioner will be powered from a covered, polarized, insulated, labeled, recessed (flush mounted), male, auto-eject receptacle. The connection will be located on the exterior of the vehicle at the rear or on either side of the vehicle.
1672	AMENDMENT: 4.5.4
1673 1674 1675 1676 1677 1678 1679 1680 1681	Battery charger or conditioner. The vehicle will have a DC taper type battery charger or an automatic battery conditioner, providing a minimum 12 amp output. The charger/conditioner will be permanently mounted on the vehicle in a properly ventilated, accessible location. The charger/conditioner will be powered from the electrical shoreline receptacle. A charging indicator will be installed next to the receptacle. When a battery conditioner is provided, the conditioner will monitor the battery state of charge and, as necessary, automatically charge or maintain the batteries without gassing, depleting fluid level, overheating, or overcharging. A slave receptacle will be provided at the rear or on either side of the vehicle cab.
1682	AMENDMENT: 4.5.4.1
1683 1684	<b>Electrical shoreline connection.</b> The battery charger will be supplied from an external power source of 110 volts AC.
1685	NFPA 414, 4.6 Vehicle Drive.
1686	AMENDMENT: 4.6
1687	Transmission. A fully automatic transmission will be provided.
1688	ADDITION: 4.6
1689 1690 1691	Provide an accessible means of lubrication for all moving parts requiring routine lubrication. Ensure there are no pressure lubrication fittings where their normal use would damage grease seals or other parts.
1692	<b>ADDITION: 4.6.4.1</b>
1693 1694 1695	If the driveline is equipped with a differential locking control, a warning/caution label will be placed in view of the driver indicating the proper differential locking/un-locking procedures.

1696	NFPA 414, 4.7 Suspension.
1697	ADDITION: 4.7
1698 1699 1700 1701	<b>Suspension.</b> Provide an off-road, high-mobility suspension system resulting in no more than $0.5  G_{rms}$ acceleration at the driver's seat of the vehicle when traversing an 8-inch diameter half round at 35 mph. The suspension design by which the manufacturer meets the suspension performance requirements is at the manufacturer's discretion.
1702	NFPA 414, 4.8 Rims, Tires, and Wheels.
1703	ADDITION: 4.8
1704 1705	A spare tire and wheel assembly will be provided; however, the spare tire and wheel assembly are not required to be mounted on the vehicle.
1706	AMENDMENT: 4.8.2
1707 1708	<b>Tire selection.</b> The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies.
1709	AMENDMENT: 4.8.4
1710 1711	<b>Tires and wheels.</b> The vehicle will be equipped with single tires and wheels on the front axle and single or dual tires and wheels on the rear. Large tires required.
1712	Tire and wheel assemblies will be identical at all positions.
1713	NFPA 414, 4.9 Towing Connections.
1714	AMENDMENT: 4.9
1715	The tow connections may intrude into the angle of approach and angle of departure.
1716	ADDITION: 4.9
1717 1718 1719	The vehicle will be provided with a towing device. The maximum towing capacity of the vehicle will be labeled on the vehicle dashboard and at the towing device location.
1720	NFPA 414, 4.10 Brakes.
1721	ADDITION: 4.10
1722 1723	Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped with air brakes.
1724 1725 1726 1727 1728 1729	All components of the braking system will be installed in such a manner as to provide adequate road clearance when traveling over uneven or rough terrain, including objects liable to strike and cause damage to the brake system components. No part of the braking system will extend below the bottom of wheel rims, to ensure, in case of a flat tire, that the weight of the vehicle will be supported by the rim and the flat tire and not be imposed on any component of the braking system.

1730	NFPA 414, 4.12 Cab.
1731	ADDITION: 4.12
1732	The vehicle will have a cab constructed of materials which are corrosion resistant, such
1733	as aluminum, stainless steel, or glass reinforced polyester construction. A tilt steering
1734	column will be provided. The cab will have a watertight roof hatch for emergency exit
1735	out of the cab.
1736	<b>ADDITION: 4.12.1.5</b>
1737	Seat belts. Each seat will be provided with a Type 3 seat belt assembly (i.e., 3-point
1738	retractable restraint) in accordance with Code of Federal Regulations (CFR) 49 CFR
1739	571.209. Ensure seat belts are long enough to accommodate crew members in full
1740	Personal Protective Equipment (PPE).
1741	<b>ADDITION: 4.12.1.7</b>
1742	Cab entry and exit features. The cab will have doors. At least one grab handle
1743	will be provided for each crew member, located inside the cab for use while the vehicle is
1744	in motion. The lowermost step(s) will be no more than 22 inches above level ground
1745	when the vehicle is fully loaded.
1746	ADDITION: 4.12.2 Cab Visibility
1747	The windshield and windows will be tinted. Each door window will be capable of being
1748	opened far enough to facilitate emergency occupant escape in the event of a vehicle
1749	accident. The vehicle windows will have control system.
1750	ADDITION: 4.12.4 Instruments, Warning Lights, and Controls.
1751	All instruments and controls will be designed to minimize windshield glare. All controls
1752	located on the exterior of the vehicle will be labeled.

1753	<b>ADDITION: 4.12.4.4</b>
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1771 1772	<b>Instruments and warning lights.</b> The following will also be provided within convenient reach of the seated driver:
1773	Master warning light control switch,
1774	<ul> <li>Work light switch(es), and</li> </ul>
1775	• Compartment "Door Open" warning light and intermittent alarm that sounds when a
1776 1777	compartment door is open and the parking brakes are released or the transmission is in any position other than neutral.
1778	ADDITION: 4.12.4.5
1779	Power window controls.
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1783	<b>SELECTION: 4.12.4.7</b>
1784	DEVS option. A DEVS system, including a Low-Visibility Enhanced Vision Subsystem
1785	and optional systems as noted below, if any, meeting FAA Advisory Circular 150/5210-
1786	19, Driver's Enhanced Vision System (DEVS), will be provided.
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1799	AMENDMENT: 4.12.4.7.2
1800	<b>DEVS system requirements.</b> AC 150/5210-19 will be met in its entirety.
1801	AMENDMENT: 4.12.4.8, 4.12.4.9
1802	FLIR system requirements. AC 150/5210-19 will be met in its entirety.
1803	NFPA 414, 4.12.5 Equipment.
1804	<b>ADDITION:</b> 4.12.5.1(1)
1805	Climate control system. The climate control system will induct at least 60 cubic feet per minute of fresh
1806 1807	air into the cab, but will include a "recirculation" setting that prevents induction of outside air. Cab mounted components will be protected from inadvertent damage by personnel.
1808	ADDITION: 4.12.5.1(2)
1809	<b>Driver's seat.</b> The driver's seat will be provided with a backrest and a remote-mounted
1810	bracket designed to store a Self-Contained Breathing Apparatus (SCBA).
1811	ADDITION: 4.12.5.1(3)
1812	Crew Seats. The turret operator's seat, located to the right front of the driver's seat, will
1813	be a fixed (non-suspension) type. It will be provided with a backrest and a remote-
1814 1815	mounted bracket designed to store a Self-Contained Breathing Apparatus (SCBA). When a four (4) door vehicle is selected, the rear seat will be the bench type.
1013	a four (1) door verified is selected, the fear seat will be the belief type.

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Windshield washers. The vehicle will be equipped with a powered windshield washer system, including an electric fluid pump, a minimum one gallon fluid container, washer nozzles mounted to the wiper arms (wet arms), and a momentary switch.

**ADDITION: 4.12.5.1(5)** 

Windshield wipers. The vehicle will be equipped with electrically powered windshield wiper(s). The wiper arm(s) and blade(s) will be of sufficient length to clear the windshield area described by Society of Automotive Engineers (SAE) J198, Windshield Wiper Systems - Trucks, Buses, and Multipurpose Vehicles. Individual wiper controls will include a minimum of two speed settings and an intermittent setting. The wiper blades will automatically return to a park position, out of the line of vision.

**ADDITION: 4.12.5.1(10)** 

**Interior lighting.** Cab interior light levels will be sufficient for reading maps or manuals.

**SELECTION: 4.12.5.1(11)** 1831

> Self-Contained Breathing Apparatus (SCBA) mounting. The vehicle will have SCBA equipment from the following manufacturer: mounting to secure

**AMENDMENT: 4.12.5.1(12)** 1835

> Forward Looking Infrared (FLIR). The FLIR monitor will be located in a position where it is visible to both the seated driver and turret operator. All components of the FLIR system will be in accordance with AC 150/5210-19.

SELECTION: 4.12.7 1839

Monitoring and Data Acquisition System (MADAS).

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**ADDITION: 4.12.7.2** 

**Data retention.** Design the data acquisition system 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.

**ADDITION: 4.12.8** 1846

Lateral accelerometer. The vehicle will be equipped with a lateral accelerometer.

1848	NFPA 414, 4.13 Body.
1849	ADDITION: 4.13
1850 1851 1852	<b>Reduction of potential foreign object damage.</b> All loose metal parts, such as pins, will be securely attached to the vehicle with wire ropes or chains. Removable exterior access panels, if provided, will be attached with permanent captive fasteners.
1853 1854 1855	<b>License plate bracket.</b> A lighted license plate bracket will be provided at the rear and front of the vehicle and will comply with state law. The location of the front bracket will be placed so as not to interfere with the operation of fire fighting systems.
1856	The vehicle will have a corrosion-resistant body.
1857	ADDITION: 4.13.3
1858 1859	<b>Compartments.</b> The vehicle body will have storage compartments with a minimum 20 cubic feet of enclosed storage space.
1860 1861 1862 1863 1864 1865	Compartment doors. Storage compartments will have clear anodized aluminum, counterbalanced, non-locking, roll-up or single hinged doors as determined by the manufacturer. Door latch handles on roll-up doors will be full-width bar type. Door straps will be provided to assist in closing the compartment doors when the rolled up or hinged door height exceeds six feet above the ground. Door locks required.
1866 1867 1868 1869	<b>Scuffplates.</b> Replaceable scuffplates will be provided at each compartment threshold to prevent body damage from sliding equipment in and out of the compartments. The scuffplates will be securely attached to the compartment threshold but will be easily replaceable in the event of damage.
1870	<b>Drip rails.</b> Drip rails will be provided over each compartment door.
1871 1872 1873 1874 1875 1876 1877 1878 1879	<b>Shelves.</b> An adjustable and removable compartment shelf will be provided for every 18 inches of each vertical storage compartment door opening. Shelving adjustments will require no more than common hand tools and will not require disassembly of fasteners. Shelves will support a minimum of 150 lbs without permanent deformation. Each shelf will be accessible to crew members standing on the ground or using a pull out and tip-down configuration for shelving over 54 inches from the ground. Access to any shelf over 54 inches from the ground will be facilitated by the installation of a pull-out step and grab rail. Each shelf will have drain holes located so as to allow for drainage of any water from the stowed equipment.
1880 1881	<b>Drainage mats.</b> Each compartment floor and shelf will be covered with a removable black mat designed to allow for drainage of any water from the stowed equipment.
1882 1883 1884 1885	SCBA storage tubes. A single compartment or tubes for storage of four SCBA bottles will be provided. If tubes are provided, two will be installed on each side of the vehicle. The tubes will be of sufficient size to accommodate the procuring agencies SCBA cylinders.

## **ADDITION: 4.13.3(3)**

Compartment lights. Waterproof white lighting sufficient to provide an average minimum illumination of 1.0 footcandle will be provided in each compartment greater than 4.0 cubic feet and having an opening greater than 144 square inches. Where a shelf is provided, this illumination will be provided both above and below the shelf. All compartments will be provided with weatherproof lights that are switched to automatically illuminate when compartment doors are opened and the vehicle master switch is in the 'on' position. Light switches will be of the magnetic (non-mechanical) type.

#### **ADDITION 4.13.4**

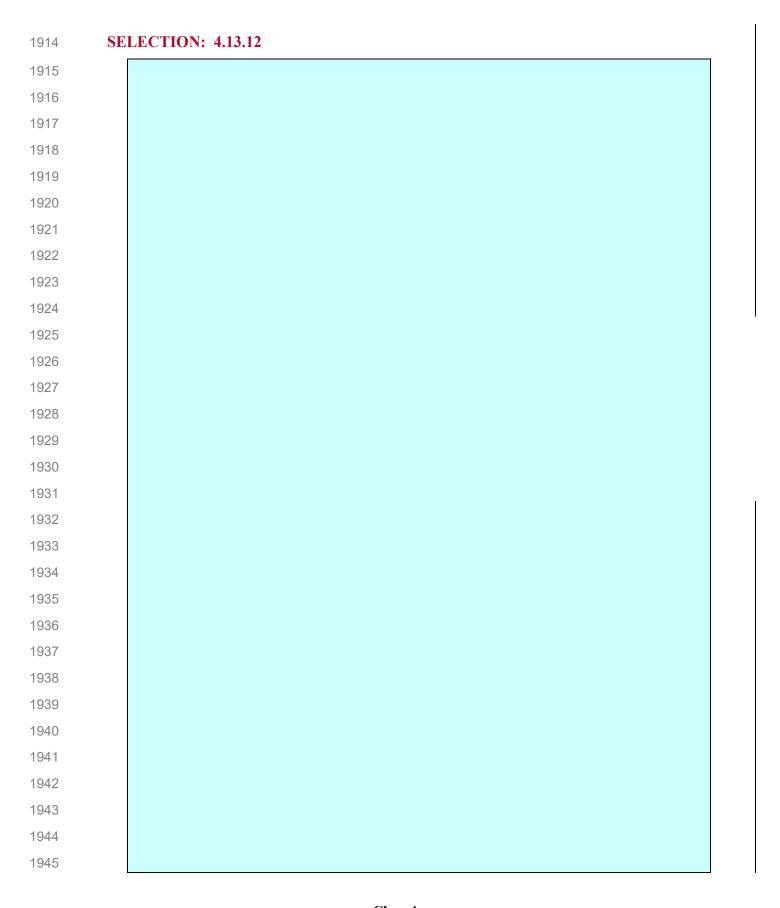
**Slip Resistance.** Provide a working deck that is reinforced and constructed of, or covered with, a slip-resistant material that is reinforced adequately to allow the crew to perform its duties in the primary turret area, cab hatch area, water tank top fill area and foam-liquid top fill area, and in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

#### **AMENDMENT: 4.13.6.3**

**Steps or ladders.** The lowermost step(s) or ladder rungs will be no more than 20 inches above level ground when the vehicle is fully loaded. A tubular style running board or custom step will be provided at each vehicle door location.

### **ADDITION: 4.13.6.4, 4.25.1**

**Ladder, step, walkway, and area lights.** Non-glare white or amber lighting will be provided at ladders and access steps where personnel work or climb during night operations. In addition, ground lighting will be provided. Ground lights will be activated when the parking brake is set in accordance with AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.* These area lights will be controlled with three-way switches on the cab instrument panel and near the light sources. Ensure The switch located in the cab is a master switch that turns on before auxiliary switches near the light sources are operational.



## NFPA 414, 4.14 Fire-Fighting Systems and Agents.

#### **ADDITION: 4.14**

**Agent system.** The fire fighting agent system may consist of a series of selected agents (dry chemical, approved clean agents, compressed air foam, and foam) as indicated in this section. Multiple agent delivery systems may be used to dispense agents simultaneously. The delivery system used to dispense and apply agent for multiple agent delivery systems will comply with Class 4/Table 2, Foam/Dry Chemical/Clean Agent Simultaneous Delivery System.

### Class 4/Table 2. Foam/Dry Chemical/Clean Agent Simultaneous Delivery System

**Note:** The agent delivery rates in this table are allowed by the FAA as a result of independent third-party demonstrations of fire suppression capability of a Foam/Dry Chemical/Clean Agent Simultaneous Delivery System.

Hand Line and Turret Performance Criteria	Class 4 Vehicles
Foam Performance	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)
Dry Chemical and Clean Agent Performance	
Hand line discharge rate	5.0 to 8.0 lbs/sec
Hand line discharge rate with foam	5.0 to 8.0 lbs/sec
Hand line discharge rate with foam and clean agent	5.0 to 6.0 lbs/sec
Dry Chemical Hand Line Range	≥ 90 ft (27.5 M)
Clean Agent Hand Line Range	≥ 40 ft
Clean Agent Inside Hose Diameter	≥ 1/4 inch
Hose Length	See NFPA 414, 2020 Edition,
-	Table 4.1.1.2(d)
Turret discharge rate	≥ 16 lbs/sec
Turret Range	≥ 100 ft
Turret Width	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)

**Note:** The agent delivery rates in this table are allowed as a result of independent third-party demonstrations of fire suppression capability of a foam/dry chemical/clean agent simultaneous delivery. (Evaluation of Quad-Agent Small Fire Fighting System DOT\FAA\AR-TN06\13.)

### NFPA 414, 4.15 Agent Pump(s) and Pump Drive.

#### **ADDITION: 4.15**

Intake connections. The vehicle will be equipped with one valved  $2\frac{1}{2}$ -inch suction intake connection. The inlet will be capable of drafting or operating from a hydrant source located at the operator's pump panel. The  $2\frac{1}{2}$ -inch intake connection will have rocker lug female National Hose threads, a quarter-turn control valve, a bleeder valve, a strainer, and a plug. All valves will be labeled "open" or "closed".

### **AMENDMENT: 4.15.1.1**

**Agent (fire) pump.** The centrifugal pump will be selected by the manufacturer.

1970	
1971	ADDITION: 4.15.1.1.1
1972 1973	<b>Priming pump.</b> The vehicle will be equipped with a priming pump. For vehicles equipped with a pre-mixed pressurized foam system, a priming pump is not required.
1974	ADDITION: 4.15.3 Tank-to-Pump Connections.
1975	A check valve and shutoff valve will be provided in each tank to pump line.
1976	AMENDMENT: 4.15.4 Discharge Connections.
1977 1978 1979 1980	All fire pump supplied agents will be delivered to the bumper turret and preconnected handlines and/or duel agent handline hose reel. A dual agent hose reel or two 1¾ -inch discharge connections (preconnected handlines) with male National Hose threads will be provided.
1981	<b>EXCEPTION: 4.15.6 Overheat Protection.</b>
1982 1983	Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.
1984	NFPA 414, 4.16 Water Tank, 4.16.1 Water Tank Capacity.
1985	AMENDMENT: 4.16.1.1
1986 1987 1988 1989	Water tank. The vehicle will have a baffled water tank with a manufacturer certified minimum capacity of at least 100 gallons. The tank will store water or premixed agent. A copy of the manufacturer's certification certificate will be provided for verification upon acceptance testing.
1990	ADDITION: 4.16.2.1
1991 1992 1993 1994	<b>Water tank construction.</b> The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP). All materials used will be capable of storing water, foam concentrate, and water/foam solutions. The water tank will have a lifetime warranty.
1995	<b>ADDITION: 4.16.2.2</b>
1996 1997 1998 1999	<b>Water tank drain.</b> The water tank will incorporate a drain and drain valve. The valve will be on the left side of the vehicle and controlled by a crew member standing on the ground. The drain line will be 2-inch internal diameter (I.D.) minimum. The point for discharge for the water tank drain will be below the under-vehicle body panels.
2000	<b>EXCEPTION:</b> 4.16.2.2(1)
2001	Manhole covers. Manhole covers are not required.

2002	<b>ADDITION: 4.16.2.3.3</b>
2003 2004	<b>Drains.</b> Drainage from the vent and overflow system will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.
2005	ADDITION: 4.16.2.5
2006	Water tank top fill opening. The fill opening, located, may be
2007 2008	incorporated as part of a manhole cover, and will be sized to accommodate a $2\frac{1}{2}$ -inch fill hose.
2009	<b>EXCEPTION: 4.16.2.6</b>
2010	This paragraph does not apply.
2011	AMENDMENT: 4.16.3.2
2012	Water tank fill connections. The water tank will incorporate one 2½-inch rocker lug
2013	female National Hose thread connection on each side of the vehicle. Each connection
2014	will be fitted with a 30° or 45° turn-down fitting. The water fill will allow external re-
2015	supply of the water tank during discharge pumping operations.
2016	<b>EXCEPTION: 4.16.3.4</b>
2017	Water tank fill connection size. This paragraph does not apply.
2018	NFPA 414, 4.17 Foam System.
2019	ADDITION: 4.17
2020	Foam transfer pump. A foam transfer pump will be provided and mounted in a
2021	compartment on the vehicle. The pump will be capable of transferring and drawing foam
2022	liquid concentrate at adjustable flow rates up to 10-gpm directly through the pump and
2023	loading connection. All materials and components that come in contact with the foam
2024	will be compatible with the foam concentrate. The pump and its plumbing will have
2025	provisions for flushing with water from the water tank. A length of hose with appropriate
2026	connections will be provided for filling the foam tank from an external foam storage
2027	container.
2028	ADDITION: 4.17.1 Foam-Liquid Concentrate Tank(s).
2029	The foam tank will incorporate a drain and drain valve. The valve will be on the left side
2030	of the vehicle and controlled by a crew member standing on the ground. The drain line
2031	will have a minimum 1½-inch I.D. The foam tank drain outlet will be located so that the
2032	contents of the tank can be drained into 5-gallon cans and 55-gallon drums.
2033	AMENDMENT: 4.17.1.1
2034	Percent concentrate.
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The foam concentrate tank(s) will have a manufacturer certified working capacity 2036 sufficient for two tanks of water at the maximum tolerance specified in NFPA 412, 2037 Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment, for 3 to 6 2038 percent foam concentrate. 2039 **AMENDMENT: 4.17.1.2** 2040 Foam tank construction. The foam tank will be constructed of passivated stainless 2041 2042 steel, polypropylene, or GRP. **ADDITION: 4.17.1.6** 2043 2044 Foam tank top fill trough. The top fill trough will be readily accessible to at least two crew members on top of the vehicle. The top fill trough will incorporate a cover, latch, 2045 and sealed so as to prevent spillage under any operating condition. The top fill trough 2046 will be designed to allow one standard 5-gallon foam concentrate container to be 2047 emptied. The fill opening will have a minimum opening of 5-inches. The top fill trough 2048 will incorporate readily removable, rigidly constructed 10 mesh stainless steel, brass, or 2049 polyethylene strainers. All components in and around the top fill trough will be 2050 2051 constructed of materials that resist all forms of deterioration that could be caused by the foam concentrate or water. 2052 **ADDITION: 4.17.1.7** 2053 Foam tank fill connections. The foam tank will incorporate a 1.5-inch National Hose 2054 thread female hose connection on of the vehicle to permit 2055 filling by an external transfer hose at flow rates up to 25-gpm. The connections will be 2056 2057 provided with chained-on long handled plugs or rocker lug plugs. The top of the connections will be no higher than 48 inches above the ground and readily accessible. 2058 The fill lines will incorporate readily removable, rigidly constructed strainers. All 2059 components in the foam tank fill system will be constructed of materials that resist all 2060 forms of deterioration that could be caused by the foam concentrate or water. 2061 2062 **ADDITION: 4.17.1.9** Foam tank vent and overflow system. The foam tank will incorporate an overflow 2063 system to relieve excess liquid in the event of tank overfill. The vent and overflow 2064 system will prevent leakage of foam when the tank is filled to capacity and the vehicle is 2065 2066 operating on the maximum side slopes and grades specified herein. As specified for the vent system, drainage from the overflow system will not flow over body panels or other 2067 vehicle components. Drainage from the vent and overflow systems will not be in front of 2068 or behind any of the tires. Tank vent hoses will be of the non-collapsible type. 2069 2070 NFPA 414, 4.17.3 Foam-Liquid Concentrate Piping. 2071 **ADDITION: 4.17.3.1** Foam concentrate piping. All metallic surfaces of the piping and associated 2072

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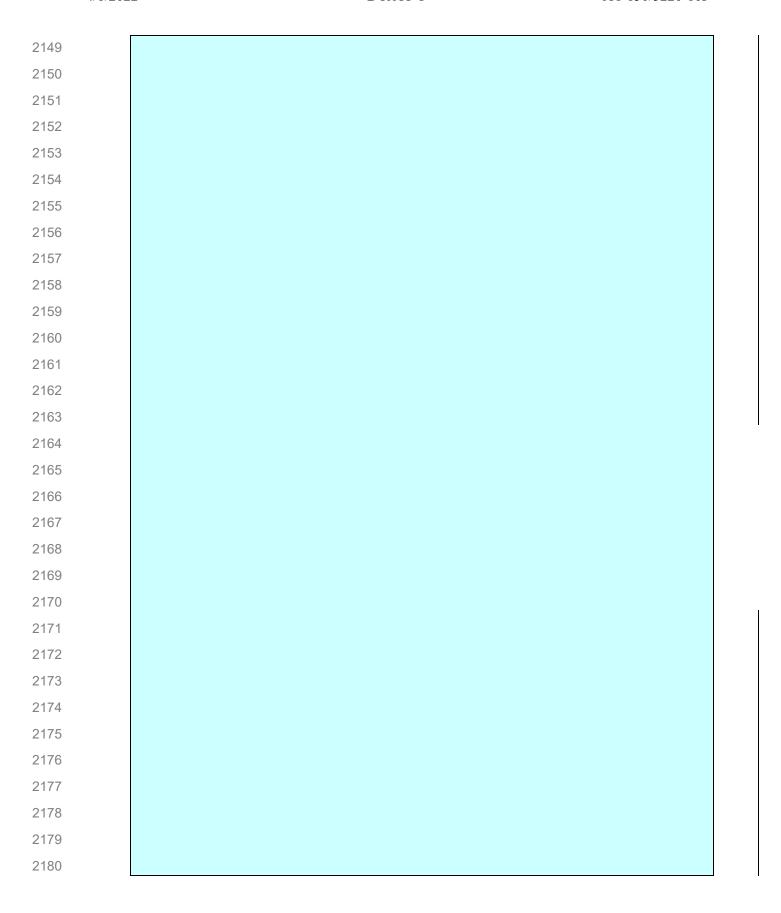
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passivated stainless steel.

components that come into contact with the foam concentrate will be of brass, bronze, or

2075	NFPA 414, 4.17.4 Foam Proportioning Systems.
2076	ADDITION: 4.17.4
2077	The vehicle will be equipped with a proportioning system for foam.
2078	<b>ADDITION: 4.17.4.1</b>
2079 2080	<b>Foam concentrate proportioning system.</b> The system will automatically and uniformly proportion water foam concentrate.
2081	NFPA 414, 4.18 Premixed Foam Solutions.
2082	ADDITION: 4.18
2083	A premixed foam solution be used.
2084	NFPA 414, 4.19 Turret Nozzles.
2085	SELECTION: 4.19.4.1, 4.19.4.2
2086	Manually operated or power assisted turret.
2087	
2088	SELECTION: 4.19.4.2(4)
2089 2090	Manual override or secondary parallel controls powered by an alternative source of all roof turret movement functions.
2091	
2092	AMENDMENT: 4.19.6
2093 2094 2095	If the boom-mounted turret is on a rotational base, it will meet the following design and functional requirements: The boom-mounted turret must be equipped with a visual indicator to the operator as the inner boom section is extended.
2096	NFPA 414, 4.20 Preconnected Handlines.
2097	ADDITION: 4.20
2098	A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. A control for charging each handling will be provided for appretion
2099	fully deployed. A control for charging each handline will be provided for operation.
<ul><li>2099</li><li>2100</li></ul>	AMENDMENT: 4.20.2

2103	NFPA 414, 4.21 Turret, Ground Sweep, and Undertruck Nozzles.
2104	ADDITION: 4.21.1
2105	
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2113	EXCEPTION: 4.21.3
2114	Undertruck nozzles are not an approved option.
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2116	NFPA 414, 4.23 Approved Clean Agent.
2117	SELECTION: 4.23.1.1.1
2118	Reservice kit.
2119	
2120	NFPA 414, 4.24 Dry Chemical Turret.
2121	Selection: 4.24.1 Auxiliary Agent Discharge.
2122	
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2126	Agent discharge locations.
2127	The primary agent discharge location will be the
2128	The complementary agent discharge location will be the



2181	NFPA 414, 4.25 Lighting and Electrical Equipment.
2182	ADDITION: 4.25.1
2183 2184 2185	<b>Auxiliary Power Receptacles.</b> The vehicle will have 2-12-volt auxiliary power receptacles mounted adjacent to the driver and crew member positions, preferably in the instrument panel.
2186	ADDITION: 4.25.1
2187 2188 2189	<b>Spot/Floodlights.</b> Two spot/floodlights will be attached at the end of the bumper turret assembly. The lights will illuminate the area covered by the turret. The lights will be switched from inside the cab. lights will be used.
2190 2191 2192	Floodlights. Two floodlights with adjustment knuckles will be provided. One light will be mounted on the left and right sides of the vehicle. lights will be used.
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2197 2198 2199 2200	Scene Lights. A total of six high mounted floodlights will be provided to illuminate the work areas around the vehicle. Two lights will be mounted on each side and two will be mounted in the rear of the vehicle. Each pair of lights will be controlled by a switch mounted on the side or rear of the vehicle. lights will be used.
2201	ADDITION: 4.25.1(1)
2202 2203	<b>Headlight flashing system.</b> A high beam, alternating/flashing, headlight system will be provided. The headlight flasher will be separately switched from the warning light panel.
2204	AMENDMENT: 4.25.2
2205 2206	<b>Siren.</b> The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control.
2207	ADDITION: 4.25.2.1
2208 2209	The siren speaker will be rated at 100 watts minimum and will be located in a guarded position as low and as far forward on the vehicle as practical.
2210	ADDITION: 4.25.2.2
2211 2212 2213	The siren unit will consist of the following functions as a minimum: "Radio," "PA," "Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and include a magnetic noise canceling microphone.

2214	AN	MENDMENT: 4.25.2.3		
2215 2216		The amplifier, microphone, and controls will be within reach of the driver and the turret operator. Siren activating foot switches will be located in front of the driver and the		
2217		turret operator.		
2218	AΓ	DITION: 4.25.4 Exterior Emergency Warning Lights.		
2219 2220		Each apparatus will have a system of optical warning devices that meet or exceed the requirements of (NFPA $1901 - 13.8$ ) Optical Warning Devices.		
2221	AΓ	DITION: 4.25.4.1		
2222		Optical Requirements for Larger Apparatus. If the apparatus has a bumper-to-bumper		
2223		length of 25' or more or has an optical center on any optical warning device greater than		
2224		8' above the ground the requirements of NFPA 1901 – 13.8.13.2 and 13.8.13.6 apply.		
2225				
2226	AΓ	DDITION: 4.25.4.2.2		
2227		Emergency warning light color. All emergency warning lights will meet the		
2228		requirements of AC 150/5210-5.		
2229	ADDITION: 4.25.5 Radios.			
2230	The vehicle will have two separate 30-amp circuits, with circuit breakers and at least 6-			
2231	foot long wires, routed to a space provided adjacent to the driver and turret operator for			
2232	purchaser provided radios and other electrical equipment. The wiring will be tagged to			
2233		indicate its purpose.		
2234	EXCEPTION: 4.25.5.1.2, 4.25.5.2			
2235		The provisioning of radios is an airport responsibility and not part of this specification.		
2236	IV	Product Conformance Provisions.		
2237	IV.1	Classification of Inspections.		
2238		The inspection requirements specified herein are classified as follows:		
2239	IV.1.1	Performance Inspection.		
2240		The vehicle will be subjected to the examinations and tests described in this Procurement		
2241 2242		Specification. The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.		
2243	IV.1.2	Conformance Inspection.		
2244		The vehicle will be subjected to the examinations and tests described in this Procurement		
2245		Specification. The contractor will provide or arrange for all test equipment, personnel,		
2246		and facilities.		

#### 2247 IV.2 Product Conformance.

The products provided will meet the performance characteristics of this Procurement Specification, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace. The purchaser reserves the right to require proof of such conformance.

# 2252 IV.3 <u>Technical Proposal.</u>

The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this Procurement Specification; a paragraph by paragraph response to the characteristics section of this Procurement Specification will be provided. The offeror/contractor will provide two copies of their commercial descriptive catalogs with their offer as supporting reference to the itemized technical proposal. The offeror/contractor will identify all modifications made to their commercial model in order to comply with the requirements herein. The vehicle furnished will comply with the "commercial item" definition of FAR 2.101 as of the date of award. The purchaser reserves the right to require the offeror/contractor to prove that their product complies with the referenced commerciality requirements and each conformance/performance characteristics of this Procurement Specification.

# IV.4 <u>Inspection Requirements.</u>

### **IV.4.1 General Inspection Requirements.**

Apparatus used in conjunction with the inspections specified herein will be laboratory precision type, calibrated at proper intervals to ensure laboratory accuracy.

#### 2268 IV.4.2 Test Rejection Criteria.

Throughout all tests specified herein, the vehicle will be closely observed for the following conditions, which will be cause for rejection:

- Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.
- Any spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any condition, except as allowed herein.
- Structural failure of any component, including permanent deformation, or evidence of impending failure.
- Evidence of excessive wear.
- Interference between the vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.
- Misalignment of components.
- Evidence of undesirable roadability characteristics, including instability in handling during cornering, braking, and while traversing all required terrain.
- Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.
- Overheating of the engine, transmission, or any other vehicle component.

• Evidence of corrosion.

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• Failure of the fire fighting system and sub-systems.

## **IV.4.3 Detailed Inspection Requirements.**

# IV.4.3.1 Examination of Product.

All component manufacturers' certifications, as well as the prototype and production/operational vehicle testing outlined in Class 4/Table 3, Vehicle Test Data, will be examined to verify compliance with the requirements herein. Attention will be given to materials, workmanship, dimensions, surface finishes, protective coatings and sealants and their application, welding, fastening, and markings. The airport may accept a manufacturer or third party certification for any/all prototype and production/operational vehicle testing performed prior to delivery that proves that the vehicle meets the required performance parameters.

The component manufacturer's certification, prototype test certifications and production vehicle test certifications will be arranged in the same order and numbering system called out in NFPA 414 and provided as part of the delivery package with each vehicle.

#### Class 4/Table 3. Vehicle Test Data

NFPA 414	Test
paragraph	
6.3	Prototype Vehicle Tests
6.3.6	Rated Water and Foam Tank Capacity Test
6.3.7	Cornering Stability
	<b>Note:</b> With the modification that the evasive maneuver / double-lane
	change test is conducted at 35 mph (56 kph).
6.3.7.6	EXCEPTION: "J" Turn Test. The measure of a vehicle's ability to traverse
	a 180 degree turn at 30 mph.
6.3.8	Vehicle Dimensions
6.3. <mark>9</mark>	Driver Vision Measurement
6.3.10	Pump and Roll on a 40 Percent Grade
6.3.11	Electrical Charging System
6.3.12	Radio Suppression
6.3.13	Gradability Test
6.3.14	Body and Chassis Flexibility Test
6.3.15	Service/Emergency Brake Test
6.3.16	Service/Emergency Brake Grade Holding Test
6.3.17	Steering Control Test
6.3.18	Vehicle Clearance Circle Test
6.3.19	Agent Pump(s)/Tank Vent Discharge Test
6.3.20	Water Tank Fill and Overflow Test
6.3.21	Flushing System Test
6.3.22	Primary Turret Flow Rate Test
6.3.23	Primary Turret Pattern Test

6.3.24	Primary Turret Control Force Measurement
6.3.25	Primary Turret Articulation Test
6.3.26	Handline Nozzle Flow Rate Test
6.3.27	Handline Nozzle Pattern Test
6.3.28	Ground Sweep/Bumper Turret Flow Rate Test
6.3.29	Ground Sweep/Bumper Turret Pattern Control Test
6.3.30	Undertruck Nozzle Test
6.3.31	Foam Concentration/Foam Quality Test
6.3.32	Warning Siren Test
6.3.33	Propellant Gas
6.3.34	Pressure Regulation
6.3.35	Foam Premix Piping and Valves
6.3.36	Pressurized Agent Purging and Venting
6.3.37	Complementary Agent Handline Flow Rate and Range
6.3.38	Dry Chemical Turret Flow Rate and Range
6.3.39	Cab Interior Noise Test
6.4	Operational Tests
6.4.1	Vehicle Testing, Side Slope
6.4.2	Weight / Weight Distribution
6.4.3	Acceleration.
	<b>Note:</b> With the modification that the instrumentation is a GPS-based
	electronic data collection system.
6.4.4	Top Speed
6.4.5	Brake Operational Test
6.4.6	Air System / Air Compressor Test
6.4.7	Agent Discharge Pumping Test
6.4.8	Dual Pumping System Test (As Applicable)
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6.4.9	Pump and Maneuver Test
6.4.10	Hydrostatic Pressure Test
6.4.10 6.4.11	Hydrostatic Pressure Test Foam Concentration Test
6.4.10	Hydrostatic Pressure Test

# 2303 V Packaging.

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- V.1 Preservation, packing, and marking will be as specified in the Procurement Specification, contract or delivery order.
- 2306 V.2 Deliver the vehicle with full operational quantities of lubricants, brake and hydraulic fluids, and cooling system fluid all of which must be suitable for use in the temperature range expected at the airport.
  - V.3 Deliver the vehicle with one complete load of firefighting agents and propellants. One complete load is defined as all of the agents and propellants necessary for the vehicle to be fully operational. One load would include, at a minimum: one fill of a foam tank; one fill of a dry chemical tank (if applicable); one fill of a clean agent tank (if applicable); one spare nitrogen cylinder for a dry chemical system (if applicable); and one spare argon

2314 2315 2316 2317		cylinder for a clean agent system (if applicable). Agents and propellants for required testing or training are not included. For the initial training period, use water in place of other extinguishing agents. The manufacturer may pre-ship agents and propellants to a receiving airport to reduce overall procurement costs.
2318 2319 2320	V.4	The vehicle manufacturer will provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.
2321	VI	Training.
2322	NFPA	414, 4.2.2.5 Parts Manual.
2323	Al	MENDMENT: 4.2.2.5.8, 4.2.2.5.9
2324 2325 2326 2327 2328 2329 2330 2331 2332	VI.1	Two person-weeks will be provided for travel to the manufacturing facility during midbuild or final build, scheduled at the airport operator's discretion. One person-week will be provided for a mechanic to travel to the manufacturing facility for training. Upon delivery of the vehicle to the airport, the manufacturer will, at no additional cost, provide the services of a qualified technician for five consecutive days for training. This is considered sufficient time for the purchaser to adjust shift work schedules to get maximum employee attendance to training sessions at some point during the training period. During this time sufficient repetitive learning opportunities will be provided by the manufacturer to allow various shifts to complete the training requirements.
2333 2334 2335 2336 2337 2338 2339	VI.2	The technician will provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup will include operator training for the primary operators, which will give them sufficient knowledge to train other personnel in the functional use of all fire fighting and vehicle operating systems. Prior to leaving the vehicle, the technician will review the maintenance instructions with the purchaser's personnel to acquaint them with maintenance procedures as well as how to obtain support service for the vehicle.
2340 2341 2342 2343	VI.3	Training will include written operating instructions, electronic training aids (videos/power point), or other graphics that depict the step-by-step operation of the vehicle. Written instructions will include materials that can be used to train subsequent new operators.
2344	VII	Referenced Documents.
2345 2346 2347	VII.1	Federal Aviation Administration (FAA).  ACs may be obtained from the FAA website: <a href="https://www.faa.gov/regulations_policies/advisory_circulars/">https://www.faa.gov/regulations_policies/advisory_circulars/</a>
2348 2349		• AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles
2350		• AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport

2351		FAA Orders, Specifications, and Drawings may be obtained from: <a href="https://www.faa.gov/">https://www.faa.gov/</a>
2352	VII.2	<u>CFR.</u>
2353		The CFR may be obtained from <a href="https://www.ecfr.gov">https://www.ecfr.gov</a> .
2354 2355		Title 14, Code of Federal Regulations (CFR), <u>Part 139</u> , <i>Certification of Airports</i> (14 CFR <u>Part 139</u> )
2356		• Section 139.315 Aircraft Rescue and Firefighting: Index Determination.
2357		• Section 139.317 Aircraft Rescue and Firefighting: Equipment and Agents.
2358		• Section 139.319 Aircraft Rescue and Firefighting: Operational Requirements.
2359 2360		Title 49, Code of Federal Regulations (CFR), Part 393: Parts and Accessories Necessary for Safe Operation: Subpart C—Brakes.
2361 2362		Title 49, Code of Federal Regulations (CFR), Part 571, Motor Carrier Vehicle Safety Standards, Part 209, Standard No. 209; Seat Belt Assemblies.
2363	VII.3	SAE International.
2364		SAE documents may be obtained from <a href="https://www.sae.org">https://www.sae.org</a> .
2365	VII.4	National Fire Protection Association (NFPA).
2366		NFPA documents may be obtained from <a href="https://www.nfpa.org/">https://www.nfpa.org/</a> .
2367 2368		• NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2014 Edition)
2369		• NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2020 Edition)
2370		NFPA 1901, Standard for Automotive Fire Apparatus (2016 Edition)

2371	FAA Submittal (Class 4)
2372 2373 2374	If this procurement is [subject to approval by the Federal Aviation Administration][to be funded under the Airport Improvement Program or the Passenger Facility Charge Program], the following must be provided to the appropriate FAA Airports office for review and approval.
2375 2376 2377	This specification has been produced using the interactive Advisory Circular 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. No alterations have been made to the resultant specification.
2378 2379 2380	The attached request for additional items needed to address unusual requirements is submitted in accordance with FAA Order 5300.1, <i>Modifications to Agency Airport Design, Construction, and Equipment Standards</i> .
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(Airport POC signature and title)

Paragraph Number:	AMENDMENT: 4.1.1	
raragraph Number:	AMENDMENT: 4.1.1	
	Extreme Temperature Justification	
☐ Approved	☐ Disapproved:	
Paragraph Number:	<b>SELECTION: 4.4.2.3.3</b>	
	Radiator Shutters Justification	
	Tudiator Shatters dustineation	
☐ Approved	☐ Disapproved:	
Paragraph Number:	<b>ADDITION: 4.12.4.4</b>	
	Justification for RIWS Additional Features	
☐ Approved	☐ Disapproved:	
**	**	

14 15 16		of a Modification to Standards for the following items that are not provided ecifications. If requesting more than four, provide additional justification
17	Item 1:	
.18 .19 .20 .21	Justification:	
22	☐ Approved	☐ Disapproved:
23	Item 2: Justification:	
24 25 26 27	Justification:	
28	☐ Approved	☐ Disapproved:
29	Item 3:	
30 31 32 33	Justification:	
34	☐ Approved	☐ Disapproved:
35	Item 4:	
36 37 38 39	Justification:	
10	☐ Approved	☐ Disapproved:
41	(FAA signature and d	ate)

2442 3.3 **Vehicle Procurement Specification, Class 5** 2443 PROCUREMENT SPECIFICATION 2444 Class 5 2445 Aircraft Rescue and Fire Fighting (ARFF) Vehicle 2446 2447 Scope. 2448 This Procurement Specification covers a commercially produced diesel engine driven ARFF vehicle for an airport. It includes a 3000 or 4500 gallon water/ 2449 foam fire suppression system with a complementary agent: 2450 2451 2452 It incorporates the delivery of combined and/or single fire fighting agents through handlines, hose reels and/or a bumper mounted turret. The ARFF vehicle is intended to 2453 2454 carry rescue and fire fighting equipment for the purpose of rescuing aircraft passengers, preventing aircraft fire loss, and combating fires in aircraft. 2455 II Classification. 2456 The ARFF vehicle(s) covered by this Procurement Specification are classified in 2457 accordance with Part 139, Certification and Operations: Land Airports Serving Certain 2458 Air Carriers, Section 315, Aircraft Rescue and Firefighting: Index Determination; 2459 Section 317, Aircraft Rescue and Firefighting: Equipment and Agents; and Federal 2460 Aviation Administration (FAA) Advisory Circular (AC) 150/5220-10, Guide 2461 Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. 2462 II.1 Fully Loaded Vehicle. 2463 Consists of the fully assembled vehicle, complete with a full complement of crew, fuel 2464 2465 and fire-fighting agent. Inflate the tires to recommended pressure. For any test that calls for the vehicle to be "fully loaded", load each storage compartment with 250 lbs. of 2466 ballast, up to a total of 1000 lbs. Load each seat that is not occupied during the test with 2467 225 lbs. of ballast seat belted into the seat. Load ballast to represent the weight of 2468 complementary agent not yet on board as close to the height of the complementary agent 2469 vessel as possible, taking care anticipated vehicle movement during the test will not cause 2470 2471 a shift in the ballast damaging vehicle components. Ш Vehicle Conformance/Performance Characteristics. 2472 The ARFF vehicle will be in accordance with the applicable requirements of AC 2473 150/5220-10F, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) 2474 Vehicles, and National Fire Protection Association (NFPA) 414, Standard for Aircraft 2475 Rescue and Fire Fighting Vehicles, 2020 Edition, NFPA 1901, Standard for Automotive 2476 Fire Apparatus, 2016 Edition, except as specified herein. 2477

2478	<b>Note:</b> The numbering system listed in this section directly corresponds to Chapter 4 in
2479	the NFPA 414, 2020 edition. To properly use this document, first refer to NFPA 414 for
2480	the base requirements then refer to this advisory circular for any additions, exceptions,
2481	amendments or selections. Additional references to specific paragraphs of NFPA 1901
2482	are indicated in brackets.
2483	Specific terms that apply to this AC are listed below:
2484	• ADDITION: A new item has been added to the standard in the reference document.
2485	• EXCEPTION: A restriction has been imposed on the standard in the reference
2486	document.
2487	• <b>AMENDMENT:</b> Subject matter has been rewritten to modify part or all of the original
2488	text of the reference document.
2489	• <b>SELECTION:</b> NFPA 414 requires or allows an option to be selected.
2490	NFPA 414, Chapter 4, Aircraft Rescue and Fire-Fighting Vehicles.
2491	NFPA 414, 4.1 General.
2492	ADDITION: 4.1
2493	Operating terrain. The vehicle will be capable of operating safely on paved roads,
2494	graded gravel roads, cross country terrain, and sandy soil environments. Cross country
2495	terrain consists of open fields, broken ground, and uneven terrain.
2496	AMENDMENT: 4.1.1
2497	The operating temperature range is

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2513 ADDITION: Table 4.1.1.2(b), Fully Loaded Vehicle Performance Parameters (Table		

ADDITION: Table 4.1.1.2(b), Fully Loaded Vehicle Performance Parameters (Table 4.1.1.2(a) does not apply).

**Vehicle Space Requirements - Overall Dimensions.** The maximum overall length, width, and height will be as indicated below, holding the overall dimensions to a minimum that is consistent with the best operational performance of the vehicle and the design concepts needed to achieve this performance and to provide maximum maneuverability.

Class 5/Table 1. Vehicle Space Requirements

<b>Maximum</b> Dimensions	Class 5
Length (inches)	_
Width, including mirrors (inches)	
Height (inches)	

AMENDMENT: Table 4.1.1.2(b), Fully Loaded Vehicle Performance Parameters.

Conduct the Evasive Maneuver test at 35 MPH.

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2523 2524	ADDITION: Table 4.1.1.2(d), Agent System Performance Parameters (Table 4.1.1.2(c) does not apply)
2525 2526	Item 2d, Ground Sweep Nozzles. Ground sweep nozzles are not an approved option.  The primary agent discharge location will be the
2527	The complementary agent discharge location will be the
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2532	EXCEPTION: 4.1.2
2533	Not applicable.
2534	AMENDMENT: 4.1.3
2535	All Class 5 vehicles are required to carry a complementary agent in addition to the
2536	primary agent.
2537	AMENDMENT: 4.1.5
2538	Only those options specifically identified herein may be specified.
2539 2540	NFPA 414, 4.2 Requirements for All Aircraft Rescue and Fire-Fighting Vehicles — Responsibility of Contractors/Suppliers.
2541	ADDITION: 4.2.1 Certification.
2542	Quality of Workmanship. The vehicle, including all parts and accessories, will be
2543	fabricated in a thoroughly workmanlike manner. Particular attention will be given to
2544 2545	freedom from blemishes, burrs, defects, and sharp edges; accuracy of dimensions, radii of fillets, and marking of parts and assemblies; thoroughness of welding, brazing, soldering,
2546	riveting, and painting; alignment of parts; tightness of fasteners; et cetera. The vehicle
2547	will be thoroughly cleaned of all foreign matter.
2548	Warranty. The fire fighting unit will be covered by a minimum one year warranty after
2549	delivery. The chassis and drive train will have a minimum 3 year / 36,000 mile warranty.
2550	All water and foam tanks will be covered by a lifetime warranty.
2551	AMENDMENT: 4.2.2 Manuals.
2552	All manuals are required to be provided in hardcopy and in digital format on media
2553	specified by the airport operator. Two complete sets of engine and transmission parts,
2554	service and operator's manuals will be packed with each vehicle.
2555	ADDITION: 4.2.2.3 Operator's Manual.
2556	The operator's manual will also include:

2557 2558	<ul> <li>Safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.</li> </ul>
2559	Tie down procedures for transport on a low-boy trailer.
2560 2561 2562 2563	<ul> <li>Warranty information and the period of the warranty coverage for the complete vehicle and for any component warranty that exceeds the warranty of the complete vehicle. Addresses and telephone numbers will be provided for all warranty providers.</li> </ul>
2564 2565	• A description of the post-operational procedures including, but not limited to draining, flushing, and re-servicing.
2566	<ul> <li>Disabled vehicle towing procedures.</li> </ul>
2567	<ul> <li>Procedures and equipment required for changing a tire.</li> </ul>
2568 2569	• If the driveline is equipped with a differential locking control, a warning/caution indicating the proper differential locking/un-locking procedures.
2570 2571 2572 2573 2574	• Line art drawing of the vehicle, including panoramic views (front, rear, left, and right sides) showing basic dimensions and weights (total vehicle and individual axle weight for the unloaded and fully loaded vehicle). For the purposes of this AC, "unloaded" is defined as a lack of agent, occupants and compartment load, and "loaded" is defined as including agent, occupants and compartment load.
2575	ADDITION: 4.2.2.4 Service Manual.
2576 2577	The service manual will contain current, voltage, and resistance data; and describe all test procedures.
2578	The service manual will contain at least the following, where applicable:
2579	• Fire fighting system schematic(s).
2580	Hydraulic schematic.
2581	• Pneumatic schematic.
2582	• Electrical schematic.
2583	Winterization schematic.
2584	• Fuel schematic.
2585 2586	<ul> <li>Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.</li> </ul>
2587	ADDITION: 4.2.2.4.6

The service manual will contain a table of contents as well as an alphabetical subject

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index.

2590	NFPA 414, 4.2.2.5 Parts Manual.
2591	ADDITION: 4.2.2.5.1
2592	The parts list will include any special equipment.
2593	<b>ADDITION: 4.2.2.5.2</b>
2594	Any special test equipment will be identified.
2595	<b>AMENDMENT: 4.2.2.5.7</b>
2596	All purchased parts will be cross-referenced with the original equipment manufacturers'
2597 2598	(OEM) name and part number. The parts manual will contain a list of all of the component vendor names, addresses, and telephone numbers referenced in the parts list.
2599	NFPA 414, 4.2.3 Metal Finish.
2600	ADDITION: 4.2.3.1
2601	Vehicles will be painted and marked in accordance with AC 150/5210-5, <i>Painting</i> ,
2602	Marking, and Lighting of Vehicles Used on an Airport. The interior finish of all
2603	compartments will be based on the manufacturer's standard production practice. This
2604	may include painting, texturing, coating or machine swirling as determined by the
2605	manufacturer. All bright metal and anodized parts, such as mirrors, horns, light bezels,
2606	tread plates, and roll-up compartment doors, will not be painted. All other paintable
2607	surfaces will be painted in the appropriate yellow-green color specified in AC 150/5210-
2608	5.
2609	NFPA 414, 4.2.4 Lettering, Numbering, and Striping.
2610	ADDITION: 4.2.4
2611	<b>Lettering.</b> The manufacturer will apply the airport's 'Name' and 'Insignia' (if available)
2612	in a contrasting color or by decal on both sides of the vehicle in long radius elliptical
2613	arches above and below the lettering center line. The size of the lettering will be a
2614	minimum of $2\frac{1}{2}$ -inches to a maximum of 6-inches. Reflective lettering is allowed if the
2615	material is the same as that which is used for the reflective stripe (as specified in AC
2616	150/5210-5).
2617	<b>AMENDMENT: 4.2.4.5, 4.2.4.6</b>
2618	Vehicle numbering, lettering, and striping will conform with AC 150/5210-5.
2619	ADDITION: 4.2.5 Vehicle Information Data Plate.
2620	A second permanently marked identification plate will be securely mounted at the
2621	driver's compartment. The identification plate will contain the following information:
2622	NOMENCLATURE
2623	MANUFACTURER'S MAKE AND MODEL

2624	MANUFACTURER'S SERIAL NUMBER		
2625	VEHICLE CURB WEIGHT: Ibs.		
2626	PAYLOAD, MAXIMUM: lbs.		
2627	GROSS VEHICLE WEIGHT (GVW): Ibs.		
2628	FUEL CAPACITY AND TYPE: gal.		
2629	DATE OF DELIVERY. (month and year)		
2630	WARRANTY. (months and miles)		
2631	CONTRACT NUMBER		
2632	PAINT COLOR AND NUMBER		
2633	A single plate that combines or contains the information required for both plates is		
2634	acceptable.		
2635	AMENDMENT: Figure 4.2.5 Aircraft Rescue and Fire-Fighting Vehicle Tilt Table		
2636	Certification per NFPA 414.		
2637	Replace NFPA 414 Figure 4.2.5 with the figure below.		
2638	Manufacturer		
2639	Vehicle Make and Model		
2640	Year of Manufacture		
2641	Drive Type $\Box 4 \times 4$ $\Box 6 \times 6$ $\Box 8 \times 8$ $\Box 10 \times 10$		
2642	This vehicle was tested todegrees while on a tilt table in the "pump down" position		
2643	This vehicle was tested todegrees while on a tilt table in the "pump up" position		
2644	Was a trip / slip rail used? ☐ Yes ☐ No.		
2645	If yes, what is the height of the rail? (Maximum 2 ")		
2646	Date of TestLocation of Test		
2647	Vehicle Empty Weight (lbs.)		
2648	Maximum Gross Weight (lbs.)		
2649	Special equipment installed prior to test		
2650	Front axle loading*(Lbs.)		
2651	Second axle loading*(Lbs.)		
2652	3rd axle loading (if applicable)*(Lbs.)		
2653	4th axle loading (if applicable)*(Lbs.)		
2654	5th axle loading (if applicable)*(Lbs.)		
2655	Tire manufacturer		

2656	Tire model		
2657	Front Tire pressure	(psi)	
2658	Rear Tire pressure	(psi)	
2659	Front wheel track	(in.)	
2660	Rear wheel track	(in.)	
2661	Crew capacity	(Number of personnel)	
2662	Fuel tank capacity	(gal.)	
2663	Equipment allowance	(lb.)	
2664	Water tank capacity	(gal.)	
2665	Foam tank capacity	(gal)	
2666	Complementary agent capacity (if app	plicable)(lb.)	
2667 2668	*The "loading" is in accordance with NFPA 414	h the definition of a fully loaded vehicle as presented in	
2669	NFPA 414, 4.3 Weights and Dimens	sions, 4.3.2 Dimensions.	
2670	,		
2670	ADDITION: 4.3.2.2 Field of Vision.		
- 11-: / /	<b>Mirrors.</b> The flat mirrors will provide not less than 60° horizontal rotational viewing range. To provide the driver a clear view of the area ahead of the vehicle and to		
2671 2672		- <del>-</del>	
<ul><li>2671</li><li>2672</li><li>2673</li></ul>	range. To provide the driver a	- <del>-</del>	
2672	range. To provide the driver a eliminate potential blind spots	a clear view of the area ahead of the vehicle and to	
2672 2673	range. To provide the driver a eliminate potential blind spots	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner	
2672 2673 2674 2675	range. To provide the driver a eliminate potential blind spots	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner	
2672 2673 2674	range. To provide the driver a eliminate potential blind spots	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner	
2672 2673 2674 2675 2676	range. To provide the driver a eliminate potential blind spots	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner	
2672 2673 2674 2675 2676 2677	range. To provide the driver a eliminate potential blind spots of each side of the windshield	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner	
2672 2673 2674 2675 2676 2677	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner, having a minimum area of 35 square inches.	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components	smission operate efficiently and without detrimental effect when lubricated with standard, commercially available	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components lubricants in keeping with the	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner, having a minimum area of 35 square inches.	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components lubricants in keeping with the manufacturers.	smission operate efficiently and without detrimental effect when lubricated with standard, commercially available recommendations of the engine and transmission	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components lubricants in keeping with the manufacturers.  Certify the engine oil and trans	smission operate efficiently and without detrimental effect when lubricated with standard, commercially available	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components lubricants in keeping with the manufacturers.  Certify the engine oil and trans replaceable spin-on element.	smission operate efficiently and without detrimental effect when lubricated with standard, commercially available recommendations of the engine and transmission	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components lubricants in keeping with the manufacturers.  Certify the engine oil and trans replaceable spin-on element.  ADDITION: 4.4.1.1 Engine Ch	a clear view of the area ahead of the vehicle and to s, a rectangular mirror will be installed on the lower corner, having a minimum area of 35 square inches.  smission operate efficiently and without detrimental effect when lubricated with standard, commercially available recommendations of the engine and transmission asmission fluid filters are of the full-flow type with a aracteristics.	
2672 2673 2674 2675 2676 2677 2678 2679 2680 2681 2682 2683 2684 2685	range. To provide the driver a eliminate potential blind spots of each side of the windshield  NFPA 414, 4.4 Engine.  ADDITION: 4.4  Ensure the engine(s) and trans to any drive train components lubricants in keeping with the manufacturers.  Certify the engine oil and trans replaceable spin-on element.  ADDITION: 4.4.1.1 Engine Cheening Engine. The vehicle will have	smission operate efficiently and without detrimental effect when lubricated with standard, commercially available recommendations of the engine and transmission	

2690	<b>AMENDMENT: 4.4.1.2.3</b>	
2691	Elevation. The vehicle, including the pumping system, will be designed for operation up	
2692	feet above sea level.	
2693	ADDITION: 4.4.2 Engine Cooling Systems.	
2694	A label will be installed near the engine coolant reservoir reading "Engine Coolant Fill."	
2695	SELECTION: 4.4.2.3.3.	
2696	Radiator shutters.	
2697		
2698	NFPA 414, 4.4.3 Fuel Systems.	
2699	<b>ADDITION: 4.4.3.4</b>	
2700	Each fuel tank will have a fill opening readily accessible to personnel standing on the	
2701	ground and designed to prevent fuel splash while refueling. If more than one tank is	
<ul><li>2702</li><li>2703</li></ul>	furnished, means will be provided to ensure equalized fuel level in both tanks. An overturn fuel valve will be provided for each tank to prevent spillage in the event of a	
2704	rollover. Prominently label each fuel tank "Diesel Fuel Only."	
2705	NFPA 414, 4.4.4 Exhaust Systems.	
2706	<b>ADDITION: 4.4.4.1</b>	
2707	The muffler(s) will be constructed of aluminized steel or stainless steel. Exhaust system	
2708 2709	outlet(s) will be directed upward or to the rear, away from personnel accessing equipment compartments, wiring, hydraulic lines and from the engine air intake.	
2710	NFPA 414, 4.5 Vehicle Electrical System.	
2711	ADDITION: 4.5	
2712	The vehicle will have a 12-volt electrical and starting system.	
2713	The minimum continuous electrical load will include operation of the air conditioning	
2714	system.	
2715	ADDITION: 4.5.1 Electrical Systems and Warning Devices.	
2716	Batteries. Batteries will be of the maintenance-free type; addition of water will not be	
2717	required during normal service life. The battery cover and vent system will be designed	
2718	to prevent electrolyte loss during service and to keep the top of the battery free from	
2719	electrolyte.	
2720	<b>Battery compartment.</b> The batteries will be installed in a protected compartment.	

2721	ADDITION: 4.5.2
2722 2723	Line voltage electrical system. A 50 foot long, three wire, 15 amp rated, 110 volt, AC power cable, with straight blade (non twist-lock) connectors, will be provided.
2724	AMENDMENT: 4.5.2.2, 4.5.4.5
2725	The battery charger/conditioner will be powered from a covered, polarized, insulated,
2726	labeled, recessed (flush mounted), male, auto-eject receptacle. The connection will be
2727	located on the exterior of the vehicle at the rear or on either side of the vehicle.
2728	AMENDMENT: 4.5.4
2729	Battery charger or conditioner. The vehicle will have a DC taper type battery charger
2730	or an automatic battery conditioner, providing a minimum 12-amp output. The
2731	charger/conditioner will be permanently mounted on the vehicle in a properly ventilated,
2732	accessible location. The charger/conditioner will be powered from the electrical
2733	shoreline receptacle. A charging indicator will be installed next to the receptacle. When
2734	a battery conditioner is provided, the conditioner will monitor the battery state of charge
2735	and, as necessary, automatically charge or maintain the batteries without gassing,
2736	depleting fluid level, overheating, or overcharging. A slave receptacle will be provided at
2737	the rear or on either side of the vehicle cab.
2738	AMENDMENT: 4.5.4.1
2739	Electrical shoreline connection. The battery charger will be supplied from an external
2740	power source of 110 volts AC.
2741	NFPA 414, 4.6 Vehicle Drive.
2742	AMENDMENT: 4.6
2743	Transmission. A fully automatic transmission will be provided.
2744	ADDITION: 4.6
2745	Provide an accessible means of lubrication for all moving parts requiring routine
2746	lubrication. Ensure there are no pressure lubrication fittings where their normal use
2747	would damage grease seals or other parts.
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2748	ADDITION: 4.6.4.1
2749	If the driveline is equipped with a differential locking control, a warning/caution label
2750	will be placed in view of the driver indicating the proper differential locking/un-locking
2751	procedures.
2752	NFPA 414, 4.7 Suspension.
2753	ADDITION: 4.7
2754	Suspension. Provide an off-road, high-mobility suspension system resulting in no more
2755	than 0.5 G <sub>rms</sub> acceleration at the driver's seat of the vehicle when traversing an 8-inch

2756 2757	diameter half round at 35 mph. The suspension design by which the manufacturer meets		
2131	the suspension performance requirements is at the manufacturer's discretion.		
2758	NFPA 414, 4.8 Rims, Tires, and Wheels.		
2759	ADDITION: 4.8		
2760 2761	A spare tire and wheel assembly will be provided; however, the spare tire and wheel assembly are not required to be mounted on the vehicle.		
2762	AMENDMENT: 4.8.2		
2763 2764 2765	<b>Tire selection.</b> The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Large tires required.		
2766	AMENDMENT: 4.8.4		
2767 2768	<b>Tires and wheels.</b> The vehicle will be equipped with single tires and wheels on the front axle and single or dual tires and wheels on the rear.		
2769	Tire and wheel assemblies will be identical at all positions.		
2770	NFPA 414, 4.9 Towing Connections.		
2771	AMENDMENT: 4.9		
2772	The tow connections may intrude into the angle of approach and angle of departure.		
2773	ADDITION: 4.9.		
2774	The vehicle will be provided with a towing device. The maximum towing		
2775	capacity of the vehicle will be labeled on the vehicle dashboard and at the towing device		
2776	location.		
2777	NFPA 414, 4.10 Brakes.		
2778	ADDITION: 4.10		
2779	Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped		
2780	with air brakes.		
2781	All components of the braking system will be installed in such a manner as to provide		
2782	adequate road clearance when traveling over uneven or rough terrain, including objects		
2783	liable to strike and cause damage to the brake system components. No part of the braking		
2784	system will extend below the bottom of wheel rims, to ensure, in case of a flat tire, that		
2785	the weight of the vehicle will be supported by the rim and the flat tire and not be imposed		
2786	on any component of the braking system.		

2787	NFPA 414, 4.12 Cab.	
2788	ADDITION: 4.12	
2789	The vehicle will have a cab constructed of materials which are corrosion resistant, such	
2790	as aluminum, stainless steel, or glass reinforced polyester construction. A tilt steering	
2791	column will be provided. The cab will have a watertight roof hatch for emergency exit	
2792	out of the cab.	
2793	<b>ADDITION: 4.12.1.5</b>	
2794	Seat belts. Each seat will be provided with a Type 3 seat belt assembly (i.e., 3-point	
2795	retractable restraint) in accordance with Code of Federal Regulations (CFR) 49 CFR	
2796	571.209. Ensure seat belts are long enough to accommodate crew members in full	
2797	Personal Protective Equipment (PPE).	
2798	<b>ADDITION: 4.12.1.7</b>	
2799	Cab entry and exit features. The cab will have doors. At least one grab handle	
2800	will be provided for each crew member, located inside the cab for use while the vehicle is	
2801	in motion. The lowermost step(s) will be no more than 22 inches above level ground	
2802	when the vehicle is fully loaded.	
2803	ADDITION: 4.12.2 Cab Visibility.	
2804	The windshield and windows will be tinted. Each door window will be capable of being	
2805	opened far enough to facilitate emergency occupant escape in the event of a vehicle	
2806	accident. The vehicle windows will have control system.	
2807	ADDITION: 4.12.4 Instruments, Warning Lights, and Controls.	
2808	All instruments and controls will be designed to minimize windshield glare.	

2809	ADDITION: 4.12.4.4
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2828 2829	<b>Instruments and warning lights.</b> The following will also be provided within convenient reach of the seated driver:
2830	Master warning light control switch,
2831	<ul> <li>Work light switch(es), and</li> </ul>
2832 2833 2834	• Compartment "Door Open" warning light and intermittent alarm that sounds when a compartment door is open and the parking brakes are released or the transmission is in any position other than neutral.
2835	ADDITION: 4.12.4.5
2836	Power window controls.
2837	
2838	
2838 2839	

2841	SELECTION: 4.12.4.7
2842	DEVS option. A DEVS system, including a Low-Visibility Enhanced Vision Subsystem
2843	and optional systems as noted below, if any, meeting FAA Advisory Circular 150/5210-
2844	19, Driver's Enhanced Vision System (DEVS), will be provided.
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2856	<b>AMENDMENT: 4.12.4.7.2</b>
2857	<b>DEVS system requirements.</b> AC 150/5210-19 will be met in its entirety.
2858	AMENDMENT: 4.12.4.8, 4.12.4.9
2859	FLIR system requirements. AC 150/5210-19 will be met in its entirety.
2860	NFPA 414, 4.12.5 Equipment.
2861	ADDITION: 4.12.5.1(1)  Climate control system. The climate control system will induct at least 60 cubic feet per
2862 2863	minute of fresh air into the cab, but will include a "recirculation" setting that prevents
2864	induction of outside air. Cab mounted components will be protected from inadvertent
2865	damage by personnel.
2866	ADDITION: 4.12.5.1(2)
2867	<b>Driver's seat.</b> The driver's seat will be provided with a backrest and a remote-mounted
2868	bracket designed to store a Self-Contained Breathing Apparatus (SCBA).
2869	ADDITION: 4.12.5.1(3)
2870	Crew Seats. The turret operator's seat, located to the right front of the driver's seat, will
2871	be a fixed (non-suspension) type.
2872	It will be provided with a backrest and a remote-mounted bracket designed to store a
2873	Self-Contained Breathing Apparatus (SCBA). When a four (4) door vehicle is selected,
2874	the rear seat will be the bench type.

2875	ADDITION: 4.12.5.1(4)		
2876 2877	Windshield washers. The vehicle will be equipped with a powered windshield washer system, including an electric fluid pump, a minimum one-gallon fluid container, washer		
2878	nozzles mounted to the wiper arms (wet arms), and a momentary switch.		
2879	ADDITION: 4.12.5.1(5)		
2880	Windshield wipers. The vehicle will be equipped with electrically powered windshield		
2881	wiper(s). The wiper arm(s) and blade(s) will be of sufficient length to clear the		
2882	windshield area described by Society of Automotive Engineers (SAE) J198, Windshield		
2883	Wiper Systems - Trucks, Buses, and Multipurpose Vehicles. Individual wiper controls		
2884 2885	will include a minimum of two speed settings and an intermittent setting. The wiper blades will automatically return to a park position, out of the line of vision.		
2886	ADDITION: 4.12.5.1(8)		
2887	<b>Equipment.</b> A means or provision that is designed to protect driver and crew from		
2888	overhead glare and light from the sun.		
2889	ADDITION: 4.12.5.1(10)		
2890	Interior lighting. Cab interior light levels will be sufficient for reading maps or		
2891	manuals.		
2892	SELECTION: 4.12.5.1(11)		
2893	Self-Contained Breathing Apparatus (SCBA) mounting. The vehicle will have		
2894	mounting to secure SCBA equipment from the following manufacturer:		
2895			
2896	<b>AMENDMENT: 4.12.5.1(12)</b>		
2897	Forward Looking Infrared (FLIR). The FLIR monitor will be located in a position		
2898	where it is visible to both the seated driver and turret operator. All components of the		
2899	FLIR system will be in accordance with AC 150/5210-19.		
2900	SELECTION: 4.12.7		
2901	Monitoring and Data Acquisition System (MADAS).		
2902			
2903	<b>ADDITION: 4.12.7.2</b>		
2904	<b>Data retention.</b> Design the data acquisition system so that the data being recorded will		
2905	not be lost or overwritten immediately after the incident due to the use of an emergency		
2906	shutoff or a master electrical disconnect switch.		
2907	ADDITION: 4.12.8		
2908	Lateral accelerometer. The vehicle will be equipped with a lateral accelerometer.		

2909	NFPA 414, 4.13 Body.
2910	ADDITION: 4.13
2911 2912 2913	<b>Reduction of potential foreign object damage.</b> All loose metal parts, such as pins, will be securely attached to the vehicle with wire ropes or chains. Removable exterior access panels, if provided, will be attached with permanent captive fasteners.
2914 2915 2916	<b>License plate bracket.</b> A lighted license plate bracket will be provided at the rear and front of the vehicle and will comply with state law. The location of the front bracket will be placed so as not to interfere with the operation of fire fighting systems.
2917	The vehicle will have a corrosion-resistant body.
2918	ADDITION: 4.13.3
2919 2920	<b>Compartments.</b> The vehicle body will have storage compartments with a minimum 20 cubic feet of enclosed storage space.
2921 2922 2923 2924 2925 2926	Compartment doors. Storage compartments will have clear anodized aluminum, counterbalanced, non-locking, roll-up or single hinged doors as determined by the manufacturer. Door latch handles on roll-up doors will be full-width bar type. Door straps will be provided to assist in closing the compartment doors when the rolled up or hinged door height exceeds six feet above the ground. Door locks required.
2927 2928 2929 2930	<b>Scuffplates.</b> Replaceable scuffplates will be provided at each compartment threshold to prevent body damage from sliding equipment in and out of the compartments. The scuffplates will be securely attached to the compartment threshold but will be easily replaceable in the event of damage.
2931	<b>Drip rails.</b> Drip rails will be provided over each compartment door.
2932 2933 2934 2935 2936 2937 2938 2939 2940	<b>Shelves.</b> An adjustable and removable compartment shelf will be provided for every 18 inches of each vertical storage compartment door opening. Shelving adjustments will require no more than common hand tools and will not require disassembly of fasteners. Shelves will support a minimum of 150 lbs without permanent deformation. Each shelf will be accessible to crew members standing on the ground or using a pull out and tip-down configuration for shelving over 54 inches from the ground. Access to any shelf over 54 inches from the ground will be facilitated by the installation of a pull-out step and grab rail. Each shelf will have drain holes located so as to allow for drainage of any water from the stowed equipment.
2941 2942	<b>Drainage mats.</b> Each compartment floor and shelf will be covered with a removable black mat designed to allow for drainage of any water from the stowed equipment.
2943 2944 2945 2946	SCBA storage tubes. A single compartment or tubes for storage of four SCBA bottles will be provided. If tubes are provided, two will be installed on each side of the vehicle. The tubes will be of sufficient size to accommodate the procuring agencies SCBA cylinders.

# **ADDITION: 4.13.3(3)**

Compartment lights. Waterproof white lighting sufficient to provide an average minimum illumination of 1.0 footcandle will be provided in each compartment greater than 4.0 cubic feet and having an opening greater than 144 square inches. Where a shelf is provided, this illumination will be provided both above and below the shelf. All compartments will be provided with weatherproof lights that are switched to automatically illuminate when compartment doors are opened and the vehicle master switch is in the 'on' position. Light switches will be of the magnetic (non-mechanical) type.

#### **ADDITION 4.13.4**

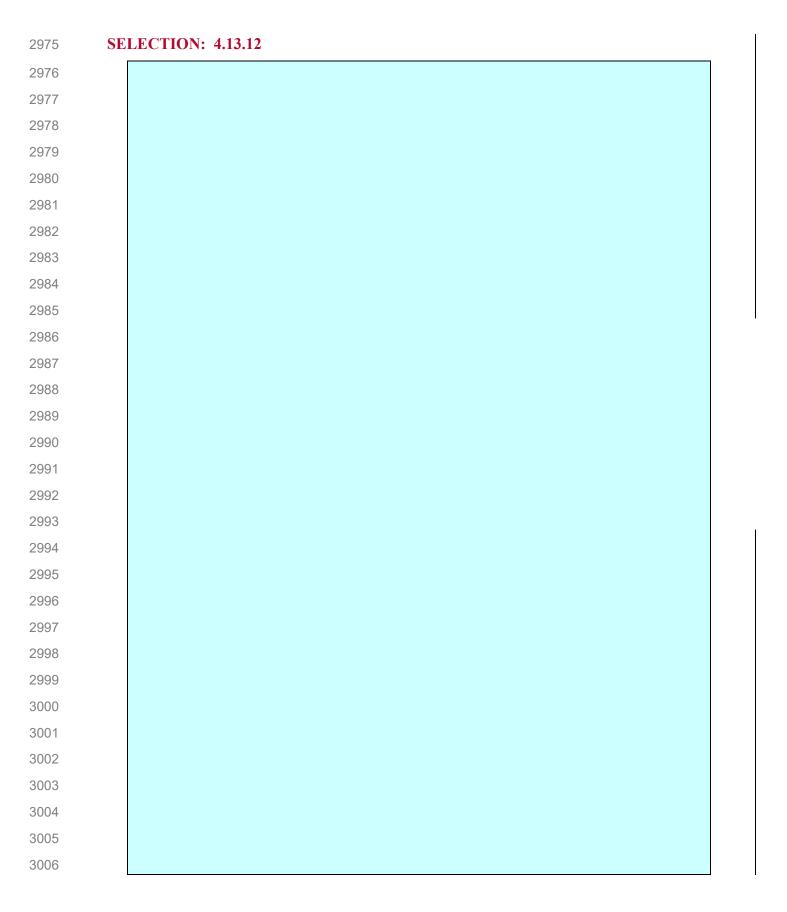
**Slip Resistance.** Provide a working deck that is reinforced and constructed of, or covered with, a slip-resistant material that is reinforced adequately to allow the crew to perform its duties in the primary turret area, cab hatch area, water tank top fill area and foam-liquid top fill area, and in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

#### **AMENDMENT: 4.13.6.3**

**Steps or ladders.** The lowermost step(s) or ladder rungs will be no more than 20 inches above level ground when the vehicle is fully loaded. A tubular style running board or custom step will be provided at each vehicle door location.

#### **ADDITION: 4.13.6.4, 4.25.1**

**Ladder, step, walkway, and area lights.** Non-glare white or amber lighting will be provided at ladders and access steps where personnel work or climb during night operations. In addition, ground lighting will be provided. Ground lights will be activated when the parking brake is set in accordance with AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.* These area lights will be controlled with three-way switches on the cab instrument panel and near the light sources. Ensure the switch located in the cab is a master switch and will be turned on before auxiliary switches near the light sources are operational.



## NFPA 414, 4.14 Fire-Fighting Systems and Agents.

#### **ADDITION: 4.14**

**Agent system.** The fire fighting agent system may consist of a series of selected agents (dry chemical, approved clean agents, compressed air foam, and foam) as indicated in this section. Multiple agent delivery systems may be used to dispense agents simultaneously. The delivery system used to dispense and apply agent for multiple agent delivery systems will comply with Class 5/Table 2, Foam/Dry Chemical/Clean Agent Simultaneous Delivery System.

## Class 5/Table 2. Foam/Dry Chemical/Clean Agent Simultaneous Delivery System

**Note:** The agent delivery rates in this table are allowed by the FAA as a result of independent third-party demonstrations of fire suppression capability of a Foam/Dry Chemical/Clean Agent Simultaneous Delivery System.

Hand Line and Turret Performance Criteria	Class 5 Vehicles
Foam Performance	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)
Dry Chemical and Clean Agent Performance	
Hand line discharge rate	5.0 to 8.0 lbs/sec
Hand line discharge rate with foam	5.0 to 8.0 lbs/sec
Hand line discharge rate with foam and clean agent	5.0 to 6.0 lbs/sec
Dry Chemical Hand Line Range	≥ 90 ft (27.5 M)
Clean Agent Hand Line Range	≥ 40 ft
Clean Agent Inside Hose Diameter	$\geq \frac{1}{4}$ inch
Hose Length	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)
Turret discharge rate	≥ 16 lbs/sec
Turret Range	≥ 100 ft
Turret Width	See NFPA 414, 2020 Edition,
	Table 4.1.1.2(d)

**Note:** The agent delivery rates in this table are allowed as a result of independent third-party demonstrations of fire suppression capability of a foam/dry chemical/clean agent simultaneous delivery. (Evaluation of Quad-Agent Small Fire Fighting System DOT\FAA\AR-TN06\13.)

#### NFPA 414, 4.15 Agent Pump(s) and Pump Drive.

#### **ADDITION: 4.15**

Intake connections. The vehicle will be equipped with one valved  $2\frac{1}{2}$ -inch suction intake connection. The inlet will be capable of drafting or operating from a hydrant source located at the operator's pump panel. The  $2\frac{1}{2}$ -inch intake connection will have rocker lug female National Hose threads, a quarter-turn control valve, a bleeder valve, a strainer, and a plug. All valves will be labeled "open" or "closed".

## **AMENDMENT: 4.15.1.1**

**Agent (fire) pump.** The centrifugal pump will be selected by the manufacturer.

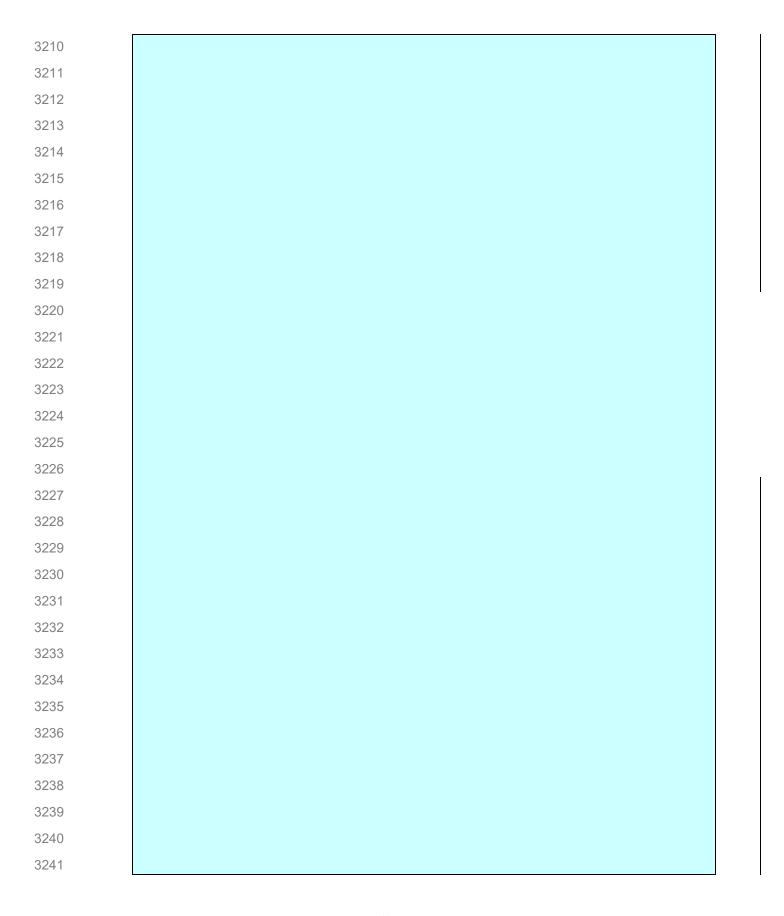
3031	
3032	ADDITION: 4.15.1.1.1
3033	<b>Priming pump.</b> The vehicle will be equipped with a priming pump. For vehicles
3034	equipped with a pre-mixed pressurized foam system, a priming pump is not required.
3035	ADDITION: 4.15.3 Tank-to-Pump Connections.
3036	A check valve and shutoff valve will be provided in each tank to pump line.
3037	AMENDMENT: 4.15.4 Discharge Connections.
3038	All fire pump supplied agents will be delivered to the bumper turret and preconnected
3039	handlines and/or duel agent handline hose reel. A dual agent hose reel or two 1¾ -inch
3040	discharge connections (preconnected handlines) with male National Hose threads will be
3041	provided.
3042	<b>EXCEPTION: 4.15.6 Overheat Protection.</b>
3043	Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam
3044	system.
3045	NFPA 414, 4.16 Water Tank, 4.16.1 Water Tank Capacity.
3046	AMENDMENT: 4.16.1.1
3047	Water tank. The vehicle will have a baffled water tank with a manufacturer certified
3048	minimum capacity of at least 100 gallons. The tank will store water or premixed agent.
3049	A copy of the manufacturer's certification certificate will be provided for verification
3050	upon acceptance testing.
3051	<b>ADDITION: 4.16.2.1</b>
3052	Water tank construction. The water tank will be constructed of passivated stainless
3053	steel, polypropylene, or Glass Reinforced Polyester (GRP). All materials used will be
3054	capable of storing water, foam concentrate, and water/foam solutions. The water tank will
3055	have a lifetime warranty.
3056	<b>ADDITION: 4.16.2.2</b>
3057	Water tank drain. The water tank will incorporate a drain and drain valve. The valve
3058	will be on the left side of the vehicle and controlled by a crew member standing on the
3059	ground. The drain line will be 2-inch internal diameter (I.D.) minimum. The point for
3060	discharge for the water tank drain will be below the under-vehicle body panels.
3061	<b>EXCEPTION: 4.16.2.2(1)</b>
3062	Manhole covers. Manhole covers are not required.

3063	<b>ADDITION: 4.16.2.3.3</b>
3064 3065	<b>Drains.</b> Drainage from the vent and overflow system will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.
3066	<b>ADDITION: 4.16.2.5</b>
3067 3068 3069	Water tank top fill opening. The fill opening, located, may be incorporated as part of a manhole cover and will be sized to accommodate a 2½-inch fill hose.
3070	<b>EXCEPTION: 4.16.2.6</b>
3071	This paragraph does not apply.
3072	<b>AMENDMENT: 4.16.3.2</b>
3073 3074 3075 3076	Water tank fill connections. The water tank will incorporate one 2½-inch rocker lug female National Hose thread connection on each side of the vehicle. Each connection will be fitted with a 30° or 45° turn-down fitting. The water fill will allow external resupply of the water tank during discharge pumping operations.
3077	<b>EXCEPTION: 4.16.3.4</b>
3078	Water tank fill connection size. This paragraph does not apply.
3079	NFPA 414, 4.17 Foam System.
3080	ADDITION: 4.17
3081 3082 3083 3084 3085 3086 3087 3088	<b>Foam transfer pump.</b> A foam transfer pump will be provided and mounted in a compartment on the vehicle. The pump will be capable of transferring and drawing foam liquid concentrate at adjustable flow rates up to 10-gpm directly through the pump and loading connection. All materials and components that come in contact with the foam will be compatible with the foam concentrate. The pump and its plumbing will have provisions for flushing with water from the water tank. A length of hose with appropriate connections will be provided for filling the foam tank from an external foam storage container.
3089	ADDITION: 4.17.1 Foam-Liquid Concentrate Tank(s).
3090 3091 3092 3093	The foam tank will incorporate a drain and drain valve. The valve will be on the left side of the vehicle and controlled by a crew member standing on the ground. The drain line will have a minimum 1½-inch I.D. The foam tank drain outlet will be located so that the contents of the tank can be drained into 5-gallon cans and 55-gallon drums.
3094	AMENDMENT: 4.17.1.1
3095	Percent concentrate.
3096	

3097 3098	The foam concentrate tank(s) will have a manufacturer certified working capacity sufficient for two tanks of water at the maximum tolerance specified in NFPA 412,
3099	Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment, for 3 to 6
3100	percent foam concentrate.
3101	AMENDMENT: 4.17.1.2
3102	Foam tank construction. The foam tank will be constructed of passivated stainless
3103	steel, polypropylene, or GRP.
3104	<b>ADDITION: 4.17.1.6</b>
3105	Foam tank top fill trough. The top fill trough will be readily accessible to at least two
3106	crew members on top of the vehicle. The top fill trough will incorporate a cover, latch,
3107	and sealed so as to prevent spillage under any operating condition. The top fill trough
3108	will be designed to allow one standard 5-gallon foam concentrate container to be
3109	emptied. The fill opening will have a minimum opening of 5-inches. The top fill trough
3110	will incorporate readily removable, rigidly constructed 10 mesh stainless steel, brass, or
3111	polyethylene strainers. All components in and around the top fill trough will be
3112	constructed of materials that resist all forms of deterioration that could be caused by the
3113	foam concentrate or water.
3114	<b>ADDITION: 4.17.1.7</b>
3115	Foam tank fill connections. The foam tank will incorporate a 1.5-inch National Hose
3116	thread female hose connection on of the vehicle to permit
3117	filling by an external transfer hose at flow rates up to 25-gpm. The connections will be
3118	provided with chained-on long handled plugs or rocker lug plugs. The top of the
3119	connections will be no higher than 48 inches above the ground and readily accessible.
3120	The fill lines will incorporate readily removable, rigidly constructed strainers. All
3121	components in the foam tank fill system will be constructed of materials that resist all
3122	forms of deterioration that could be caused by the foam concentrate or water.
3123	<b>ADDITION: 4.17.1.9</b>
3124	Foam tank vent and overflow system. The foam tank will incorporate an overflow
3125	system to relieve excess liquid in the event of tank overfill. The vent and overflow
3126	system will prevent leakage of foam when the tank is filled to capacity and the vehicle is
3127	operating on the maximum side slopes and grades specified herein. As specified for the
3128	vent system, drainage from the overflow system will not flow over body panels or other
3129	vehicle components. Drainage from the vent and overflow systems will not be in front of
3130	or behind any of the tires. Tank vent hoses will be of the non-collapsible type.
3131	NFPA 414, 4.17.3 Foam-Liquid Concentrate Piping.
3132	<b>ADDITION: 4.17.3.1</b>
3133	Foam concentrate piping. All metallic surfaces of the piping and associated
3134	components that come into contact with the foam concentrate will be of brass, bronze, or
3135	passivated stainless steel.

3136	NFPA 414, 4.17.4 Foam Proportioning Systems.
3137	ADDITION: 4.17.4
3138	The vehicle will be equipped with a proportioning system for foam.
3139	<b>ADDITION: 4.17.4.1</b>
3140 3141	<b>Foam concentrate proportioning system.</b> The system will automatically and uniformly proportion water foam concentrate.
3142	NFPA 414, 4.18 Premixed Foam Solutions.
3143	ADDITION: 4.18
3144	A premixed foam solution be used.
3145	NFPA 414, 4.19 Turret Nozzles.
3146	SELECTION: 4.19.4.1, 4.19.4.2
3147	Manually operated or power assisted turret.
3148	
3149	SELECTION: 4.19.4.2(4)
3150 3151	Manual override or secondary parallel controls powered by an alternative source of all roof turret movement functions.
3152	
3153	AMENDMENT: 4.19.6
3154 3155 3156	If the boom-mounted turret is on a rotational base, it will meet the following design and functional requirements: The boom-mounted turret must be equipped with a visual indicator to the operator as the inner boom section is extended.
3157	NFPA 414, 4.20 Preconnected Handlines.
3158	ADDITION: 4.20
3159 3160	A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. A control for charging each handline will be provided for operation.
3161	AMENDMENT: 4.20.2
3162 3163	Each side of the vehicle will have a 150-foot, 1¾-inch preconnected woven jacket handline, with a 1½-inch control valve and nozzle.

3164	NFPA 414, 4.21 Turret, Ground Sweep, and Undertruck Nozzles.
3165	ADDITION: 4.21.1
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3174	EXCEPTION: 4.21.3
3175	Undertruck nozzles are not an approved option.
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3177	NFPA 414, 4.23 Approved Clean Agent.
3178	SELECTION: 4.23.1.1.1
3179	Reservice kit.
3180	
3181	NFPA 414, 4.24 Dry Chemical Turret.
3182	SELECTION: 4.24.1 Auxiliary Agent Discharge.
3183	
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3187	Agent discharge locations.
3188	The primary agent discharge location will be the
3189	The complementary agent discharge location will be the



3242	NFPA 414, 4.25 Lighting and Electrical Equipment.
3243	ADDITION: 4.25.1
3244	Auxiliary Power Receptacles. The vehicle will have 2-12-volt auxiliary power
3245	receptacles mounted adjacent to the driver and crew member positions, preferably in the
3246	instrument panel.
3247	ADDITION: 4.25.1
3248	Spot/Floodlights. Two spot/floodlights will be attached at the end of the bumper turret
3249	assembly. The lights will illuminate the area covered by the turret. The lights will be
3250	switched from inside the cab. lights will be used.
3251	Floodlights. Two floodlights with adjustment knuckles will be
3252	provided. One light will be mounted on the left and right sides of the vehicle.
3253	lights will be used.
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3265	Scene Lights. A total of six high mounted floodlights will be provided to illuminate the
3266	work areas around the vehicle. Two lights will be mounted on each side and two will be
3267	mounted in the rear of the vehicle. Each pair of lights will be controlled by a switch
3268	mounted on the side or rear of the vehicle. lights will be used.
3269	ADDITION: 4.25.1(1)
3270	Headlight flashing system. A high beam, alternating/flashing, headlight system will be
3271	provided. The headlight flasher will be separately switched from the warning light panel.
3272	AMENDMENT: 4.25.2
3273	<b>Siren.</b> The vehicle will be equipped with an electronic siren system. The amplifier unit
3274	will include volume control.
3275	ADDITION: 4.25.2.1
3276	The siren speaker will be rated at 100 watts minimum and will be located in a guarded
3277	position as low and as far forward on the vehicle as practical.
3278	ADDITION: 4.25.2.2
3279	The siren unit will consist of the following functions as a minimum: "Radio," "PA,"
3280	"Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and include a magnetic noise
3281	canceling microphone.

3282	AN	MENDMENT: 4.25.2.3		
3283 3284 3285	operator. Siren activating foot switches will be located in front of the driver and the			
3286	ADDITION: 4.25.4 Exterior Emergency Warning Lights.			
3287 3288		Each apparatus will have a system of optical warning devices that meet or exceed the requirements of (NFPA $1901 - 13.8$ ) Optical Warning Devices		
3289	ADDITION: 4.25.4.1			
3290 3291 3292 3293		Optical Requirements for Larger Apparatus. If the apparatus has a bumper-to-bumper length of 25' or more or has an optical center on any optical warning device greater than 8' above the ground the requirements of NFPA $1901 - 13.8.13.2$ and $13.8.13.6$ apply. (NFPA $1901 - 13.8.13$ )		
3294	ΑĽ	DDITION: 4.25.4.2.2		
3295 3296		<b>Emergency warning light color.</b> All emergency warning lights will meet the requirements of AC 150/5210-5.		
3297	AΓ	DDITION: 4.25.5 Radios.		
3298 3299 3300 3301		The vehicle will have two separate 30 amp circuits, with circuit breakers and at least 6-foot long wires, routed to a space provided adjacent to the driver and turret operator for purchaser provided radios and other electrical equipment. The wiring will be tagged indicating its purpose.		
3302	EX	CEPTION: 4.25.5.1.2, 4.25.5.2		
3303		The provisioning of radios is an airport responsibility and not part of this specification.		
3304	IV	Product Conformance Provisions.		
3305 3306	IV.1	Classification of Inspections. The inspection requirements specified herein are classified as follows:		
3307 3308 3309 3310	IV.1.1	Performance Inspection. The vehicle will be subjected to the examinations and tests described in this Procurement Specification. The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.		
3311 3312 3313 3314	IV.1.2	Conformance Inspection.  The vehicle will be subjected to the examinations and tests described in this Procurement Specification. The contractor will provide or arrange for all test equipment, personnel, and facilities.		

#### IV.2 Product Conformance.

The products provided will meet the performance characteristics of this Procurement Specification, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace. The purchaser reserves the right to require proof of such conformance.

# IV.3 <u>Technical Proposal.</u>

The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this Procurement Specification; a paragraph by paragraph response to the characteristics section of this Procurement Specification will be provided. The offeror/contractor will provide two copies of their commercial descriptive catalogs with their offer as supporting reference to the itemized technical proposal. The offeror/contractor will identify all modifications made to their commercial model in order to comply with the requirements herein. The vehicle furnished will comply with the "commercial item" definition of FAR 2.101 as of the date of award. The purchaser reserves the right to require the offeror/contractor to prove that their product complies with the referenced commerciality requirements and each conformance/performance characteristics of this Procurement Specification.

# IV.4 <u>Inspection Requirements.</u>

### IV.4.1 General Inspection Requirements.

Apparatus used in conjunction with the inspections specified herein will be laboratory precision type, calibrated at proper intervals to ensure laboratory accuracy.

#### 3336 IV.4.2 Test Rejection Criteria.

Throughout all tests specified herein, the vehicle will be closely observed for the following conditions, which will be cause for rejection:

- Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.
- Any spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any condition, except as allowed herein.
- Structural failure of any component, including permanent deformation, or evidence of impending failure.
- Evidence of excessive wear.
- Interference between the vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.
- Misalignment of components.
- Evidence of undesirable roadability characteristics, including instability in handling during cornering, braking, and while traversing all required terrain.
- Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.
- Overheating of the engine, transmission, or any other vehicle component.

• Evidence of corrosion.

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• Failure of the fire fighting system and sub-systems.

## **IV.4.3 Detailed Inspection Requirements.**

## IV.4.3.1 Examination of product.

All component manufacturers' certifications, as well as the prototype and production/operational vehicle testing outlined in Table 3, will be examined to verify compliance with the requirements herein. Attention will be given to materials, workmanship, dimensions, surface finishes, protective coatings and sealants and their application, welding, fastening, and markings. The airport may accept a manufacturer or third party certification for any/all prototype and production/operational vehicle testing performed prior to delivery that proves that the vehicle meets the required performance parameters.

The component manufacturer's certification, prototype test certifications and production vehicle test certifications will be arranged in the same order and numbering system called out in NFPA 414 and provided as part of the delivery package with each vehicle.

#### Class 5/Table 3. Vehicle Test Data

NFPA 414	Test
paragraph	
6.3	Prototype Vehicle Tests
6.3.6	Rated Water and Foam Tank Capacity Test
6.3.7	Cornering Stability
	<b>Note:</b> With the modification that the evasive maneuver / double-lane
	change test is conducted at 35 mph (56 kph).
6.3.7.6	EXCEPTION: "J" Turn Test. The measure of a vehicle's ability to traverse
	a 180 degree turn at 30 mph.
6.3.8	Vehicle Dimensions
6.3. <mark>9</mark>	Driver Vision Measurement
6.3.10	Pump and Roll on a 40 Percent Grade
6.3.11	Electrical Charging System
6.3.12	Radio Suppression
6.3.13	Gradability Test
6.3.14	Body and Chassis Flexibility Test
6.3.15	Service/Emergency Brake Test
6.3.16	Service/Emergency Brake Grade Holding Test
6.3.17	Steering Control Test
6.3.18	Vehicle Clearance Circle Test
6.3.19	Agent Pump(s)/Tank Vent Discharge Test
6.3.20	Water Tank Fill and Overflow Test
6.3.21	Flushing System Test
6.3.22	Primary Turret Flow Rate Test
6.3.23	Primary Turret Pattern Test
6.3.24	Primary Turret Control Force Measurement

based
based

# 3370 V Packaging.

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- V.1 Preservation, packing, and marking will be as specified in the Procurement Specification, contract or delivery order.
- 3373 V.2 Deliver the vehicle with full operational quantities of lubricants, brake and hydraulic fluids, and cooling system fluid all of which are suitable for use in the temperature range expected at the airport.
  - V.3 Deliver the vehicle with one complete load of firefighting agents and propellants. One complete load is defined as all of the agents and propellants necessary for the vehicle to be fully operational. One load would include, at a minimum: one fill of a foam tank; one fill of a dry chemical tank (if applicable); one fill of a clean agent tank (if applicable); one spare nitrogen cylinder for a dry chemical system (if applicable); and one spare argon cylinder for a clean agent system (if applicable). Agents and propellants for required

3382 3383 3384		testing or training are not included. For the initial training period, use water in place of other extinguishing agents. The manufacturer may pre-ship agents and propellants to a receiving airport to reduce overall procurement costs.
3385 3386 3387	V.4	The vehicle manufacturer will provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.
3388	VI	Training.
3389	NFPA	414, 4.2.2.5 Parts Manual.
3390	Al	MENDMENT: 4.2.2.5.8, 4.2.2.5.9
3391 3392 3393 3394 3395 3396 3397 3398 3399	VI.1	Two person-weeks will be provided for travel to the manufacturing facility during midbuild or final build, scheduled at the airport operator's discretion. One person-week will be provided for a mechanic to travel to the manufacturing facility for training. Upon delivery of the vehicle to the airport, the manufacturer will, at no additional cost, provide the services of a qualified technician for five consecutive days for training. This is considered sufficient time for the purchaser to adjust shift work schedules to get maximum employee attendance to training sessions at some point during the training period. During this time sufficient repetitive learning opportunities will be provided by the manufacturer to allow various shifts to complete the training requirements.
3400 3401 3402 3403 3404 3405 3406	VI.2	The technician will provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup includes operator training for the primary operators, which will give them sufficient knowledge to train other personnel in the functional use of all fire fighting and vehicle operating systems. Prior to leaving the vehicle, the technician will review the maintenance instructions with the purchaser's personnel to acquaint them with maintenance procedures as well as how to obtain support service for the vehicle.
3407 3408 3409 3410	VI.3	Training will include written operating instructions, electronic training aids (videos/power point), or other graphics that depict the step-by-step operation of the vehicle. Written instructions will include materials that can be used to train subsequent new operators.
3411	VII	Referenced Documents.
3412 3413 3414 3415 3416	VII.1	Federal Aviation Administration (FAA).  ACs may be obtained from the FAA website: <a href="https://www.faa.gov/regulations">https://www.faa.gov/regulations</a> policies/advisory circulars/  • AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF)  Vehicles
3417		• AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport
3418		FAA Orders, Specifications, and Drawings may be obtained from: <a href="https://www.faa.gov/">https://www.faa.gov/</a>

3419	VII.2	<u>CFR.</u>
3420		The CFR may be obtained from <a href="https://www.ecfr.gov">https://www.ecfr.gov</a> .
3421 3422		Title 14, Code of Federal Regulations (CFR), <u>Part 139</u> , <i>Certification of Airports</i> (14 CFR <u>Part 139</u> )
3423		• Section 139.315 Aircraft Rescue and Firefighting: Index Determination.
3424		• Section 139.317 Aircraft Rescue and Firefighting: Equipment and Agents.
3425		• Section 139.319 Aircraft Rescue and Firefighting: Operational Requirements.
3426 3427		Title 49, Code of Federal Regulations (CFR), Part 393: Parts and Accessories Necessary for Safe Operation: Subpart C—Brakes.
3428 3429		Title 49, Code of Federal Regulations (CFR), Part 571, Motor Carrier Vehicle Safety Standards, Part 209, Standard No. 209, Seat Belt Assemblies.
3430	VII.3	SAE International.
3431		SAE documents may be obtained from <a href="https://www.sae.org">https://www.sae.org</a> .
3432	VII.4	National Fire Protection Association (NFPA).
3433		NFPA documents may be obtained from <a href="https://www.nfpa.org/">https://www.nfpa.org/</a> .
3434 3435		• NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2014 Edition)
3436		• NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2020 Edition)
3437		NFPA 1901, Standard for Automotive Fire Apparatus (2016 Edition)

3438	FAA Submittal (Class 5)
3439 3440 3441	If this procurement is [subject to approval by the Federal Aviation Administration][to be funded under the Airport Improvement Program or the Passenger Facility Charge Program], the following must be provided to the appropriate FAA Airports office for review and approval.
3442 3443 3444	This specification has been produced using the interactive Advisory Circular 150/5220-10, <i>Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles</i> . No alterations have been made to the resultant specification.
3445 3446 3447	The attached request for additional items needed to address unusual requirements is submitted in accordance with FAA Order <u>5300.1</u> , <i>Modifications to Agency Airport Design, Construction, and Equipment Standards</i> .
3448	(Airport POC signature and title)

Paragraph Number:	AMENDMENT: 4.1.1	
	Extreme Temperature Justification	
☐ Approved	☐ Disapproved:	
□ Approved	□ Disapproved.	
Paragraph Number:	<b>SELECTION: 4.4.2.3.3</b>	
	Radiator Shutters Justification	
☐ Approved	☐ Disapproved:	
Paragraph Number:	<b>ADDITION: 4.12.4.4</b>	
	Justification for RIWS Additional Features	
☐ Approved	☐ Disapproved:	

3478 3479 3480		of a Modification to Standards for the following items that are not provided ecifications. If requesting more than four, provide additional justification
3481	Item 1:	
3482	Justification:	
3483		
3484		
3485		
3486	☐ Approved	☐ Disapproved:
3487	Item 2:	
3488	Justification:	
3489		
3490		
3491		
3492	☐ Approved	☐ Disapproved:
3493	Item 3:	
3494	Justification:	
3495		
3496 3497		
3498	☐ Approved	☐ Disapproved:
3499	Item 4:	
3500	Justification:	
3501		
3502 3503		
3504	☐ Approved	☐ Disapproved:
3505	(EAA signature of 1.1	oto)
	(FAA signature and d	aic)

3507		APPENDIX A. ARFF VEHICLE TRAINING EQUIPMENT
3508 3509 3510	Penet	e are two types of vehicle training devices available to ARFF personnel: the Aircraft Skin ration Device and the Computer Based Simulation Training System. Only one of the es is needed per airport.
3511 3512 3513	The s	ise of an aircraft skin penetration tool has been shown to be an effective firefighting device. kill involved with the effective employment of this device increases dramatically with cal application. The training devices will meet the following requirements:
3514 3515 3516	A.1	Aircraft Skin Penetration Training Device A rigid frame structure with a cross-sectional, curved aluminum panel(s) may be specified to meet the following requirements:
3517 3518 3519		a. Aluminum panels will be comparable in thickness, hardness and curvature of the predominant type aircraft for the specific airport. Panels may be movable or replaceable to allow adjustments for different aircraft types.
3520 3521		b. Panels will be located at a representative height to the predominant aircraft in use at the specific airport.
3522 3523		c. Panels will be mounted on a structure (portable or stationary) that remains stable during training exercises.
3524 3525 3526 3527 3528 3529 3530	A.2	Computer Training System  A computer-based simulator training program may be specified to increase and maintain proficiency in the employment of boom-mounted turrets. The training package will include controls that simulate as closely as possible the actual cab environment (e.g. location of joystick, throttle, and steering wheel). Ensure The simulation software program represents the actual maneuvering operation and controller interface of the actual operation of the elevated and boom-mounted turret of the ARFF vehicle.

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# APPENDIX B. CHECKLIST FOR DELIVERY PACKAGE

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B.1 The delivery package is an important component of this AIP purchase. The delivery package will include each of the applicable documents identified in this checklist and be included in a tabbed binder, two copies (one for the customer and one for the FAA ADO).

AC 150	elivery Package /5200-10 6 Acceptance Criteria	FAA Approval (Initials)
Customer (Airport)		
Authorized Airport Representat	rive Name & Title	
Airport Call Sign for Vehicle(s)		
Manufacturer Name		
Model		
Year of Manufacture		
VIN or Build #		
NFPA 414, 6.1 General		
NFPA 6.1.1 – Manufacturer's quality assurance documents for their manufacturing processes		
NFPA 6.1.2 – Documentation of test results for:		
1	Component Manufacturers Certification	
2	Prototype Vehicle Tests	
3	Operational Tests	

Reference	Comments	(Initials)		
NFPA 414, 6.2 Component Manufacturer's Certification				
Engine				
Transmission				
Axles				
Transfer Case				
Wheels				
Tires				
Hand line Hose with couplings attached				
Premixed storage container				
Premix system pressure relief valve				
Propellant Gas Cylinder (CAFS)				
Propellant Gas Cylinder (DC)				
Propellant Gas Cylinder Regulating Device (CAFS)				
Propellant Gas Cylinder Regulating Device (DC)				
Complementary Agent Storage Container				
Complementary Agent Pressure Relief Device				
Cooling System				
Fire Pump				
Foam Tank				
Water Tank				
Engine or PTO Driven Generator				
Brake System Certified data for Air Brake System				

Reference	Test Name	Comments	(Initials)	
NFPA 414, 6.3 Prototype Vehicle Tests				
6.3.6	Rated Water and Foam Tank Capacity Test			
6.3.7	Cornering Stability			
6.3.7.4	AMENDMENT: Evasive maneuver test will be conducted at 35 MPH			
6.3.8	Vehicle Dimensions			
6.3.9	Driver Vision Measurement			
6.3.10	Pump and Roll on a 40% Grade			
6.3.11	Electrical Charging System			
6.3.11.3	Electrical System Performance Test			
6.3.12	Radio Suppression			
6.3.13	Gradability Test			
6.3.14	Body and Chassis Flexibility Test			
6.3.15	Service / Emergency Brake Test			
6.3.16	Service / Parking Brake Grade Holding Test			
6.3.17	Steering Control Test			
6.3.18	Vehicle Clearance Circle Test			
6.3.19	Agent Pump(s) / Tank Vent Discharge Test			
6.3.20	Water Tank Fill and Overflow Test			
6.3.21	Flushing System Test			
6.3.22	Primary Turret Flow Rate Test			
6.3.23	Primary Turret Pattern Test			
6.3.24	Primary Turret Control Force Measurement			
6.3.25	Primary Turret Articulation Test			
6.3.26	Handline Nozzle Flow Rate Test			
6.3.27	Handline Nozzle Pattern Test			
6.3.28	Ground Sweep / Bumper Turret Flow Rate			
6.3.29	Ground Sweep / Bumper Turret Pattern Test			

6.3.30	Undertruck Nozzle Test	
6.3.31	Foam Concentration / Foam Quality Test	
6.3.32	Warning Siren Test	
6.3.33	Propellant Gas	
6.3.34	Pressure Regulation	
6.3.35	Foam Premix Piping and Valves	
6.3.36	Pressurized Agent Purging and Venting	
6.3.37	Complementary Agent Handline Flow Rate and Range	
6.3.38	Dry Chemical Turret Flow Rate and Range	
6.3.39	Cab Interior Noise Test	
NFPA 414	4, 6.4 Operational Tests	
6.4.1	Vehicle Testing, Side Slope	
6.4.2	Weight / Weight Distribution	
6.4.3	Acceleration	
6.4.4	Top Speed	
6.4.5	Brake Operational Test	
6.4.6	Air System / Air Compressor Test	
6.4.7	Agent Discharge Pumping Test	
6.4.8	Dual Pumping System Test	
6.4.9	Pump and Maneuver Test	
6.4.10	Hydrostatic Pressure Test	
6.4.11	Foam Concentration Test	
6.4.12	Primary Turret Flow Rate Test	
6.4.13	Piercing Nozzle Testing	
	•	

As Applicable	Comments	(Initials)
NFPA 414, 4.2.2.3 Operator's Manual		
Chassis (As Built)		
Boom-mounted Turret (2) and 1 CD (As Built)		
PTO Generator		
HVLA Bumper Turret		

MADAS				
Continuous Lubrication System				
(Other) (As Built)				
Electrical Schematics (As Built)				
Engineered Drawing (As Built)				
Photo Documentation during the production process				
Warranties – General Requirements				
Base Vehicle – Bumper to Bumper (1 Year)				
Engine (5 Years)				
Transmission (2 Years)				
Water Pump (5 Years)				
Water / Foam Tank (Lifetime)				
Paint (5 Years)				
NFPA 414, 4.2.2.4 Service Manual				
Chassis (As Built)				
Boom-mounted Turret (As Built)				
Complementary Agent System (As Built)				
PTO Generator				
HVLA Bumper Turret				
Continuous Lubrication System				
(Other) (As Built)				
NFPA 414, 4.2.2.5 Parts Manual				
Chassis (As Built)				
Boom-mounted Turret (As Built)				
CAFS (As Built)				
Complementary Agent System				
PTO Generator				
HVLA Bumper Turret				
Continuous Lubrication System				
(Other) (As Built)				

3536					
3537	The undersigned authorized representative has inspected the delivery documents for this ARFF				
3538	Vehicle and find it meets the requirements of AC 150/5220-10F.				
3539					
3540	Inspector Name:				
3541					
3542	Inspector Signature:				
3543					
3544	Inspector Title:				
3545					
3546	Date:				
3547	A signed copy of this signed checklist must be submitted to the ADO.				

# **Advisory Circular Feedback**

If you find an error in this AC, have recommendations for improving it, or have suggestions for new items/subjects to be added, you may let us know by (1) mailing this form to Manager, Airport Engineering Division, Federal Aviation Administration ATTN: AAS-100, 800 Independence Avenue SW, Washington DC 20591 or (2) faxing it to the attention of the Office of Airport Safety and Standards at (202) 267-5383.

Sub	ject: AC 150/5220-10F	Date:			
Plea	use check all appropriate line	e items:			
		error (procedural or typographical) has been noted in paragraph on page			
		on page	·		
	In a future change to this A (Briefly describe what you we	C, please cover the following subject and added.)	et:		
	Other comments:				
	I would like to discuss the	above. Please contact me at (phone	number, email address).		
Sub	mitted by:	Date:			