U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

Subject: Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles	**Date:** Draft **Initiated By:** AAS-300	**AC No:** 150/5220-10F **Change:**

1 Purpose.

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

2 Cancellation.

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

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*.

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 Appendix B, "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.

7 Related Documents.

ACs and Orders referenced in the text of this AC do not include a revision letter, as they refer to the latest version.

1. FAA AIP Handbook
2. AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*
3. AC 150/5210-14, *Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing*
4. AC 150/5210-19, *Driver's Enhanced Vision System (DEVS)*
5. AC 150/5210-25, *Performance Specification for Airport Vehicle Runway Incursion Warning Systems (RIWS)*
6. FAA Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards*
7. Part 139, *Certification of Airports*
8. NFPA 414, *Standard for Aircraft Rescue and Fire-Fighting Vehicles (2020 Edition),* https://www.nfpa.org/
9. NFPA 1901, *Standard for Automotive Fire Apparatus (2016 Edition),* https://www.nfpa.org/

8 Where to Find this AC.

You can view a list of all ACs at https://www.faa.gov/regulations_policies/advisory_circulars/. You can view the Federal Aviation Regulations at https://www.faa.gov/regulations_policies/faa_regulations/.

9 Feedback on this AC.

If you have suggestions for improving this AC, you may use the Advisory Circular Feedback form at the end of this AC.

John R. Dermody
Director of Airport Safety and Standards

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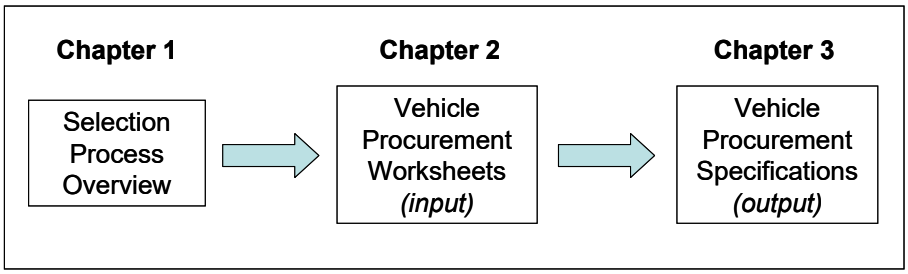
TABLES

Chapter 1. THE VEHICLE SELECTION PROCESS

1.1 General.

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

Figure 1-1. Advisory Circular (AC) Flowchart



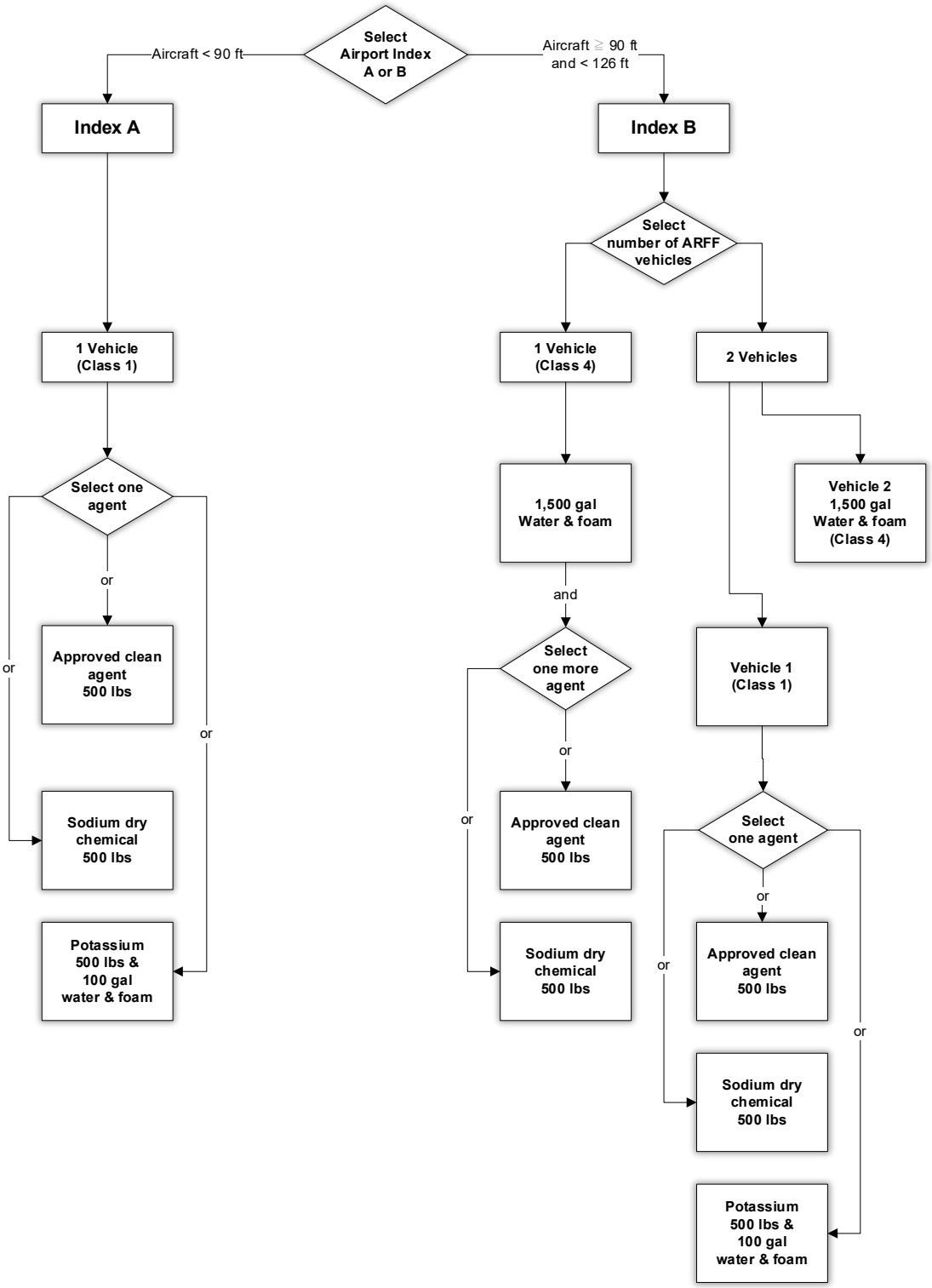
1.2 Background.

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.

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



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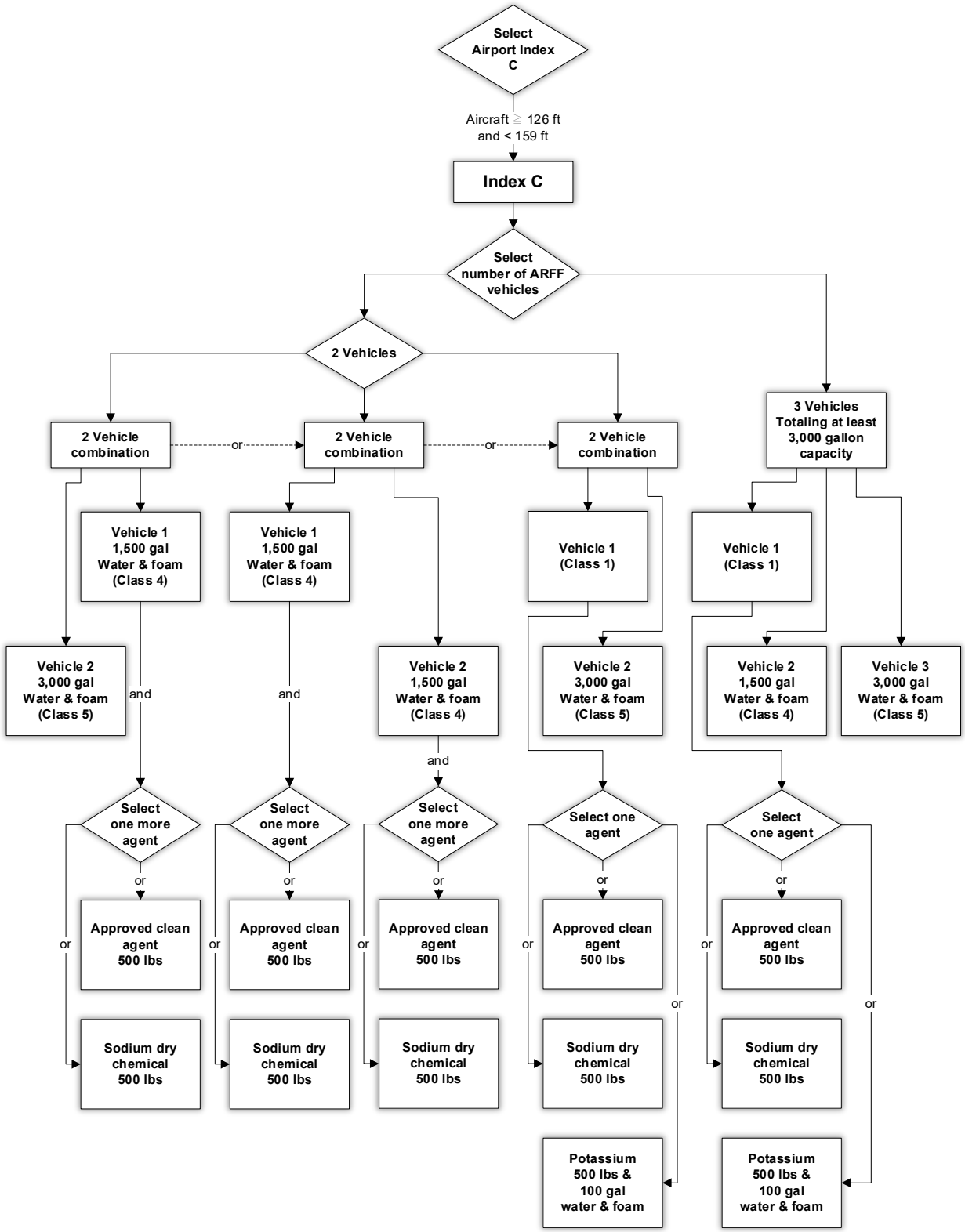
151 **Figure 1-3. Decision Logic Diagram Summary for Index C Airports**



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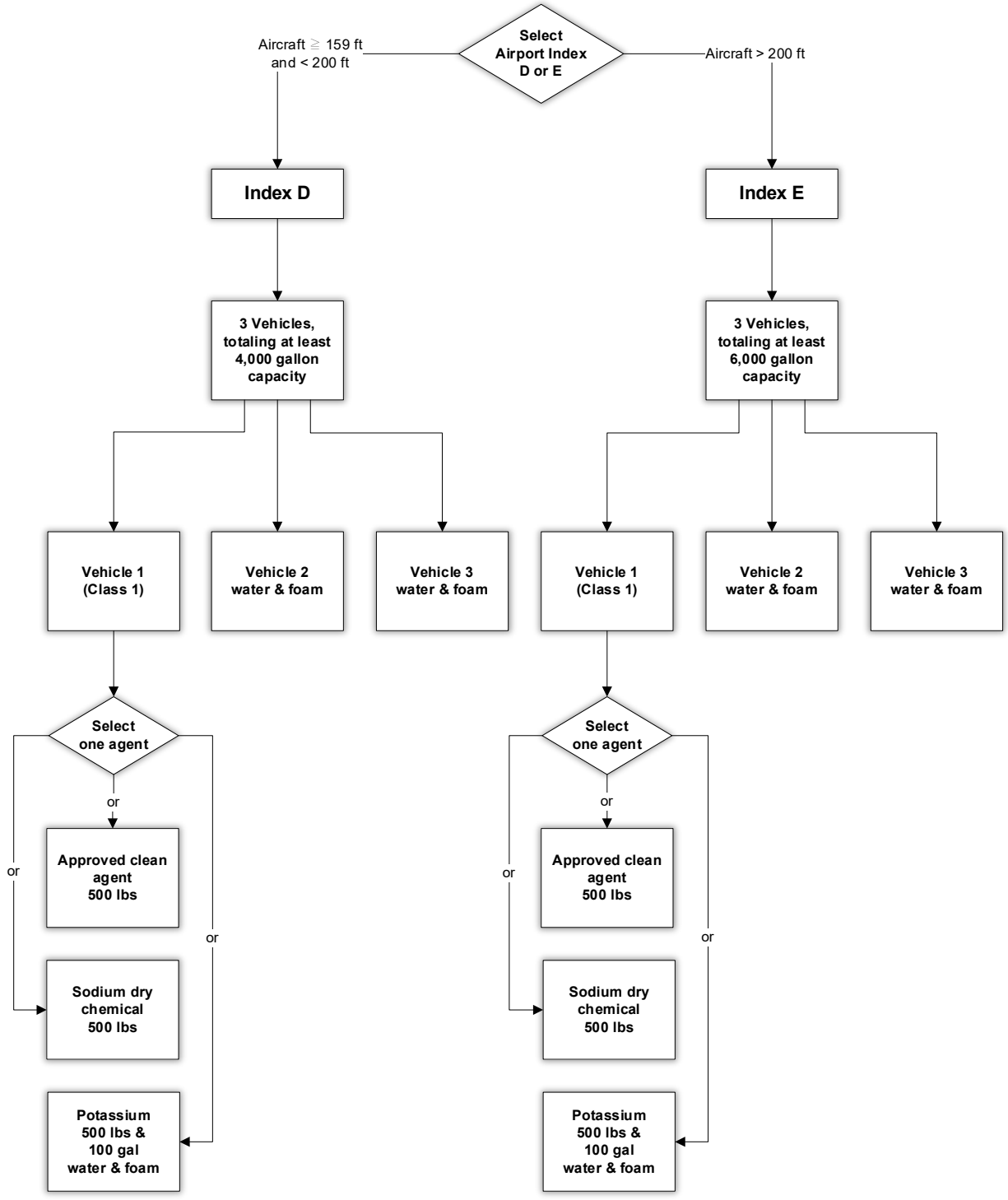
153 **Figure 1-4. Decision Logic Diagram Summary for Index D or E Airports**



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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 1.5 of this AC and Part 139.315, 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 1.7 and Chapter 2 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.

1.5 Step 2 – Determining the Airport's ARFF Index.

An airport's ARFF index is determined by the requirements of Part 139.315. See Part 139.5 for definitions of air carrier aircraft, air carrier operations, and average daily departures.

1. An airport's ARFF index is determined by a combination of two factors. These include:
   a. The length of air carrier aircraft.
   b. The average daily departures of air carrier aircraft.
      i. 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.
      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.
2. Air carrier aircraft are grouped by length to determine an airport's index as described below:
   a. Index A includes aircraft less than 90 feet in length.
   b. Index B includes aircraft at least 90 feet but less than 126 feet in length.
   c. Index C includes aircraft at least 126 feet but less than 159 feet in length.
   d. Index D includes aircraft at least 159 feet but less than 200 feet in length.
   e. Index E includes aircraft at least 200 feet in length.
3. See Table 1-1 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.

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	X				
Cessna 414	X				
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			X		
Embraer 195			X		
MD-88			X		
Airbus A300				X	
Airbus A330-200				X	
Airbus A350-800				X	
Boeing 767-300				X	
Boeing 787-8				X	
Airbus A330-300					X
Airbus A340 300					X
Airbus A350-900					X
Airbus A380					X
Antonov AN-225					X
Boeing 747-200					X
Boeing 747-8					X
Boeing 787-9					X

* 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 Part 139.317. 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 Types of Fire Fighting Agents.

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 Index	Vehicle Class	Minimum Rated Capacities Options	
		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
B	4	1500 gallons water/foam	500 lbs sodium-based dry chemical
B	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 Vehicle Agent Carrying Capacity.

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 Table 1-3 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 and Dry Chemical (500 lbs sodium- or 500 lbs potassium-based), or Approved Clean Agent (500 lbs)	1500 Gallon Water/Foam	3000-4500 Gallon Water/Foam
Airport Index	**(Note 1)**		**(Note 1)**
A	1	N/A	N/A
B	1	1 **(Note 2)**	N/A
C	1	2	N/A
	1	1	1 (3,000 Gallon)
D	1	1	1
E	1	N/A	2
	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 AC 150/5210-14, *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:

1.7.1 Class 1 ARFF Vehicle.

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.

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,

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.

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.

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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 Part 139.317

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Chapter 2. INTERACTIVE PROCUREMENT SPECIFICATION - INPUT

2.1 General.

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 Class 1 Specification	☐ **Print Class 1 Specification**
Class 4 →	Worksheets	→ Review Class 4 Specification	☐ **Print Class 4 Specification**
Class 5 →	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 FAA Airport Technology Research and Development Branch Home Page, where detailed technical reports (i.e. Technical Notes) can be found in the Aircraft Rescue and Fire Fighting Technology section.

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2.2 Airport Requirements Worksheet: Class 1

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

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

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Standard/Specialized Equipment Requirements Worksheet

Standard Requirements	Specialized Requirements	Selection	Justification
Elevation less than 2,000 feet	Is elevation 2,000 feet or more?	○ 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?	○ Yes ○ over 110°F	
Tire size	Large tires	○ Yes ○ No	
Radiator shutters	Are radiator shutters required?	○ Yes ○ No	

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

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Vehicle Space Requirements Worksheet

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

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

Standard requirements	Specialized requirements	Selection / Details
		○ SCBA ○ N/A
Self-Contained Breathing Apparatus (SCBA) mounting type	Enter SCBA equipment manufacturer name and model number: _____	○ 2216 psi ○ 4500 psi
		○ 30-minute bottles ○ 60-minute bottles
Mirrors	Electrically heated heads	○ Yes ○ No
Towing Device	Type	○ Pintle Hook ○ Ball Mount
Emergency warning lights	Lighting type (LED)	○ rotating beacon ○ strobe
MADAS	Monitoring and Data Acquisition System (MADAS) capability	○ Yes ○ No
Windows	Control system	○ electric ○ manual
Floodlights	Style to include adjustment knuckle	○ fixed ○ telescoping
Spot, flood, and scene lights	Lighting type	○ halogen ○ LED ○ 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 antennas and wire terminations.	
Lubrication system	Continuous duty cycle for suspension parts and other mechanical equipment joints.	○ 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 space available; not all items will fit on one truck.

- ☐ 36” axe, pick head, fiberglass handle [1]
- ☐ Halligan bar – 36” [1]
- ☐ axe, flat head, fiberglass handle – 36” with mounting bracket [1]
- ☐ 36” crowbar [1]
- ☐ cutter, cable [1]: ○ 24” ○ 36”
- ☐ hacksaw, 12” [1]
- ☐ hammer, 1¼ lb (maul) [1]
- ☐ hammer, 16 oz, non-sparking [1]
- ☐ hammer, sledge, 8 lb with fiberglass handle [1]
- ☐ knife, rescue [1]
- ☐ V-blade (harness cutting tool) [2]
- ☐ pliers, side cutting, 7” [1]
- ☐ adjustable wrench, 8” [1]
- ☐ locking pliers, 10” [1]
- ☐ plug, fuel line [6]
- ☐ 6 screw drivers [1 set]
- ☐ shears, sheet metal [1]
- ☐ tool bag to carry all hand tools (cutter through shears, above) [1]
- ☐ blanket, fire resistant with storage pouch [1]
- ☐ wheel chocks – one set with mounting brackets [1]
- ☐ ladder, ≤ 24 ft overall length with mounting brackets [1]: _____ ft
  ○ extension ○ "A-frame"
- ☐ rechargeable flashlights chargers to be mounted in cab wired into vehicle electrical system for charging [2]
- ☐ pike pole, 8 ft [2]
- ☐ pike pole with 4 ft “D” handle [1]
- ☐ rescue kit, pneumatic air hammer / chisel standard duty type, complete with spare air cylinder, carrying case and various tips [1]
- ☐ rescue saw with spare blades [1 per station]
  ○ 14” for A, B, C airports
  ○ 16” for D, E airports
- ☐ rope, 100 ft - 5/8” diameter
- [2]20B:C fire extinguishers: ○ 1 ○ 2
- ☐ 30 lb Class D fire extinguisher [1]
- ☐ skin penetrator (piercing applicator) for water or foam application, including carry case, applicator and air cylinder (only if vehicle is not equipped with a boom-mounted turret) [1]
- ☐ powered firefighting hydraulic rescue tool equipped with cutter, spreader and rams [1 per station]
- ☐ heavy duty canvas hydrant bag [1]
- ☐ gate valve labeled open/closed 2½” [2]
- ☐ female gated reducing wye, 2½” female connection x (2) 1½” male connections [1]
- ☐ adjustable hydrant wrench [1]
- ☐ 2½” spanner wrenches w/bracket [2]
- ☐ 1” spanner wrenches w/ bracket [2]
- ☐ LDH spanner wrenches w/ mounting bracket [0]
- ☐ reducer, non-swivel – 2½” to 1½” [2]
- ☐ double female coupling – 1½” [1]
- ☐ double female coupling – 2½” [1]
- ☐ double male coupling – 1½” [1]
- ☐ double male coupling – 2½” [1]
- ☐ large diameter hose (rubber / synthetic) 25 ft [0], diameter:
  ○ 4½” ○ larger: _____ inch
- ☐ 50 ft rubber / synthetic hose, NST [6], diameter: ○ 2½” ○ 3”
- ☐ 1½” hand line nozzle [2]
- ☐ digital refractometer [1 per station]
- ☐ foam tank drum wrench tool [1 per station]
- ☐ 5 gallon pail wrench [1 per station]
- ☐ full spine board, 6 ft [1]
- ☐ 18” gasoline powered fan [1 per station]
- ☐ ARFF vehicle medical jump kit [1]

☐ 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 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.

	○ 1	○ 2	○ 3	set(s) of aluminized proximity protection suit, including coat, trousers, and gloves
	○ 1	○ 2	○ 3	pair(s) ARFF boots
	○ 1	○ 2	○ 3	complete SCBA including 30-minute bottle, face piece and PASS device
	○ 1	○ 2	○ 3	Nomex hood(s)
○ 0	○ 1	○ 2	○ 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 Class 1.

Return to Class 1 worksheet page 1

Review Class 1 Specification

☐ Print Class 1 Specification

2.3 Airport Requirements Worksheet: Class 4

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

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

* Complementary System Options Worksheet

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

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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?	○ Yes ○ No	
Equipment capable of operating at 40° to 110°F	Is standard temperature range equipment adequate?	○ Yes ○ over 110°F	
Tires and wheels	Tire bead locks	○ Yes ○ No	
Tire size	Large tires	○ Yes ○ No	
Additional Seats	Non-suspension type	○ none (2 front-row seats only) ○ 3rd (left side) ○ 3rd (right side) ○ 3rd and 4th	

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

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Vehicle Space Requirements Worksheet

Minimum Requirements		Facility Dimensions Sufficient for fully loaded vehicle with turrets bedded?	For insufficient dimensions, enter minimum requirement:
Length	433 inches	○ Yes ○ No	_____ inches
Width, including mirrors	124 inches	○ Yes ○ No	_____ inches
Height	154 inches	○ Yes ○ No	_____ inches

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

Standard Requirements	Specialized Requirements	Selection
Floodlights	Style to include adjustment knuckle	○ Fixed ○ Telescoping
Spot, flood, and scene lights	Lighting type	○ Halogen ○ LED ○ 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 antennas and wire terminations.	
Lubrication system	Continuous duty cycle for suspension parts and other mechanical equipment joints.	○ 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 space available; not all items will fit on one truck.

- ☐ 36” axe, pick head, fiberglass handle [1]
- ☐ Halligan bar – 36” [1]
- ☐ axe, flat head, fiberglass handle – 36” with mounting bracket [1]
- ☐ 36” crowbar [1]
- ☐ cutter, cable [1]: ○ 24” ○ 36”
- ☐ hacksaw, 12” [1]
- ☐ hammer, 1¼ lb (maul) [1]
- ☐ hammer, 16 oz, non-sparking [1]
- ☐ hammer, sledge, 8 lb with fiberglass handle [1]
- ☐ knife, rescue [1]
- ☐ V-blade (harness cutting tool) [2]
- ☐ pliers, side cutting, 7” [1]
- ☐ adjustable wrench, 8” [1]
- ☐ locking pliers, 10” [1]
- ☐ plug, fuel line [6]
- ☐ 6 screw drivers [1 set]
- ☐ shears, sheet metal [1]
- ☐ tool bag to carry all hand tools (cutter through shears, above) [1]
- ☐ blanket, fire resistant with storage pouch [1]
- ☐ wheel chocks – one set with mounting brackets [1]
- ☐ ladder, ≤ 24 ft overall length with mounting brackets [1]: _____ ft
  ○ extension ○ "A-frame"
- ☐ rechargeable flashlights chargers to be mounted in cab wired into vehicle electrical system for charging [2]
- ☐ pike pole, 8 ft [2]
- ☐ pike pole with 4 ft “D” handle [1]
- ☐ rescue kit, pneumatic air hammer / chisel standard duty type, complete with spare air cylinder, carrying case and various tips [1]
- ☐ 16” rescue saw with spare blades [1 per station]
  ○ 14” for A, B, C airports
  ○ 16” for D, E airports
- ☐ rope, 100 ft - 5/8” diameter
- [2]20B:C fire extinguishers: ○ 1 ○ 2
- ☐ 30 lb Class D fire extinguisher [1]
- ☐ skin penetrator (piercing applicator) for water or foam application, including carry case, applicator and air cylinder (only if vehicle is not equipped with a boom-mounted turret) [1]
- ☐ powered firefighting hydraulic rescue tool equipped with cutter, spreader and rams [1 per station]
- ☐ heavy duty canvas hydrant bag [1]
- ☐ gate valve labeled open/closed 2½” [2]
- ☐ female gated reducing wye, 2½” female connection x (2) 1½” male connections [1]
- ☐ adjustable hydrant wrench [1]
- ☐ 2½” spanner wrenches w/bracket [2]
- ☐ 1” spanner wrenches w/ bracket [2]
- ☐ LDH spanner wrenches w/ mounting bracket [0]
- ☐ reducer, non-swivel – 2½” to 1½” [2]
- ☐ double female coupling – 1½” [1]
- ☐ double female coupling – 2½” [1]
- ☐ double male coupling – 1½” [1]
- ☐ double male coupling – 2½” [1]
- ☐ large diameter hose (rubber / synthetic) 25 ft [0], diameter:
  ○ 4½” ○ larger: _____ inch
- ☐ 50 ft rubber / synthetic hose, NST [6], diameter: ○ 2½” ○ 3”
- ☐ 1½” hand line nozzle [2]
- ☐ digital refractometer [1 per station]
- ☐ foam tank drum wrench tool [1 per station]
- ☐ 5 gal pail wrench [1 per station]
- ☐ full spine board, 6 ft [1]
- ☐ 18” gasoline powered fan [1 per station]
- ☐ ARFF vehicle medical jump kit [1]

- ☐ 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 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.

	○ 1	○ 2	○ 3	set(s) of aluminized proximity protection suit, including coat, trousers, and gloves
	○ 1	○ 2	○ 3	pair(s) ARFF boots
	○ 1	○ 2	○ 3	complete SCBA including 30-minute bottle, face piece and PASS device
	○ 1	○ 2	○ 3	Nomex hood(s)
○ 0	○ 1	○ 2	○ 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 Class 4.

Return to Class 4 worksheet page 1

Review Class 4 Specification

☐ Print Class 4 Specification

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	○ D ○ E
Primary extinguishing agent	○ 3000 gallons water/foam ○ 4500 gallons water/foam
Complementary extinguishing agent system	○ 500 lb sodium-based dry chemical. ○ 500 lb potassium-based dry chemical ○ 500 lb approved clean agent
Roof turret type	○ standard turret ○ boom-mounted turret (capable of penetrating all aircraft except the second level of an aircraft with two passenger levels) ○ boom-mounted turret (capable of penetrating the second level of an aircraft with two passenger levels), see note below * ○ no roof turret
Bumper turret type	○ Single agent turret ○ Dual agent turret ○ fixed mount low volume single rate (minimum 250 GPM) bumper turret. ○ fixed mount high volume dual rate (minimum 600/1200 GPM) bumper turret. ○ low angle high volume dual rate (minimum 600/1200 GPM) bumper turret. ○ no bumper turret.

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

* Complementary System Options Worksheet

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

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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?	○ Yes ○ No	
Equipment capable of operating at 40° to 110°F	Is standard temperature range equipment adequate?	○ Yes ○ over 110°F	
Tires and wheels	Tire bead locks	○ Yes ○ No	
Tire size	Large tires	○ Yes ○ No	
Additional Seats	Non-suspension type	○ none (2 front-row seats only) ○ 3rd (left side) ○ 3rd (right side) ○ 3rd and 4th	

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

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Vehicle Space Requirements Worksheet

Minimum 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)	○ Yes ○ No	_____ inches
Width, including mirrors	124	○ Yes ○ No	_____ inches
Height	154	○ Yes ○ No	_____ inches

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

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

Standard Requirements	Specialized Requirements	Selection / Details
Spot, flood, and scene lights	Lighting type	○ halogen ○ LED ○ 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.	○ 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 space available; not all items will fit on one truck.

- ☐ 36” axe, pick head, fiberglass handle [1]
- ☐ Halligan bar – 36” [1]
- ☐ axe, flat head, fiberglass handle – 36” with mounting bracket [1]
- ☐ 36” crowbar [1]
- ☐ cutter, cable [1]: ○ 24” ○ 36”
- ☐ hacksaw, 12” [1]
- ☐ hammer, 1¼ lb (maul) [1]
- ☐ hammer, 16 oz, non-sparking [1]
- ☐ hammer, sledge, 8 lb with fiberglass handle [1]
- ☐ knife, rescue [1]
- ☐ V-blade (harness cutting tool) [2]
- ☐ pliers, side cutting, 7” [1]
- ☐ adjustable wrench, 8” [1]
- ☐ locking pliers, 10” [1]
- ☐ plug, fuel line [6]
- ☐ 6 screw drivers [1 set]
- ☐ shears, sheet metal [1]
- ☐ tool bag to carry all hand tools (cutter through shears, above) [1]
- ☐ blanket, fire resistant with storage pouch [1]
- ☐ wheel chocks – one set with mounting brackets [1]
- ☐ ladder, ≤ 24 ft overall length with mounting brackets [1]: _____ ft
  ○ extension ○ "A-frame"
- ☐ rechargeable flashlights chargers to be mounted in cab wired into vehicle electrical system for charging [2]
- ☐ pike pole, 8 ft [2]
- ☐ pike pole with 4 ft “D” handle [1]
- ☐ rescue kit, pneumatic air hammer / chisel standard duty type, complete with spare air cylinder, carrying case and various tips [1]
- ☐ 16” rescue saw with spare blades [1 per station]
  ○ 14” for A, B, C airports
  ○ 16” for D, E airports
- ☐ rope, 100 ft - 5/8” diameter
- [2]20B:C fire extinguishers: ○ 1 ○ 2
- ☐ 30 lb Class D fire extinguisher [1]
- ☐ skin penetrator (piercing applicator) for water or foam application, including carry case, applicator and air cylinder (only if vehicle is not equipped with a boom-mounted turret) [1]
- ☐ powered firefighting hydraulic rescue tool equipped with cutter, spreader and rams [1 per station]
- ☐ heavy duty canvas hydrant bag [1]
- ☐ gate valve labeled open/closed 2½” [2]
- ☐ female gated reducing wye, 2½” female connection x (2) 1½” male connections [1]
- ☐ adjustable hydrant wrench [1]
- ☐ 2½” spanner wrenches w/bracket [2]
- ☐ 1” spanner wrenches w/ bracket [2]
- ☐ LDH spanner wrenches w/ mounting bracket [0]
- ☐ reducer, non-swivel – 2½” to 1½” [2]
- ☐ double female coupling – 1½” [1]
- ☐ double female coupling – 2½” [1]
- ☐ double male coupling – 1½” [1]
- ☐ double male coupling – 2½” [1]
- ☐ large diameter hose (rubber / synthetic) 25 ft [0], diameter:
  ○ 4½” ○ larger: _____ inch
- ☐ 50 ft rubber / synthetic hose, NST [6], diameter: ○ 2½” ○ 3”
- ☐ 1½” hand line nozzle [2]
- ☐ digital refractometer [1 per station]
- ☐ foam tank drum wrench tool [1 per station]
- ☐ 5 gal pail wrench [1 per station]
- ☐ full spine board, 6 ft [1]
- ☐ 18” gasoline powered fan [1 per station]
- ☐ ARFF vehicle medical jump kit [1]

- ☐ 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 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.

	○ 1	○ 2	○ 3	set(s) of aluminized proximity protection suit, including coat, trousers, and gloves
	○ 1	○ 2	○ 3	pair(s) ARFF boots
	○ 1	○ 2	○ 3	complete SCBA including 30-minute bottle, face piece and PASS device
	○ 1	○ 2	○ 3	Nomex hood(s)
○ 0	○ 1	○ 2	○ 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 Class 5.

Return to Class 5 worksheet page 1

Review Class 5 Specification

☐ Print Class 5 Specification

Chapter 3. INTERACTIVE PROCUREMENT SPECIFICATION – OUTPUT

3.1 Vehicle Procurement Specification, Class 1

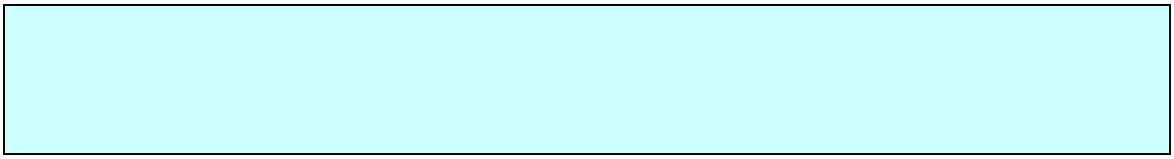
PROCUREMENT SPECIFICATION

Class 1

Aircraft Rescue and Fire Fighting (ARFF) Vehicle

I **Scope.**

This Procurement Specification covers a commercially produced 4-wheel drive, diesel engine driven ARFF vehicle with a minimum:



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.

II **Classification.**

The ARFF vehicle covered by this Procurement Specification is classified in accordance with Part 139, Certification of Airports, Section 315, Aircraft Rescue and Firefighting: Index Determination; Section 317, Aircraft Rescue and Firefighting: Equipment and Agents; and Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles*.

II.1 Fully Loaded Vehicle.

Consists of the fully assembled vehicle, complete with a full complement of crew, fuel 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 ballast, up to a total of 1000 lbs. Load each seat that is not occupied during the test with 225 lbs. of ballast seat belted into the seat. Load ballast to represent the weight of complementary agent not yet on board as close to the height of the complementary agent vessel as possible, taking care anticipated vehicle movement during the test will not cause a shift in the ballast damaging vehicle components.

III **Vehicle Conformance/Performance Characteristics.**

The ARFF vehicle will be in accordance with the applicable requirements of AC 150/5220-10F, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles,* and National Fire Protection Association (NFPA) 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles*, 2020 Edition, NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 Edition, except as specified herein.

Note: 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:

- **ADDITION:** A new item has been added to the standard in the reference document.
- **EXCEPTION:** 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.
- **SELECTION:** NFPA 414 requires or allows an option to be selected.

Note: Requirements referring to complementary agents and/or water/foam systems apply only if those systems are installed.

NFPA 414, Chapter 4, Aircraft Rescue and Fire-Fighting Vehicles.

ADDITION: 4.1 General.

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

The operating temperature range is [ ].

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 1/Table 1. Vehicle Space Requirements

Maximum Dimensions	Class 1
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.

ADDITION: Table 4.1.1.2(d) Agent System Performance Parameters (Table 4.1.1.2(c) does not apply).

Vehicle Water Tank Capacity. Except where noted below, the requirements for vehicles with a water tank capacity from 120 gallons to 528 gallons apply.

EXCEPTION: Table 4.1.1.2(d) Agent System Performance Parameters (Table 4.1.1.2(c) does not apply).

Item 2a, Roof Turret. This item does not apply.

ADDITION: Table 4.1.1.2(d) Agent System Performance Parameters (Table 4.1.1.2(c) does not apply).

Item 2d, Ground Sweep Nozzles. Ground sweep nozzles are not an approved option. The primary agent discharge location will be the _____.

The complementary agent discharge location will be the _____.

_____

EXCEPTION: 4.1.2

Not applicable.

AMENDMENT: 4.1.5

Only those options specifically identified herein may be specified.

NFPA 414, 4.2 Requirements for All Aircraft Rescue and Fire-Fighting Vehicles — Responsibility of Contractors/Suppliers.

ADDITION: 4.2.1 Certification.

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.

Warranty. The fire fighting unit system will be covered by a minimum one-year warranty after delivery. The commercially purchased chassis and drive train will have a minimum 3 year / 36,000-mile warranty. The warranty will accompany the vehicle during delivery. All water and foam tanks will be covered by a lifetime warranty.

AMENDMENT: 4.2.2 Manuals.

All manuals and warranties 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.

ADDITION: 4.2.2.3 Operator's Manual.

The operator's manual will also include:

- Safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.
- Tie down procedures for transport on a low-boy trailer.
- 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.
- A description of the post-operational procedures including, but not limited to draining, flushing, and re-servicing.
- Disabled vehicle towing procedures.
- Procedures and equipment required for changing a tire.
- If the driveline is equipped with a differential locking control, a warning/caution indicating the proper differential locking/un-locking procedures.
- 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.

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

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.

ADDITION: 4.2.2.5.2

Any special test equipment will be identified.

AMENDMENT: 4.2.2.5.7

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.

NFPA 414, 4.2.3 Metal Finish.

ADDITION: 4.2.3.1

Vehicles will be painted and marked in accordance with AC 150/5210-5, *Painting, 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 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.

NFPA 414, 4.2.4 Lettering, Numbering, and Striping.

ADDITION: 4.2.4

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 arches above and below the lettering center line. The size of the lettering will be a minimum of 2½-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).

AMENDMENT: 4.2.4.5, 4.2.4.6

Vehicle numbering, lettering, and striping will conform with AC 150/5210-5.

ADDITION: 4.2.5 Vehicle Information Data Plate.

A second permanently marked identification plate will be securely mounted at the driver's compartment. The identification plate will contain the following information:

- NOMENCLATURE
- MANUFACTURER'S MAKE AND MODEL
- MANUFACTURER'S SERIAL NUMBER
- VEHICLE CURB WEIGHT: lbs.
- PAYLOAD, MAXIMUM: lbs.
- GROSS VEHICLE WEIGHT (GVW): lbs.
- FUEL CAPACITY AND TYPE: gal.
- DATE OF DELIVERY (month and year)

- WARRANTY (months and miles)
- CONTRACT NUMBER
- PAINT COLOR AND NUMBER

A single plate that combines or contains the information required for both plates is acceptable.

AMENDMENT: Figure 4.2.5 Aircraft Rescue and Fire-Fighting Vehicle Tilt Table Certification per NFPA 414.

Replace NFPA 414 Figure 4.2.5 with the figure below.

Manufacturer _____

Vehicle Make and Model _____

Year of Manufacture _____

Drive Type ☐ 4 × 4 ☐ 6 × 6

This vehicle was tested to_____degrees while on a tilt table in the "pump down" position

This vehicle was tested to_____degrees while on a tilt table in the "pump up" position

Was a trip / slip rail used? ☐ Yes ☐ No.

If yes, what is the height of the rail? _____ (Maximum 2 inches)

Date of Test _____Location of Test_____

Vehicle Empty Weight (lbs.)_____

Maximum Gross Weight (lbs.)_____

Front axle loading*	_____(lbs.)
Rear axle loading*	_____(lbs.)
Tire manufacturer	_____
Tire model	_____
Front tire pressure	_____(psi)
Rear tire pressure	_____(psi)
Front wheel track	_____(in.)
Rear wheel track	_____(in.)
Crew capacity	_____(Number of personnel)
Fuel tank capacity	_____(gal.)
Equipment allowance	_____(lbs.)
Water tank capacity (if applicable)	_____(gal.)
Foam tank capacity (if applicable)	_____ (gal.)

Complementary agent capacity (if applicable) _____ (lbs.)

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

NFPA 414, 4.3 Weights and Dimensions, 4.3.2 Dimensions.

ADDITION: 4.3.2.2 Field of Vision.

Mirrors. 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 eliminate potential blind spots, a rectangular mirror will be installed on the lower corner of each side of the windshield, having a minimum area of 35 square inches.

NFPA 414, 4.4 Engine.

ADDITION: 4.4

Ensure the engine(s) and transmission operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants in keeping with the recommendations of the engine and transmission manufacturers.

ADDITION: 4.4.1.1 Engine Characteristics.

Engine. 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.

AMENDMENT: 4.4.1.2.3

Elevation. The vehicle, including the pumping system, will be designed for operation up to _____ feet above sea level.

ADDITION: 4.4.2 Engine Cooling Systems.

A label will be installed near the engine coolant reservoir reading "Engine Coolant Fill."

SELECTION: 4.4.2.3.3

Radiator shutters.

NFPA 414, 4.4.3 Fuel Systems.

ADDITION: 4.4.3.4

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."

NFPA 414, 4.4.4 Exhaust Systems.

ADDITION: 4.4.4.1

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.

NFPA 414, 4.5 Vehicle Electrical System.

ADDITION: 4.5

The vehicle will have a 12-volt electrical and starting system.

The minimum continuous electrical load will include operation of the air conditioning system.

ADDITION: 4.5.1 Electrical Systems and Warning Devices.

Batteries. 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 to prevent electrolyte loss during service and to keep the top of the battery free from electrolyte.

Battery compartment. The batteries will be installed in a protected compartment.

ADDITION: 4.5.2 Battery Chargers.

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.

AMENDMENT: 4.5.2.2, 4.5.4.5

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.

AMENDMENT: 4.5.4

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.

AMENDMENT: 4.5.4.1

Electrical shoreline connection. The battery charger will be supplied from an external power source of 110 volts AC.

NFPA 414, 4.6 Vehicle Drive.

AMENDMENT: 4.6

Transmission. A fully automatic transmission will be provided.

ADDITION: 4.6

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.

ADDITION: 4.6.4.1

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.

NFPA 414, 4.7 Suspension.

ADDITION: 4.7

Suspension. Provide an off-road, high-mobility suspension system resulting in no more than 0.5 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.

NFPA 414, 4.8 Rims, Tires, and Wheels.

ADDITION: 4.8

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.

AMENDMENT: 4.8.2

Tire selection. The vehicle will be equipped with new tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Large tires [ ] required.

AMENDMENT: 4.8.4

Tires and wheels. The vehicle will be equipped with single tires and wheels on the front axle and single or dual tires and wheels on the rear.

Tire and wheel assemblies will be identical at all positions.

NFPA 414, 4.9 Towing Connections.

AMENDMENT: 4.9

The tow connections may intrude into the angle of approach and angle of departure.

ADDITION: 4.9

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.

NFPA 414, 4.10 Brakes.

ADDITION: 4.10

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.

NFPA 414, 4.12 Cab.

ADDITION: 4.12

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.

ADDITION: 4.12.1.5

Seat belts. 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).

ADDITION: 4.12.1.7

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.

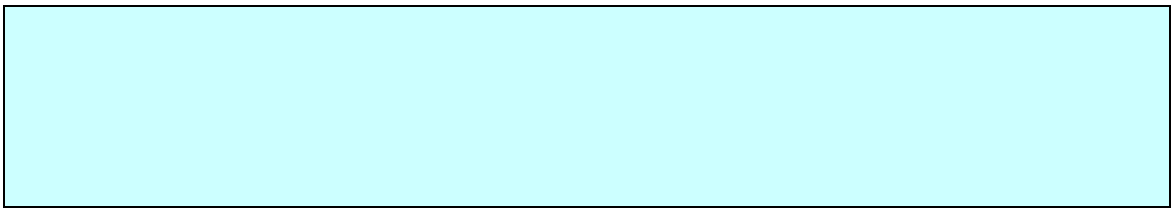
ADDITION: 4.12.4.4

Instruments and warning lights. The following will also be provided within convenient reach of the seated driver:

- Master warning light control switch,
- Work light switch(es), and
- 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.

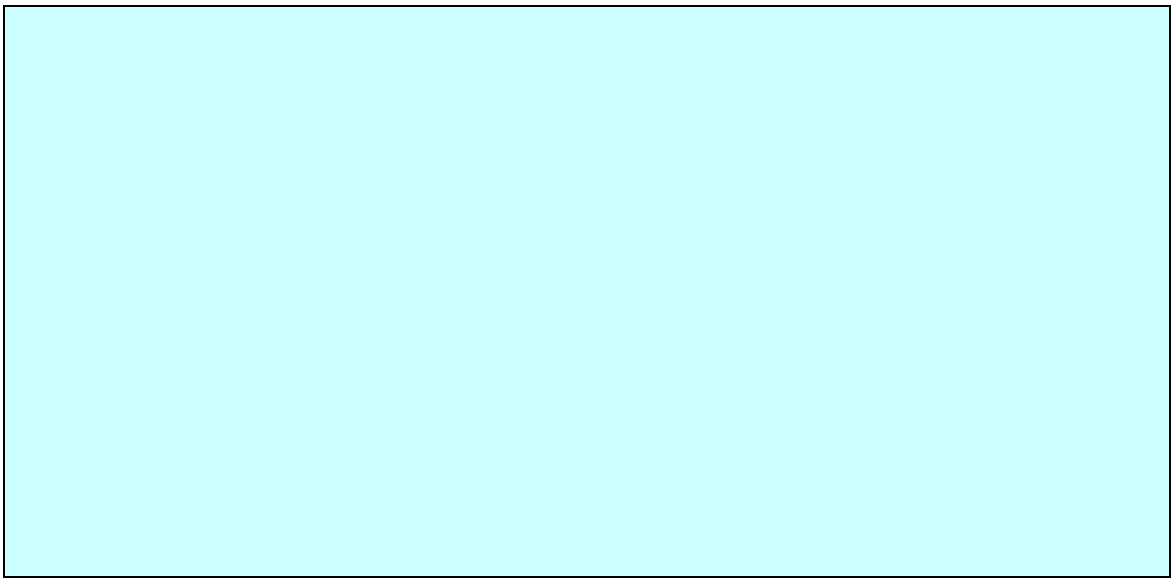
ADDITION: 4.12.4.5

Power window controls.



SELECTION: 4.12.4.7

DEVS Option. A DEVS system, including a Low-Visibility Enhanced Vision Subsystem and optional systems as noted below, if any, meeting FAA Advisory Circular (AC) 150/5210-19, *Driver's Enhanced Vision System (DEVS)*, will be provided.



AMENDMENT: 4.12.4.7.2

DEVS System Requirements. AC 150/5210-19 will be met in its entirety.

AMENDMENT: 4.12.4.8, 4.12.4.9

FLIR System Requirements. AC 150/5210-19 will be met in its entirety.

NFPA 414, 4.12.5 Equipment.

ADDITION: 4.12.5.1(1)

Climate Control System. The climate control system will induct at least 60 cubic feet per minute of fresh 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.

ADDITION: 4.12.5.1(2)

Driver's Seat. The driver's seat will be provided with a backrest and a remote-mounted bracket designed to store a Self-Contained Breathing Apparatus (SCBA).

ADDITION: 4.12.5.1(3)

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 remote-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.

ADDITION: 4.12.5.1(4)

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(8)

Equipment. A means or provision that is designed to protect driver and crew from overhead glare and light from the sun.

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)

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

AMENDMENT: 4.12.5.1(12)

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

Monitoring and Data Acquisition System (MADAS).

_____

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

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

NFPA 414, 4.13 Body.

ADDITION: 4.13

Reduction of Potential Foreign Object Damage. 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.

License plate bracket. 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.

The vehicle will have a corrosion-resistant body.

Winch. 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.

ADDITION: 4.13.3

Compartments. The vehicle body will have storage compartments with a minimum 20 cubic feet of enclosed storage space.

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.

Scuffplates. 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.

Drip rails. 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

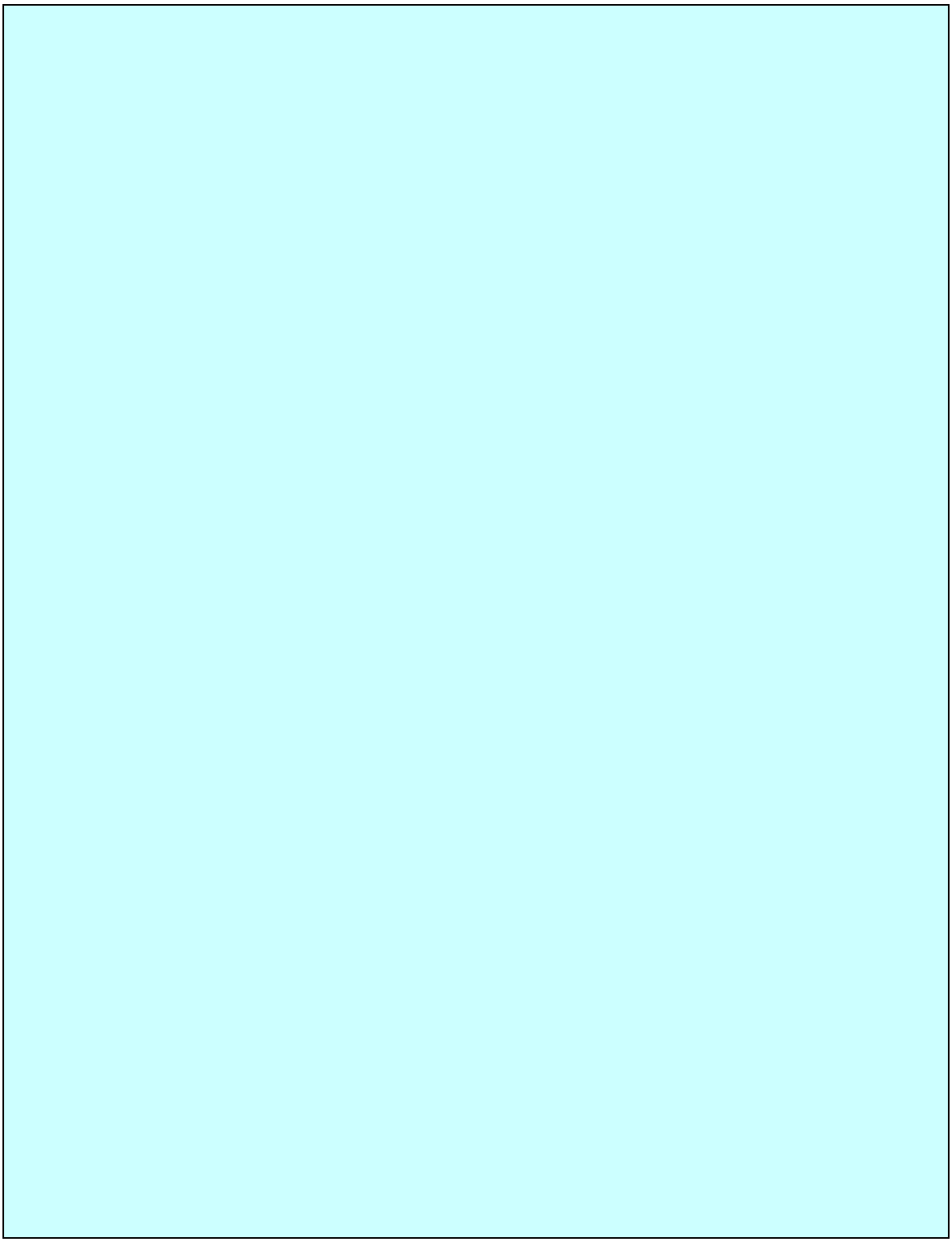
Steps or ladders. The lowermost step(s) or ladder rungs will be no more than 20 inches above level ground when the vehicle is fully loaded. A tubular style running board or custom step will be provided at each vehicle door location.

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.)

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

ADDITION: 4.15

Intake connections. The vehicle will be equipped with one valved 2½-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 2½-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.

ADDITION: 4.15.1.1.1

Priming pump. 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.

ADDITION: 4.15.3 Tank-to-Pump Connections.

A check valve and shutoff valve will be provided in each tank to pump line.

AMENDMENT: 4.15.4 Discharge Connections.

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.

EXCEPTION: 4.15.6 Overheat Protection.

Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

NFPA 414, 4.16 Water Tank, 4.16.1 Water Tank Capacity (if applicable).

AMENDMENT: 4.16.1.1

Water Tank. 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.

ADDITION: 4.16.2.1

Water Tank Construction. 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.

ADDITION: 4.16.2.2

Tank drain. 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 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.

EXCEPTION: 4.16.2.2(1)

Manhole covers. Manhole covers are not required.

ADDITION: 4.16.2.3.3

Drains. 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.

ADDITION: 4.16.2.5

Foam 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.

EXCEPTION: 4.16.2.6

This paragraph does not apply.

AMENDMENT: 4.16.3.2

Foam Tank Fill Connections. The foam 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 fill will allow external re-supply of the foam tank during discharge pumping operations.

EXCEPTION: 4.16.3.4

Water Tank Fill Connection Size. This paragraph does not apply.

NFPA 414, 4.17 Foam System.

This paragraph does not apply.

NFPA 414, 4.18 Premixed Foam Solutions.

ADDITION: 4.18

A premixed foam solution will be used.

NFPA 414, 4.19 Turret Nozzles.

SELECTION: 4.19.4.1, 4.19.4.2

Manually operated or power assisted turret.

SELECTION: 4.19.4.2(4)

Manual override or secondary parallel controls powered by an alternative source of all roof turret movement functions.

AMENDMENT: 4.19.6

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.

NFPA 414, 4.20 Preconnected Handlines.

ADDITION: 4.20

Preconnected handlines. 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.

AMENDMENT: 4.20.4.3

Hose Reel. Each hose reel will:

1. Be designed and positioned to allow hose reel removal by a single person from any position in a 120-degree horizontal sector.
2. Be designed to prevent the hose from unreeling when not desired.
3. Have power rewind with manual override.

NFPA 414, 4.21 Turret, Ground Sweep, and Undertruck Nozzles.

ADDITION: 4.21.1

EXCEPTION: 4.21.3

Undertruck nozzles are not an approved option.

NFPA 414, 4.23 Approved Clean Agent.

SELECTION: 4.23.1.1.1

Reservice Kit.

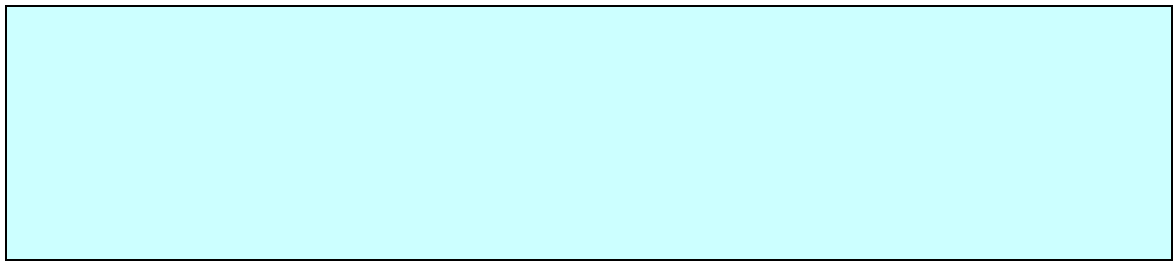
NFPA 414, 4.24 Dry Chemical Turret.

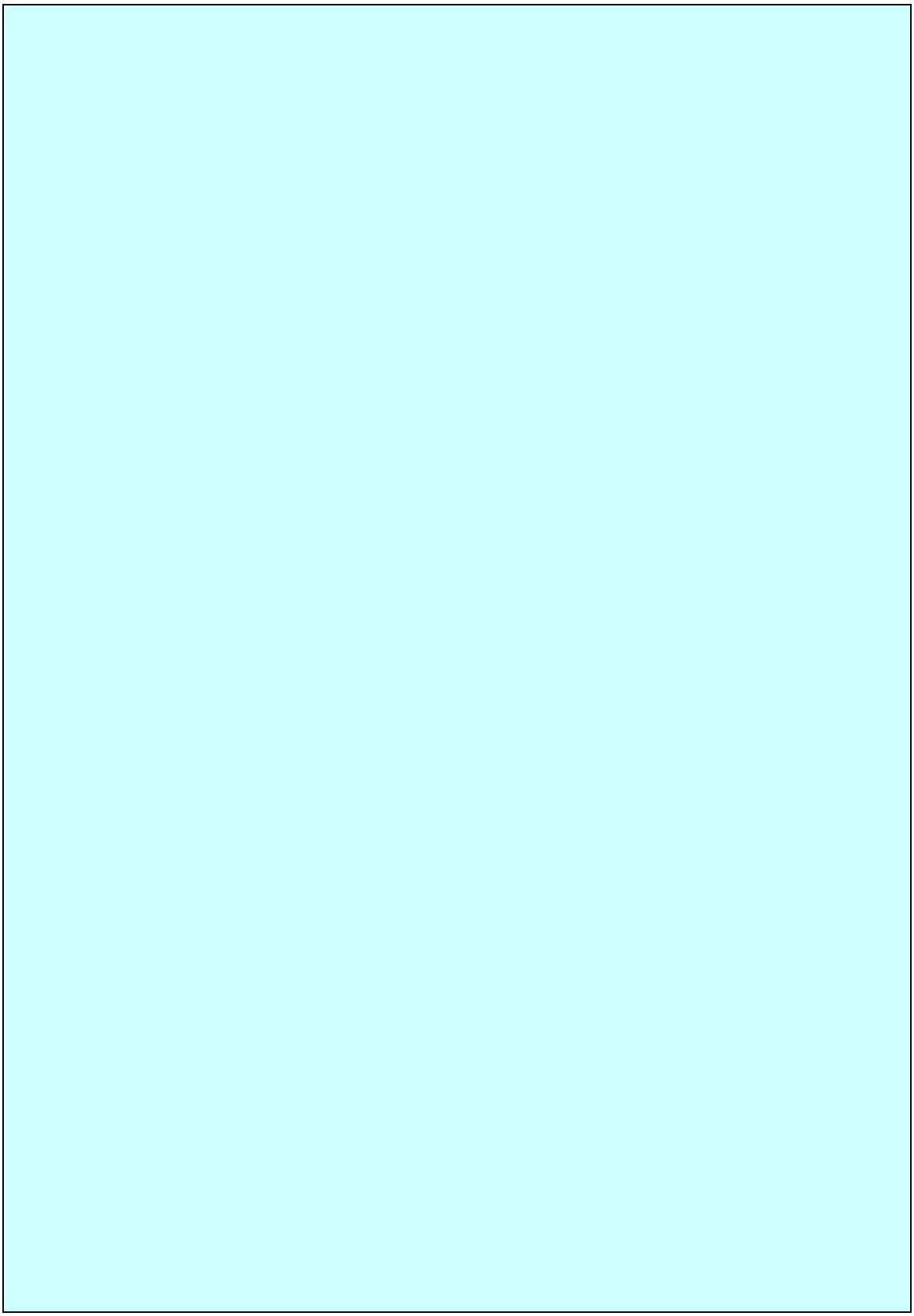
SELECTION: 4.24.1 Auxiliary Agent Discharge.

Agent Discharge Locations.

The primary agent discharge location will be the _____.

The complementary agent discharge location will be the _____.





NFPA 414, 4.25 Lighting and Electrical Equipment.

ADDITION: 4.25.1

Auxiliary Power Receptacles. The vehicle will have 2-12-volt auxiliary power receptacles mounted adjacent to the driver and crew member positions, preferably in the instrument panel.

ADDITION: 4.25.1

Spot/Floodlights. 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.

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.

[ ]

Scene Lights. A total of four high mounted floodlights will be provided to illuminate the work areas around the vehicle. One light 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.

ADDITION: 4.25.1(1)

Headlight Flashing System. A high beam, alternating/flashing, headlight system will be provided. The headlight flasher will be separately switched from the warning light panel.

AMENDMENT: 4.25.2

Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control.

ADDITION: 4.25.2.1

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.

ADDITION: 4.25.2.2

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.

ADDITION: 4.25.4 Exterior Emergency Warning Lights.

Each apparatus will have a system of optical warning devices that meet or exceed the requirements of (NFPA 1901 – 13.8) Optical Warning Devices

ADDITION: 4.25.4.1

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)

ADDITION: 4.25.4.2.2

Emergency Warning Light Color. All emergency warning lights will meet the requirements of AC 150/5210-5.

ADDITION: 4.25.5 Radios.

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.

EXCEPTION: 4.25.5.1.2, 4.25.5.2

The provisioning of radios is an airport responsibility and not part of this specification.

Note: The paragraph numbering of the following provisions does not conform to the numbering in NFPA 414.

IV Product Conformance Provisions.

IV.1 Classification of Inspections.
The inspection requirements specified herein are classified as follows:

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.

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 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 Inspection Requirements.

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.

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.

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 Class 1/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 1/Table 3. Vehicle Test Data

NFPA 414 paragraph	*Test*
6.3	**Prototype Vehicle Tests**
6.3.6	Rated Water and Foam Tank Capacity Test
6.3.7	Cornering Stability **Note:** *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. **Note:** *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

V **Packaging.**

V.1 Preservation, packing, and marking will be as specified in the Procurement Specification, contract or delivery order.

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 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.

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.

VI **Training.**

NFPA 414, 4.2.2.5 Parts Manual.

AMENDMENT: 4.2.2.5.8, 4.2.2.5.9

VI.1 Two person-weeks will be provided for travel to the manufacturing facility during mid-build 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.

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.

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.

VII **Referenced Documents.**

VII.1 Federal Aviation Administration (FAA).

ACs may be obtained from the FAA website: https://www.faa.gov/regulations_policies/advisory_circulars/

- AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles*
- AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*

FAA Orders, Specifications, and Drawings may be obtained from: https://www.faa.gov/

VII.2 CFR.

The CFR may be obtained from https://www.ecfr.gov.

Title 14, Code of Federal Regulations (CFR), Part 139, *Certification of Airports* (14 CFR Part 139)

- Section 139.315 Aircraft Rescue and Firefighting: Index Determination.
- Section 139.317 Aircraft Rescue and Firefighting: Equipment and Agents.
- Section 139.319 Aircraft Rescue and Firefighting: Operational Requirements.

Title 49, Code of Federal Regulations (CFR), Part 393, *Parts and Accessories Necessary for Safe Operation: Subpart C—Brakes*.

Title 49, Code of Federal Regulations (CFR), Part 571, *Motor Carrier Vehicle Safety Standards*, Part 209, Standard No. 209, *Seat Belt Assemblies*.

VII.3 SAE International.

SAE documents may be obtained from https://www.sae.org.

VII.4 National Fire Protection Association (NFPA).

NFPA documents may be obtained from https://www.nfpa.org/.

- NFPA 412, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment* (2014 Edition)
- NFPA 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles* (2020 Edition)
- NFPA 1901, *Standard for Automotive Fire Apparatus* (2016 Edition)

FAA Submittal (Class 1)

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.

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.

[The attached request for additional items needed to address unusual requirements is submitted in accordance with FAA Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards*.]

(Airport POC signature and title)

The following justifications are provided for FAA approval:

Paragraph Number: AMENDMENT: 4.1.1

Extreme Temperature Justification

☐ Approved ☐ Disapproved:

Paragraph Number: SELECTION: 4.4.2.3.3

Radiator Shutters Justification

☐ Approved ☐ Disapproved:

Paragraph Number: ADDITION: 4.12.4.4

Justification for RIWS Additional Features

☐ Approved ☐ Disapproved:

(FAA signature and date)

We request approval of a Modification to Standards for the following items that are not provided for in the standard specifications. If requesting more than four, provide additional justification pages.

Item 1:

Justification:

☐ Approved ☐ Disapproved:

Item 2:

Justification:

☐ Approved ☐ Disapproved:

Item 3:

Justification:

☐ Approved ☐ Disapproved:

Item 4:

Justification:

☐ Approved ☐ Disapproved:

(FAA signature and date)

3.2 Vehicle Procurement Specification, Class 4

PROCUREMENT SPECIFICATION

Class 4

Aircraft Rescue and Fire Fighting (ARFF) Vehicle

I **Scope.**

This Procurement Specification covers a commercially produced diesel engine driven ARFF vehicle for an index [ ] airport. It includes a 1500 gallon water and commensurate quantity of foam fire suppression system with a complementary agent:

[ ]

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.

II **Classification.**

The ARFF vehicle(s) covered by this Procurement Specification are classified in accordance with Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, Section 315, Aircraft Rescue and Firefighting: Index Determination; Section 317, Aircraft Rescue and Firefighting: Equipment and Agents; and Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

II.1 Fully Loaded Vehicle.

Consists of the fully assembled vehicle, complete with a full complement of crew, fuel 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 ballast, up to a total of 1000 lbs. Load each seat that is not occupied during the test with 225 lbs. of ballast seat belted into the seat. Load ballast to represent the weight of complementary agent not yet on board as close to the height of the complementary agent vessel as possible, taking care anticipated vehicle movement during the test will not cause a shift in the ballast damaging vehicle components.

III **Vehicle Conformance/Performance Characteristics.**

The ARFF vehicle will be in accordance with the applicable requirements of AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles,* and National Fire Protection Association (NFPA) 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles*, 2020 Edition, NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 Edition, except as specified herein.

Note: 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:

- **ADDITION:** A new item has been added to the standard in the reference document.
- **EXCEPTION:** 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.
- **SELECTION:** NFPA 414 requires or allows an option to be selected.

NFPA 414, Chapter 4, Aircraft Rescue and Fire-Fighting Vehicles.

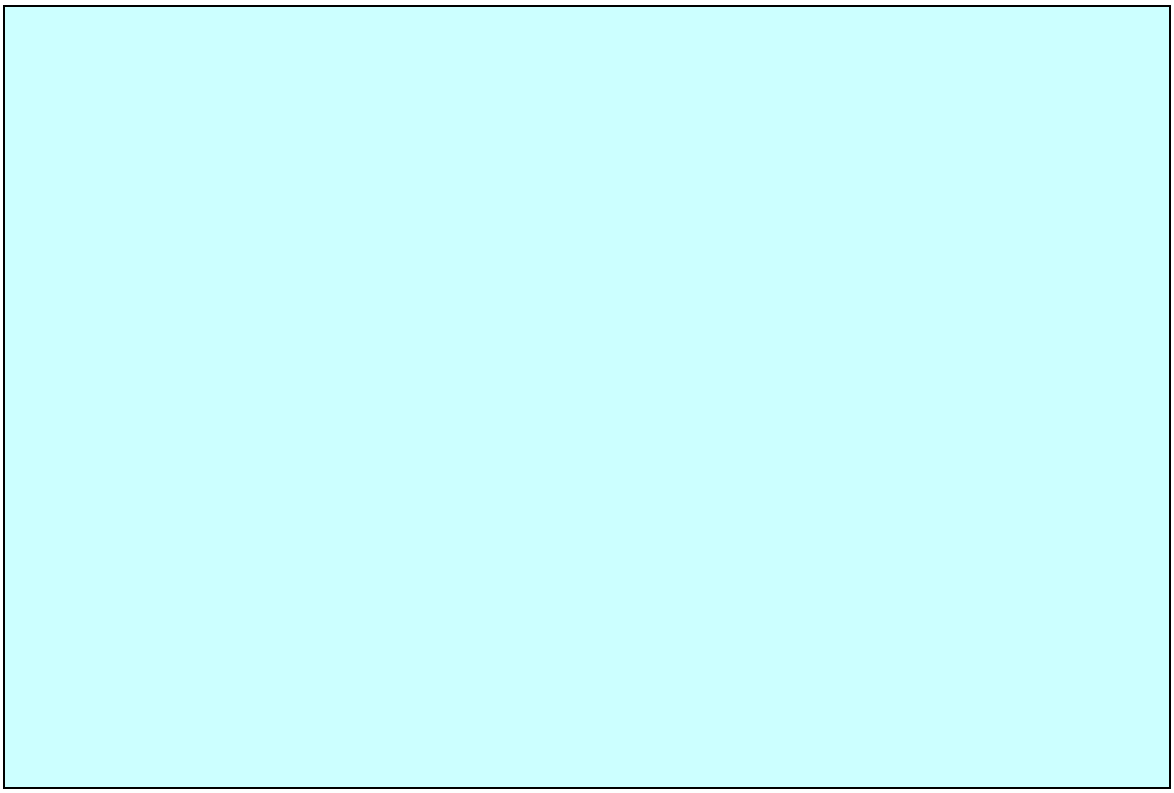
NFPA 414, 4.1 General.

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

The operating temperature range is [ ].



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.

ADDITION: Table 4.1.1.2(d) Agent System Performance Parameters (Table 4.1.1.2(c) does not apply).

Item 2d, Ground Sweep Nozzles. Ground sweep nozzles are not an approved option. The primary agent discharge location will be the .

The complementary agent discharge location will be the .

EXCEPTION: 4.1.2

Not applicable.

AMENDMENT: 4.1.3

All Class 4 vehicles are required to carry a complementary agent in addition to the primary agent.

AMENDMENT: 4.1.5

Only those options specifically identified herein may be specified.

NFPA 414, 4.2 Requirements for All Aircraft Rescue and Fire-Fighting Vehicles — Responsibility of Contractors/Suppliers.

ADDITION: 4.2.1 Certification.

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.

Warranty. The fire fighting unit will be covered by a minimum one year warranty after delivery, unless individual items have been warranted by their manufacturer.

AMENDMENT: 4.2.2 Manuals.

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.

ADDITION: 4.2.2.3 Operator's Manual.

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 functionally described.
- Safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.
- All operational and inspection checks and adjustments in preparation for placing the vehicle into service upon receipt from the manufacturer.
- Tie down procedures for transport on a low-boy trailer.
- 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.
- General description and necessary step-by-step instructions for the operation of the vehicle and its fire extinguishing system(s) and auxiliary equipment.
- A description of the post-operational procedures (draining, flushing, re-servicing, etcetera).
- Daily maintenance inspection checklists that the operator is expected to perform, including basic troubleshooting procedures.
- Disabled vehicle towing procedures.
- Procedures and equipment required for changing a tire.
- Schedules (hours, miles, time periods) for required preventative maintenance and required periodic maintenance.
- 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.

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.

- Schedules for required preventative maintenance and required periodic maintenance.
- Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

ADDITION: 4.2.2.4.6

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

NFPA 414, 4.2.2.5 Parts Manual.

ADDITION: 4.2.2.5.1

The parts list will include any special equipment.

ADDITION: 4.2.2.5.2

Any special test equipment will be identified.

AMENDMENT: 4.2.2.5.7

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.

NFPA 414, 4.2.3 Metal Finish.

ADDITION: 4.2.3.1

Vehicles will be painted and marked in accordance with AC 150/5210-5, *Painting, 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 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.

NFPA 414, 4.2.4 Lettering, Numbering, and Striping.

ADDITION: 4.2.4

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 arches above and below the lettering center line. The size of the lettering will be a minimum of 2½-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).

AMENDMENT: 4.2.4.5, 4.2.4.6

Vehicle numbering, lettering, and striping will conform with AC 150/5210-5.

ADDITION: 4.2.5 Vehicle Information Data Plate.

A second permanently marked identification plate will be securely mounted at the driver's compartment. The identification plate will contain the following information:

- NOMENCLATURE
- MANUFACTURER'S MAKE AND MODEL
- MANUFACTURER'S SERIAL NUMBER
- VEHICLE CURB WEIGHT: lbs.
- PAYLOAD, MAXIMUM: lbs.
- GROSS VEHICLE WEIGHT (GVW): lbs.
- FUEL CAPACITY AND TYPE: gal.
- DATE OF DELIVERY (month and year)
- WARRANTY (months and miles)
- CONTRACT NUMBER
- PAINT COLOR AND NUMBER

A single plate that combines or contains the information required for both plates is acceptable.

AMENDMENT: Figure 4.2.5 Aircraft Rescue and Fire-Fighting Vehicle Tilt Table Certification per NFPA 414.

Replace NFPA 414 Figure 4.2.5 with the figure below.

Manufacturer _____

Vehicle Make and Model _____

Year of Manufacture _____

Drive Type ☐ 4 × 4 ☐ 6 × 6

This vehicle was tested to_____degrees while on a tilt table in the "pump down" position

This vehicle was tested to_____degrees while on a tilt table in the "pump up" position

Was a trip / slip rail used? ☐ Yes ☐ No.

If yes, what is the height of the rail? _____ (Maximum 2 ")

Date of Test _____Location of Test_____

Vehicle Empty Weight (lbs.)_____

Maximum Gross Weight (lbs.)_____

Special equipment installed prior to test	
Front axle loading*	_____(Lbs.)
Rear axle loading*	_____(Lbs.)
Tire manufacturer	_____
Tire model	_____
Front Tire pressure	_____(psi)
Rear Tire pressure	_____(psi) Front wheel track _____(in.)
Rear wheel track	_____(in.)
Crew capacity	_____(Number of personnel)
Fuel tank capacity	_____(gal.)
Equipment allowance	_____(lb.)
Water tank capacity	_____(gal.)
Foam tank capacity	_____(gal)
Complementary agent capacity (if applicable)	_____(lb.)

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

NFPA 414, 4.3 Weights and Dimensions, 4.3.2 Dimensions.

ADDITION: 4.3.2.2 Field of Vision.

Mirrors. 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 eliminate potential blind spots, a rectangular mirror will be installed on the lower corner of each side of the windshield, having a minimum area of 35 square inches.

NFPA 414, 4.4 Engine.

ADDITION: 4.4

Ensure the engine(s) and transmission operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants in keeping with the recommendations of the engine and transmission manufacturers.

Certify the engine oil and transmission fluid filters are of the full-flow type with a replaceable spin-on element.

ADDITION: 4.4.1.1 Engine Characteristics.

Engine. 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.

AMENDMENT: 4.4.1.2.3

Elevation. The vehicle, including the pumping system, will be designed for operation up to [ ] feet above sea level.

ADDITION: 4.4.2 Engine Cooling Systems.

A label will be installed near the engine coolant reservoir reading "Engine Coolant Fill."

SELECTION: 4.4.2.3.3

Radiator shutters.

[ ]

NFPA 414, 4.4.3 Fuel Systems.

ADDITION: 4.4.3.4

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."

NFPA 414, 4.4.4 Exhaust Systems.

ADDITION: 4.4.4.1

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.

NFPA 414, 4.5 Vehicle Electrical System.

ADDITION: 4.5

The vehicle will have a 12-volt electrical and starting system.

The minimum continuous electrical load will include operation of the air conditioning system.

ADDITION: 4.5.1 Electrical Systems and Warning Devices.

Batteries. 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

to prevent electrolyte loss during service and to keep the top of the battery free from electrolyte.

Battery compartment. The batteries will be installed in a protected compartment.

ADDITION: 4.5.2 Battery Chargers.

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.

AMENDMENT: 4.5.2.2, 4.5.4.5

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.

AMENDMENT: 4.5.4

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.

AMENDMENT: 4.5.4.1

Electrical shoreline connection. The battery charger will be supplied from an external power source of 110 volts AC.

NFPA 414, 4.6 Vehicle Drive.

AMENDMENT: 4.6

Transmission. A fully automatic transmission will be provided.

ADDITION: 4.6

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.

ADDITION: 4.6.4.1

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.

NFPA 414, 4.7 Suspension.

ADDITION: 4.7

Suspension. 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.

NFPA 414, 4.8 Rims, Tires, and Wheels.

ADDITION: 4.8

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.

AMENDMENT: 4.8.2

Tire selection. The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies.

AMENDMENT: 4.8.4

Tires and wheels. 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.

Tire and wheel assemblies will be identical at all positions.

NFPA 414, 4.9 Towing Connections.

AMENDMENT: 4.9

The tow connections may intrude into the angle of approach and angle of departure.

ADDITION: 4.9

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.

NFPA 414, 4.10 Brakes.

ADDITION: 4.10

Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped with air brakes.

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.

NFPA 414, 4.12 Cab.

ADDITION: 4.12

The vehicle will have a cab constructed of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. A tilt steering column will be provided. The cab will have a watertight roof hatch for emergency exit out of the cab.

ADDITION: 4.12.1.5

Seat belts. 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).

ADDITION: 4.12.1.7

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. All controls located on the exterior of the vehicle will be labeled.

ADDITION: 4.12.4.4

Instruments and warning lights. The following will also be provided within convenient reach of the seated driver:

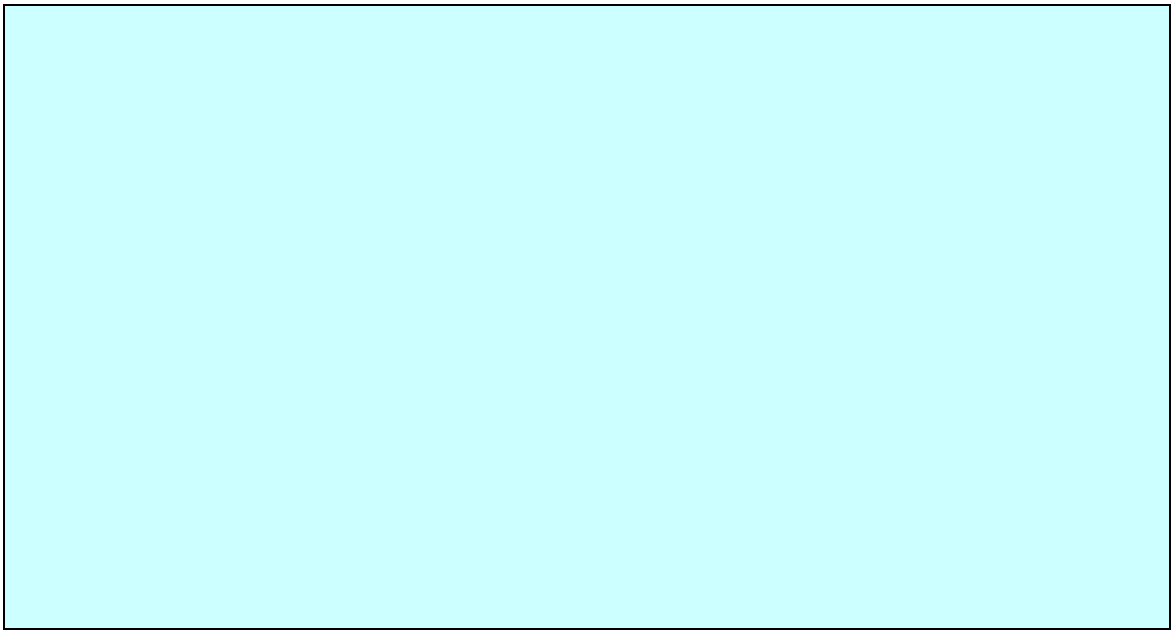
- Master warning light control switch,
- Work light switch(es), and
- Compartment "Door Open" warning light and intermittent alarm that sounds when a compartment door is open and the parking brakes are released or the transmission is in any position other than neutral.

ADDITION: 4.12.4.5

Power window controls.

SELECTION: 4.12.4.7

DEVS option. A DEVS system, including a Low-Visibility Enhanced Vision Subsystem and optional systems as noted below, if any, meeting FAA Advisory Circular 150/5210-19, *Driver's Enhanced Vision System (DEVS)*, will be provided.



AMENDMENT: 4.12.4.7.2

DEVS system requirements. AC 150/5210-19 will be met in its entirety.

AMENDMENT: 4.12.4.8, 4.12.4.9

FLIR system requirements. AC 150/5210-19 will be met in its entirety.

NFPA 414, 4.12.5 Equipment.

ADDITION: 4.12.5.1(1)

Climate control system. The climate control system will induct at least 60 cubic feet per minute of fresh 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.

ADDITION: 4.12.5.1(2)

Driver's seat. The driver's seat will be provided with a backrest and a remote-mounted bracket designed to store a Self-Contained Breathing Apparatus (SCBA).

ADDITION: 4.12.5.1(3)

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 remote-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.

ADDITION: 4.12.5.1(4)

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)

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

AMENDMENT: 4.12.5.1(12)

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

Monitoring and Data Acquisition System (MADAS).

[ ]

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

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

NFPA 414, 4.13 Body.

ADDITION: 4.13

Reduction of potential foreign object damage. 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.

License plate bracket. 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.

The vehicle will have a corrosion-resistant body.

ADDITION: 4.13.3

Compartments. The vehicle body will have storage compartments with a minimum 20 cubic feet of enclosed storage space.

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.

Scuffplates. 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.

Drip rails. 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.

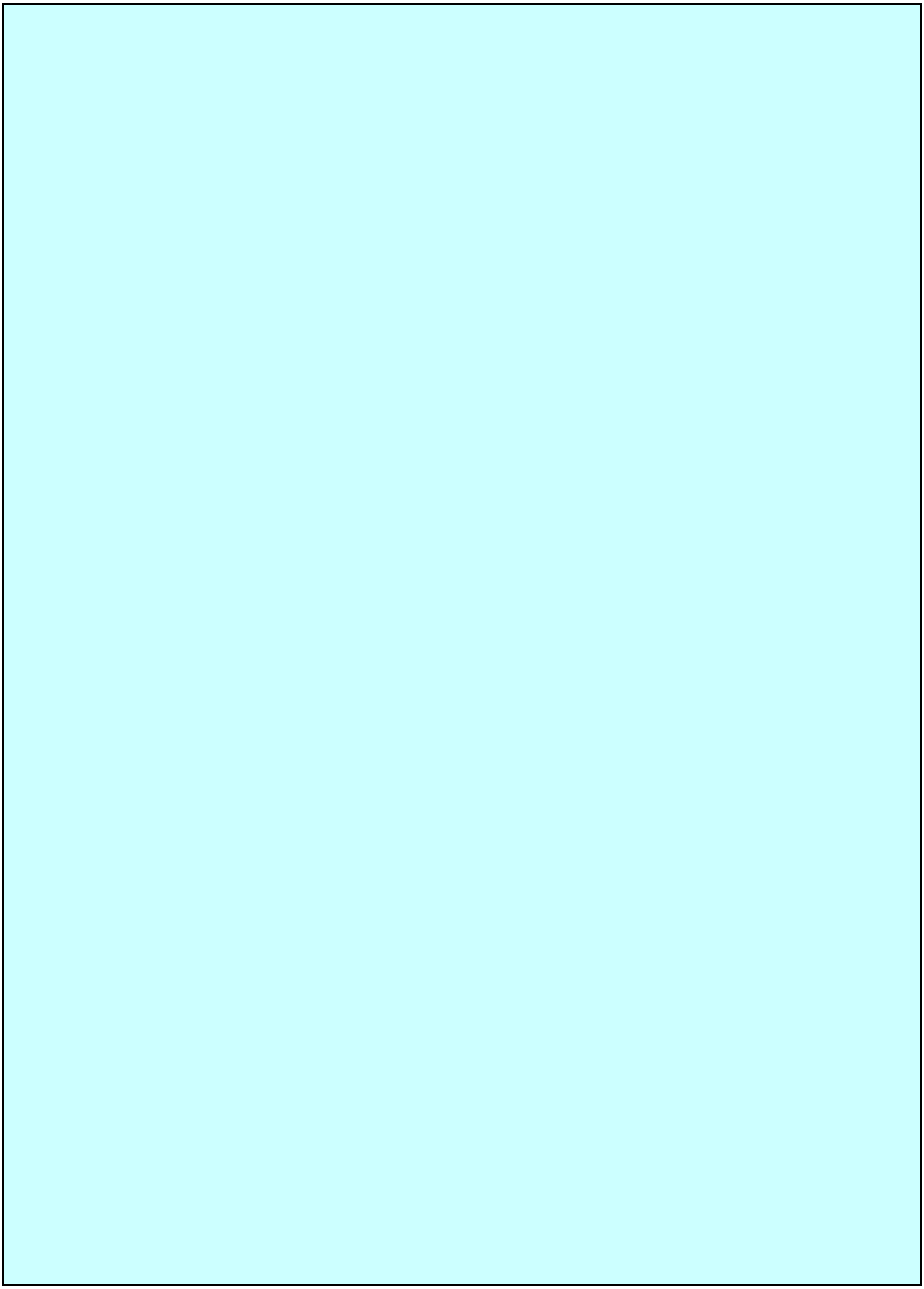
AMENDMENT: 4.13.6.3

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 turns 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. 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	≥ 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.)

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

ADDITION: 4.15

Intake connections. The vehicle will be equipped with one valved 2½-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 2½-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.

ADDITION: 4.15.1.1.1

Priming pump. 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.

ADDITION: 4.15.3 Tank-to-Pump Connections.

A check valve and shutoff valve will be provided in each tank to pump line.

AMENDMENT: 4.15.4 Discharge Connections.

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.

EXCEPTION: 4.15.6 Overheat Protection.

Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

NFPA 414, 4.16 Water Tank, 4.16.1 Water Tank Capacity.

AMENDMENT: 4.16.1.1

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.

ADDITION: 4.16.2.1

Water tank construction. 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.

ADDITION: 4.16.2.2

Water tank drain. 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.

EXCEPTION: 4.16.2.2(1)

Manhole covers. Manhole covers are not required.

ADDITION: 4.16.2.3.3

Drains. 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.

ADDITION: 4.16.2.5

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.

EXCEPTION: 4.16.2.6

This paragraph does not apply.

AMENDMENT: 4.16.3.2

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 re-supply of the water tank during discharge pumping operations.

EXCEPTION: 4.16.3.4

Water tank fill connection size. This paragraph does not apply.

NFPA 414, 4.17 Foam System.

ADDITION: 4.17

Foam transfer pump. 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.

ADDITION: 4.17.1 Foam–Liquid Concentrate Tank(s).

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.

AMENDMENT: 4.17.1.1

Percent concentrate.

[ ]

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, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment*, for 3 to 6 percent foam concentrate.

AMENDMENT: 4.17.1.2

Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP.

ADDITION: 4.17.1.6

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, and sealed so as to prevent spillage under any operating condition. The top fill trough will be designed to allow one standard 5-gallon foam concentrate container to be emptied. The fill opening will have a minimum opening of 5-inches. The top fill trough will incorporate readily removable, rigidly constructed 10 mesh stainless steel, brass, or polyethylene strainers. All components in and around the top fill trough will be constructed of materials that resist all forms of deterioration that could be caused by the foam concentrate or water.

ADDITION: 4.17.1.7

Foam tank fill connections. The foam tank will incorporate a 1.5-inch National Hose thread female hose connection on [ ] of the vehicle to permit filling by an external transfer hose at flow rates up to 25-gpm. The connections will be 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. The fill lines will incorporate readily removable, rigidly constructed strainers. All components in the foam tank fill system will be constructed of materials that resist all forms of deterioration that could be caused by the foam concentrate or water.

ADDITION: 4.17.1.9

Foam tank vent and overflow system. The foam tank will incorporate an overflow system to relieve excess liquid in the event of tank overfill. The vent and overflow system will prevent leakage of foam when the tank is filled to capacity and the vehicle is 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 vehicle components. Drainage from the vent and overflow systems will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

NFPA 414, 4.17.3 Foam-Liquid Concentrate Piping.

ADDITION: 4.17.3.1

Foam concentrate piping. All metallic surfaces of the piping and associated components that come into contact with the foam concentrate will be of brass, bronze, or passivated stainless steel.

NFPA 414, 4.17.4 Foam Proportioning Systems.

ADDITION: 4.17.4

The vehicle will be equipped with a proportioning system for foam.

ADDITION: 4.17.4.1

Foam concentrate proportioning system. The system will automatically and uniformly proportion water foam concentrate.

NFPA 414, 4.18 Premixed Foam Solutions.

ADDITION: 4.18

A premixed foam solution [ ] be used.

NFPA 414, 4.19 Turret Nozzles.

SELECTION: 4.19.4.1, 4.19.4.2

Manually operated or power assisted turret.

[ ]

SELECTION: 4.19.4.2(4)

Manual override or secondary parallel controls powered by an alternative source of all roof turret movement functions.

[ ]

AMENDMENT: 4.19.6

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.

NFPA 414, 4.20 Preconnected Handlines.

ADDITION: 4.20

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.

AMENDMENT: 4.20.2

Each side of the vehicle will have a 150-foot, 1¾-inch preconnected woven jacket handline, with a 1½-inch control valve and nozzle.

NFPA 414, 4.21 Turret, Ground Sweep, and Undertruck Nozzles.

ADDITION: 4.21.1

EXCEPTION: 4.21.3

Undertruck nozzles are not an approved option.

NFPA 414, 4.23 Approved Clean Agent.

SELECTION: 4.23.1.1.1

Reservice kit.

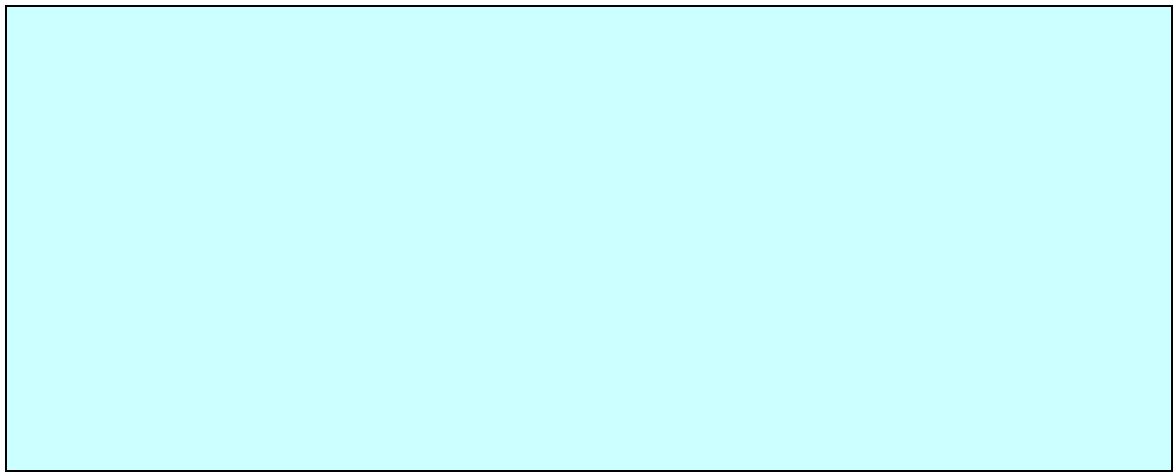
NFPA 414, 4.24 Dry Chemical Turret.

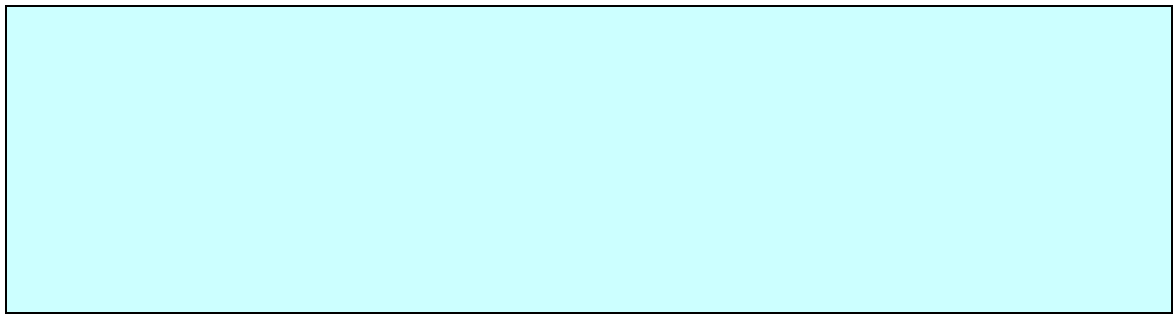
Selection: 4.24.1 Auxiliary Agent Discharge.

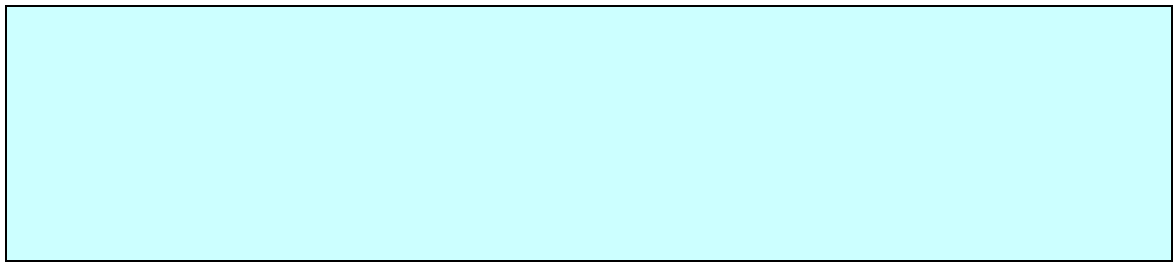
Agent discharge locations.

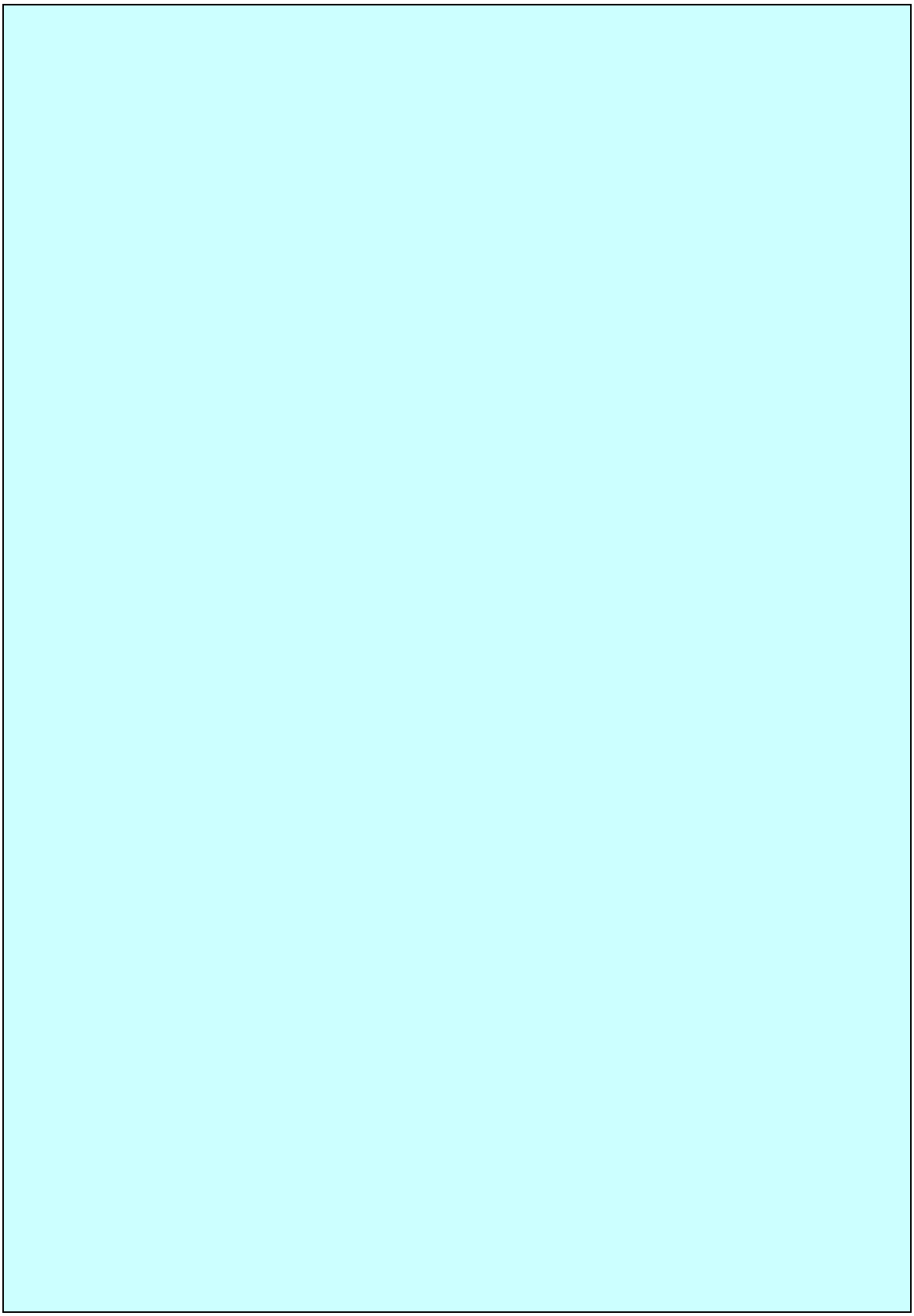
The primary agent discharge location will be the _____.

The complementary agent discharge location will be the _____.









NFPA 414, 4.25 Lighting and Electrical Equipment.

ADDITION: 4.25.1

Auxiliary Power Receptacles. The vehicle will have 2-12-volt auxiliary power receptacles mounted adjacent to the driver and crew member positions, preferably in the instrument panel.

ADDITION: 4.25.1

Spot/Floodlights. 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.

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.

_____

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.

ADDITION: 4.25.1(1)

Headlight flashing system. A high beam, alternating/flashing, headlight system will be provided. The headlight flasher will be separately switched from the warning light panel.

AMENDMENT: 4.25.2

Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control.

ADDITION: 4.25.2.1

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.

ADDITION: 4.25.2.2

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.

AMENDMENT: 4.25.2.3

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 turret operator.

ADDITION: 4.25.4 Exterior Emergency Warning Lights.

Each apparatus will have a system of optical warning devices that meet or exceed the requirements of (NFPA 1901 – 13.8) Optical Warning Devices.

ADDITION: 4.25.4.1

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)

ADDITION: 4.25.4.2.2

Emergency warning light color. All emergency warning lights will meet the requirements of AC 150/5210-5.

ADDITION: 4.25.5 Radios.

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 to indicate its purpose.

EXCEPTION: 4.25.5.1.2, 4.25.5.2

The provisioning of radios is an airport responsibility and not part of this specification.

IV Product Conformance Provisions.

IV.1 Classification of Inspections.
The inspection requirements specified herein are classified as follows:

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.

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 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 Inspection Requirements.

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.

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.

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 paragraph	Test
6.3	**Prototype Vehicle Tests**
6.3.6	Rated Water and Foam Tank Capacity Test
6.3.7	Cornering Stability **Note:** *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
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. **Note:** *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

V **Packaging.**

V.1 Preservation, packing, and marking will be as specified in the Procurement Specification, contract or delivery order.

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

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.

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.

VI **Training.**

NFPA 414, 4.2.2.5 Parts Manual.

AMENDMENT: 4.2.2.5.8, 4.2.2.5.9

VI.1 Two person-weeks will be provided for travel to the manufacturing facility during mid-build 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.

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.

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.

VII **Referenced Documents.**

VII.1 Federal Aviation Administration (FAA).
ACs may be obtained from the FAA website:
https://www.faa.gov/regulations_policies/advisory_circulars/

- AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles*
- AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*

FAA Orders, Specifications, and Drawings may be obtained from: https://www.faa.gov/

VII.2 CFR.

The CFR may be obtained from https://www.ecfr.gov.

Title 14, Code of Federal Regulations (CFR), Part 139, *Certification of Airports* (14 CFR Part 139)

- Section 139.315 Aircraft Rescue and Firefighting: Index Determination.
- Section 139.317 Aircraft Rescue and Firefighting: Equipment and Agents.
- Section 139.319 Aircraft Rescue and Firefighting: Operational Requirements.

Title 49, Code of Federal Regulations (CFR), Part 393: *Parts and Accessories Necessary for Safe Operation: Subpart C—Brakes*.

Title 49, Code of Federal Regulations (CFR), Part 571, *Motor Carrier Vehicle Safety Standards*, Part 209, Standard No. 209; *Seat Belt Assemblies*.

VII.3 SAE International.

SAE documents may be obtained from https://www.sae.org.

VII.4 National Fire Protection Association (NFPA).

NFPA documents may be obtained from https://www.nfpa.org/.

- NFPA 412, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment* (2014 Edition)
- NFPA 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles* (2020 Edition)
- NFPA 1901, *Standard for Automotive Fire Apparatus* (2016 Edition)

FAA Submittal (Class 4)

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.

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.

The attached request for additional items needed to address unusual requirements is submitted in accordance with FAA Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards*.

_____

(Airport POC signature and title)

The following justifications are provided for FAA approval:

Paragraph Number: AMENDMENT: 4.1.1

Extreme Temperature Justification

☐ Approved ☐ Disapproved:

Paragraph Number: SELECTION: 4.4.2.3.3

Radiator Shutters Justification

☐ Approved ☐ Disapproved:

Paragraph Number: ADDITION: 4.12.4.4

Justification for RIWS Additional Features

☐ Approved ☐ Disapproved:

(FAA signature and date)

We request approval of a Modification to Standards for the following items that are not provided for in the standard specifications. If requesting more than four, provide additional justification pages.

Item 1:

Justification:

☐ Approved ☐ Disapproved:

Item 2:

Justification:

☐ Approved ☐ Disapproved:

Item 3:

Justification:

☐ Approved ☐ Disapproved:

Item 4:

Justification:

☐ Approved ☐ Disapproved:

(FAA signature and date)

3.3 Vehicle Procurement Specification, Class 5

PROCUREMENT SPECIFICATION

Class 5

Aircraft Rescue and Fire Fighting (ARFF) Vehicle

I Scope.

This Procurement Specification covers a commercially produced diesel engine driven ARFF vehicle for an [ ] airport. It includes a 3000 or 4500 gallon water/ foam fire suppression system with a complementary agent:

[ ]

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.

II Classification.

The ARFF vehicle(s) covered by this Procurement Specification are classified in accordance with Part 139, Certification and Operations: Land Airports Serving Certain Air Carriers, Section 315, Aircraft Rescue and Firefighting: Index Determination; Section 317, Aircraft Rescue and Firefighting: Equipment and Agents; and Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

II.1 Fully Loaded Vehicle.

Consists of the fully assembled vehicle, complete with a full complement of crew, fuel 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 ballast, up to a total of 1000 lbs. Load each seat that is not occupied during the test with 225 lbs. of ballast seat belted into the seat. Load ballast to represent the weight of complementary agent not yet on board as close to the height of the complementary agent vessel as possible, taking care anticipated vehicle movement during the test will not cause a shift in the ballast damaging vehicle components.

III Vehicle Conformance/Performance Characteristics.

The ARFF vehicle will be in accordance with the applicable requirements of AC 150/5220-10F, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles,* and National Fire Protection Association (NFPA) 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles*, 2020 Edition, NFPA 1901, *Standard for Automotive Fire Apparatus*, 2016 Edition, except as specified herein.

Note: 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:

- **ADDITION:** A new item has been added to the standard in the reference document.
- **EXCEPTION:** 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.
- **SELECTION:** NFPA 414 requires or allows an option to be selected.

NFPA 414, Chapter 4, Aircraft Rescue and Fire-Fighting Vehicles.

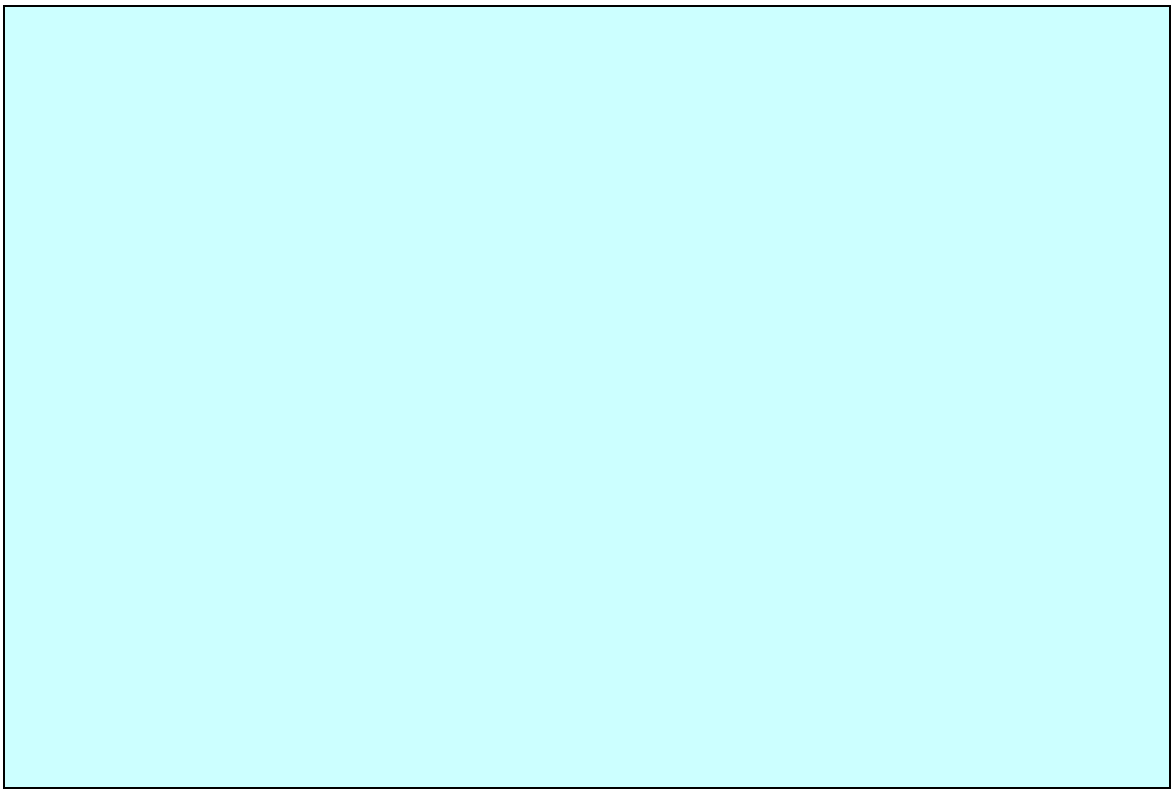
NFPA 414, 4.1 General.

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

The operating temperature range is [ ].



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

Maximum 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.

ADDITION: Table 4.1.1.2(d), Agent System Performance Parameters (Table 4.1.1.2(c) does not apply)

Item 2d, Ground Sweep Nozzles. Ground sweep nozzles are not an approved option. The primary agent discharge location will be the _____.

The complementary agent discharge location will be the _____.

EXCEPTION: 4.1.2

Not applicable.

AMENDMENT: 4.1.3

All Class 5 vehicles are required to carry a complementary agent in addition to the primary agent.

AMENDMENT: 4.1.5

Only those options specifically identified herein may be specified.

NFPA 414, 4.2 Requirements for All Aircraft Rescue and Fire-Fighting Vehicles — Responsibility of Contractors/Suppliers.

ADDITION: 4.2.1 Certification.

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.

Warranty. The fire fighting unit will be covered by a minimum one year warranty after delivery. The chassis and drive train will have a minimum 3 year / 36,000 mile warranty. All water and foam tanks will be covered by a lifetime warranty.

AMENDMENT: 4.2.2 Manuals.

All manuals are required to be provided in hardcopy and in digital format on media specified by the airport operator. Two complete sets of engine and transmission parts, service and operator's manuals will be packed with each vehicle.

ADDITION: 4.2.2.3 Operator's Manual.

The operator's manual will also include:

- Safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.
- Tie down procedures for transport on a low-boy trailer.
- 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.
- A description of the post-operational procedures including, but not limited to draining, flushing, and re-servicing.
- Disabled vehicle towing procedures.
- Procedures and equipment required for changing a tire.
- If the driveline is equipped with a differential locking control, a warning/caution indicating the proper differential locking/un-locking procedures.
- 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.

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

ADDITION: 4.2.2.4.6

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

NFPA 414, 4.2.2.5 Parts Manual.

ADDITION: 4.2.2.5.1

The parts list will include any special equipment.

ADDITION: 4.2.2.5.2

Any special test equipment will be identified.

AMENDMENT: 4.2.2.5.7

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.

NFPA 414, 4.2.3 Metal Finish.

ADDITION: 4.2.3.1

Vehicles will be painted and marked in accordance with AC 150/5210-5, *Painting, 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 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.

NFPA 414, 4.2.4 Lettering, Numbering, and Striping.

ADDITION: 4.2.4

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 arches above and below the lettering center line. The size of the lettering will be a minimum of 2½-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).

AMENDMENT: 4.2.4.5, 4.2.4.6

Vehicle numbering, lettering, and striping will conform with AC 150/5210-5.

ADDITION: 4.2.5 Vehicle Information Data Plate.

A second permanently marked identification plate will be securely mounted at the driver's compartment. The identification plate will contain the following information:

- NOMENCLATURE
- MANUFACTURER'S MAKE AND MODEL

- MANUFACTURER'S SERIAL NUMBER
- VEHICLE CURB WEIGHT: lbs.
- PAYLOAD, MAXIMUM: lbs.
- GROSS VEHICLE WEIGHT (GVW): lbs.
- FUEL CAPACITY AND TYPE: gal.
- DATE OF DELIVERY (month and year)
- WARRANTY (months and miles)
- CONTRACT NUMBER
- PAINT COLOR AND NUMBER

A single plate that combines or contains the information required for both plates is acceptable.

AMENDMENT: Figure 4.2.5 Aircraft Rescue and Fire-Fighting Vehicle Tilt Table Certification per NFPA 414.

Replace NFPA 414 Figure 4.2.5 with the figure below.

Manufacturer _____

Vehicle Make and Model _____

Year of Manufacture _____

Drive Type ☐ 4 × 4 ☐ 6 × 6 ☐ 8 × 8 ☐ 10 × 10

This vehicle was tested to_____degrees while on a tilt table in the "pump down" position

This vehicle was tested to_____degrees while on a tilt table in the "pump up" position

Was a trip / slip rail used? ☐ Yes ☐ No.

If yes, what is the height of the rail? _____ (Maximum 2 ")

Date of Test _____Location of Test_____

Vehicle Empty Weight (lbs.)_____

Maximum Gross Weight (lbs.)_____

Special equipment installed prior to test

Front axle loading* _____(Lbs.)

Second axle loading* _____(Lbs.)

3rd axle loading (if applicable)* _____(Lbs.)

4th axle loading (if applicable)* _____(Lbs.)

5th axle loading (if applicable)* _____(Lbs.)

Tire manufacturer _____

Tire model	_____
Front Tire pressure	_____(psi)
Rear Tire pressure	_____(psi)
Front wheel track	_____(in.)
Rear wheel track	_____(in.)
Crew capacity	_____(Number of personnel)
Fuel tank capacity	_____(gal.)
Equipment allowance	_____(lb.)
Water tank capacity	_____(gal.)
Foam tank capacity	_____(gal)
Complementary agent capacity (if applicable)	_____(lb.)

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

NFPA 414, 4.3 Weights and Dimensions, 4.3.2 Dimensions.

ADDITION: 4.3.2.2 Field of Vision.

Mirrors. 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 eliminate potential blind spots, a rectangular mirror will be installed on the lower corner of each side of the windshield, having a minimum area of 35 square inches.

NFPA 414, 4.4 Engine.

ADDITION: 4.4

Ensure the engine(s) and transmission operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants in keeping with the recommendations of the engine and transmission manufacturers.

Certify the engine oil and transmission fluid filters are of the full-flow type with a replaceable spin-on element.

ADDITION: 4.4.1.1 Engine Characteristics.

Engine. 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.

AMENDMENT: 4.4.1.2.3

Elevation. The vehicle, including the pumping system, will be designed for operation up to [ ] feet above sea level.

ADDITION: 4.4.2 Engine Cooling Systems.

A label will be installed near the engine coolant reservoir reading "Engine Coolant Fill."

SELECTION: 4.4.2.3.3.

Radiator shutters.

[ ]

NFPA 414, 4.4.3 Fuel Systems.

ADDITION: 4.4.3.4

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."

NFPA 414, 4.4.4 Exhaust Systems.

ADDITION: 4.4.4.1

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.

NFPA 414, 4.5 Vehicle Electrical System.

ADDITION: 4.5

The vehicle will have a 12-volt electrical and starting system.

The minimum continuous electrical load will include operation of the air conditioning system.

ADDITION: 4.5.1 Electrical Systems and Warning Devices.

Batteries. 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 to prevent electrolyte loss during service and to keep the top of the battery free from electrolyte.

Battery compartment. The batteries will be installed in a protected compartment.

ADDITION: 4.5.2

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.

AMENDMENT: 4.5.2.2, 4.5.4.5

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.

AMENDMENT: 4.5.4

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.

AMENDMENT: 4.5.4.1

Electrical shoreline connection. The battery charger will be supplied from an external power source of 110 volts AC.

NFPA 414, 4.6 Vehicle Drive.

AMENDMENT: 4.6

Transmission. A fully automatic transmission will be provided.

ADDITION: 4.6

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.

ADDITION: 4.6.4.1

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.

NFPA 414, 4.7 Suspension.

ADDITION: 4.7

Suspension. 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.

NFPA 414, 4.8 Rims, Tires, and Wheels.

ADDITION: 4.8

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.

AMENDMENT: 4.8.2

Tire selection. 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.

AMENDMENT: 4.8.4

Tires and wheels. The vehicle will be equipped with single tires and wheels on the front axle and single or dual tires and wheels on the rear.

Tire and wheel assemblies will be identical at all positions.

NFPA 414, 4.9 Towing Connections.

AMENDMENT: 4.9

The tow connections may intrude into the angle of approach and angle of departure.

ADDITION: 4.9.

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.

NFPA 414, 4.10 Brakes.

ADDITION: 4.10

Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped with air brakes.

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.

NFPA 414, 4.12 Cab.

ADDITION: 4.12

The vehicle will have a cab constructed of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. A tilt steering column will be provided. The cab will have a watertight roof hatch for emergency exit out of the cab.

ADDITION: 4.12.1.5

Seat belts. 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).

ADDITION: 4.12.1.7

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.

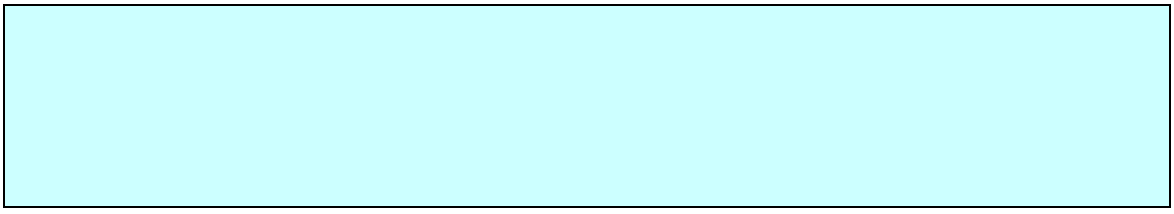
ADDITION: 4.12.4.4

Instruments and warning lights. The following will also be provided within convenient reach of the seated driver:

- Master warning light control switch,
- Work light switch(es), and
- 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.



SELECTION: 4.12.4.7

DEVS option. A DEVS system, including a Low-Visibility Enhanced Vision Subsystem and optional systems as noted below, if any, meeting FAA Advisory Circular 150/5210-19, *Driver's Enhanced Vision System (DEVS)*, will be provided.

AMENDMENT: 4.12.4.7.2

DEVS system requirements. AC 150/5210-19 will be met in its entirety.

AMENDMENT: 4.12.4.8, 4.12.4.9

FLIR system requirements. AC 150/5210-19 will be met in its entirety.

NFPA 414, 4.12.5 Equipment.

ADDITION: 4.12.5.1(1)

Climate control system. The climate control system will induct at least 60 cubic feet per minute of fresh 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.

ADDITION: 4.12.5.1(2)

Driver's seat. The driver's seat will be provided with a backrest and a remote-mounted bracket designed to store a Self-Contained Breathing Apparatus (SCBA).

ADDITION: 4.12.5.1(3)

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 remote-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.

ADDITION: 4.12.5.1(4)

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(8)

Equipment. A means or provision that is designed to protect driver and crew from overhead glare and light from the sun.

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)

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

AMENDMENT: 4.12.5.1(12)

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

Monitoring and Data Acquisition System (MADAS).

[ ]

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

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

NFPA 414, 4.13 Body.

ADDITION: 4.13

Reduction of potential foreign object damage. 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.

License plate bracket. 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.

The vehicle will have a corrosion-resistant body.

ADDITION: 4.13.3

Compartments. The vehicle body will have storage compartments with a minimum 20 cubic feet of enclosed storage space.

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.

Scuffplates. 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.

Drip rails. 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.

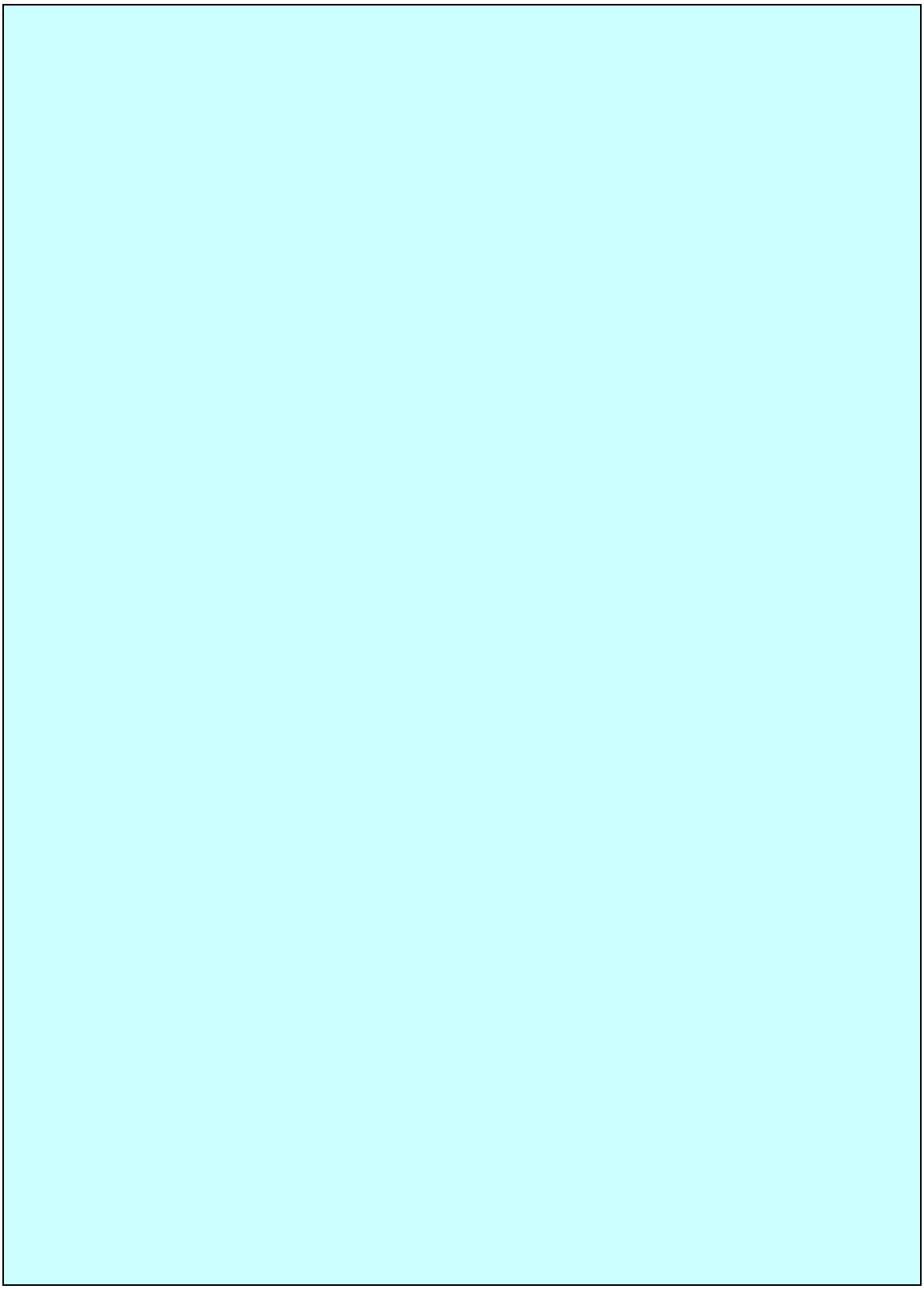
AMENDMENT: 4.13.6.3

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 and will be 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. 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	≥ 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.)

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

ADDITION: 4.15

Intake connections. The vehicle will be equipped with one valved 2½-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 2½-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.

ADDITION: 4.15.1.1.1

Priming pump. 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.

ADDITION: 4.15.3 Tank-to-Pump Connections.

A check valve and shutoff valve will be provided in each tank to pump line.

AMENDMENT: 4.15.4 Discharge Connections.

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.

EXCEPTION: 4.15.6 Overheat Protection.

Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

NFPA 414, 4.16 Water Tank, 4.16.1 Water Tank Capacity.

AMENDMENT: 4.16.1.1

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.

ADDITION: 4.16.2.1

Water tank construction. 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.

ADDITION: 4.16.2.2

Water tank drain. 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.

EXCEPTION: 4.16.2.2(1)

Manhole covers. Manhole covers are not required.

ADDITION: 4.16.2.3.3

Drains. 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.

ADDITION: 4.16.2.5

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.

EXCEPTION: 4.16.2.6

This paragraph does not apply.

AMENDMENT: 4.16.3.2

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 re-supply of the water tank during discharge pumping operations.

EXCEPTION: 4.16.3.4

Water tank fill connection size. This paragraph does not apply.

NFPA 414, 4.17 Foam System.

ADDITION: 4.17

Foam transfer pump. 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.

ADDITION: 4.17.1 Foam–Liquid Concentrate Tank(s).

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.

AMENDMENT: 4.17.1.1

Percent concentrate.

[ ]

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, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment*, for 3 to 6 percent foam concentrate.

AMENDMENT: 4.17.1.2

Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP.

ADDITION: 4.17.1.6

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, and sealed so as to prevent spillage under any operating condition. The top fill trough will be designed to allow one standard 5-gallon foam concentrate container to be emptied. The fill opening will have a minimum opening of 5-inches. The top fill trough will incorporate readily removable, rigidly constructed 10 mesh stainless steel, brass, or polyethylene strainers. All components in and around the top fill trough will be constructed of materials that resist all forms of deterioration that could be caused by the foam concentrate or water.

ADDITION: 4.17.1.7

Foam tank fill connections. The foam tank will incorporate a 1.5-inch National Hose thread female hose connection on [ ] of the vehicle to permit filling by an external transfer hose at flow rates up to 25-gpm. The connections will be 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. The fill lines will incorporate readily removable, rigidly constructed strainers. All components in the foam tank fill system will be constructed of materials that resist all forms of deterioration that could be caused by the foam concentrate or water.

ADDITION: 4.17.1.9

Foam tank vent and overflow system. The foam tank will incorporate an overflow system to relieve excess liquid in the event of tank overfill. The vent and overflow system will prevent leakage of foam when the tank is filled to capacity and the vehicle is 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 vehicle components. Drainage from the vent and overflow systems will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

NFPA 414, 4.17.3 Foam-Liquid Concentrate Piping.

ADDITION: 4.17.3.1

Foam concentrate piping. All metallic surfaces of the piping and associated components that come into contact with the foam concentrate will be of brass, bronze, or passivated stainless steel.

NFPA 414, 4.17.4 Foam Proportioning Systems.

ADDITION: 4.17.4

The vehicle will be equipped with a proportioning system for foam.

ADDITION: 4.17.4.1

Foam concentrate proportioning system. The system will automatically and uniformly proportion water foam concentrate.

NFPA 414, 4.18 Premixed Foam Solutions.

ADDITION: 4.18

A premixed foam solution [ ] be used.

NFPA 414, 4.19 Turret Nozzles.

SELECTION: 4.19.4.1, 4.19.4.2

Manually operated or power assisted turret.

[ ]

SELECTION: 4.19.4.2(4)

Manual override or secondary parallel controls powered by an alternative source of all roof turret movement functions.

[ ]

AMENDMENT: 4.19.6

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.

NFPA 414, 4.20 Preconnected Handlines.

ADDITION: 4.20

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.

AMENDMENT: 4.20.2

Each side of the vehicle will have a 150-foot, 1¾-inch preconnected woven jacket handline, with a 1½-inch control valve and nozzle.

NFPA 414, 4.21 Turret, Ground Sweep, and Undertruck Nozzles.

ADDITION: 4.21.1

EXCEPTION: 4.21.3

Undertruck nozzles are not an approved option.

NFPA 414, 4.23 Approved Clean Agent.

SELECTION: 4.23.1.1.1

Reservice kit.

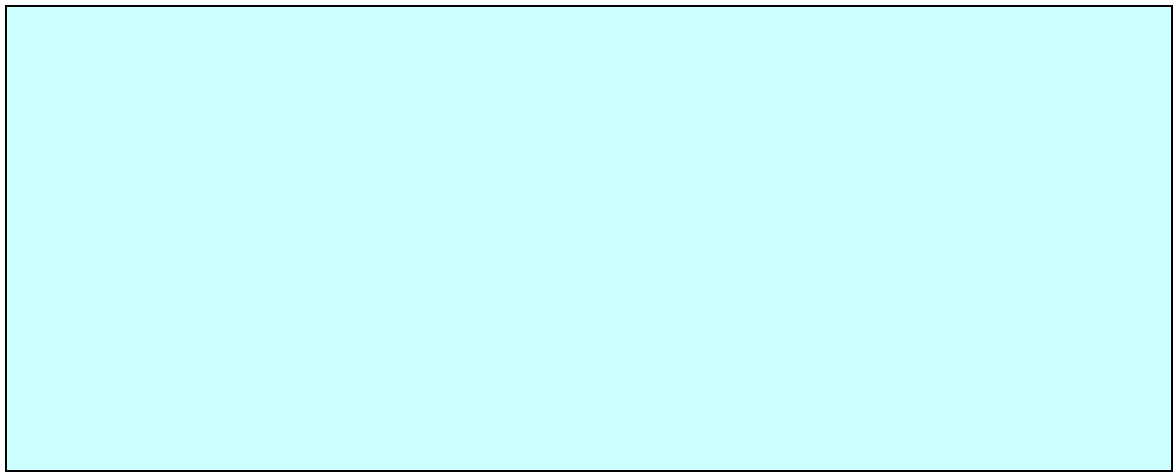
NFPA 414, 4.24 Dry Chemical Turret.

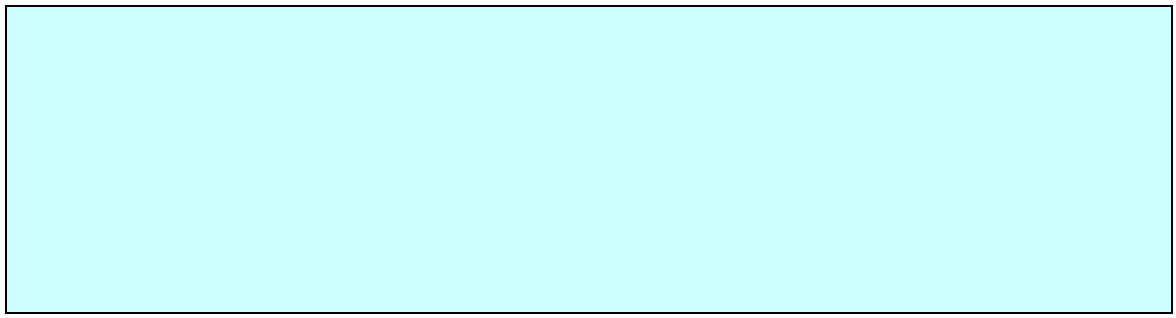
SELECTION: 4.24.1 Auxiliary Agent Discharge.

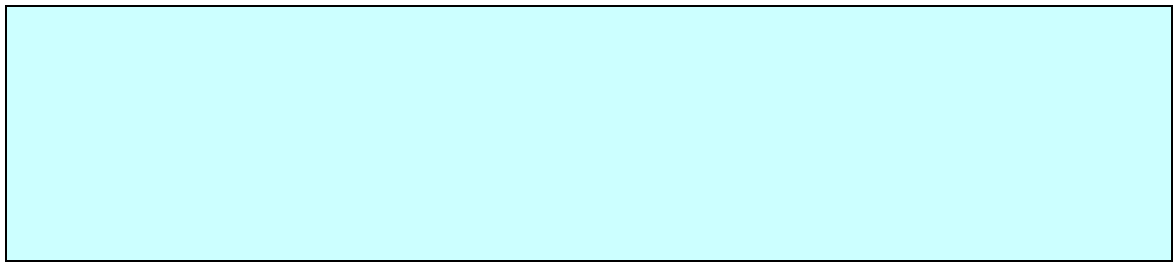
Agent discharge locations.

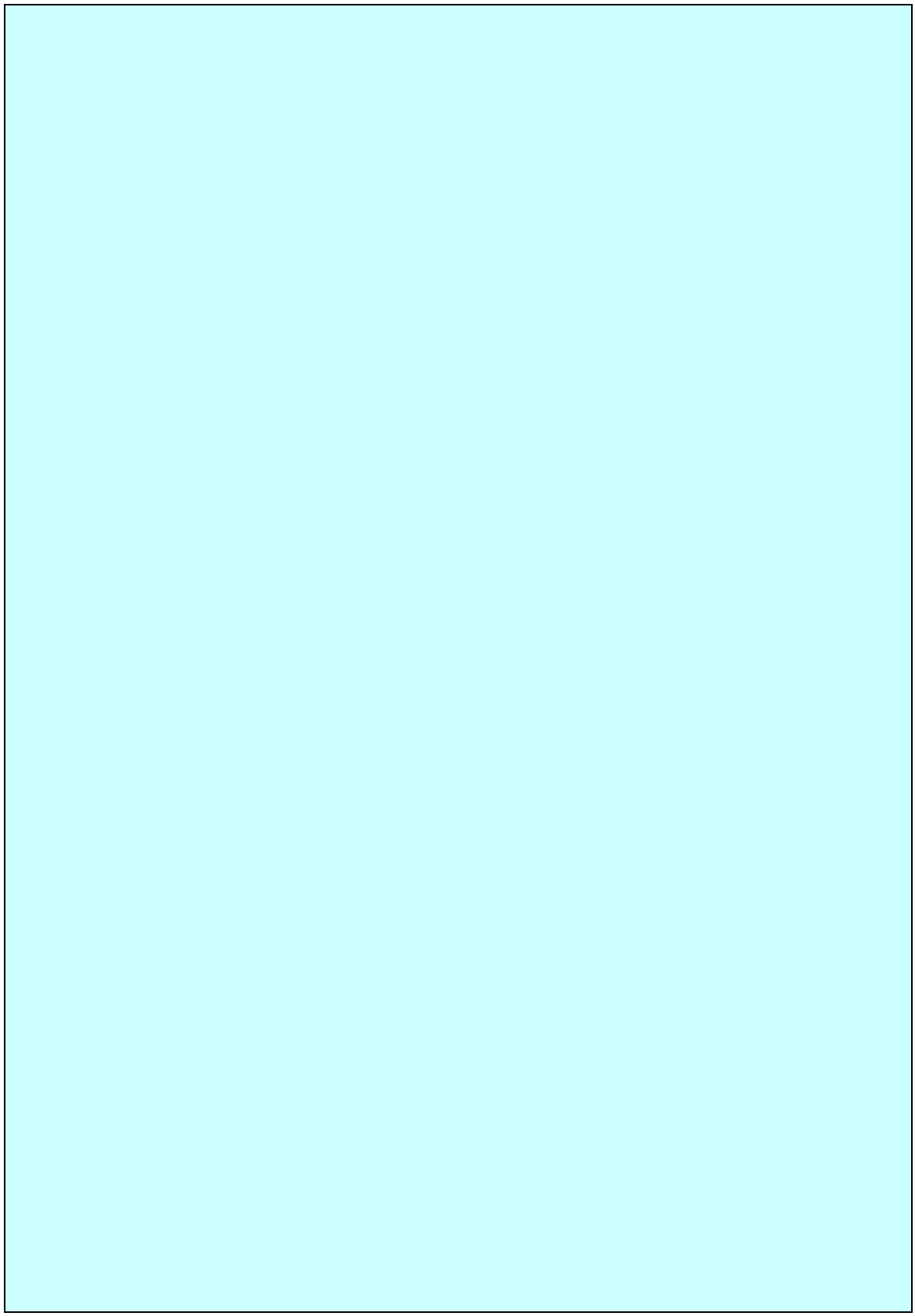
The primary agent discharge location will be the _____.

The complementary agent discharge location will be the _____.









NFPA 414, 4.25 Lighting and Electrical Equipment.

ADDITION: 4.25.1

Auxiliary Power Receptacles. The vehicle will have 2-12-volt auxiliary power receptacles mounted adjacent to the driver and crew member positions, preferably in the instrument panel.

ADDITION: 4.25.1

Spot/Floodlights. 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.

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.

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.

ADDITION: 4.25.1(1)

Headlight flashing system. A high beam, alternating/flashing, headlight system will be provided. The headlight flasher will be separately switched from the warning light panel.

AMENDMENT: 4.25.2

Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control.

ADDITION: 4.25.2.1

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.

ADDITION: 4.25.2.2

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.

AMENDMENT: 4.25.2.3

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 turret operator.

ADDITION: 4.25.4 Exterior Emergency Warning Lights.

Each apparatus will have a system of optical warning devices that meet or exceed the requirements of (NFPA 1901 – 13.8) Optical Warning Devices

ADDITION: 4.25.4.1

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)

ADDITION: 4.25.4.2.2

Emergency warning light color. All emergency warning lights will meet the requirements of AC 150/5210-5.

ADDITION: 4.25.5 Radios.

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.

EXCEPTION: 4.25.5.1.2, 4.25.5.2

The provisioning of radios is an airport responsibility and not part of this specification.

IV Product Conformance Provisions.

IV.1 Classification of Inspections.
The inspection requirements specified herein are classified as follows:

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.

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 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 Inspection Requirements.

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.

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.

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 paragraph	Test
6.3	**Prototype Vehicle Tests**
6.3.6	Rated Water and Foam Tank Capacity Test
6.3.7	Cornering Stability **Note:** *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
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. **Note:** *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

V **Packaging.**

V.1 Preservation, packing, and marking will be as specified in the Procurement Specification, contract or delivery order.

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

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.

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.

VI **Training.**

NFPA 414, 4.2.2.5 Parts Manual.

AMENDMENT: 4.2.2.5.8, 4.2.2.5.9

VI.1 Two person-weeks will be provided for travel to the manufacturing facility during mid-build 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.

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.

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.

VII **Referenced Documents.**

VII.1 Federal Aviation Administration (FAA).
ACs may be obtained from the FAA website:
https://www.faa.gov/regulations_policies/advisory_circulars/

- AC 150/5220-10, *Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles*
- AC 150/5210-5, *Painting, Marking, and Lighting of Vehicles Used on an Airport*

FAA Orders, Specifications, and Drawings may be obtained from: https://www.faa.gov/

VII.2 CFR.

The CFR may be obtained from https://www.ecfr.gov.

Title 14, Code of Federal Regulations (CFR), Part 139, *Certification of Airports* (14 CFR Part 139)

- Section 139.315 Aircraft Rescue and Firefighting: Index Determination.
- Section 139.317 Aircraft Rescue and Firefighting: Equipment and Agents.
- Section 139.319 Aircraft Rescue and Firefighting: Operational Requirements.

Title 49, Code of Federal Regulations (CFR), Part 393: *Parts and Accessories Necessary for Safe Operation: Subpart C—Brakes*.

Title 49, Code of Federal Regulations (CFR), Part 571, *Motor Carrier Vehicle Safety Standards*, Part 209, Standard No. 209, *Seat Belt Assemblies*.

VII.3 SAE International.

SAE documents may be obtained from https://www.sae.org.

VII.4 National Fire Protection Association (NFPA).

NFPA documents may be obtained from https://www.nfpa.org/.

- NFPA 412, *Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment* (2014 Edition)
- NFPA 414, *Standard for Aircraft Rescue and Fire Fighting Vehicles* (2020 Edition)
- NFPA 1901, *Standard for Automotive Fire Apparatus* (2016 Edition)

FAA Submittal (Class 5)

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.

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.

The attached request for additional items needed to address unusual requirements is submitted in accordance with FAA Order 5300.1, *Modifications to Agency Airport Design, Construction, and Equipment Standards*.

(Airport POC signature and title)

The following justifications are provided for FAA approval:

Paragraph Number: AMENDMENT: 4.1.1

Extreme Temperature Justification

☐ Approved ☐ Disapproved:

Paragraph Number: SELECTION: 4.4.2.3.3

Radiator Shutters Justification

☐ Approved ☐ Disapproved:

Paragraph Number: ADDITION: 4.12.4.4

Justification for RIWS Additional Features

☐ Approved ☐ Disapproved:

(FAA signature and date)

We request approval of a Modification to Standards for the following items that are not provided for in the standard specifications. If requesting more than four, provide additional justification pages.

Item 1:

Justification:

☐ Approved ☐ Disapproved:

Item 2:

Justification:

☐ Approved ☐ Disapproved:

Item 3:

Justification:

☐ Approved ☐ Disapproved:

Item 4:

Justification:

☐ Approved ☐ Disapproved:

(FAA signature and date)

APPENDIX A. ARFF VEHICLE TRAINING EQUIPMENT

There are two types of vehicle training devices available to ARFF personnel: the Aircraft Skin Penetration Device and the Computer Based Simulation Training System. Only one of the devices is needed per airport.

The use of an aircraft skin penetration tool has been shown to be an effective firefighting device. The skill involved with the effective employment of this device increases dramatically with practical application. The training devices will meet the following requirements:

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:

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.

b. Panels will be located at a representative height to the predominant aircraft in use at the specific airport.

c. Panels will be mounted on a structure (portable or stationary) that remains stable during training exercises.

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

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).

Checklist for Delivery Package AC 150/5200-10 NFPA 414, Chapter 6 Acceptance Criteria		FAA Approval (Initials)
Customer (Airport)		
Authorized Airport Representative 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, 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)		

The undersigned authorized representative has inspected the delivery documents for this ARFF Vehicle and find it meets the requirements of AC 150/5220-10F.

Inspector Name: _____

Inspector Signature: _____

Inspector Title: _____

Date: _____

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.

Subject: AC 150/5220-10F Date: _____

Please check all appropriate line items:

☐ An error (procedural or typographical) has been noted in paragraph _____ on page _____.

☐ Recommend paragraph _____ on page _____ be changed as follows:

_____
_____
_____

☐ In a future change to this AC, please cover the following subject:
(Briefly describe what you want added.)

_____
_____
_____

☐ Other comments:

_____
_____
_____

☐ I would like to discuss the above. Please contact me at (phone number, email address).

_____
_____
_____

Submitted by: _____ Date: _____