



U.S. Department
of Transportation
Federal Aviation
Administration

Advisory Circular

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

Date: 9/30/2010
Initiated by: AAS-100

AC No.: 150/5220-10E
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. **SCOPE.** The three main phases of the ARFF vehicle procurement process are presented in this AC, including the:
 - a. Description of the vehicle selection process;
 - b. Selection of vehicle requirements; and
 - c. Production of a formal specification.

This AC contains information based on the minimum ARFF vehicle requirements established by Title 14 Code of Federal Regulations (CFR) Part 139, Certification of Airports. The AC is also based on the FAA additions, exemptions, or amendments made to National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition) (as referenced in Appendix A of this document) and NFPA 1901, Standard for Automotive Fire Apparatus (2009 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.

3. APPLICATION. The Federal Aviation Administration (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. Features or design details not listed as required or optional in this document are not considered necessary unless a justification acceptable to the FAA is provided. If there are no additions, exceptions or amendments noted, then the standards of NFPA 414 are applicable.

4. CANCELLATION. AC 150/5220-10D, Guide Specification for Aircraft Rescue and Fire Fighting Vehicles, dated September 24, 2007, is cancelled.

5. PRINCIPAL CHANGES. This AC represents a complete revision to the approach used to develop an ARFF vehicle procurement specification. The previous version of this AC contained only the FAA additions, exemptions, or amendments to NFPA 414. While that information is retained in this AC (now located in Appendix A), the main chapters now provide a description of the procurement process and contain an interactive portable document format (PDF) that airports can use to enter information and print a complete procurement specification. In addition, two types of vehicle training devices available to ARFF personnel have been incorporated in Appendix B. These include the Aircraft Skin Penetration Device and the Computer Based Simulation Training System.

6. COMMENTS OR SUGGESTIONS for improvements to this AC should be sent to:

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CHAPTER 1. THE VEHICLE SELECTION PROCESS

1.1. GENERAL.

This chapter provides an overview of the ARFF vehicle selection process. As shown in 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).

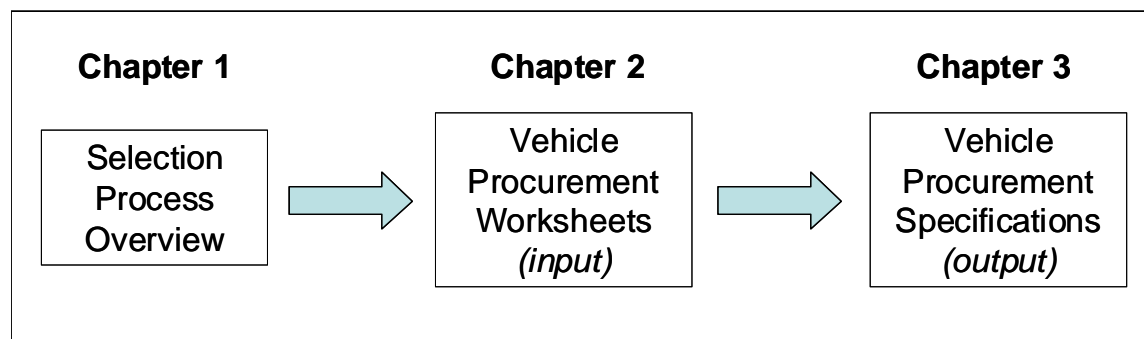


Figure 1-1. Decision Logic Diagram Summary for Index A-E Airports

1.2. BACKGROUND.

ARFF vehicles are designed to provide an invaluable service to the commercial and private airline industry and the passengers and cargo they transport. The airline 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. They must be designed to perform specific functions, constructed for longevity and ease of maintenance, and tailored to the airport's needs.

1.3. ARFF VEHICLE REQUIREMENTS.

The requirements for ARFF vehicles to transport a specific quantity(ies) and type(s) of fire fighting agents are established by Title 14 CFR Part 139.317, Aircraft Rescue and Firefighting: Equipment and Agents. A decision logic tree has been developed (figure 1-2) which identifies an airport index and provides the user a graphic of the decision process concerning what vehicles an airport must have as a minimum: specifically, what vehicles and agents are required by an airport's 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 (500 pounds versus 450 pounds), use of a halogenated agent in lieu of dry chemical, and a minimum of 100 gallons water/Aqueous Film Forming Foam (AFFF).

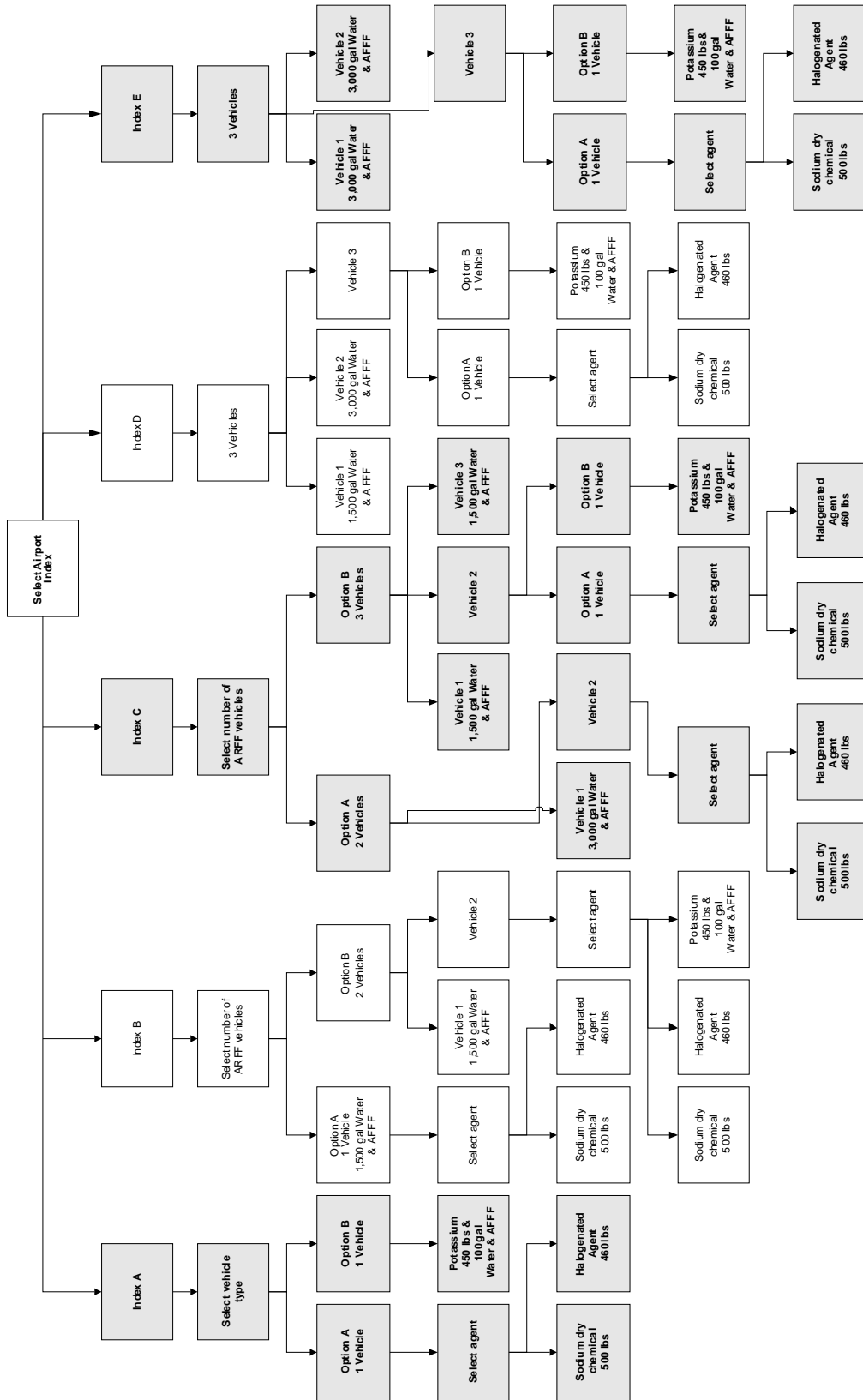


Figure 1-2. Decision Logic Diagram Summary for Index A-E Airports

a. 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 ARFF airport index. Consult paragraph 1.5 of this AC and Title 14 CFR 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 Title 14 CFR 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 and Appendix A of this AC).

1.4. STEP 1 – DETERMINING REPLACEMENT NEED.

The manufacturers of fire fighting apparatus and fire departments do not have hard and fast rules as to when a vehicle must be replaced. 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 normally has a 10-12 year service life and, in many cases, even longer based on an airports' level of activity. The following items should be considered as relevant factors when considering fire fighting vehicle replacement.

- a.** Reliability and serviceability is questionable.
- b.** Parts for repair (including after-market) are no longer available.
- c.** Annual operating cost becomes excessive.
- d.** Service life has been extended beyond the vehicle's normal field service life.
- e.** Repair cost exceeds 75% of the current estimated value of the apparatus.
- f.** Introduction of new and different aircraft to the airport which changes the airport index.
- g.** Relative overall age of the airport fire fighting vehicle fleet to allow for programmed replacement over a span of years.

1.5. STEP 2 – DETERMINING AIRPORT INDEX.

The document used to determine an airport's index is: Title 14 CFR Part 139.315.

a. An airport index is determined by a combination of two factors. These include:

- (1) The length of air carrier aircraft.
- (2) The average daily departures of air carrier aircraft.

(a) 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 5 or more daily departures is the Index required for the airport.

(b) If there are less 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 will be Index A.

b. Air carrier aircraft are grouped by length to determine an airports' index as described below and illustrated in figure 1-3:

- (1) Index A includes aircraft less than 90 feet in length.
- (2) Index B includes aircraft at least 90 feet but less than 126 feet in length.
- (3) Index C includes aircraft at least 126 feet but less than 159 feet in length.
- (4) Index D includes aircraft at least 159 feet but less than 200 feet in length.
- (5) Index E includes aircraft at least 200 feet in length.

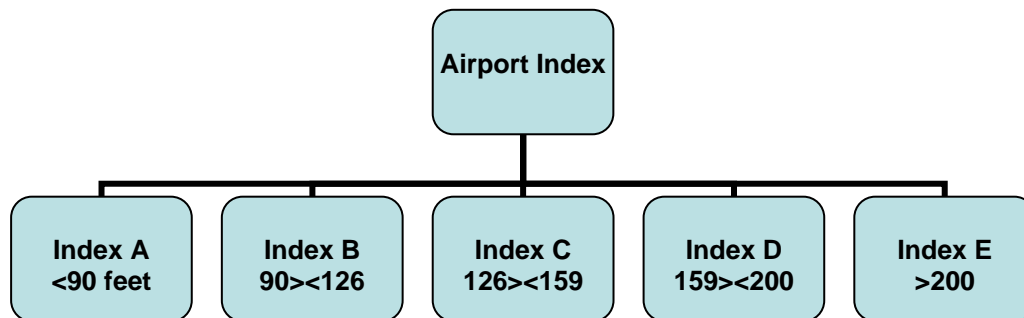


Figure 1-3. Airport Index and Fuselage Lengths

c. Table 1-1 provides 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 the airport operator and airlines to obtain aircraft design drawing lengths.

Table 1-1. Sample Aircraft Types by Airport Index

Type Aircraft*	Index A	Index B	Index C	Index D	Index E
Beech Kingaire 200	X				
Cessna 414	X				
Piper Cheyenne 2	X				
Lear 55	X				
DeHavaland Dash 8	X				
Fokker F-27 2000	X				
ATR 72	X				
Gulfstream 3	X				
BAE 146-200		X			
Airbus A-320 300		X			
Boeing 737-300		X			
Boeing 727-200			X		
Boeing 757			X		
M.D. 88			X		
Airbus A-300				X	
Boeing 767-300				X	
D.C. 10-40				X	
Lockheed L-1011				X	
Airbus A-340 300					X
Boeing 747-200					X
M.D. 11					X
Antonov AN-225					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 Title 14 CFR Part 139.317. The FAA's standardized ARFF vehicle classifications are Classes 1 through 5. These classifications segregate vehicles by the type of fire fighting agent employed on the vehicle and the vehicle's agent carrying capacity.

a. Types of Fire Fighting Agents. There are five (5) 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) Halogenated (gaseous clean agents).
- (4) Water/AFFF.

- (5) Water/AFFF pressurized pre-mix system.
- (6) Compressed Air Foam System (CAFS) (water/AFFF with air injection).

Each ARFF vehicle is designed to be capable of carrying and delivering the specific types of fire fighting agents cited above either as a stand alone 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.”

b. Vehicle Agent Carrying Capacity. The agent carrying and delivery capability of an ARFF vehicle is limited to several factors. These include chassis design, 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 1-2 for summaries of the five (5) classes of ARFF vehicles and the fire fighting agent requirements for each class of vehicle.

Table 1-2. Airport Index and Vehicle Class Requirements

VEHICLE CLASS AIRPORT INDEX	CLASS 1	CLASS 2	CLASS 3	CLASS 4	CLASS 5
	100 Gallon Water/AFFF, and Dry Chemical (500 lbs sodium- or 450 potassium-based), or Halogenated Agent (460 lbs) (Note 1)	300 Gallon Water/AFFF, and Dry Chemical (500 lbs sodium- or 450 potassium-based), or Halogenated Agent (460 lbs) (Note 1)	500 Gallon Water/AFFF, and Dry Chemical (500 lbs sodium- or 450 potassium-based), or Halogenated Agent (460 lbs) (Note 1)	1500 Gallon Water/AFFF	3000-4500 Gallon Water/AFFF (Note 1)
A	1	In lieu of Class 1	In lieu of Class 1 or 2	N/A	N/A
B	1	In lieu of Class 1	In lieu of Class 1 or 2	1 (Note 2)	N/A
C	1	In lieu of Class 1	In lieu of Class 1 or 2	2	
D	1	In lieu of Class 1	In lieu of Class 1 or 2	1	1
E	1	In lieu of Class 1	In lieu of Class 1 or 2		2

NOTE 1: For Index A-E, a Class 1, 2, or 3 vehicle is required (see Note 2 for exception).

NOTE 2: If the Class 4 vehicle has Dry Chemical/Halogenated agent, a Class 1 vehicle is not required for an Index B Airport. If the Class 4/5 vehicle does not have Dry Chemical /Halogenated agent, a Class 1 vehicle is required.

1.7. STEP 4 – DETERMINING VEHICLE REQUIREMENTS.

The specifications contained in Appendices A through E were developed using NFPA 414 as the baseline and were cross referenced to the additions, exceptions, and amendments contained in Appendix A of this AC. NFPA 414, Chapter 4, ARFF Vehicles and Chapter 6, Acceptance Criteria, address vehicle performance. The five (5) specifications aligned to the five (5) vehicle classifications, are generic in nature, describe vehicles' performance requirements and are not name brand product specific. Each contains a series of interactive worksheets that allows the user to select a requirement block that populates the document based on those choices. The five (5) specifications are as follows:

a. **CLASS 1 ARFF Vehicle**. This Procurement Specification (PS) covers a commercially produced 4 by 4 drive diesel engine driven ARFF vehicle for an Index A through E airport. It includes the choice of a vehicle with a minimum 500 pound (lb) sodium or 450 pound (lb) potassium-based Dry Chemical system, or 460 lb Halogenated Agent system, with 100 gallon (gal) water/AFFF and supplemental CAFS fire suppression system.

b. **CLASS 2 ARFF Vehicle**. This PS covers a commercially produced 4 by 4 drive diesel engine driven ARFF vehicle for an Index A through E airport. It includes the choice of a vehicle with a minimum 500 pound (lb) sodium or 450 pound (lb) potassium-based Dry Chemical system, or 460 lb Halogenated Agent system, with 300 gallon (gal) water/AFFF and supplemental CAFS fire suppression system.

c. **CLASS 3 ARFF Vehicle**. This PS covers a commercially produced 4 by 4 drive diesel engine driven ARFF vehicle for an Index A through E airport. It includes the choice of a vehicle with a minimum 500 pound (lb) sodium or 450 pound (lb) potassium-based Dry Chemical system, or 460 lb Halogenated Agent system, with 500 gallon (gal) water/AFFF and supplemental CAFS fire suppression system.

d. **CLASS 4 1500 Gallon ARFF Vehicle**. This PS covers a commercially produced diesel engine driven ARFF vehicle for an Index B, C, or D airport. It includes a 1500 gallon water/AFFF fire suppression system with/without the following complementary agent systems:

- (1) without a complementary agent,
- (2) with a complementary 450 or 500 pound (lb) Dry Chemical only,
- (3) with a complementary 460 pound (lb) Halogenated Agent only,
- (4) with a complementary 450 or 500 pound (lb) Dry Chemical and 460 lb Halogenated Agent.

e. **CLASS 5 (3000-4500 Gallon) ARFF Vehicle**. This PS covers a commercially produced diesel engine driven ARFF vehicle for an Index D or E airport. It includes a Class 5 (3000-4500 gallon) water/AFFF fire suppression system with/without the following complementary agents systems:

- (1) without a complementary agent,

- (2) with a complementary 450 or 500 pound (lb) Dry Chemical only,
- (3) with a complementary 460 lb Halogenated Agent only,
- (4) with a complementary 450 or 500 pound (lb) Dry Chemical and 460 lb Halogenated Agent.

CHAPTER 2. INTERACTIVE PROCUREMENT SPECIFICATION - INPUT

2.1. GENERAL.

Chapter 3 contains specifications for Class 1 through 5 ARFF vehicles. Those specifications are preceded by interactive worksheets in this chapter that are designed to allow the user to select options and provide inputs to the specifications based on their requirements. The corresponding specification will be populated automatically based on the item selections and inputs. For example, the worksheets in paragraph 2.2 populate the Class 1, Class 2, and Class 3 specifications. The document has been aligned to the *performance requirements of NFPA 414* and incorporates the *amended criteria of Appendix A*. Specifically, all the options that are allowed by the FAA are included. All the options where an airport must justify their requirements are also included. When an option requires justification, text must be provided by the user for the Airport District Office (ADO) review and approval. It should be noted that this document will serve as the baseline for submission of AIP funded vehicles – thus it is a specification for a commercially available vehicle without extraneous items that an airport may fund on its own. Follow the process in Figure 2-1 to produce the required specifications.

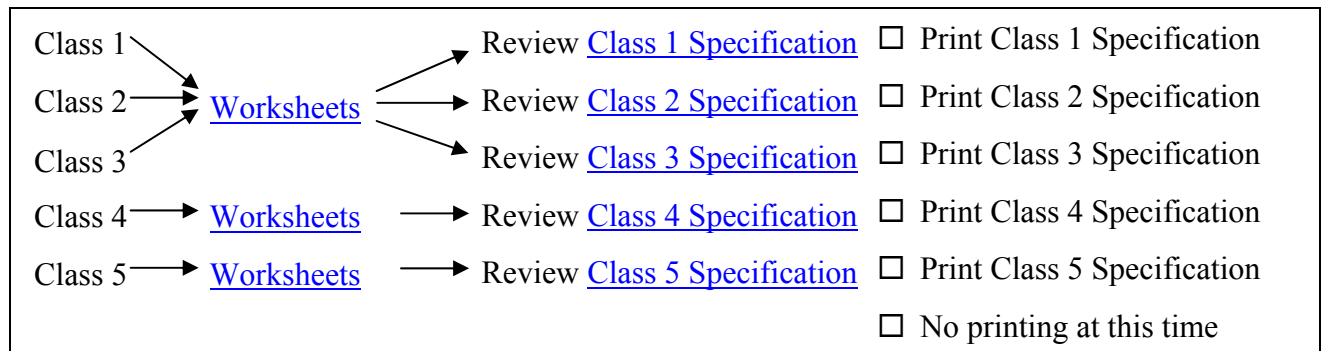


Figure 2-1. Specification Completion Process

2.2. AIRPORT REQUIREMENTS WORKSHEET, CLASSES 1-3

<i>Check one in each category:</i>	
Airport index	<input type="radio"/> A <input type="radio"/> B <input type="radio"/> C <input type="radio"/> D <input type="radio"/> E
Primary Agent	<input type="radio"/> water/AFFF (100 gal (Class 1)/300 gal (Class 2)/500 gal (Class 3)) <input type="radio"/> dry chemical
Primary System	<input type="radio"/> pumping system with separate water and foam tanks <input type="radio"/> pressurized pre-mix system <input type="radio"/> pumping system with separate water and foam tanks plus supplemental CAFS <input type="radio"/> pressurized pre-mix system plus supplemental CAFS
Complementary Agent	<input type="radio"/> 500 lb sodium-based dry chemical <input type="radio"/> 450 lb potassium-based dry chemical <input type="radio"/> 460 lb halogenated
Temperature range equipment must be capable of operating in	<input type="radio"/> 33° to 110°F <input type="radio"/> -40° to 110°F
Cab doors	<input type="radio"/> 2 doors <input type="radio"/> 4 doors (rear seat will be bench type)

* Additional information may be requested in the next worksheet.

*** Complementary System Options Worksheet (Classes 1, 2, 3)**

	Options	Justification Statement (limit 1000 characters)
Primary Turret Discharge Nozzle	<input type="radio"/> an auxiliary agent discharge nozzle mounted parallel to the water/foam discharge <input type="radio"/> an auxiliary agent discharge nozzle of the entrainment type	
Dual Agent Hose Reel Discharge Nozzle	<input type="radio"/> an auxiliary agent discharge nozzle mounted parallel to the water/foam discharge <input type="radio"/> an auxiliary agent discharge nozzle of the entrainment type	
Halogenated-Agent System		

Vehicle Space Requirements Worksheet (Classes 1, 2, 3)

Maximum Requirements Inches/cm		Facility Qualifies?	Validation Statement (limit 1000 character)
Length	360/914	<input type="radio"/> YES <input type="radio"/> NO	
Width	100/254	<input type="radio"/> YES <input type="radio"/> NO	
Height	120/305	<input type="radio"/> YES <input type="radio"/> NO	

Standard/Specialized Equipment Requirements Worksheet (Classes 1, 2, 3)

Standard Requirements	Specialized Requirements	Is specialized equipment justified?	Justification Statement (limit 1000 characters)
Mirrors	Backup Camera with Monitor (to be substituted for mirrors)	<input type="radio"/> YES <input type="radio"/> NO	
Altitude less than 2,000 feet	Altitude 2,000 feet or more	<input type="radio"/> YES <input type="radio"/> NO	
FLIR	FLIR camera and in-cab monitor	<input type="radio"/> YES <input type="radio"/> NO	

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2.3. AIRPORT REQUIREMENTS WORKSHEET, CLASS 4

<i>Check one in each category:</i>	
Airport index	<input type="radio"/> B <input type="radio"/> C <input type="radio"/> D
Complementary system	<input type="radio"/> without a complementary agent. <input type="radio"/> 500 lb sodium-based dry chemical only complementary system. <input type="radio"/> 450 lb potassium-based dry chemical only. <input type="radio"/> 460 lb Halogenated Agent only complementary system. <input type="radio"/> 500 lb sodium-based dry chemical <u>and</u> 460 lb halogenated agent complementary systems. <input type="radio"/> 450 lb potassium-based dry chemical <u>and</u> 460 lb halogenated agent complementary systems.
Temperature range equipment must be capable of operating in	<input type="radio"/> 33° to 110°F <input type="radio"/> -40° to 110°F
Roof turret type	<input type="radio"/> standard roof-mounted turret <input type="radio"/> extendable turret <input type="radio"/> no roof turret
Bumper turret type	<input type="radio"/> fixed mount low volume single rate (minimum 250 GPM) bumper turret. <input type="radio"/> fixed mount high volume dual rate (minimum 600/1200 GPM) bumper turret. <input type="radio"/> low angle high volume dual rate (minimum 600/1200 GPM) bumper turret. <input type="radio"/> no bumper turret.
Structural fire fighting capability	<input type="radio"/> YES <input type="radio"/> NO
Auxiliary generator (kilowatts)	<input type="radio"/> 10kW <input type="radio"/> 15kW

*** Complementary System Options Worksheet (Class 4)**

	Options	Justification Statement (limit 1000 characters)
Dry Chemical Agent-System	<ul style="list-style-type: none"> <input type="radio"/> 500 lb minimum capacity sodium-based dry chemical <input type="radio"/> 450 lb minimum capacity potassium-based dry chemical 	
Dry Chemical Primary-Turret-Discharge-Nozzle	<ul style="list-style-type: none"> <input type="radio"/> an auxiliary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the cab roof. <input type="radio"/> a combination dry chemical/ AFFF nozzle of the entrainment type on the primary turret mounted on the cab roof. <input type="radio"/> an auxiliary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the front bumper. <input type="radio"/> a combination dry chemical/ AFFF nozzle of the entrainment type on the primary turret mounted on the front bumper. 	
Additional Handlines	<ul style="list-style-type: none"> <input type="radio"/> dry chemical - 150 feet of 1 inch dry chemical hose on a reel <input type="radio"/> dual agent - 100 feet of twinned 1 inch dry chemical / foam-water hose on a reel <input type="radio"/> none 	

Vehicle Space Requirements Worksheet (Class 4)

<i>Maximum Requirements Inches/cm</i>		<i>Facility Qualifies?</i>	<i>Validation Statement (limit 1000 character)</i>
Length	428/1087	<input type="radio"/> YES <input type="radio"/> NO	
Width	122/310	<input type="radio"/> YES <input type="radio"/> NO	
Height	154/391	<input type="radio"/> YES <input type="radio"/> NO	

Standard/Specialized Equipment Requirements Worksheet (Class 4)

Standard Requirements	Specialized Requirements	Is specialized equipment justified?	Justification Statement (limit 1000 characters)
Mirrors	Backup Camera with Monitor (to be substituted for mirrors)	<input type="radio"/> YES <input type="radio"/> NO	
Altitude less than 2,000 feet	Altitude 2,000 feet or more	<input type="radio"/> YES <input type="radio"/> NO	
Tires and wheels	Tire bead locks	<input type="radio"/> YES <input type="radio"/> NO	
FLIR	FLIR camera and in-cab monitor	<input type="radio"/> YES <input type="radio"/> NO	
Additional Seats	Non-suspension type	<input type="radio"/> none (2 front-row seats only) <input type="radio"/> 3 rd (left-side) <input type="radio"/> 3 rd and 4 th	

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2.4. AIRPORT REQUIREMENTS WORKSHEET, CLASS 5

<i>Check one in each category:</i>	
Airport index	<input type="radio"/> D <input type="radio"/> E
Complementary system	<input type="radio"/> without a complementary agent. <input type="radio"/> 500 lb sodium-based dry chemical only complementary system. <input type="radio"/> 450 lb potassium-based dry chemical only. <input type="radio"/> 460 lb Halogenated Agent only complementary system. <input type="radio"/> 500 lb sodium-based dry chemical <u>and</u> 460 lb halogenated agent complementary systems. <input type="radio"/> 450 lb potassium-based dry chemical <u>and</u> 460 lb halogenated agent complementary systems.
Temperature range equipment must be capable of operating in	<input type="radio"/> 33° to 110°F <input type="radio"/> -40° to 110°F
Roof turret type	<input type="radio"/> standard roof-mounted turret <input type="radio"/> high reach extendable turret (50') <input type="radio"/> high reach extendable turret (65') <input type="radio"/> no roof turret
Bumper turret type	<input type="radio"/> fixed mount low volume single rate (minimum 250 GPM) bumper turret. <input type="radio"/> fixed mount high volume dual rate (minimum 600/1200 GPM) bumper turret. <input type="radio"/> low angle high volume dual rate (minimum 600/1200 GPM) bumper turret. <input type="radio"/> no bumper turret.
Structural fire fighting capability	<input type="radio"/> Yes <input type="radio"/> No
Auxiliary generator (kilowatts)	<input type="radio"/> 10kW <input type="radio"/> 15kW

*** Complementary System Options Worksheet (Class 5)**

	<i>Options</i>	<i>Justification Statement (limit 1000 characters)</i>
Dry Chemical Agent-System	<ul style="list-style-type: none"> <input type="radio"/> 500 lb minimum capacity sodium-based dry chemical <input type="radio"/> 450 lb minimum capacity potassium-based dry chemical 	
Dry Chemical Primary-Turret-Discharge-Nozzle	<ul style="list-style-type: none"> <input type="radio"/> an auxiliary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the cab roof. <input type="radio"/> a combination dry chemical/ AFFF nozzle of the entrainment type on the primary turret mounted on the cab roof. <input type="radio"/> an auxiliary agent discharge mounted parallel to the foam solution discharge on the primary turret mounted on the front bumper. <input type="radio"/> a combination dry chemical/ AFFF nozzle of the entrainment type on the primary turret mounted on the front bumper. 	
Additional Handlines	<ul style="list-style-type: none"> <input type="radio"/> dry chemical - 150 feet of 1 inch dry chemical hose on a reel <input type="radio"/> dual agent - 100 feet of twinned 1 inch dry chemical / foam-water hose on a reel <input type="radio"/> none 	

Vehicle Space Requirements Worksheet (Class 5)

Maximum Requirements Inches/cm		Facility Qualifies?	Validation Statement (limit 1000 character)
Length	480 inches (3000 gallons)	<input type="radio"/> YES <input type="radio"/> NO	
	540 inches (4500 gallons)		
Width	122/310	<input type="radio"/> YES <input type="radio"/> NO	
Height	154/391	<input type="radio"/> YES <input type="radio"/> NO	

Standard/Specialized Equipment Requirements Worksheet (Class 5)

Standard Requirements	Specialized Requirements	Is specialized equipment justified?	Justification Statement (limit 1000 characters)
Mirrors	Backup Camera with Monitor (to be substituted for mirrors)	<input type="radio"/> YES <input type="radio"/> NO	
Altitude less than 2,000 feet	Altitude 2,000 feet or more	<input type="radio"/> YES <input type="radio"/> NO	
Tires and wheels	Tire bead locks	<input type="radio"/> YES <input type="radio"/> NO	
FLIR	FLIR camera and in-cab monitor	<input type="radio"/> YES <input type="radio"/> NO	
Additional Seats	Non-suspension type	<input type="radio"/> none (2 front-row seats only) <input type="radio"/> 3 rd (left-side) <input type="radio"/> 3 rd and 4 th	

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CHAPTER 3.INTERACTIVE PROCUREMENT SPECIFICATION - OUTPUT

3.1. VEHICLE PROCUREMENT SPECIFICATION, CLASS 1

PROCUREMENT SPECIFICATION

Class 1

AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLE

1. SCOPE. This Procurement Specification (PS) covers a commercially produced 4 by 4 drive diesel engine driven ARFF vehicle for an [redacted] airport. It includes the choice of a 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.

2. CLASSIFICATION. The ARFF vehicle(s) covered by this PS 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, as follows:

Airport Index	Vehicle Class	Minimum Rated Capacities Options
[redacted]	1	500 lbs Sodium-Based Dry Chemical only
[redacted]	1	450 lbs Potassium-Based Dry Chemical with 100 gal of water/AFFF
[redacted]	1	460 lbs Halogenated Agent with 100 gal of water/AFFF
[redacted]	1	500 lbs Sodium-Based Dry Chemical with 100 gal of water/AFFF with supplemental CAFS
[redacted]	1	450 lbs Potassium-Based Dry Chemical with 100 gal of water/AFFF with supplemental CAFS
[redacted]	1	460 lbs Halogenated Agent with 100 gal of water/AFFF with supplemental CAFS

3. VEHICLE CONFORMANCE/PERFORMANCE CHARACTERISTICS. The ARFF vehicle will be in accordance with the applicable requirements of National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007

Edition), and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.1 General Administration Requirements.

3.1.1 Manuals. Technical manuals will consist of operator, service, and parts manuals. All manuals are required to be provided in digital format on CDs.

3.1.1.1 Technical manuals. The overall format for the manuals will be commercial. Each technical manual will have a title page. Line art will be used to the maximum extent possible for illustrations and parts lists. One complete set of engine and transmission parts, service and operator's manuals will be packed with each vehicle.

- a. The contractor may submit digitized technical manuals in lieu of printed paper copies.
- b. The contractor will pack two complete sets of both hard copy and CDs (if applicable) with each vehicle and ship with the vehicle to the final destination.

3.1.1.1.1 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:

- a. The location and function of all controls and instruments will be illustrated and functionally described.
- b. All safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.
- c. All operational and inspection checks and adjustments in preparation for placing the vehicle into service upon receipt from the manufacturer.
- d. Tie down procedures for transport on a low-boy trailer.
- e. 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.
- f. General description and necessary step-by-step instructions for the operation of the vehicle and its fire extinguishing system(s) and auxiliary equipment.
- g. A description of the post-operational procedures (draining, flushing, re-servicing, et cetera).
- h. Daily maintenance inspection checklists that the operator is expected to perform, including basic troubleshooting procedures.

- i. Disabled vehicle towing procedures.
- j. Procedures and equipment required for changing a tire.
- k. Schedules (hours, miles, time periods) for required preventative maintenance and required periodic maintenance.
- l. 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).

3.1.1.1.2 Service manual. The service manual will identify all special tools and test equipment required to perform servicing, inspection, and testing. The manual will cover troubleshooting and maintenance as well as minor and major repair procedures. The text will contain performance specifications, tolerances, and fluid capacities; current, voltage, and resistance data; test procedures; and illustrations and exploded views as may be required to permit proper maintenance by qualified vehicle mechanics. The manual will contain an alphabetical subject index as well as a table of contents. The service manual will contain at least the following, where applicable:

- a. Fire fighting system schematic(s).
- b. Hydraulic schematic.
- c. Pneumatic schematic.
- d. Electrical schematic.
- e. Winterization schematic.
- f. Fuel schematic.
- g. Schedules for required preventative maintenance and required periodic maintenance.
- h. Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

3.1.1.1.3 Parts identification 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, thread dimensions, torque specifications, and special characteristics will be provided for all nonstandard 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.

3.1.2 Painting, plating, and corrosion control.

3.1.2.1 Finish. Exterior surfaces will be prepared, primed, and painted in accordance with all of the paint manufacturer's instructions and recommendations. 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.

3.1.2.2 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, Dissimilar Metals, will not be in contact with each other. Metal plating or metal spraying of dissimilar base metals to provide electromotively compatible abutting surfaces is acceptable. The use of dissimilar metals separated by suitable insulating material is permitted, except in systems where bridging of insulation materials by an electrically conductive fluid can occur.

3.1.2.3 Protection against deterioration. Materials that deteriorate when exposed to sunlight, weather, or operational conditions normally encountered during service will not be used or will have a means of protection against such deterioration that does not prevent compliance with performance requirements. Protective coatings that chip, crack, or scale with age or extremes of climatic conditions or when exposed to heat will not be used.

3.1.2.4 Reflective stripes. An eight (8) inch horizontal reflective stripe will be applied around the vehicle in accordance with AC 150/5210-5. Offsets in the reflective stripes will be made to maximize the length of reflective surface. Bright metal trim or anodized parts may interrupt the reflective stripes. The pattern will be eight (8) inch wide reflective striping.

3.1.2.5 Lettering. Vehicles will have the letters "insert Airport Name" and, if available, the Airport Insignia, applied 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).

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

- a. NOMENCLATURE
- b. MANUFACTURER'S MAKE AND MODEL
- c. MANUFACTURER'S SERIAL NUMBER
- d. STOCK NUMBER (SN)
- e. VEHICLE CURB WEIGHT: kg (pounds)

- f. PAYLOAD, MAXIMUM: kg (pounds)
- g. GROSS VEHICLE WEIGHT (GVW): kg (pounds)
- h. FUEL CAPACITY AND TYPE: gals (gallons)
- i. DATE OF DELIVERY (month and year)
- j. WARRANTY (months and km (miles))
- k. CONTRACT NUMBER
- l. PAINT COLOR AND NUMBER

A second permanently marked information data plate will be securely mounted on the interior of the driver's compartment. The plate will contain the information required by NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), Section 1.3.5 Vehicle Information Data Plate. A single plate that combines or contains the information required for both plates is acceptable.

3.1.4 Environmental conditions.

3.1.4.1 Vehicle operation and storage temperature conditions will vary with geographical location. Thus, the locality temperature range can go from -40° to 110°F. Refer to NFPA 414 for vehicle winterization criteria.



3.1.5 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 panels, if provided, will be attached with captive fasteners.

3.1.6 Vehicle Mobility.

3.1.6.1 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.

3.1.6.2 Gradeability. The fully loaded vehicle will be able to ascend any paved slope up to and including 40-percent.

3.1.6.3 Side slope stability. The fully loaded vehicle will be stable on a 30° side slope when tested in accordance with NFPA 414.

3.1.6.4 Cornering stability. The fully loaded vehicle will be stable in accordance with NFPA 414 when tested in accordance with NFPA 414. An Evasive Maneuver test will be conducted at 35 MPH (56 KPH) in accordance with AC 150/5220-10, , Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles, as amended.

3.2 Weights and dimensions.

3.2.1 Overall dimensions. The maximum dimensions listed below are desirable to ensure vehicles can be accommodated in existing fire stations. Likewise, the overall dimensions should be held 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 in accordance with NFPA 414.

Maximum Dimensions	Class 1
Length (inches/cm)	360/914
Width (inches/cm) (excluding mirrors)	100/254
Height (inches/cm)	120/305

NOTE: For Airport Operator Validation: Consult AC 150/5210-15, Aircraft Rescue and Fire Fighting Station Building Design, Appendix A, to ensure vehicles measurements do not exceed existing airport fire station dimensions.

<u>VEHICLE MEASUREMENT VALIDATION</u>
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3.2.2 Angles of approach and departure. The fully loaded vehicle will have angles of approach and departure of not less than 19°.

3.2.3 Field of vision. The vehicle will have a field of vision in accordance with NFPA 414.

3.2.3.1 Mirrors. Combination flat and convex outside rearview mirrors will be installed on each side of the cab. The flat mirrors will be of the motorized remote control type, providing not less than 60° horizontal rotational viewing range. Mirror remote and heating controls will be located on the instrument panel within reach of the seated driver. 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, but not within the driver's direct line of sight, having a minimum area of 35 square inches. Where justified, flat mirrors will have electrically heated heads.

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3.3 Chassis and vehicle components.

3.3.1 Engine. The vehicle will have a turbocharged diesel engine that is certified to comply with the Environmental Protection Agency (EPA) and state laws for off-highway emission requirements at the time of manufacture. The engine and transmission must 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.

3.3.1.1 Acceleration. The fully loaded vehicle will accelerate from 0 to 50 miles per hour (mph) on a level paved road within: 30 seconds.

3.3.1.2 Maximum speed. The fully loaded vehicle will attain a minimum top speed of 70 mph on a level, paved road.

3.3.1.3 Pump and roll on a 40-percent grade. The fully loaded vehicle will be capable of pump and roll operations on a paved, dry, 40-percent grade in accordance with NFPA 414.

3.3.1.4 Altitude. Where justified, the vehicle, including the pumping system, will be designed for operation at 2,000 feet above sea level.

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3.3.2 Engine cooling system. The engine cooling system will be in accordance with NFPA 414. A label will be installed near the engine coolant reservoir reading “Engine Coolant Fill.”

3.3.3 Fuel system. The fuel system will be in accordance with NFPA 414.

3.3.3.1 Fuel tank. The vehicle will have one or two fuel tanks with a minimum usable capacity in accordance with NFPA 414, as amended by AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Each tank will have a fill opening readily accessible to personnel standing on the ground and designed to prevent fuel splash while refueling. Each tank will be located and mounted so as to provide maximum protection from damage, exhaust heat, and ground fires. If more than one tank is furnished, means will be provided to assure 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. Each fuel tank must be prominently labeled “Diesel Fuel Only”.

3.3.4 Exhaust system. The exhaust system will be in accordance with NFPA 414. The exhaust system will be constructed of high grade rust resistant materials and protected from damage resulting from travel over rough terrain. Exhaust system outlet(s) will be directed upward or to the rear, away from personnel accessing equipment compartments and the engine air intake, and will not be directed toward the ground.

3.3.5 Transmission. A fully automatic transmission will be provided. The transmission will be in accordance with NFPA 414.

3.3.6 Driveline. The vehicle driveline will be in accordance with NFPA 414. 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. The operator’s manual will also include a similar warning/caution. All moving parts requiring routine lubrication must have a means of providing for such lubrication. There must be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

3.3.7 Axle capacity. Each axle will have a rated capacity, as established by the axle manufacturer, in accordance with NFPA 414.

3.3.8 Suspension. The suspension system will be in accordance with NFPA 414 and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.3.9 Tires and wheels. Tires and wheels will be in accordance with NFPA 414. The vehicle will be equipped with single tires (front) and dual tires (rear) and wheels. The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Tire and wheel assemblies will be identical at all positions. Tires and wheels will be certified by the manufacturer for not less than 25 miles of continuous operation at 60 mph at the normal operational inflation pressure. 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. Tires will be new. Retreads, recaps, or re-grooved tires will not be permitted.

3.3.10 Towing connections. The vehicle will be equipped with towing connections in accordance with NFPA 414. The vehicle will be designed for flat towing; the capability to lift and tow the vehicle is not required. The tow connections may intrude into the 30 degree approach angle. The vehicle will be provided with a pintle hook. The maximum towing capacity of the vehicle will be labeled on the vehicle dash board and at the pintle hook location.

3.3.11 Brake system. The vehicle will be equipped with a braking system in accordance with NFPA 414 and Federal Motor Vehicle Safety Standard (FMVSS) standards. Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped with air brakes that meet the requirements of NFPA 414.

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.

3.3.12 Steering. The vehicle will be equipped with power steering.

3.3.12.1 Steering effort. The steering system performance will be in accordance with NFPA 414.

3.3.12.2 Turning diameter. The fully loaded vehicle will have a wall to wall turning diameter of less than three times the overall length of the vehicle in both directions in accordance with NFPA 414.

3.3.13 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.

3.4 Cab. The vehicle will have a fully enclosed door cab of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. Cab door openings will extend for the full vertical height of the side panels. Steps and handrails will be provided for all crew doors, and 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. A tilt steering column will be provided.

3.4.1 Windshield and windows. The windshield and windows will be of tinted safety glass. Each door window will be capable of being opened far enough to facilitate emergency occupant escape in the event of a vehicle accident.

3.4.2 Cab interior sound level. The maximum cab interior sound level will be in accordance with NFPA 414.

3.4.3 Instruments and controls. All instruments and controls will be illuminated and designed to prevent or produce windshield glare. Gauges will be provided for oil pressure, coolant temperature, and automatic transmission temperature. In addition to the instruments and controls required by NFPA 414, the following will be provided within convenient reach of the seated driver:

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

3.4.4 Climate control system. The offeror/contractor's standard heater/defroster and air conditioning system will be provided. The climate control system will induct at least 60 cubic feet per minute of fresh air into the cab. Cab mounted components will be protected from inadvertent damage by personnel.

3.4.5 Seats. The driver seat will be adjustable fore and aft. The turret operator's seat, located to the right front of the driver's seat, will be a fixed (non-suspension) type. Both seats will be provided with a backrest and a 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. 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. Seat belts must be of sufficient length to accommodate crew members in full Personal Protective Equipment (PPE).

3.4.6 Forward Looking Infrared (FLIR). Where justified, a forward looking infrared (FLIR) camera and in-cab monitor may be provided. If provided, the FLIR system must be in accordance with NFPA 414. In addition, the FLIR monitor described in NFPA 414 will have a minimum dimension of 10 in (25 cm) (measured diagonally) and be located in a position where it is visible to both the seated driver and turret operator.

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3.4.7 Windshield wipers and washer. 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. 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.

3.4.8 Warning signs. Signs that state "Occupants must be seated and wearing a seat belt when apparatus is in motion" will be provided in locations that are visible from each seated position in accordance with NFPA 414."

3.4.9 Lateral accelerometer. The vehicle will be equipped with a lateral accelerometer in accordance with 4.11.8 of NFPA 414.

3.5 Body, compartments, and equipment mounting.

3.5.1 Body. The vehicle will have a corrosion-resistant body.

3.5.2 Compartments. The vehicle body will have lighted compartments in accordance with NFPA 414 with a minimum 20 cubic feet of enclosed storage space.

3.5.2.1 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 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.

3.5.2.2 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.

3.5.2.3 Drip rails. Drip rails will be provided over each compartment door.

3.5.2.4 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 pounds 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.

3.5.2.5 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.

3.5.3 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.

3.5.4 Ladder, handrails, and walkways. Ladders, stepping, standing, and walking surfaces will be in accordance with NFPA 414. 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.

3.5.5 Ancillary equipment. Ancillary equipment listed in NFPA 414 A.4.2.1 (1)-(17) is not covered by this Procurement Specification in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Ancillary equipment is funded separately by other sources.

NOTE: Equipment funding will be obtained as a separate contract under the provisions of AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing.

3.6 Agent system. The fire fighting agent system may consist of a series of selected agents (dry chemical, halogenated agents, compressed air foam, and AFFF) as indicated in this section. The delivery system used to dispense and apply agent will comply with Table A-1 in Appendix A. 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 Table A-2 in Appendix A. When specified, a Compressed Air Foam System (CAFS) will be provided with air injection for the foam discharges.

3.6.1 Agent (fire) pump. The vehicle will be equipped with a centrifugal pump capable of providing the performance specified herein as prescribed by NFPA 414. When specified, a premixed pressurized system may be used in lieu of the agent fire pump. The liquid container and propellant gas will comply with NFPA 414.

3.6.1.1 Agent system piping. All piping, couplings, and valves and associated components that come into contact with the agent will be in accordance with NFPA 414. A flushing system will be provided to purge all of the piping and associated components with clear water.

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

3.6.1.3 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.

3.6.1.4 Discharge connections. All fire pump supplied agents will be delivered to the bumper turret and pre-connected handlines and/or dual agent handline hose reel. A dual agent hose reel or two 1¾ -inch discharge connections (pre-connected handlines) with male National Hose threads will be provided.

3.6.1.5 Piping, couplings, and valves. All agent system piping will conform to NFPA 414 criteria.

3.6.1.6 Overheat protection. The agent system will be equipped with an overheat protection system in accordance with NFPA 414. Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

3.6.1.7 Pressure relief valves. The agent system will be equipped with pressure relief valves in accordance with NFPA 414.

3.6.1.8 Drains. The agent system will be equipped with a drainage system in accordance with NFPA 414.

3.6.1.9 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.

3.6.2 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 manufacturers' certification certificate will be provided for verification upon acceptance testing.

3.6.2.1 Water tank construction. The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP) construction. All materials used will be capable of storing water, foam concentrate, and water/foam solutions.

3.6.2.2 Water tank manhole cover and drain. A removable water tank manhole cover is not required, in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. 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.

3.6.2.3 Water tank overflow system and venting. The water tank will incorporate a venting system to relieve pressure on the tank during fill and discharge operations at maximum flow rates. It will have an overflow system to relieve excess fluid in the event of tank overflow.

The vent and overflow system will prevent leakage of water when the tank is filled to capacity and the vehicle is operating on the maximum side slopes and grades specified herein. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.2.4 Water tank top fill opening. A top fill opening of not less than 8 inches internal diameter with a readily removable ¼-inch mesh strainer will be provided. The fill opening may be incorporated as part of the manhole cover, and will be sized to accommodate a 2½-inch fill hose.

3.6.2.5 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° turn-down fitting. The water fill will allow external re-supply of the water tank during discharge pumping operations. Each tank fill connection will be in accordance with NFPA 414.

3.6.3 Foam system. (**NOTE:** *The requirements of section 3.6.3 do not apply to pre-mixed pressurized foam systems.*)

3.6.3.1 Foam concentrate tank. 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.

3.6.3.1.1 Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP construction. All materials used will be capable of storing foam concentrate.

3.6.3.1.2 Foam tank drain. 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.

3.6.3.1.3 Foam tank top fill trough. The foam tank will incorporate a top fill trough mounted in the top of the tank 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 must have a minimum opening of 5-inches. The top fill trough neck will extend sufficiently close to the bottom of the tank to reduce foaming to a minimum during the fill operation. 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.

3.6.3.2 Foam tank fill connections. The foam tank will incorporate a 1-inch National Hose thread female hose connection on each side 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 check valves and readily removable, rigidly constructed ¼-inch mesh 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.

3.6.3.2.1 Foam tank vent and overflow system. The foam tank will incorporate a vent system to relieve pressure on the tank during fill and discharge operations at maximum flow rates and an overflow system to relieve excess liquid in the event of tank overflow. 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. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.3.3 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 (see 3.6.3.2). 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. The pump will be removable as an assembly without disturbing other components. A length of hose with appropriate connections will be provided for filling the foam tank from an external foam storage container.

3.6.3.4 Foam flushing system. The foam concentrate system will be designed in accordance with NFPA 414 so that the system can be readily flushed with clear water.

3.6.3.5 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. The foam concentrate piping will be in accordance with NFPA 414.

3.6.4 Foam proportioning system. The vehicle will be equipped with a proportioning system for Aqueous Film-Forming Foam (AFFF). The system will automatically and uniformly proportion water foam concentrate. The requirements of this paragraph do not apply to pre-mixed pressurized foam systems.

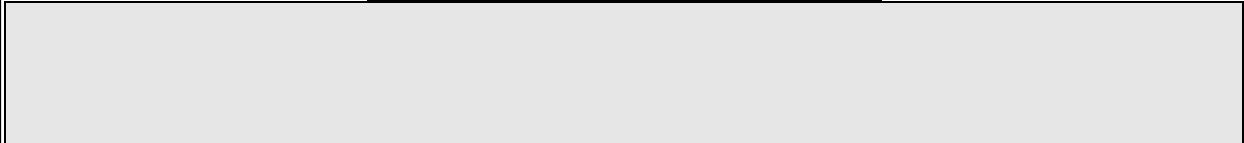
3.6.5 Vehicle turret. The vehicle will be equipped with a bumper turret in accordance with NFPA 414.

3.6.5.1 Bumper turret. The vehicle will be equipped with a joystick controlled, constant flow, non-air-aspirating, variable stream type *fixed mount bumper turret*. The bumper turret and nozzle will be remote controlled from the cab console inside the cab. The bumper turret will be capable of discharging at a minimum flow rate of 60-gpm at 100 psi of foam or water (with a minimum discharge distance of 65 ft), and a simultaneous dry chemical flow of up to seven (7) pounds per second from a separate dry chemical system. The dry chemical system will be electronically activated from a switch located in the cab. The turret nozzle will have a pattern infinitely variable from straight stream to fully dispersed. The bumper turret will be capable of automatic oscillation, with the range of oscillation adjustable up to 90° each side of center (left and right) with vertical travel capabilities of +45°/-20° meeting section 4.20.2 in NFPA 414.

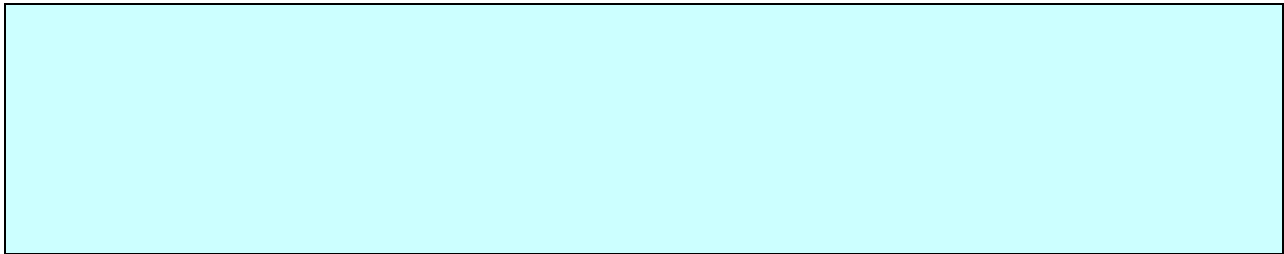
3.6.6 Preconnected handlines. Two 150-foot, 1³/₄-inch pre-connected woven jacket handlines, with a 1¹/₂-inch control valve and nozzle, will be located in a cross-lay accessible from each side of the vehicle. A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. The handlines and nozzles will be in accordance with NFPA414, and will provide 95 gpm at 100 psi nozzle pressure. A control for charging each handline will be provided for operation.



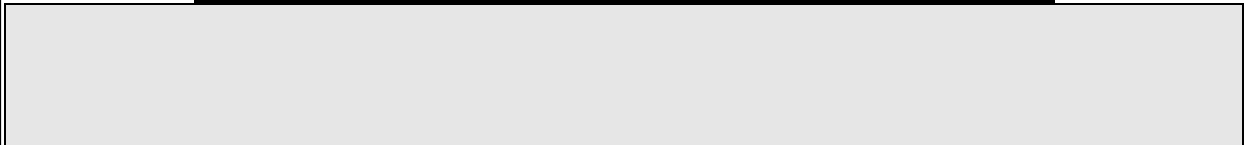
JUSTIFICATION (Dry Chemical Agent)



ADO/FAA Approval: ⇨ _____

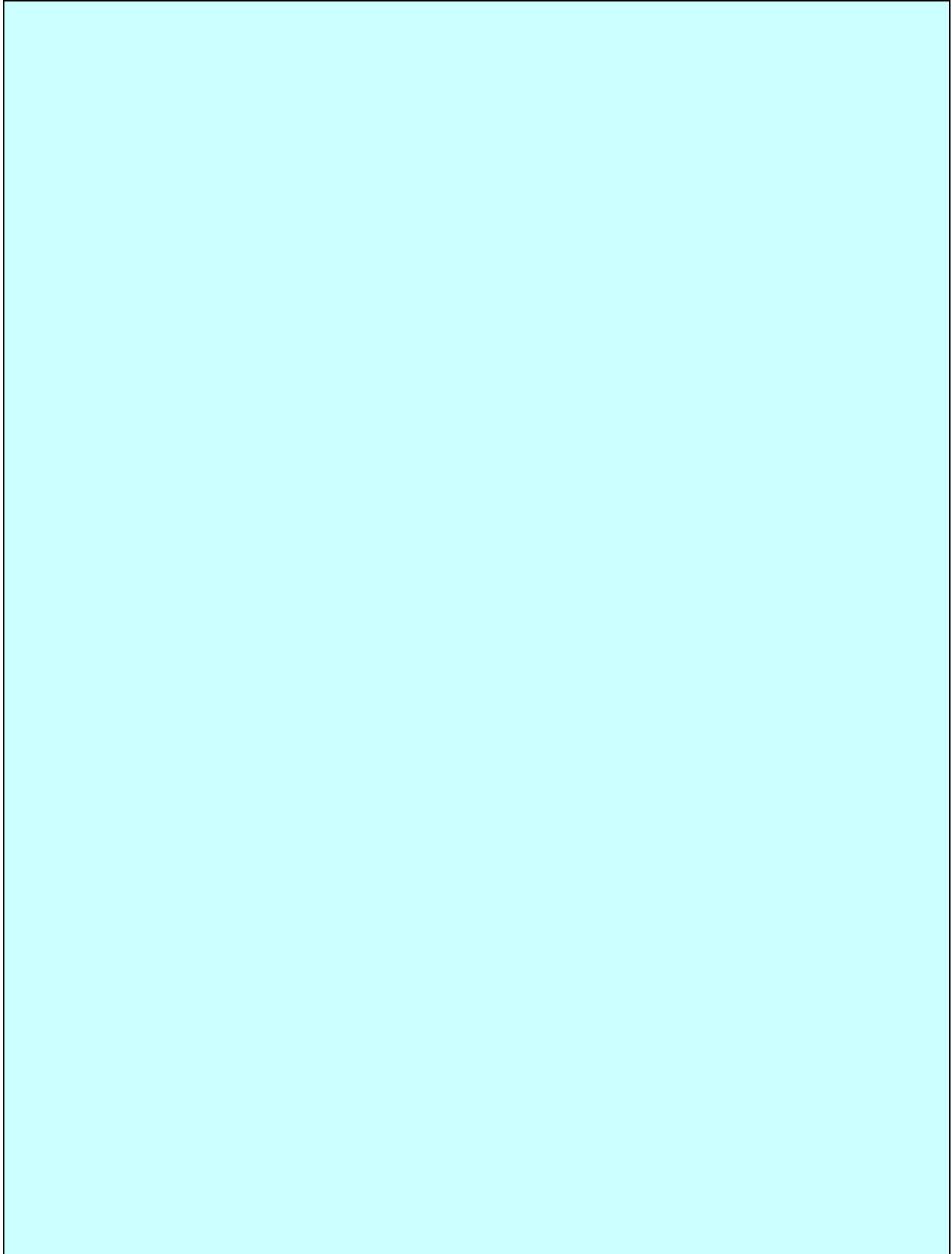


JUSTIFICATION (Dry Chemical Primary Turret Discharge Nozzle)



ADO/FAA Approval: ⇨ _____





JUSTIFICATION
ADO/FAA Approval: → _____

3.9 Electrical systems and warning devices. The vehicle will have a 12-volt electrical and starting system.

3.9.1 Alternator. A single or dual alternator charging system in accordance with NFPA 414 will be provided. The minimum continuous electrical load will include operation of the air conditioning system.

3.9.2 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.

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

3.9.3 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 (see 3.11.1). 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.

3.9.4 Electromagnetic interference. The vehicle electrical system will be in accordance with SAE J551-2 for electromagnetic interference.

3.9.5 Work lighting.

3.9.5.1 Cab interior lights. Cab interior light levels will be sufficient for reading maps or manuals.

3.9.5.2 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.

3.9.5.3 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. The switch located in the cab will be a master switch and must be turned on before auxiliary switches near the light sources are operational.

3.9.5.4 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. NOTE: Halogen, LED, or HID lights may be used, based on the following conversions (1W Halogen = 4W LED = 5W HID).

3.9.5.5 Telescoping Flood Lights. Two floodlights will be provided. One light will be mounted on the left and right sides of the vehicle on extension tubes. Both lights will be controlled from switches in the cab and manually raised. The lights will either be a 500W halogen, 125W LED, or 100W HID type.

3.9.5.6 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. NOTE: Halogen, LED, or HID lights may be used, based on the following conversions (1W Halogen = 4W LED = 5W HID).

3.9.6 Audible warning devices.

3.9.6.1 Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control and selection of "Radio," "PA," "Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and a magnetic noise canceling microphone. 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. 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.

3.9.6.2 Horn. Dual forward facing horns will be installed in protected locations near the front of the vehicle. Horn activating foot switches will be located in front of the driver and the turret operator.

3.9.7 Emergency warning lights. All emergency warning lights will use Light Emitting Diode (LED), strobe, or rotating beacon elements and will meet the requirements of AC 150/5210-5. Lighting units will be installed on the top front, sides, and rear of the vehicle to provide 360° visibility. A switch will be provided on the instrument panel to control all of the top, side, front and rear emergency warning lights. A switch will also be provided on the instrument panel to disable all lower emergency warning lights when desired. All lighting systems will meet NFPA 414 emergency lighting criteria.

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

3.9.7.2 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.

3.9.8 Radio circuit. The vehicle will have two separate 30 amp circuits, with 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. ***The provisioning of radios is an airport responsibility and not part of this specification.***

3.9.9 Power receptacles.

3.9.9.1 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.

3.10 Line voltage electrical system.

3.10.1 Electrical shoreline connection. The battery charger/conditioner will be powered from a covered, polarized, insulated, labeled, recessed (flush mounted), male, 110 volt AC auto-eject receptacle. The connection will be located on the exterior of the vehicle at the rear or on either side of the vehicle. A weatherproof charge meter will be installed next to the receptacle. A 50 foot long, three wire, 15 amp rated, 110 volt, AC power cable, with straight blade (non twist-lock) connectors, will be provided.

3.11 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 3/6 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.

3.12 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.

3.13 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 polypropylene tanks will be covered by a lifetime warranty.

4. REGULATORY REQUIREMENTS.

4.1 Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with Title 48: Federal Acquisition Regulations System, Part 2823—Environment, Conservation, Occupational Safety, and Drug-free Workplace, Subpart 2823.4 Use of Recovered Material, 403 Policy and 404 Procedures.

4.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired:

- a. competitively within a reasonable timeframe;
- b. meet appropriate performance standards, or
- c. at a reasonable price.

The prime contractor is responsible for ensuring that all subcontractors comply with this requirement. Information on the GPP can be found at:

http://www.dot.gov/ost/m60/DOT_policy_letters/apl8_04.pdf or FAR 23.404(b):
http://www.acquisition.gov/far/current/html/Subpart%2023_4.html.

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Performance inspection (see 5.2).
- b. Conformance inspection (see 5.3).

5.2 Performance inspection. The vehicle will be subjected to the examinations and tests described in this PS. The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.

5.3 Conformance inspection. The vehicle will be subjected to the examinations and tests described in this PS. The contractor will provide or arrange for all test equipment, personnel, and facilities.

5.4 Product conformance. The products provided will meet the performance characteristics of this PS, 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.

5.5 Technical proposal. The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this PS; a paragraph by paragraph response to the characteristics section of this PS 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 PS.

5.6 Inspection requirements.

5.6.1 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.

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

a. Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.

b. Any spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any condition, except as allowed herein.

c. Structural failure of any component, including permanent deformation, or evidence of impending failure.

d. Evidence of excessive wear.

e. Interference between the vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.

f. Misalignment of components.

g. Evidence of undesirable roadability characteristics, including instability in handling during cornering, braking, and while traversing all required terrain.

h. Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.

i. Overheating of the engine, transmission, or any other vehicle component.

j. Evidence of corrosion.

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

5.6.3 Detailed inspection requirements.

5.6.3.1 Examination of product. All Component Manufacturers Certifications, as well as Prototype Vehicle Testing and Operational Testing, 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. Proper operation of vehicle functions will be verified as defined by NFPA 414, Acceptance Criteria chapter. A copy of the vehicle manufacturer's certifications will be provided with each vehicle in accordance with NFPA 414. The airport performing the test may accept manufacturer and or third party certification that prior testing was performed and the vehicle meets the performance parameters of NFPA 414.

5.6.3.1.1 Roadability test. The fully loaded vehicle will be driven over ten miles of paved and ten miles of cross country terrain consisting of open fields, broken ground, and uneven terrain. After completing the driving portion of the roadability test, all loads will be removed and all structure and surfaces will be visibly inspected for failure or permanent deformation.

5.6.3.1.2 Gradeability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.2.

5.6.3.1.3 Tilt table test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.3. If an adjustable height suspension system is provided, the suspension system may be set to the height normally used on hard pavement.

5.6.3.1.4 Cornering stability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.4.

5.6.3.1.5 Weight and weight distribution measurement. Each vehicle will be weighed (full and empty) to demonstrate compliance with NFPA 414.

5.6.3.1.6 Dimension measurement. The vehicle will be measured in accordance with NFPA 414. In addition to the dimensions listed in NFPA 414, the overall length, width, and height will be measured to demonstrate compliance with 3.2.1.

5.6.3.1.7 Angles of approach and departure measurement. The angles of approach and departure of the fully loaded vehicle will be measured to demonstrate compliance with 3.2.2.

5.6.3.1.8 Acceleration test. Each vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.1.2. A time-distance recorder, engine electronic measurement or Global Positioning System (GPS) based electronic data collection system will be used to record data for this test.

5.6.3.1.9 Maximum speed test. Each vehicle will be tested in accordance with 5.4.4 of NFPA 414 to demonstrate compliance with 3.3.1.3. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.10 Pump and roll on a 40-percent grade test. The fully loaded vehicle will be tested in accordance with NFPA 414.

5.6.3.1.11 Service brake system test. Each vehicle will be tested in accordance with NFPA 414. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.12 Air system and air compressor test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.1.13 Turning diameter test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.12.2.

5.6.3.1.14 Evasive maneuver test. The fully loaded vehicle will be tested in accordance with NFPA 414 at 35 miles per hour (mph) (56 kilometers per hour (kph) to demonstrate compliance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.2 Cab interior sound level test. The cab interior sound levels of the vehicle will be measured in accordance with NFPA 414 to demonstrate compliance with 3.4.2.

5.6.3.3 Agent system tests.

5.6.3.3.1 Agent discharge pumping test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.2 Pump and maneuver test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.3 Hydrostatic pressure test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.4 Priming device test. Each vehicle that is equipped with a priming pump will be tested.

5.6.3.3.5 Agent tank capacity test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with the capacity requirements of 3.6.2 and 3.6.3.1.

5.6.3.3.6 Water tank fill and overflow test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.6.2.3.

5.6.3.3.7 Foam concentration test. Each vehicle will be tested in accordance with NFPA 414 at the 6-percent concentration setting to demonstrate compliance with the foam concentration quality requirements of 3.6.4.

5.6.3.3.8 Primary turret flow rate test. The vehicle will be tested in accordance with NFPA 414. Each vehicle will be tested to demonstrate compliance with NFPA 414.

5.6.3.4 Electrical system tests.

5.6.3.4.1 Electrical charging system test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with Annex B.4 of NFPA 414.

5.6.3.4.2 Electromagnetic interference test. The vehicle will be tested in accordance with NFPA 414 and SAE J551 to demonstrate compliance with 3.8.4.

6. PACKAGING.

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

6.2 The vehicle must be delivered 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.

6.3 The manufacturer may pre-ship chemical agents to a receiving airport to place a vehicle into operational status upon delivery. The manufacturer has the responsibility for provisioning these agents and propellants.

6.4 The vehicle manufacturer must provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.

7. TRAINING.

7.1 Upon delivery of the vehicle to the airport, the manufacturer must, at no additional cost, provide the services of a qualified technician for 5 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 must be provided by the manufacturer to allow various shifts to complete the training requirements.

7.2 The technician must provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup must 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 should 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.

7.3 Training must 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 must include materials that can be used to train subsequent new operators.

8. REFERENCED DOCUMENTS.

8.1 Source of documents.

8.1.1 The CFR may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

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.

8.1.2 SAE documents may be obtained from SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096.

8.1.3 National Fire Protection Association (NFPA): NFPA documents may be obtained from NFPA, Batterymarch Park, Quincy MA 02269-9101.

NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2009 Edition)

NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition)

NFPA 1901, Standard for Automotive Fire Apparatus (2009 Edition)

8.1.4 Federal Aviation Administration (FAA): FAA ACs may be obtained from the FAA website: http://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: Federal Aviation Administration, ATO-W CM-NAS Documentation, Control Center, 800 Independence Avenue, SW, Washington, DC 20591. Telephone: (202) 548-5256, FAX: (202) 548-5501 and website: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_facilities/cm/cm_documentation/



Print Class 1 Specification

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3.2. VEHICLE PROCUREMENT SPECIFICATION, CLASS 2

PROCUREMENT SPECIFICATION Class 2 AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLE

1. SCOPE. This Procurement Specification (PS) covers a commercially produced 4 by 4 drive diesel engine driven ARFF vehicle for an [REDACTED] airport. It includes the choice of a 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.

2. CLASSIFICATION. The ARFF vehicle(s) covered by this PS 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, as follows:

Airport Index	Vehicle Class	Minimum Rated Capacities Options
	2	500 lbs Sodium-Based Dry Chemical only
	2	450 lbs Potassium-Based Dry Chemical with 300 gal of water/AFFF
	2	460 lbs Halogenated Agent with 300 gal of water/AFFF
	2	
	2	500 lbs Sodium-Based Dry Chemical with 300 gal of water/AFFF with supplemental CAFS
	2	450 lbs Potassium-Based Dry Chemical with 300 gal of water/AFFF with supplemental CAFS
	2	460 lbs Halogenated Agent with 300 gal of water/AFFF with supplemental CAFS

3. VEHICLE CONFORMANCE/PERFORMANCE CHARACTERISTICS. The ARFF vehicle will be in accordance with the applicable requirements of National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.1 General Administration Requirements.

3.1.1 Manuals. Technical manuals will consist of operator, service, and parts manuals. All manuals are required to be provided in digital format on CDs.

3.1.1.1 Technical manuals. The overall format for the manuals will be commercial. Each technical manual will have a title page. Line art will be used to the maximum extent possible for illustrations and parts lists. One complete set of engine and transmission parts, service and operator's manuals will be packed with each vehicle.

- a. The contractor may submit digitized technical manuals in lieu of printed paper copies.
- b. The contractor will pack two complete sets of both hard copy and CDs (if applicable) with each vehicle and ship with the vehicle to the final destination.

3.1.1.1.1 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:

- a. The location and function of all controls and instruments will be illustrated and functionally described.
- b. All safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.
- c. All operational and inspection checks and adjustments in preparation for placing the vehicle into service upon receipt from the manufacturer.
- d. Tie down procedures for transport on a low-boy trailer.
- e. 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.
- f. General description and necessary step-by-step instructions for the operation of the vehicle and its fire extinguishing system(s) and auxiliary equipment.
- g. A description of the post-operational procedures (draining, flushing, re-servicing, et cetera).
- h. Daily maintenance inspection checklists that the operator is expected to perform, including basic troubleshooting procedures.
- i. Disabled vehicle towing procedures.
- j. Procedures and equipment required for changing a tire.

- k. Schedules (hours, miles, time periods) for required preventative maintenance and required periodic maintenance.
- l. 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).

3.1.1.1.2 Service manual. The service manual will identify all special tools and test equipment required to perform servicing, inspection, and testing. The manual will cover troubleshooting and maintenance as well as minor and major repair procedures. The text will contain performance specifications, tolerances, and fluid capacities; current, voltage, and resistance data; test procedures; and illustrations and exploded views as may be required to permit proper maintenance by qualified vehicle mechanics. The manual will contain an alphabetical subject index as well as a table of contents. The service manual will contain at least the following, where applicable:

- a. Fire fighting system schematic(s).
- b. Hydraulic schematic.
- c. Pneumatic schematic.
- d. Electrical schematic.
- e. Winterization schematic.
- f. Fuel schematic.
- g. Schedules for required preventative maintenance and required periodic maintenance.
- h. Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

3.1.1.1.3 Parts identification 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, thread dimensions, torque specifications, and special characteristics will be provided for all nonstandard 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.

3.1.2 Painting, plating, and corrosion control.

3.1.2.1 Finish. Exterior surfaces will be prepared, primed, and painted in accordance with all of the paint manufacturer's instructions and recommendations. 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.

3.1.2.2 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, Dissimilar Metals, will not be in contact with each other. Metal plating or metal spraying of dissimilar base metals to provide electromotively compatible abutting surfaces is acceptable. The use of dissimilar metals separated by suitable insulating material is permitted, except in systems where bridging of insulation materials by an electrically conductive fluid can occur.

3.1.2.3 Protection against deterioration. Materials that deteriorate when exposed to sunlight, weather, or operational conditions normally encountered during service will not be used or will have a means of protection against such deterioration that does not prevent compliance with performance requirements. Protective coatings that chip, crack, or scale with age or extremes of climatic conditions or when exposed to heat will not be used.

3.1.2.4 Reflective stripes. An eight (8) inch horizontal reflective stripe will be applied around the vehicle in accordance with AC 150/5210-5. Offsets in the reflective stripes will be made to maximize the length of reflective surface. Bright metal trim or anodized parts may interrupt the reflective stripes. The pattern will be eight (8) inch wide reflective striping.

3.1.2.5 Lettering. Vehicles will have the letters "insert Airport Name" and, if available, the Airport Insignia, applied 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).

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

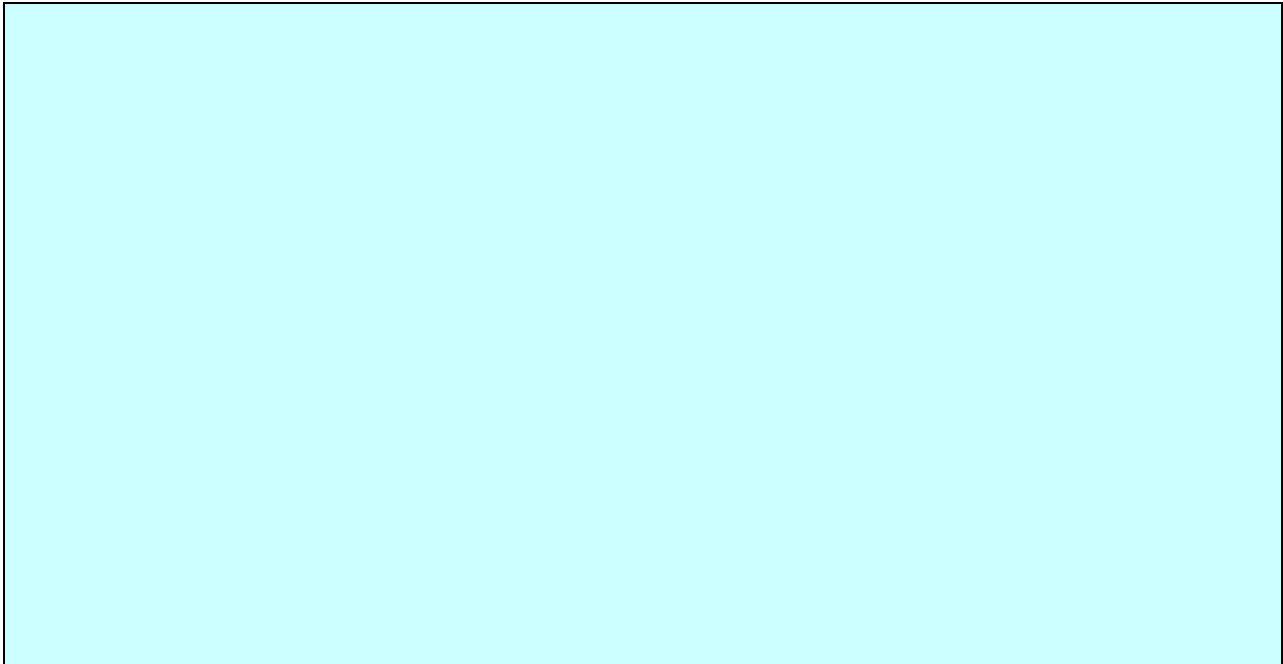
- a. NOMENCLATURE
- b. MANUFACTURER'S MAKE AND MODEL
- c. MANUFACTURER'S SERIAL NUMBER
- d. STOCK NUMBER (SN)
- e. VEHICLE CURB WEIGHT: kg (pounds)

- f. PAYLOAD, MAXIMUM: kg (pounds)
- g. GROSS VEHICLE WEIGHT (GVW): kg (pounds)
- h. FUEL CAPACITY AND TYPE: gals (gallons)
- i. DATE OF DELIVERY (month and year)
- j. WARRANTY (months and km (miles))
- k. CONTRACT NUMBER
- l. PAINT COLOR AND NUMBER

A second permanently marked information data plate will be securely mounted on the interior of the driver's compartment. The plate will contain the information required by NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), Section 1.3.5 Vehicle Information Data Plate. A single plate that combines or contains the information required for both plates is acceptable.

3.1.4 Environmental conditions.

3.1.4.1 Vehicle operation and storage temperature conditions will vary with geographical location. Thus, the locality temperature range can go from -40° to 110°F. Refer to NFPA 414 for vehicle winterization criteria.



3.1.5 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 panels, if provided, will be attached with captive fasteners.

3.1.6 Vehicle Mobility.

3.1.6.1 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. .

3.1.6.2 Gradeability. The fully loaded vehicle will be able to ascend any paved slope up to and including 40-percent.

3.1.6.3 Side slope stability. The fully loaded vehicle will be stable on a 30° side slope when tested in accordance with NFPA 414.

3.1.6.4 Cornering stability. The fully loaded vehicle will be stable in accordance with NFPA 414 when tested in accordance with NFPA 414.

3.2 Weights and dimensions.

3.2.1 Overall dimensions. The maximum dimensions listed below are desirable to ensure vehicles can be accommodated in existing fire stations. Likewise, the overall dimensions should be held 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 in accordance with NFPA 414.

Maximum Dimensions	Class 2
Length (inches/cm)	360/914
Width (inches/cm) (excluding mirrors)	100/254
Height (inches/cm)	120/305

NOTE: For Airport Operator Validation: Consult AC 150/5210-15, Aircraft Rescue and Fire Fighting Station Building Design, Appendix A, to ensure vehicles measurements do not exceed existing airport fire station dimensions.

<u>VEHICLE MEASUREMENT VALIDATION</u>
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3.2.2 Angles of approach and departure. The fully loaded vehicle will have angles of approach and departure of not less than 19°.

3.2.3 Field of vision. The vehicle will have a field of vision in accordance with NFPA 414.

3.2.3.1 Mirrors. Combination flat and convex outside rearview mirrors will be installed on each side of the cab. The flat mirrors will be of the motorized remote control type, providing not less than 60° horizontal rotational viewing range. Mirror remote and heating controls will be located on the instrument panel within reach of the seated driver. 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, but not within the driver's direct line of sight, having a minimum area of 35 square inches. Where justified, flat mirrors will have electrically heated heads.

<u>JUSTIFICATION</u>
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3.3 Chassis and vehicle components.

3.3.1 Engine. The vehicle will have a turbocharged diesel engine that is certified to comply with the Environmental Protection Agency (EPA) and state laws for off-highway emission requirements at the time of manufacture. The engine and transmission must operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants according to the recommendations of the engine and transmission manufacturers.

3.3.1.1 Acceleration. The fully loaded vehicle will accelerate from 0 to 50 miles per hour (mph) on a level paved road within: 30 seconds.

3.3.1.2 Maximum speed. The fully loaded vehicle will attain a minimum top speed of 70 mph on a level, paved road.

3.3.1.3 Pump and roll on a 40-percent grade. The fully loaded vehicle will be capable of pump and roll operations on a paved, dry, 40-percent grade in accordance with NFPA 414.

3.3.1.4 Altitude. Where justified, the vehicle, including the pumping system, will be designed for operation at 2,000 feet above sea level.

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3.3.2 Engine cooling system. The engine cooling system will be in accordance with NFPA 414. A label will be installed near the engine coolant reservoir reading “Engine Coolant Fill.”

3.3.3 Fuel system. The fuel system will be in accordance with NFPA 414.

3.3.3.1 Fuel tank. The vehicle will have one or two fuel tanks with a minimum usable capacity in accordance with NFPA 414, as amended by AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Each tank will have a fill opening readily accessible to personnel standing on the ground and designed to prevent fuel splash while refueling. Each tank will be located and mounted so as to provide maximum protection from damage, exhaust heat, and ground fires. If more than one tank is furnished, means will be provided to assure 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. Each fuel tank must be prominently labeled “Diesel Fuel Only”.

3.3.4 Exhaust system. The exhaust system will be in accordance with NFPA 414. The exhaust system will be constructed of high grade rust resistant materials and protected from damage resulting from travel over rough terrain. 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 and the engine air intake, and will not be directed toward the ground.

3.3.5 Transmission. A fully automatic transmission will be provided. The transmission will be in accordance with NFPA 414.

3.3.6 Driveline. The vehicle driveline will be in accordance with NFPA 414. 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. The operator’s manual will also include a similar warning/caution. All moving parts requiring routine lubrication must have a means of providing for such lubrication. There must be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

3.3.7 Axle capacity. Each axle will have a rated capacity, as established by the axle manufacturer, in accordance with NFPA 414.

3.3.8 Suspension. The suspension system will be in accordance with NFPA 414 and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.3.9 Tires and wheels. Tires and wheels will be in accordance with NFPA 414. The vehicle will be equipped with single tires (front) and dual tires (rear) and wheels. The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Tire and wheel assemblies will be identical at all positions. Tires and wheels will be certified by the manufacturer for not less than 25 miles of continuous operation at 60 mph at the normal operational inflation pressure. 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. Tires will be new. Retreads, recaps, or re-grooved tires will not be permitted.

3.3.10 Towing connections. The vehicle will be equipped with towing connections in accordance with NFPA 414. The vehicle will be designed for flat towing; the capability to lift and tow the vehicle is not required. The tow connections may intrude into the 30 degree approach angle. The vehicle will be provided with a pintle hook. The maximum towing capacity of the vehicle will be labeled on the vehicle dash board and at the pintle hook location.

3.3.11 Brake system. The vehicle will be equipped with a braking system in accordance with NFPA 414 and Federal Motor Vehicle Safety Standard (FMVSS) standards. Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped with air brakes that meet the requirements of NFPA 414.

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.

3.3.12 Steering. The vehicle will be equipped with power steering.

3.3.12.1 Steering effort. The steering system performance will be in accordance with NFPA 414.

3.3.12.2 Turning diameter. The fully loaded vehicle will have a wall to wall turning diameter of less than three times the overall length of the vehicle in both directions in accordance with NFPA 414.

3.3.13 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.

3.4 Cab. The vehicle will have a fully enclosed door cab of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. Cab door openings will extend for the full vertical height of the side panels. Steps and handrails will be provided for all crew doors, and 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. A tilt steering column will be provided.

3.4.1 Windshield and windows. The windshield and windows will be of tinted safety glass. Each door window will be capable of being opened far enough to facilitate emergency occupant escape in the event of a vehicle accident.

3.4.2 Cab interior sound level. The maximum cab interior sound level will be in accordance with NFPA 414.

3.4.3 Instruments and controls. All instruments and controls will be illuminated and designed to prevent or produce windshield glare. Gauges will be provided for oil pressure, coolant temperature, and automatic transmission temperature. In addition to the instruments and controls required by NFPA 414, the following will be provided within convenient reach of the seated driver:

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

3.4.4 Climate control system. The offeror/contractor's standard heater/defroster and air conditioning system will be provided. The climate control system will induct at least 60 cubic feet per minute of fresh air into the cab. Cab mounted components will be protected from inadvertent damage by personnel.

3.4.5 Seats. The driver seat will be adjustable fore and aft. The turret operator's seat, located to the right front of the driver's seat, will be a fixed (non-suspension) type. Both seats will be provided with a backrest and a 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. 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. Seat belts must be of sufficient length to accommodate crew members in full Personal Protective Equipment (PPE).

3.4.6 Forward Looking Infrared (FLIR). Where justified, a forward looking infrared (FLIR) camera and in-cab monitor may be provided. If provided, the FLIR system must be in accordance with NFPA 414. In addition, the FLIR monitor described in NFPA 414 will have a minimum dimension of 10 in (25 cm) (measured diagonally) and be located in a position where it is visible to both the seated driver and turret operator.

<u>JUSTIFICATION</u>
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3.4.7 Windshield wipers and washer. The vehicle will be equipped with electrically powered windshield wipers. The wiper arms and blades 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. 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.

3.4.8 Warning signs. Signs that state "Occupants must be seated and wearing a seat belt when apparatus is in motion" will be provided in locations that are visible from each seated position in accordance with NFPA 414."

3.4.9 Lateral accelerometer. The vehicle will be equipped with a lateral accelerometer in accordance with 4.11.8 of NFPA 414.

3.5 Body, compartments, and equipment mounting.

3.5.1 Body. The vehicle will have a corrosion-resistant body.

3.5.2 Compartments. The vehicle body will have lighted compartments in accordance with NFPA 414 with a minimum 20 cubic feet of enclosed storage space.

3.5.2.1 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 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.

3.5.2.2 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.

3.5.2.3 Drip rails. Drip rails will be provided over each compartment door.

3.5.2.4 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 pounds 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.

3.5.2.5 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.

3.5.3 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.

3.5.4 Ladder, handrails, and walkways. Ladders, stepping, standing, and walking surfaces will be in accordance with NFPA 414. 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.

3.5.5 Ancillary equipment. Ancillary equipment listed in NFPA 414 A.4.2.1 (1)-(17) is not covered by this Procurement Specification in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Ancillary equipment is funded separately by other sources.

NOTE: Equipment funding will be obtained as a separate contract under the provisions of AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing.

3.6 Agent system. The fire fighting agent system may consist of a series of selected agents (dry chemical, halogenated agents, compressed air foam, and AFFF) as indicated in this section. The delivery system used to dispense and apply agent will comply with Table A-1 in Appendix A. 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 Table A-2 in Appendix A. When specified, a Compressed Air Foam System (CAFS) will be provided with air injection for the foam discharges.

3.6.1 Agent (fire) pump. The vehicle will be equipped with a centrifugal pump capable of providing the performance specified herein as prescribed by NFPA 414. When specified, a premixed pressurized system may be used in lieu of the agent fire pump. The liquid container and propellant gas will comply with NFPA 414.

3.6.1.1 Agent system piping. All piping, couplings, and valves and associated components that come into contact with the agent will be in accordance with NFPA 414. A flushing system will be provided to purge all of the piping and associated components with clear water.

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

3.6.1.3 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.

3.6.1.4 Discharge connections. All fire pump supplied agents will be delivered to the bumper turret and pre-connected handlines and/or dual agent handline hose reel. A dual agent hose reel or two 1¾ -inch discharge connections (pre-connected handlines) with male National Hose threads will be provided.

3.6.1.5 Piping, couplings, and valves. All agent system piping will conform to NFPA 414 criteria.

3.6.1.6 Overheat protection. The agent system will be equipped with an overheat protection system in accordance with NFPA 414. Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

3.6.1.7 Pressure relief valves. The agent system will be equipped with pressure relief valves in accordance with NFPA 414.

3.6.1.8 Drains. The agent system will be equipped with a drainage system in accordance with NFPA 414.

3.6.1.9 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.

3.6.2 Water tank. The vehicle will have a baffled water tank with a manufacturer certified minimum capacity of at least 300 gallons. The tank will store water or premixed agent. A copy of the manufacturers' certification certificate will be provided for verification upon acceptance testing.

3.6.2.1 Water tank construction. The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP) construction. All materials used will be capable of storing water, foam concentrate, and water/foam solutions.

3.6.2.2 Water tank manhole cover and drain. A removable water tank manhole cover is not required in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. 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.

3.6.2.3 Water tank overflow system and venting. The water tank will incorporate a venting system to relieve pressure on the tank during fill and discharge operations at maximum flow rates. It will have an overflow system to relieve excess fluid in the event of tank overflow.

The vent and overflow system will prevent leakage of water when the tank is filled to capacity and the vehicle is operating on the maximum side slopes and grades specified herein. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.2.4 Water tank top fill opening. A top fill opening of not less than 8 inches internal diameter with a readily removable ¼-inch mesh strainer will be provided. The fill opening may be incorporated as part of the manhole cover, and will be sized to accommodate a 2½-inch fill hose.

3.6.2.5 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° turn-down fitting. The water fill will allow external re-supply of the water tank during discharge pumping operations. Each tank fill connection will be in accordance with NFPA 414.

3.6.3 Foam system. (**NOTE:** *The requirements of section 3.6.3 do not apply to pre-mixed pressurized foam systems.*)

3.6.3.1 Foam concentrate tank. 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.

3.6.3.1.1 Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP construction. All materials used will be capable of storing foam concentrate.

3.6.3.1.2 Foam tank drain. 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.

3.6.3.1.3 Foam tank top fill trough. The foam tank will incorporate a top fill trough mounted in the top of the tank 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 must have a minimum opening of 5-inches. The top fill trough neck will extend sufficiently close to the bottom of the tank to reduce foaming to a minimum during the fill operation. 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.

3.6.3.2 Foam tank fill connections. The foam tank will incorporate a 1-inch National Hose thread female hose connection on each side 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 check valves and readily removable, rigidly constructed ¼-inch mesh 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.

3.6.3.2.1 Foam tank vent and overflow system. The foam tank will incorporate a vent system to relieve pressure on the tank during fill and discharge operations at maximum flow rates and an overflow system to relieve excess liquid in the event of tank overflow. 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. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.3.3 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 (see 3.6.3.2). 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. The pump will be removable as an assembly without disturbing other components. A length of hose with appropriate connections will be provided for filling the foam tank from an external foam storage container.

3.6.3.4 Foam flushing system. The foam concentrate system will be designed in accordance with NFPA 414 so that the system can be readily flushed with clear water.

3.6.3.5 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. The foam concentrate piping will be in accordance with NFPA 414.

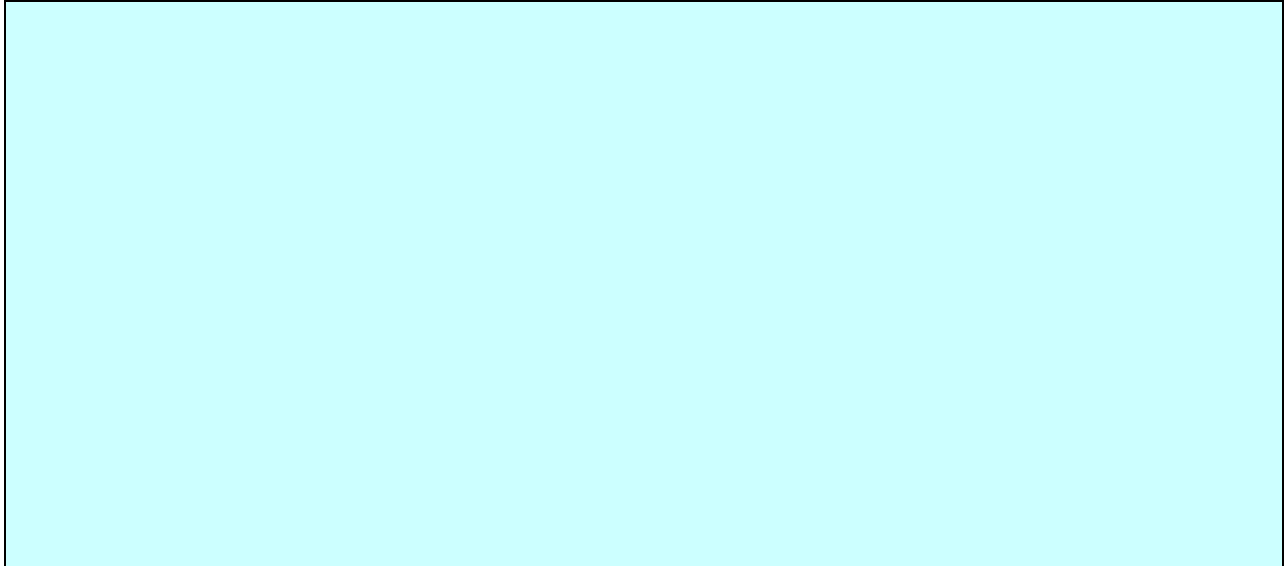
3.6.4 Foam proportioning system. The vehicle will be equipped with a proportioning system for Aqueous Film-Forming Foam (AFFF). The system will automatically and uniformly proportion water foam concentrate. The requirements of this paragraph do not apply to pre-mixed pressurized foam systems.

3.6.5 Vehicle turret. The vehicle will be equipped with a bumper turret in accordance with NFPA 414.

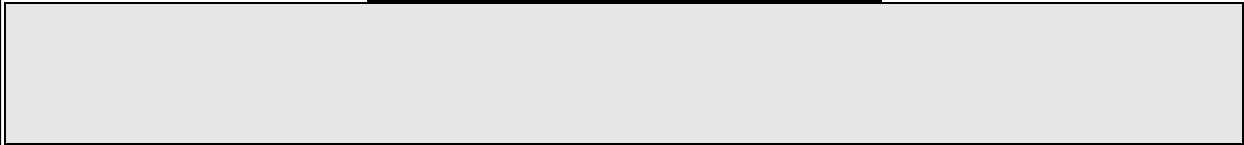
3.6.5.1 Bumper turret. The vehicle will be equipped with a joystick controlled, constant flow, non-air-aspirating, variable stream type *fixed mount bumper turret*. The bumper turret and nozzle will be remote controlled from the cab console inside the cab. The bumper turret will be capable of discharging at a minimum flow rate of 60-gpm at 100 psi of foam or water (with a minimum discharge distance of 65 ft), and a simultaneous dry chemical flow of up to seven (7) pounds per second from a separate dry chemical system. The dry chemical system will be electronically activated from a switch located in the cab. The turret nozzle will have a pattern infinitely variable from straight stream to fully dispersed. The bumper turret will be capable of

automatic oscillation, with the range of oscillation adjustable up to 90° each side of center (left and right) with vertical travel capabilities of +45°/-20° meeting section 4.20.2 in NFPA 414.

3.6.6 Preconnected handlines. Two 150 foot, 1¾-inch pre-connected woven jacket handlines, with a 1½-inch control valve and nozzle, will be located in a cross-lay accessible from each side of the vehicle. A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. The handlines and nozzles will be in accordance with NFPA414, and will provide 95 gpm at 100 psi nozzle pressure. A control for charging each handline will be provided for operation.



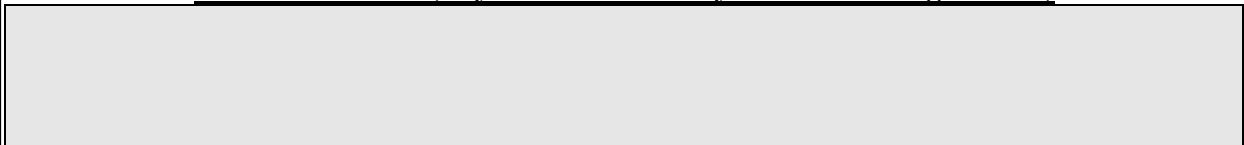
JUSTIFICATION (Dry Chemical Agent)



ADO/FAA Approval: → _____

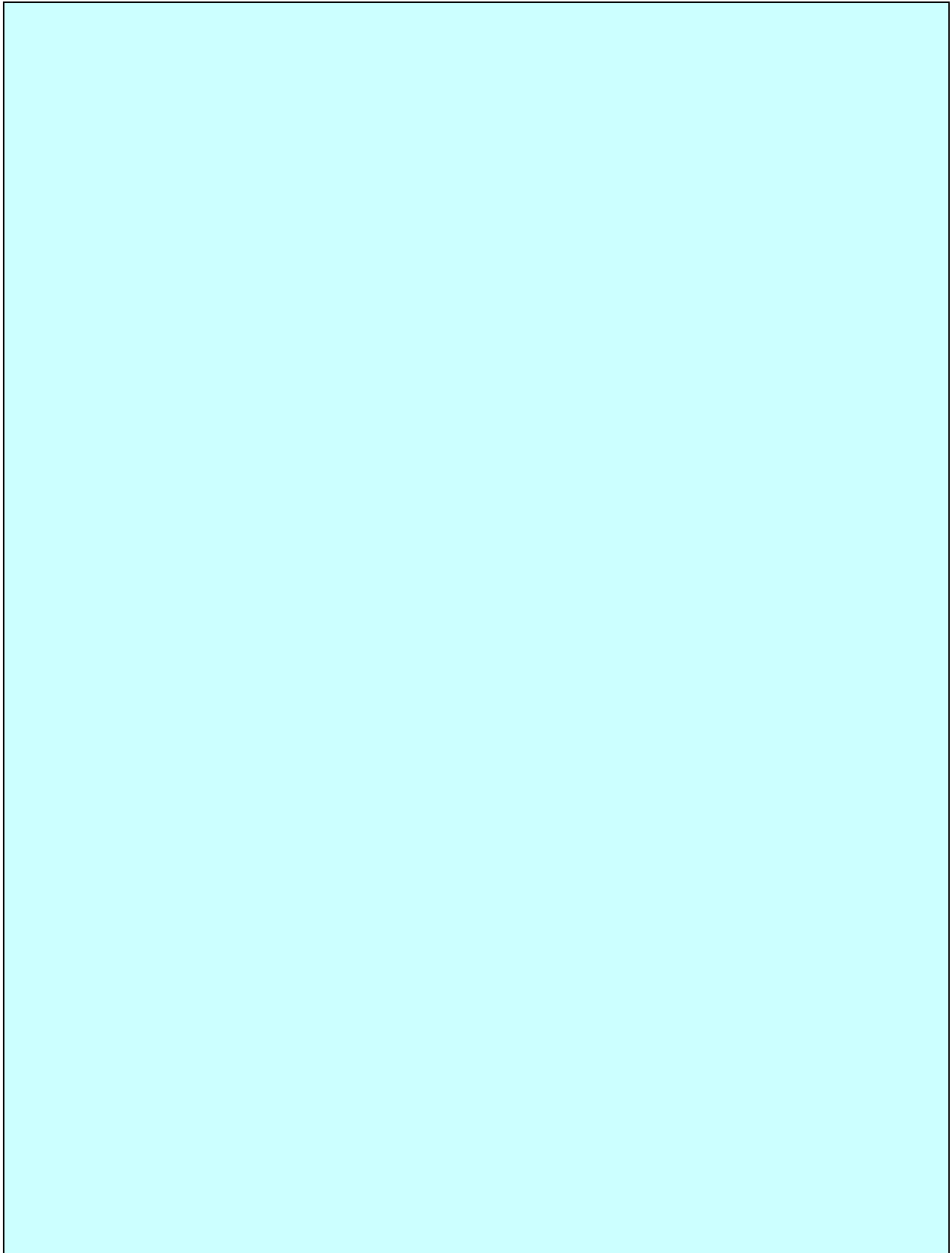


JUSTIFICATION (Dry Chemical Primary Turret Discharge Nozzle)



ADO/FAA Approval: → _____





JUSTIFICATION
ADO/FAA Approval: → _____

3.9 Electrical systems and warning devices. The vehicle will have a 12-volt electrical and starting system.

3.9.1 Alternator. A single or dual alternator charging system in accordance with NFPA 414 will be provided. The minimum continuous electrical load will include operation of the air conditioning system.

3.9.2 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.

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

3.9.3 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 (see 3.11.1). 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.

3.9.4 Electromagnetic interference. The vehicle electrical system will be in accordance with SAE J551-2 for electromagnetic interference.

3.9.5 Work lighting.

3.9.5.1 Cab interior lights. Cab interior light levels will be sufficient for reading maps or manuals.

3.9.5.2 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 illuminate automatically 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.

3.9.5.3 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. The switch located in the cab will be a master switch and must be turned on before auxiliary switches near the light sources are operational.

3.9.5.4 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. NOTE: Halogen, LED, or HID lights may be used, based on the following conversions (1W Halogen = 4W LED = 5W HID).

3.9.5.5 Telescoping Flood Lights. Two floodlights will be provided. One light will be mounted on the left and right sides of the vehicle on extension tubes. Both lights will be controlled from switches in the cab and manually raised. The lights will either be a 500W halogen, 125W LED, or 100W HID type.

3.9.5.6 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. NOTE: Halogen, LED, or HID lights may be used, based on the following conversions (1W Halogen = 4W LED = 5W HID).

3.9.6 Audible warning devices.

3.9.6.1 Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control and selection of "Radio," "PA," "Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and a magnetic noise canceling microphone. 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. 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.

3.9.6.2 Horn. Dual forward facing horns will be installed in protected locations near the front of the vehicle. Horn activating foot switches will be located in front of the driver and the turret operator.

3.9.7 Emergency warning lights. All emergency warning lights will use Light Emitting Diode (LED), strobe, or rotating beacon elements and will meet the requirements of AC 150/5210-5. Lighting units will be installed on the top front, sides, and rear of the vehicle to provide 360° visibility. A switch will be provided on the instrument panel to control all of the top, side, front and rear emergency warning lights. A switch will also be provided on the instrument panel to disable all lower emergency warning lights when desired. All lighting systems will meet NFPA 414 emergency lighting criteria.

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

3.9.7.2 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.

3.9.8 Radio circuit. The vehicle will have two separate 30 amp circuits, with 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. ***The provisioning of radios is an airport responsibility and not part of this specification.***

3.9.9 Power receptacles.

3.9.9.1 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.

3.10 Line voltage electrical system.

3.10.1 Electrical shoreline connection. The battery charger/conditioner will be powered from a covered, polarized, insulated, labeled, recessed (flush mounted), male, 110 volt AC auto-eject receptacle. The connection will be located on the exterior of the vehicle at the rear or on either side of the vehicle. A weatherproof charge meter will be installed next to the receptacle. A 50 foot long, three wire, 15 amp rated, 110 volt, AC power cable, with straight blade (non twist-lock) connectors, will be provided.

3.11 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 3/6 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.

3.12 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.

3.13 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 polypropylene tanks will be covered by a lifetime warranty.

4. REGULATORY REQUIREMENTS.

4.1 Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with Title 48: Federal Acquisition Regulations System, Part 2823—Environment, Conservation, Occupational Safety, and Drug-free Workplace, Subpart 2823.4 Use of Recovered Material, 403 Policy and 404 Procedures.

4.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired:

- a. competitively within a reasonable timeframe;
- b. meet appropriate performance standards, or
- c. at a reasonable price.

The prime contractor is responsible for ensuring that all subcontractors comply with this requirement. Information on the GPP can be found at:

http://www.dot.gov/ost/m60/DOT_policy_letters/apl8_04.pdf or FAR 23.404(b):
http://www.acquisition.gov/far/current/html/Subpart%2023_4.html.

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Performance inspection (see 5.2).
- b. Conformance inspection (see 5.3).

5.2 Performance inspection. The vehicle will be subjected to the examinations and tests described in this PS. The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.

5.3 Conformance inspection. The vehicle will be subjected to the examinations and tests described in this PS. The contractor will provide or arrange for all test equipment, personnel, and facilities.

5.4 Product conformance. The products provided will meet the performance characteristics of this PS, 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.

5.5 Technical proposal. The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this PS; a paragraph by paragraph response to the characteristics section of this PS 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 PS.

5.6 Inspection requirements.

5.6.1 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.

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

a. Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.

b. Any spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any condition, except as allowed herein.

c. Structural failure of any component, including permanent deformation, or evidence of impending failure.

d. Evidence of excessive wear.

e. Interference between the vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.

f. Misalignment of components.

g. Evidence of undesirable roadability characteristics, including instability in handling during cornering, braking, and while traversing all required terrain.

h. Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.

i. Overheating of the engine, transmission, or any other vehicle component.

j. Evidence of corrosion.

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

5.6.3 Detailed inspection requirements.

5.6.3.1 Examination of product. All Component Manufacturers Certifications, as well as Prototype Vehicle Testing and Operational Testing, 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. Proper operation of vehicle functions will be verified as defined by NFPA 414, Acceptance Criteria chapter. A copy of the vehicle manufacturer's certifications will be provided with each vehicle in accordance with NFPA 414. The airport performing the test may accept manufacturer and or third party certification that prior testing was performed and the vehicle meets the performance parameters of NFPA 414.

5.6.3.1.1 Roadability test. The fully loaded vehicle will be driven over ten miles of paved and ten miles of cross country terrain consisting of open fields, broken ground, and uneven terrain. After completing the driving portion of the roadability test, all loads will be removed and all structure and surfaces will be visibly inspected for failure or permanent deformation.

5.6.3.1.2 Gradeability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.2.

5.6.3.1.3 Tilt table test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.3. If an adjustable height suspension system is provided, the suspension system may be set to the height normally used on hard pavement.

5.6.3.1.4 Cornering stability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.4.

5.6.3.1.5 Weight and weight distribution measurement. Each vehicle will be weighed (full and empty) to demonstrate compliance with NFPA 414.

5.6.3.1.6 Dimension measurement. The vehicle will be measured in accordance with NFPA 414. In addition to the dimensions listed in NFPA 414, the overall length, width, and height will be measured to demonstrate compliance with 3.2.1.

5.6.3.1.7 Angles of approach and departure measurement. The angles of approach and departure of the fully loaded vehicle will be measured to demonstrate compliance with 3.2.2.

5.6.3.1.8 Acceleration test. Each vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.1.2. A time-distance recorder, engine electronic measurement or Global Positioning System (GPS) based electronic data collection system will be used to record data for this test.

5.6.3.1.9 Maximum speed test. Each vehicle will be tested in accordance with 5.4.4 of NFPA 414 to demonstrate compliance with 3.3.1.3. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.10 Pump and roll on a 40-percent grade test. The fully loaded vehicle will be tested in accordance with NFPA 414.

5.6.3.1.11 Service brake system test. Each vehicle will be tested in accordance with NFPA 414. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.12 Air system and air compressor test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.1.13 Turning diameter test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.12.2.

5.6.3.1.14 Evasive maneuver test. The fully loaded vehicle will be tested in accordance with NFPA 414 at 35 miles per hour (mph) (56 kilometers per hour (kph) to demonstrate compliance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.2 Cab interior sound level test. The cab interior sound levels of the vehicle will be measured in accordance with NFPA 414 to demonstrate compliance with 3.4.2.

5.6.3.3 Agent system tests.

5.6.3.3.1 Agent discharge pumping test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.2 Pump and maneuver test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.3 Hydrostatic pressure test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.4 Priming device test. Each vehicle that is equipped with a priming pump will be tested.

5.6.3.3.5 Agent tank capacity test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with the capacity requirements of 3.6.2 and 3.6.3.1.

5.6.3.3.6 Water tank fill and overflow test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.6.2.3.

5.6.3.3.7 Foam concentration test. Each vehicle will be tested in accordance with NFPA 414 at the 6-percent concentration setting to demonstrate compliance with the foam concentration quality requirements of 3.6.4.

5.6.3.3.8 Primary turret flow rate test. The vehicle will be tested in accordance with NFPA 414. Each vehicle will be tested to demonstrate compliance with NFPA 414.

5.6.3.4 Electrical system tests.

5.6.3.4.1 Electrical charging system test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with Annex B.4 of NFPA 414.

5.6.3.4.2 Electromagnetic interference test. The vehicle will be tested in accordance with NFPA 414 and SAE J551 to demonstrate compliance with 3.8.4.

6. PACKAGING.

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

6.2 The vehicle must be delivered 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.

6.3 The manufacturer may pre-ship chemical agents to a receiving airport to place a vehicle into operational status upon delivery. The manufacturer has the responsibility for provisioning these agents and propellants.

6.4 The vehicle manufacturer must provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.

7. TRAINING.

7.1 Upon delivery of the vehicle to the airport, the manufacturer must, at no additional cost, provide the services of a qualified technician for 5 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 must be provided by the manufacturer to allow various shifts to complete the training requirements.

7.2 The technician must provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup must 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 should 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.

7.3 Training must 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 must include materials that can be used to train subsequent new operators.

8. REFERENCED DOCUMENTS.

8.1 Source of documents.

8.1.1 The CFR may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

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.

8.1.2 SAE documents may be obtained from SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096.

8.1.3 National Fire Protection Association (NFPA): NFPA documents may be obtained from NFPA, Batterymarch Park, Quincy MA 02269-9101.

NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2009 Edition)

NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition)

NFPA 1901, Standard for Automotive Fire Apparatus (2009 Edition)

8.1.4 Federal Aviation Administration (FAA): FAA ACs may be obtained from the FAA website: http://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: Federal Aviation Administration, ATO-W CM-NAS Documentation, Control Center, 800 Independence Avenue, SW, Washington, DC 20591. Telephone: (202) 548-5256, FAX: (202) 548-5501 and website: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_facilities/cm/cm_documentation/



Print Class 2 Specification

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3.3. VEHICLE PROCUREMENT SPECIFICATION, CLASS 3

PROCUREMENT SPECIFICATION Class 3 AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLE

1. SCOPE. This Procurement Specification (PS) covers a commercially produced 4 by 4 drive diesel engine driven ARFF vehicle for an [REDACTED] airport. It includes the choice of a 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.

2. CLASSIFICATION. The ARFF vehicle(s) covered by this PS 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, as follows:

Airport Index	Vehicle Class	Minimum Rated Capacities Options
	3	500 lbs Sodium-Based Dry Chemical only
	3	450 lbs Potassium-Based Dry Chemical with 500 gal of water/AFFF
	3	460 lbs Halogenated Agent with 500 gal of water/AFFF
	3	500 lbs Sodium-Based Dry Chemical with 500 gal of water/AFFF with supplemental CAFS
	3	450 lbs Potassium-Based Dry Chemical with 500 gal of water/AFFF with supplemental CAFS
	3	460 lbs Halogenated Agent with 500 gal of water/AFFF with supplemental CAFS

3. VEHICLE CONFORMANCE/PERFORMANCE CHARACTERISTICS. The ARFF vehicle will be in accordance with the applicable requirements of National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.1 General Administration Requirements.

3.1.1 Manuals. Technical manuals will consist of operator, service, and parts manuals. All manuals are required to be provided in digital format on CDs.

3.1.1.1 Technical manuals. The overall format for the manuals will be commercial. Each technical manual will have a title page. Line art will be used to the maximum extent possible for illustrations and parts lists. One complete set of engine and transmission parts, service and operator's manuals will be packed with each vehicle.

- a. The contractor may submit digitized technical manuals in lieu of printed paper copies.
- b. The contractor will pack two complete sets of both hard copy and CDs (if applicable) with each vehicle and ship with the vehicle to the final destination.

3.1.1.1.1 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:

- a. The location and function of all controls and instruments will be illustrated and functionally described.
- b. All safety information that is consistent with the safety standards established by the Occupational Safety and Health Administration (OSHA) and NFPA.
- c. All operational and inspection checks and adjustments in preparation for placing the vehicle into service upon receipt from the manufacturer.
- d. Tie down procedures for transport on a low-boy trailer.
- e. 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.
- f. General description and necessary step-by-step instructions for the operation of the vehicle and its fire extinguishing system(s) and auxiliary equipment.
- g. A description of the post-operational procedures (draining, flushing, re-servicing, et cetera).
- h. Daily maintenance inspection checklists that the operator is expected to perform, including basic troubleshooting procedures.
- i. Disabled vehicle towing procedures.
- j. Procedures and equipment required for changing a tire.

- k. Schedules (hours, miles, time periods) for required preventative maintenance and required periodic maintenance.
- l. 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).

3.1.1.1.2 Service manual. The service manual will identify all special tools and test equipment required to perform servicing, inspection, and testing. The manual will cover troubleshooting and maintenance as well as minor and major repair procedures. The text will contain performance specifications, tolerances, and fluid capacities; current, voltage, and resistance data; test procedures; and illustrations and exploded views as may be required to permit proper maintenance by qualified vehicle mechanics. The manual will contain an alphabetical subject index as well as a table of contents. The service manual will contain at least the following, where applicable:

- a. Fire fighting system schematic(s).
- b. Hydraulic schematic.
- c. Pneumatic schematic.
- d. Electrical schematic.
- e. Winterization schematic.
- f. Fuel schematic.
- g. Schedules for required preventative maintenance and required periodic maintenance.
- h. Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

3.1.1.1.3 Parts identification 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, thread dimensions, torque specifications, and special characteristics will be provided for all nonstandard 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.

3.1.2 Painting, plating, and corrosion control.

3.1.2.1 Finish. Exterior surfaces will be prepared, primed, and painted in accordance with all of the paint manufacturer's instructions and recommendations. 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.

3.1.2.2 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, Dissimilar Metals, will not be in contact with each other. Metal plating or metal spraying of dissimilar base metals to provide electromotively compatible abutting surfaces is acceptable. The use of dissimilar metals separated by suitable insulating material is permitted, except in systems where bridging of insulation materials by an electrically conductive fluid can occur.

3.1.2.3 Protection against deterioration. Materials that deteriorate when exposed to sunlight, weather, or operational conditions normally encountered during service will not be used or will have a means of protection against such deterioration that does not prevent compliance with performance requirements. Protective coatings that chip, crack, or scale with age or extremes of climatic conditions or when exposed to heat will not be used.

3.1.2.4 Reflective stripes. An eight (8) inch horizontal reflective stripe will be applied around the vehicle in accordance with AC 150/5210-5. Offsets in the reflective stripes will be made to maximize the length of reflective surface. Bright metal trim or anodized parts may interrupt the reflective stripes. The pattern will be eight (8) inch wide reflective striping.

3.1.2.5 Lettering. Vehicles will have the letters "insert Airport Name" and, if available, the Airport Insignia, applied 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).

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

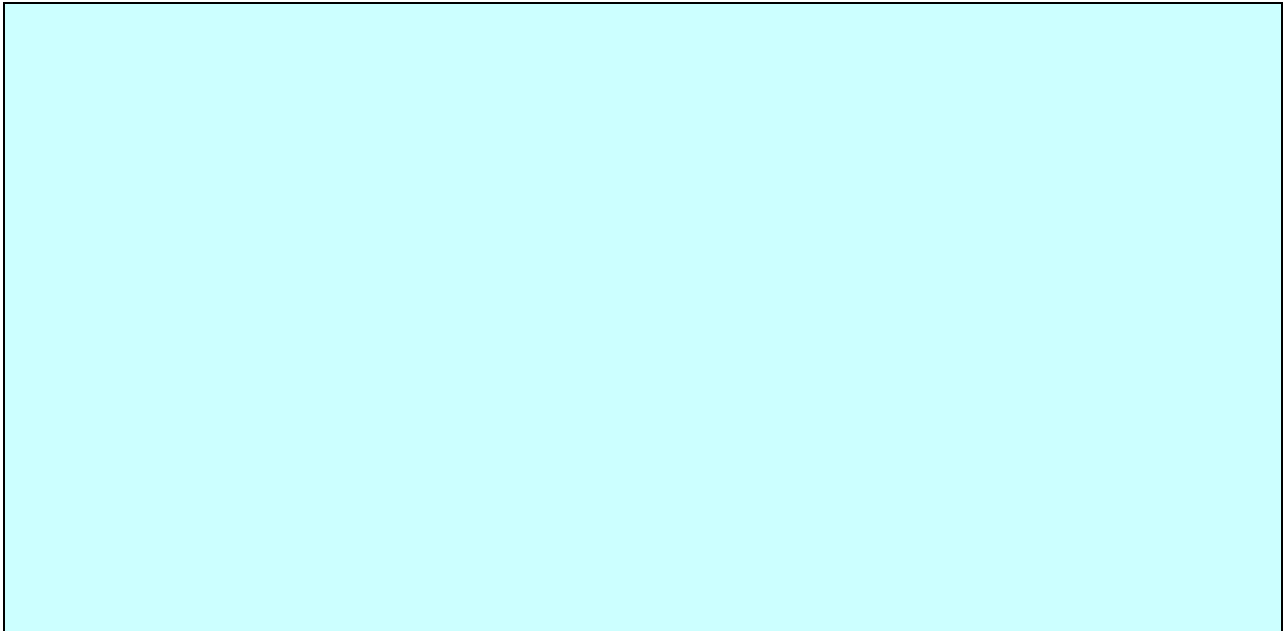
- a. NOMENCLATURE
- b. MANUFACTURER'S MAKE AND MODEL
- c. MANUFACTURER'S SERIAL NUMBER
- d. STOCK NUMBER (SN)
- e. VEHICLE CURB WEIGHT: kg (pounds)

- f. PAYLOAD, MAXIMUM: kg (pounds)
- g. GROSS VEHICLE WEIGHT (GVW): kg (pounds)
- h. FUEL CAPACITY AND TYPE: gals (gallons)
- i. DATE OF DELIVERY (month and year)
- j. WARRANTY (months and km (miles))
- k. CONTRACT NUMBER
- l. PAINT COLOR AND NUMBER

A second permanently marked information data plate will be securely mounted on the interior of the driver's compartment. The plate will contain the information required by NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), Section 1.3.5 Vehicle Information Data Plate. A single plate that combines or contains the information required for both plates is acceptable.

3.1.4 Environmental conditions.

3.1.4.1 Vehicle operation and storage temperature conditions will vary with geographical location. Thus, the locality temperature range can go from -40° to 110°F. Refer to NFPA 414 for vehicle winterization criteria.



3.1.5 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 panels, if provided, will be attached with captive fasteners.

3.1.6 Vehicle Mobility.

3.1.6.1 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.

3.1.6.2 Gradeability. The fully loaded vehicle will be able to ascend any paved slope up to and including 40-percent.

3.1.6.3 Side slope stability. The fully loaded vehicle will be stable on a 30° side slope when tested in accordance with NFPA 414.

3.1.6.4 Cornering stability. The fully loaded vehicle will be stable in accordance with NFPA 414 when tested in accordance with NFPA 414.

3.2 Weights and dimensions.

3.2.1 Overall dimensions. The maximum dimensions listed below are desirable to ensure vehicles can be accommodated in existing fire stations. Likewise, the overall dimensions should be held 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 in accordance with NFPA 414.

Maximum Dimensions	Class 3
Length (inches/cm)	360/914
Width (inches/cm) (excluding mirrors)	100/254
Height (inches/cm)	120/305

NOTE: For Airport Operator Validation: Consult AC 150/5210-15, Aircraft Rescue and Fire Fighting Station Building Design, Appendix A, to ensure vehicles measurements do not exceed existing airport fire station dimensions.

<u>VEHICLE MEASUREMENT VALIDATION</u>
ADO/FAA Approval: ➔ _____

3.2.2 Angles of approach and departure. The fully loaded vehicle will have angles of approach and departure of not less than 19°.

3.2.3 Field of vision. The vehicle will have a field of vision in accordance with NFPA 414.

3.2.3.1 Mirrors. Combination flat and convex outside rearview mirrors will be installed on each side of the cab. The flat mirrors will be of the motorized remote control type, providing not less than 60° horizontal rotational viewing range. Mirror remote and heating controls will be located on the instrument panel within reach of the seated driver. 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, but not within the driver's direct line of sight, having a minimum area of 35 square inches. Where justified, flat mirrors will have electrically heated heads.

JUSTIFICATION
ADO/FAA Approval: ⇒ _____

3.3 Chassis and vehicle components.

3.3.1 Engine. The vehicle will have a turbocharged diesel engine that is certified to comply with the Environmental Protection Agency (EPA) and state laws for off-highway emission requirements at the time of manufacture. The engine and transmission must operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants according to the recommendations of the engine and transmission manufacturers.

3.3.1.1 Acceleration. The fully loaded vehicle will accelerate from 0 to 50 miles per hour (mph) on a level paved road within: 30 seconds.

3.3.1.2 Maximum speed. The fully loaded vehicle will attain a minimum top speed of 70 mph on a level, paved road.

3.3.1.3 Pump and roll on a 40-percent grade. The fully loaded vehicle will be capable of pump and roll operations on a paved, dry, 40-percent grade in accordance with NFPA 414.

3.3.1.4 Altitude. Where justified, the vehicle, including the pumping system, will be designed for operation at 2,000 feet above sea level.

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3.3.2 Engine cooling system. The engine cooling system will be in accordance with NFPA 414. A label will be installed near the engine coolant reservoir reading “Engine Coolant Fill.”

3.3.3 Fuel system. The fuel system will be in accordance with NFPA 414.

3.3.3.1 Fuel tank. The vehicle will have one or two fuel tanks with a minimum usable capacity in accordance with NFPA 414, as amended by AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Each tank will have a fill opening readily accessible to personnel standing on the ground and designed to prevent fuel splash while refueling. Each tank will be located and mounted so as to provide maximum protection from damage, exhaust heat, and ground fires. If more than one tank is furnished, means will be provided to assure 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. Each fuel tank must be prominently labeled “Diesel Fuel Only”.

3.3.4 Exhaust system. The exhaust system will be in accordance with NFPA 414. The exhaust system will be constructed of high grade rust resistant materials and protected from damage resulting from travel over rough terrain. 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 and the engine air intake, and will not be directed toward the ground.

3.3.5 Transmission. A fully automatic transmission will be provided. The transmission will be in accordance with NFPA 414.

3.3.6 Driveline. The vehicle driveline will be in accordance with NFPA 414. 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. The operator’s manual will also include a similar warning/caution. All moving parts requiring routine lubrication must have a means of providing for such lubrication. There must be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

3.3.7 Axle capacity. Each axle will have a rated capacity, as established by the axle manufacturer, in accordance with NFPA 414.

3.3.8 Suspension. The suspension system will be in accordance with NFPA 414 and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.3.9 Tires and wheels. Tires and wheels will be in accordance with NFPA 414. The vehicle will be equipped with single tires (front) and dual tires (rear) and wheels. The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Tire and wheel assemblies will be identical at all positions. Tires and wheels will be certified by the manufacturer for not less than 25 miles of continuous operation at 60 mph at the normal operational inflation pressure. 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. Tires will be new. Retreads, recaps, or re-grooved tires will not be permitted.

3.3.10 Towing connections. The vehicle will be equipped with towing connections in accordance with NFPA 414. The vehicle will be designed for flat towing; the capability to lift and tow the vehicle is not required. The tow connections may intrude into the 30 degree approach angle. The vehicle will be provided with a pintle hook. The maximum towing capacity of the vehicle will be labeled on the vehicle dash board and at the pintle hook location.

3.3.11 Brake system. The vehicle will be equipped with a braking system in accordance with NFPA 414 and Federal Motor Vehicle Safety Standard (FMVSS) standards. Vehicles with a Gross Vehicle Weight Ratio (GVWR) above 26,000 lbs will be equipped with air brakes that meet the requirements of NFPA 414.

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.

3.3.12 Steering. The vehicle will be equipped with power steering.

3.3.12.1 Steering effort. The steering system performance will be in accordance with NFPA 414.

3.3.12.2 Turning diameter. The fully loaded vehicle will have a wall to wall turning diameter of less than three times the overall length of the vehicle in both directions in accordance with NFPA 414.

3.3.13 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.

3.4 Cab. The vehicle will have a fully enclosed door cab of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. Cab door openings will extend for the full vertical height of the side panels. Steps and handrails will be provided for all crew doors, and 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. A tilt steering column will be provided.

3.4.1 Windshield and windows. The windshield and windows will be of tinted safety glass. Each door window will be capable of being opened far enough to facilitate emergency occupant escape in the event of a vehicle accident.

3.4.2 Cab interior sound level. The maximum cab interior sound level will be in accordance with NFPA 414.

3.4.3 Instruments and controls. All instruments and controls will be illuminated and designed to prevent or produce windshield glare. Gauges will be provided for oil pressure, coolant

temperature, and automatic transmission temperature. In addition to the instruments and controls required by NFPA 414, the following will be provided within convenient reach of the seated driver:

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

3.4.4 Climate control system. The offeror/contractor's standard heater/defroster and air conditioning system will be provided. The climate control system will induct at least 60 cubic feet per minute of fresh air into the cab. Cab mounted components will be protected from inadvertent damage by personnel.

3.4.5 Seats. The driver seat will be adjustable fore and aft. The turret operator's seat, located to the right front of the driver's seat, will be a fixed (non-suspension) type. Both seats will be provided with a backrest and a 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. Each seat will be provided with a Type 2 seat belt assembly (i.e., 3-point retractable restraint) in accordance with Code of Federal Regulations (CFR) 49 CFR 571.209. Seat belts must be of sufficient length to accommodate crew members in full Personal Protective Equipment (PPE).

3.4.6 Forward Looking Infrared (FLIR). Where justified, a forward looking infrared (FLIR) camera and in-cab monitor may be provided. If provided, the FLIR system must be in accordance with NFPA 414. In addition, the FLIR monitor described in NFPA 414 will have a minimum dimension of 10 in (25 cm) (measured diagonally) and be located in a position where it is visible to both the seated driver and turret operator.

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3.4.7 Windshield wipers and washer. The vehicle will be equipped with electrically powered windshield wipers. The wiper arms and blades will be of sufficient length to clear the windshield area described by 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. 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.

3.4.8 Warning signs. Signs that state "Occupants must be seated and wearing a seat belt when apparatus is in motion" will be provided in locations that are visible from each seated position in accordance with NFPA 414."

3.4.9 Lateral accelerometer. The vehicle will be equipped with a lateral accelerometer in accordance with 4.11.8 of NFPA 414.

3.5 Body, compartments, and equipment mounting.

3.5.1 Body. The vehicle will have a corrosion-resistant body.

3.5.2 Compartments. The vehicle body will have lighted compartments in accordance with NFPA 414 with a minimum 20 cubic feet of enclosed storage space.

3.5.2.1 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 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.

3.5.2.2 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.

3.5.2.3 Drip rails. Drip rails will be provided over each compartment door.

3.5.2.4 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 pounds 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.

3.5.2.5 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.

3.5.3 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.

3.5.4 Ladder, handrails, and walkways. Ladders, stepping, standing, and walking surfaces will be in accordance with NFPA 414. 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.

3.5.5 Ancillary equipment. Ancillary equipment listed in NFPA 414 A.4.2.1 (1)-(17) is not covered by this Procurement Specification in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Ancillary equipment is funded separately by other sources.

NOTE: Equipment funding will be obtained as a separate contract under the provisions of AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing.

3.6 Agent system. The fire fighting agent system may consist of a series of selected agents (dry chemical, halogenated agents, compressed air foam, and AFFF) as indicated in this section. The delivery system used to dispense and apply agent will comply with Table A-1 in Appendix A. 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 Table A-2 in Appendix A. When specified, a Compressed Air Foam System (CAFS) will be provided with air injection for the foam discharges.

3.6.1 Agent (fire) pump. The vehicle will be equipped with a centrifugal pump capable of providing the performance specified herein as prescribed by NFPA 414. When specified, a premixed pressurized system may be used in lieu of the agent fire pump. The liquid container and propellant gas will comply with NFPA 414.

3.6.1.1 Agent system piping. All piping, couplings, and valves and associated components that come into contact with the agent will be in accordance with NFPA 414. A flushing system will be provided to purge all of the piping and associated components with clear water.

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

3.6.1.3 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.

3.6.1.4 Discharge connections. All fire pump supplied agents will be delivered to the bumper turret and pre-connected handlines and/or dual agent handline hose reel. A dual agent hose reel or two 1¾ -inch discharge connections (pre-connected handlines) with male National Hose threads will be provided.

3.6.1.5 Piping, couplings, and valves. All agent system piping will conform to NFPA 414 criteria.

3.6.1.6 Overheat protection. The agent system will be equipped with an overheat protection system in accordance with NFPA 414. Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

3.6.1.7 Pressure relief valves. The agent system will be equipped with pressure relief valves in accordance with NFPA 414.

3.6.1.8 Drains. The agent system will be equipped with a drainage system in accordance with NFPA 414.

3.6.1.9 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.

3.6.2 Water tank. The vehicle will have a baffled water tank with a manufacturer certified minimum capacity of at least 500 gallons. The tank will store water or premixed agent. A copy of the manufacturers' certification certificate will be provided for verification upon acceptance testing.

3.6.2.1 Water tank construction. The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP) construction. All materials used will be capable of storing water, foam concentrate, and water/foam solutions.

3.6.2.2 Water tank manhole cover and drain. A removable water tank manhole cover is not required in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. 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.

3.6.2.3 Water tank overflow system and venting. The water tank will incorporate a venting system to relieve pressure on the tank during fill and discharge operations at maximum flow rates. It will have an overflow system to relieve excess fluid in the event of tank overflow. The vent and overflow system will prevent leakage of water when the tank is filled to capacity and the vehicle is operating on the maximum side slopes and grades specified herein. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.2.4 Water tank top fill opening. A top fill opening of not less than 8 inches internal diameter with a readily removable ¼-inch mesh strainer will be provided. The fill opening may be incorporated as part of the manhole cover, and will be sized to accommodate a 2½-inch fill hose.

3.6.2.5 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° turn-down fitting. The water fill will allow external re-supply of the water tank during discharge pumping operations. Each tank fill connection will be in accordance with NFPA 414.

3.6.3 Foam system. (**NOTE:** *The requirements of section 3.6.3 do not apply to pre-mixed pressurized foam systems.*)

3.6.3.1 Foam concentrate tank. 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.

3.6.3.1.1 Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP construction. All materials used will be capable of storing foam concentrate.

3.6.3.1.2 Foam tank drain. 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.

3.6.3.1.3 Foam tank top fill trough. The foam tank will incorporate a top fill trough mounted in the top of the tank 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 must have a minimum opening of 5-inches. The top fill trough neck will extend sufficiently close to the bottom of the tank to reduce foaming to a minimum during the fill operation. 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.

3.6.3.2 Foam tank fill connections. The foam tank will incorporate a 1-inch National Hose thread female hose connection on each side 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 check valves and readily removable, rigidly constructed ¼-inch mesh 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.

3.6.3.2.1 Foam tank vent and overflow system. The foam tank will incorporate a vent system to relieve pressure on the tank during fill and discharge operations at maximum flow rates and an overflow system to relieve excess liquid in the event of tank overflow. 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. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.3.3 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 (see 3.6.3.2). 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. The pump will be removable as an assembly without disturbing other components. A length of hose with appropriate connections will be provided for filling the foam tank from an external foam storage container.

3.6.3.4 Foam flushing system. The foam concentrate system will be designed in accordance with NFPA 414 so that the system can be readily flushed with clear water.

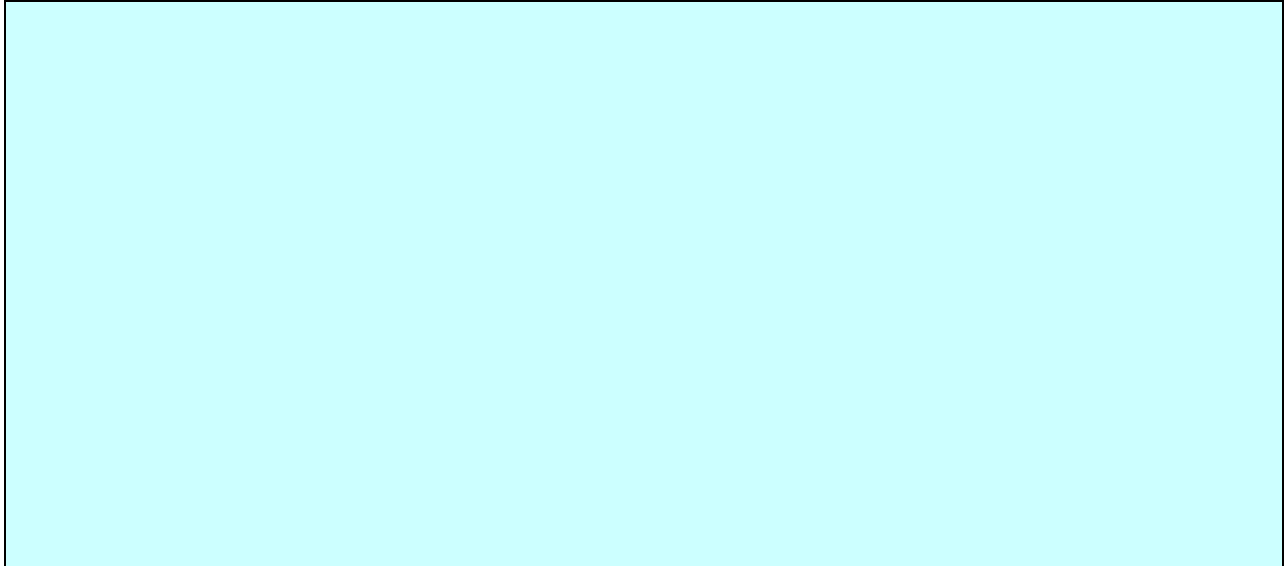
3.6.3.5 Foam concentrate piping. All metallic surfaces of the piping and associated components that come into contact with the foam concentrate will be of brass, bronze, or passivated stainless steel. The foam concentrate piping will be in accordance with NFPA 414.

3.6.4 Foam proportioning system. The vehicle will be equipped with a proportioning system for Aqueous Film-Forming Foam (AFFF). The system will automatically and uniformly proportion water foam concentrate. The requirements of this paragraph do not apply to pre-mixed pressurized foam systems.

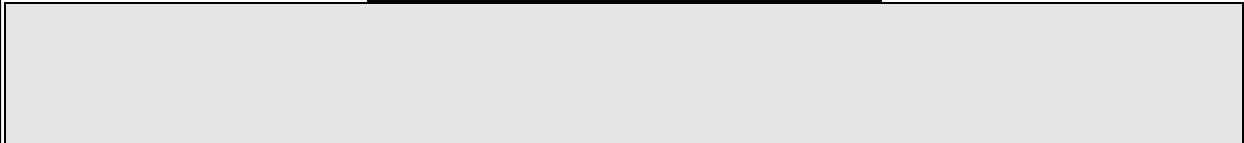
3.6.5 Vehicle turret. The vehicle will be equipped with a bumper turret in accordance with NFPA 414.

3.6.5.1 Bumper turret. The vehicle will be equipped with a joystick controlled, constant flow, non-air-aspirating, variable stream type *fixed mount bumper turret*. The bumper turret and nozzle will be remote controlled from the cab console inside the cab. The bumper turret will be capable of discharging at a minimum flow rate of 60-gpm at 100 psi of foam or water (with a minimum discharge distance of 65 ft), and a simultaneous dry chemical flow of up to seven (7) pounds per second from a separate dry chemical system. The dry chemical system will be electronically activated from a switch located in the cab. The turret nozzle will have a pattern infinitely variable from straight stream to fully dispersed. The bumper turret will be capable of automatic oscillation, with the range of oscillation adjustable up to 90° each side of center (left and right) with vertical travel capabilities of +45°/-20° meeting section 4.20.2 in NFPA 414.

3.6.6 Preconnected handlines. Two 150 foot, 1¾-inch pre-connected woven jacket handlines, with a 1½-inch control valve and nozzle, will be located in a cross-lay accessible from each side of the vehicle. A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. The handlines and nozzles will be in accordance with NFPA414, and will provide 95 gpm at 100 psi nozzle pressure. A control for charging each handline will be provided for operation.



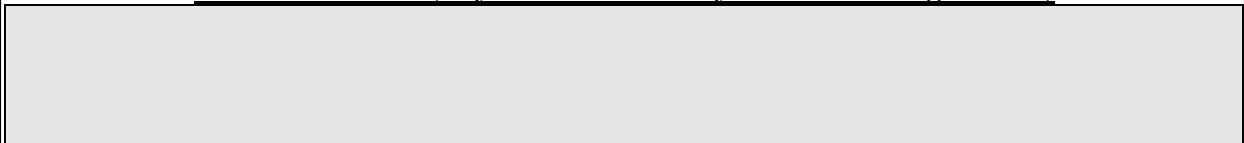
JUSTIFICATION (Dry Chemical Agent)



ADO/FAA Approval: ⇨ _____

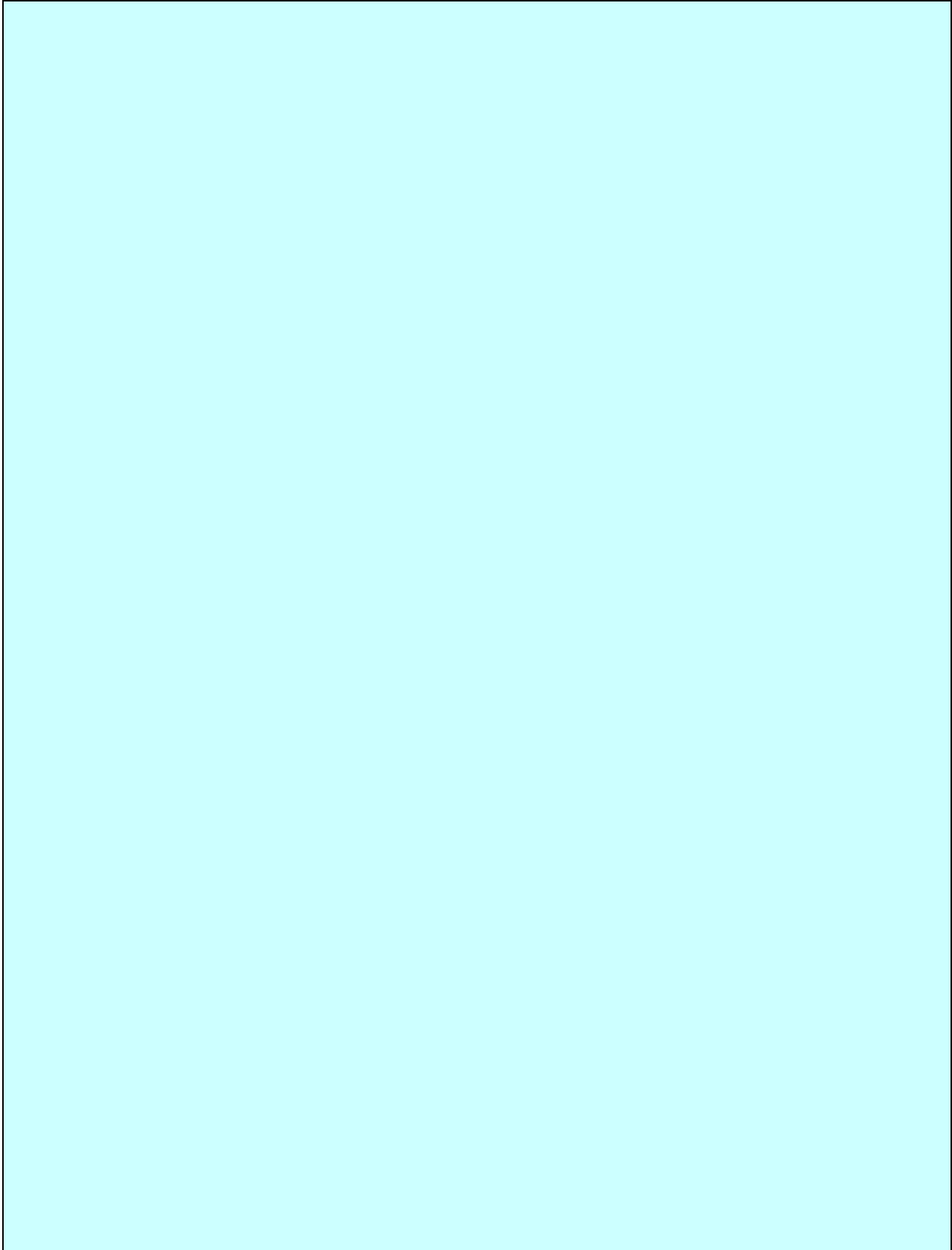


JUSTIFICATION (Dry Chemical Primary Turret Discharge Nozzle)



ADO/FAA Approval: ⇨ _____





JUSTIFICATION
ADO/FAA Approval: → _____

3.9 Electrical systems and warning devices. The vehicle will have a 12-volt electrical and starting system.

3.9.1 Alternator. A single or dual alternator charging system in accordance with NFPA 414 will be provided. The minimum continuous electrical load will include operation of the air conditioning system.

3.9.2 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.

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

3.9.3 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 (see 3.11.1). 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.

3.9.4 Electromagnetic interference. The vehicle electrical system will be in accordance with SAE J551-2 for electromagnetic interference.

3.9.5 Work lighting.

3.9.5.1 Cab interior lights. Cab interior light levels will be sufficient for reading maps or manuals.

3.9.5.2 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.

3.9.5.3 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. The switch located in the cab will be a master switch and must be turned on before auxiliary switches near the light sources are operational.

3.9.5.4 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. NOTE: Halogen, LED, or HID lights may be used, based on the following conversions (1W Halogen = 4W LED = 5W HID).

3.9.5.5 Telescoping Flood Lights. Two floodlights will be provided. One light will be mounted on the left and right sides of the vehicle on extension tubes. Both lights will be controlled from switches in the cab and manually raised. The lights will either be a 500W halogen, 125W LED, or 100W HID type.

3.9.5.6 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. NOTE: Halogen, LED, or HID lights may be used, based on the following conversions (1W Halogen = 4W LED = 5W HID).

3.9.6 Audible warning devices.

3.9.6.1 Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control and selection of "Radio," "PA," "Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and a magnetic noise canceling microphone. 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. 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.

3.9.6.2 Horn. Dual forward facing horns will be installed in protected locations near the front of the vehicle. Horn activating foot switches will be located in front of the driver and the turret operator.

3.9.7 Emergency warning lights. All emergency warning lights will use Light Emitting Diode (LED), strobe, or rotating beacon elements and will meet the requirements of AC 150/5210-5. Lighting units will be installed on the top front, sides, and rear of the vehicle to provide 360° visibility. A switch will be provided on the instrument panel to control all of the top, side, front and rear emergency warning lights. A switch will also be provided on the instrument panel to disable all lower emergency warning lights when desired. All lighting systems will meet NFPA 414 emergency lighting criteria.

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

3.9.7.2 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.

3.9.8 Radio circuit. The vehicle will have two separate 30 amp circuits, with 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. ***The provisioning of radios is an airport responsibility and not part of this specification.***

3.9.9 Power receptacles.

3.9.9.1 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.

3.10 Line voltage electrical system.

3.10.1 Electrical shoreline connection. The battery charger/conditioner will be powered from a covered, polarized, insulated, labeled, recessed (flush mounted), male, 110 volt AC auto-eject receptacle. The connection will be located on the exterior of the vehicle at the rear or on either side of the vehicle. A weatherproof charge meter will be installed next to the receptacle. A 50 foot long, three wire, 15 amp rated, 110 volt, AC power cable, with straight blade (non twist-lock) connectors, will be provided.

3.11 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 3/6 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.

3.12 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.

3.13 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 polypropylene tanks will be covered by a lifetime warranty.

4. REGULATORY REQUIREMENTS.

4.1 Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with Title 48: Federal Acquisition Regulations System, Part 2823—Environment, Conservation, Occupational Safety, and Drug-free Workplace, Subpart 2823.4 Use of Recovered Material, 403 Policy and 404 Procedures.

4.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired:

- a. competitively within a reasonable timeframe;
- b. meet appropriate performance standards, or
- c. at a reasonable price.

The prime contractor is responsible for ensuring that all subcontractors comply with this requirement. Information on the GPP can be found at:

http://www.dot.gov/ost/m60/DOT_policy_letters/apl8_04.pdf or FAR 23.404(b):
http://www.acquisition.gov/far/current/html/Subpart%2023_4.html.

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Performance inspection (see 5.2).
- b. Conformance inspection (see 5.3).

5.2 Performance inspection. The vehicle will be subjected to the examinations and tests described in this PS. The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.

5.3 Conformance inspection. The vehicle will be subjected to the examinations and tests described in this PS. The contractor will provide or arrange for all test equipment, personnel, and facilities.

5.4 Product conformance. The products provided will meet the performance characteristics of this PS, 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.

5.5 Technical proposal. The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this PS; a paragraph by paragraph response to the characteristics section of this PS 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 PS.

5.6 Inspection requirements.

5.6.1 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.

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

a. Failure to conform to design or performance requirements specified herein or in the contractor's technical proposal.

b. Any spillage or leakage of any liquid, including fuel, coolant, lubricant, or hydraulic fluid, under any condition, except as allowed herein.

c. Structural failure of any component, including permanent deformation, or evidence of impending failure.

d. Evidence of excessive wear.

e. Interference between the vehicle components or between the vehicle, the ground, and all required obstacles, with the exception of normal contact by the tires.

f. Misalignment of components.

g. Evidence of undesirable roadability characteristics, including instability in handling during cornering, braking, and while traversing all required terrain.

h. Conditions that present a safety hazard to personnel during operation, servicing, or maintenance.

i. Overheating of the engine, transmission, or any other vehicle component.

j. Evidence of corrosion.

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

5.6.3 Detailed inspection requirements.

5.6.3.1 Examination of product. All Component Manufacturers Certifications, as well as Prototype Vehicle Testing and Operational Testing, 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. Proper operation of vehicle functions will be verified as defined by NFPA 414, Acceptance Criteria chapter. A copy of the vehicle manufacturer's certifications will be provided with each vehicle in accordance with NFPA 414. The airport performing the test may accept manufacturer and or third party certification that prior testing was performed and the vehicle meets the performance parameters of NFPA 414.

5.6.3.1.1 Roadability test. The fully loaded vehicle will be driven over ten miles of paved and ten miles of cross country terrain consisting of open fields, broken ground, and uneven terrain. After completing the driving portion of the roadability test, all loads will be removed and all structure and surfaces will be visibly inspected for failure or permanent deformation.

5.6.3.1.2 Gradeability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.2.

5.6.3.1.3 Tilt table test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.3. If an adjustable height suspension system is provided, the suspension system may be set to the height normally used on hard pavement.

5.6.3.1.4 Cornering stability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.4.

5.6.3.1.5 Weight and weight distribution measurement. Each vehicle will be weighed (full and empty) to demonstrate compliance with NFPA 414.

5.6.3.1.6 Dimension measurement. The vehicle will be measured in accordance with NFPA 414. In addition to the dimensions listed in NFPA 414, the overall length, width, and height will be measured to demonstrate compliance with 3.2.1.

5.6.3.1.7 Angles of approach and departure measurement. The angles of approach and departure of the fully loaded vehicle will be measured to demonstrate compliance with 3.2.2.

5.6.3.1.8 Acceleration test. Each vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.1.2. A time-distance recorder, engine electronic measurement or Global Positioning System (GPS) based electronic data collection system will be used to record data for this test.

5.6.3.1.9 Maximum speed test. Each vehicle will be tested in accordance with 5.4.4 of NFPA 414 to demonstrate compliance with 3.3.1.3. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.10 Pump and roll on a 40-percent grade test. The fully loaded vehicle will be tested in accordance with NFPA 414.

5.6.3.1.11 Service brake system test. Each vehicle will be tested in accordance with NFPA 414. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.12 Air system and air compressor test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.1.13 Turning diameter test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.12.2.

5.6.3.1.14 Evasive maneuver test. The fully loaded vehicle will be tested in accordance with NFPA 414 at 35 miles per hour (mph) (56 kilometers per hour (kph) to demonstrate compliance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.2 Cab interior sound level test. The cab interior sound levels of the vehicle will be measured in accordance with NFPA 414 to demonstrate compliance with 3.4.2.

5.6.3.3 Agent system tests.

5.6.3.3.1 Agent discharge pumping test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.2 Pump and maneuver test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.3 Hydrostatic pressure test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.4 Priming device test. Each vehicle that is equipped with a priming pump will be tested.

5.6.3.3.5 Agent tank capacity test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with the capacity requirements of 3.6.2 and 3.6.3.1.

5.6.3.3.6 Water tank fill and overflow test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.6.2.3.

5.6.3.3.7 Foam concentration test. Each vehicle will be tested in accordance with NFPA 414 at the 6-percent concentration setting to demonstrate compliance with the foam concentration quality requirements of 3.6.4.

5.6.3.3.8 Primary turret flow rate test. The vehicle will be tested in accordance with NFPA 414. Each vehicle will be tested to demonstrate compliance with NFPA 414.

5.6.3.4 Electrical system tests.

5.6.3.4.1 Electrical charging system test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with Annex B.4 of NFPA 414.

5.6.3.4.2 Electromagnetic interference test. The vehicle will be tested in accordance with NFPA 414 and SAE J551 to demonstrate compliance with 3.8.4.

6. PACKAGING.

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

6.2 The vehicle must be delivered 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.

6.3 The manufacturer may pre-ship chemical agents to a receiving airport to place a vehicle into operational status upon delivery. The manufacturer has the responsibility for provisioning these agents and propellants.

6.4 The vehicle manufacturer must provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.

7. TRAINING.

7.1 Upon delivery of the vehicle to the airport, the manufacturer must, at no additional cost, provide the services of a qualified technician for 5 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 must be provided by the manufacturer to allow various shifts to complete the training requirements.

7.2 The technician must provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup must 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 should 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.

7.3 Training must 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 must include materials that can be used to train subsequent new operators.

8. REFERENCED DOCUMENTS.

8.1 Source of documents.

8.1.1 The CFR may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

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.

8.1.2 SAE documents may be obtained from SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096.

8.1.3 National Fire Protection Association (NFPA): NFPA documents may be obtained from NFPA, Batterymarch Park, Quincy MA 02269-9101.

NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2009 Edition)

NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition)

NFPA 1901, Standard for Automotive Fire Apparatus (2009 Edition)

8.1.4 Federal Aviation Administration (FAA): FAA ACs may be obtained from the FAA website: http://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: Federal Aviation Administration, ATO-W CM-NAS Documentation, Control Center, 800 Independence Avenue, SW, Washington, DC 20591. Telephone: (202) 548-5256, FAX: (202) 548-5501 and website: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_facilities/cm/cm_documentation/

Print Class 3 Specification

3.4. VEHICLE PROCUREMENT SPECIFICATION, CLASS 4

PROCUREMENT SPECIFICATION Class 4 AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLE

1. SCOPE. This Procurement Specification (PS) covers a commercially produced diesel engine driven ARFF vehicle for an [REDACTED] airport. It includes a 1500 gallon water/Aqueous Film Forming Foam (AFFF) fire suppression system:

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.

2. CLASSIFICATION. The ARFF vehicle(s) covered by this PS 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, as follows:

Airport Index	Vehicle Class	Minimum Rated Capacities (gallons/liters)
[REDACTED]	4	1500 gallon (5678 liter) water/foam solution

3. VEHICLE CONFORMANCE/PERFORMANCE CHARACTERISTICS. The ARFF vehicle will be in accordance with the applicable requirements of National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.1 General Administration Requirements.

3.1.1 Manuals: Technical manuals will consist of operator, service, and parts manuals. All manuals are required to be provided in digital format on CDs.

3.1.1.1 Technical manuals. The overall format for the manuals will be commercial. Each technical manual will have a title page. Line art will be used to the maximum extent possible for illustrations and parts lists. One complete set of engine and transmission parts, service and operator's manuals will be packed with each vehicle.

- a. The contractor may submit digitized technical manuals in lieu of printed paper copies.
- b. The contractor will pack two complete sets of both hardcopy and CDs (if applicable) reflecting the vehicle as built and ship them with the vehicle to the final destination.

3.1.1.1.1 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:

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

3.1.1.1.2 Service manual. The service manual will identify all special tools and test equipment required to perform servicing, inspection, and testing. The manual will cover troubleshooting and maintenance as well as minor and major repair procedures. The text will contain performance specifications, tolerances, and fluid capacities; current, voltage, and resistance data; test procedures; and illustrations and exploded views as may be required to permit proper maintenance by qualified vehicle mechanics. The manual will contain an

alphabetical subject index as well as a table of contents. The service manual will contain at least the following, where applicable:

- a. Fire fighting system schematic(s).
- b. Hydraulic schematic.
- c. Pneumatic schematic.
- d. Electrical schematic.
- e. Winterization schematic.
- f. Fuel schematic.
- g. Schedules for required preventative maintenance and required periodic maintenance.
- h. Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

3.1.1.1.3 Parts identification 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, thread dimensions, torque specifications, and special characteristics will be provided for all nonstandard 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.

3.1.2 Painting, plating, and corrosion control.

3.1.2.1 Finish. Exterior surfaces will be prepared, primed, and painted in accordance with all of the paint manufacturer's instructions and recommendations. 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.

3.1.2.2 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, Dissimilar Metals, will not be in contact with each other. Metal plating or metal spraying of dissimilar base metals to provide electromotively compatible abutting surfaces is acceptable. The use of dissimilar metals separated by suitable insulating material is permitted, except in systems where bridging of insulation materials by an electrically conductive fluid can occur.

3.1.2.3 Protection against deterioration. Materials that deteriorate when exposed to sunlight, weather, or operational conditions normally encountered during service will not be used or will have a means of protection against such deterioration that does not prevent compliance with performance requirements. Protective coatings that chip, crack, or scale with age or extremes of climatic conditions or when exposed to heat will not be used.

3.1.2.4 Reflective stripes. An eight (8) inch horizontal reflective stripe will be applied around the vehicle in accordance with AC 150/5210-5. Offsets in the reflective stripes will be made to maximize the length of reflective surface. Bright metal trim or anodized parts may interrupt the reflective stripes. The pattern will be eight (8) inch wide reflective striping.

3.1.2.5 Lettering. Vehicles will have the letters "insert Airport Name" and, if available, the Airport Insignia, applied 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).

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

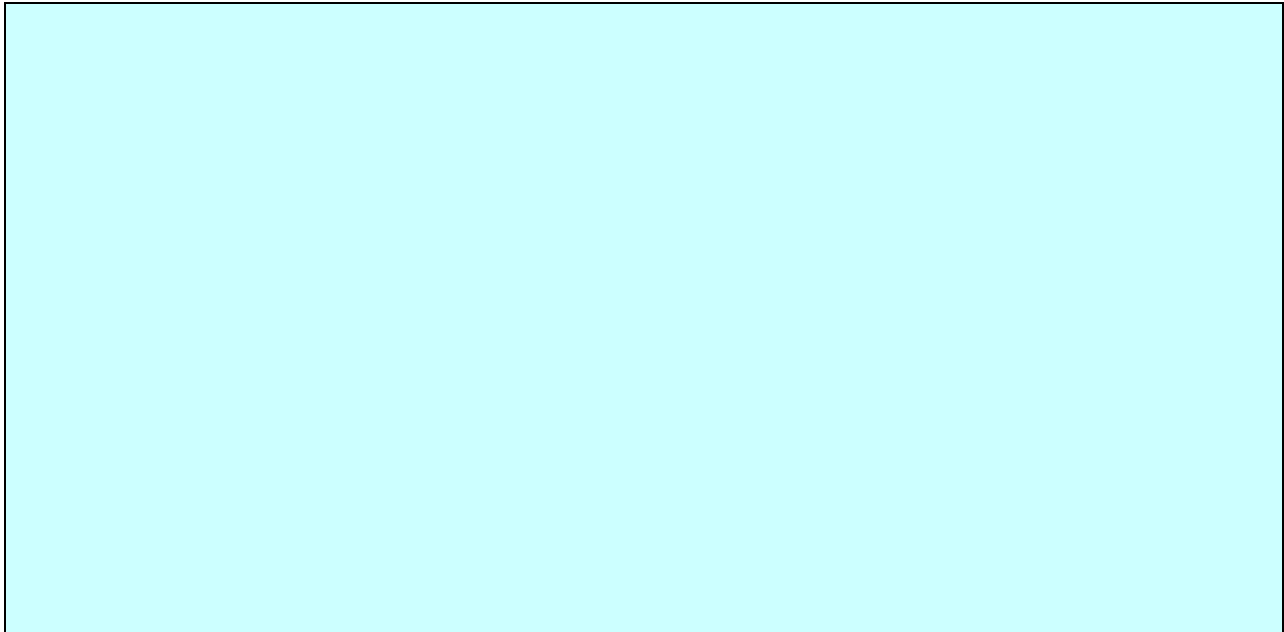
- a. NOMENCLATURE
- b. MANUFACTURER'S MAKE AND MODEL
- c. MANUFACTURER'S SERIAL NUMBER
- d. STOCK NUMBER (SN)
- e. VEHICLE CURB WEIGHT: kg (pounds)
- f. PAYLOAD, MAXIMUM: kg (pounds)
- g. GROSS VEHICLE WEIGHT (GVW): kg (pounds)
- h. FUEL CAPACITY AND TYPE: gals (gallons)
- i. DATE OF DELIVERY (month and year)
- j. WARRANTY (months and km (miles))
- k. CONTRACT NUMBER
- l. PAINT COLOR AND NUMBER

A second permanently marked information data plate will be securely mounted on the interior of the driver's compartment. The plate will contain the information required by NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), Section 1.3.5 Vehicle

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

3.1.4 Environmental conditions.

3.1.4.1 Vehicle operation and storage temperature conditions will vary with geographical location. Thus, the locality temperature range can go from -40° to 110°F . Refer to NFPA 414 for vehicle winterization criteria.



3.1.5 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 panels, if provided, will be attached with captive fasteners.

3.1.6 Vehicle Mobility.

3.1.6.1 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. An off-road, high-mobility suspension system resulting in no more than $0.5 G_{\text{rms}}$ acceleration at the driver's seat of the vehicle when traversing an 8-inch (20 cm) diameter half round at 35 mph (56 kph) must be provided. The suspension design by which the manufacturer meets the suspension performance requirements is at the manufacturer's discretion.

3.1.6.2 Gradeability. The fully loaded vehicle will be able to ascend any paved slope up to and including 50-percent.

3.1.6.3 Side slope stability. The fully loaded vehicle will be stable on a 30° side slope when tested in accordance with NFPA 414.

3.1.6.4 Cornering stability. The fully loaded vehicle will be stable in accordance with NFPA 414 when tested in accordance with NFPA 414.

3.2 Weights and dimensions.

3.2.1 Overall dimensions. The maximum dimensions listed below are desirable to ensure vehicles can be accommodated in existing fire stations. Likewise, the overall dimensions should be held 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 in accordance with NFPA 414.

Vehicle Capacity /Dimensions	1500 Gallon
Length (inches/cm)	428/1087
Width (inches/cm, excluding mirrors)	122/310
Height (inches/cm)	154/391

NOTE: For Airport Operator Validation: Consult AC 150/5210-15, Aircraft Rescue and Fire Fighting Station Building Design, Appendix A, to ensure vehicles measurements do not exceed existing airport fire station dimensions.

<u>VEHICLE MEASUREMENT VALIDATION</u>
ADO/FAA Approval: ⇒ _____

3.2.2 Angles of approach and departure. The fully loaded vehicle will have angles of approach and departure of not less than 30°.

3.2.3 Field of vision. The vehicle will have a field of vision in accordance with NFPA 414.

3.2.3.1 Mirrors. Combination flat and convex outside rearview mirrors will be installed on each side of the cab. The flat mirrors will be of the motorized remote control type, providing not less than 60° horizontal rotational viewing range. The flat mirrors will also have electrically heated heads. Mirror remote and heating controls will be located on the instrument panel within reach of the seated driver. 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, but not within the driver's direct line of sight, having a minimum area of 35 square inches. Where justified, a rear view camera / monitor system that meets or exceeds the field of vision provided by wide-angled mirrors may be substituted for mirrors. The

system will include a rear view camera mounted on each side of the cab and a monitor for each camera mounted above the driver in the cab.

<u>JUSTIFICATION</u>
ADO/FAA Approval: ➡ _____

3.3 Chassis and vehicle components.

3.3.1 Engine. The vehicle will have a turbocharged diesel engine that is certified to comply with the Environmental Protection Agency (EPA) and state laws for off-highway emission requirements at the time of manufacture. The engine and transmission must operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants according to the recommendations of the engine and transmission manufacturers.

3.3.1.1 Acceleration. The fully loaded vehicle will accelerate from 0 to 50 miles per hour (mph) on a level paved road within: 25 seconds.

3.3.1.2 Maximum speed. The fully loaded vehicle will attain a minimum top speed of 70 mph on a level, paved road.

3.3.1.3 Pump and roll on a 40-percent grade. The fully loaded vehicle will be capable of pump and roll operations on a paved, dry, 40-percent grade in accordance with NFPA 414.

3.3.1.4 Altitude. Where justified, the vehicle, including the pumping system, will be designed for operation at 2,000 feet above sea level.

<u>JUSTIFICATION</u>
ADO/FAA Approval: ➡ _____

3.3.2 Engine cooling system. The engine cooling system will be in accordance with NFPA 414. A label will be installed near the engine coolant reservoir reading “Engine Coolant Fill.”

3.3.3 Fuel system. The fuel system will be in accordance with NFPA 414.

3.3.3.1 Fuel priming pump. The vehicle will be equipped with an electric or pneumatic fuel pump in addition to the mechanical fuel pump. The electric/pneumatic pump will be used as a priming pump capable of re-priming the engines fuel system.

3.3.3.2 Fuel tank. The vehicle will have one or two fuel tanks with a minimum usable capacity in accordance with NFPA 414, as amended by NFPA 414. Each tank will have a fill opening of 3 inches minimum, readily accessible to personnel standing on the ground and designed to prevent fuel splash while refueling. Each tank will be located and mounted so as to provide maximum protection from damage, exhaust heat, and ground fires. If more than one tank is furnished, means will be provided to assure 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. Each fuel tank must be prominently labeled "Diesel Fuel Only".

3.3.4 Exhaust system. The exhaust system will be in accordance with NFPA 414. The exhaust system will be constructed of high grade rust resistant materials and protected from damage resulting from travel over rough terrain. 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 and the engine air intake, and will not be directed toward the ground.

3.3.5 Transmission. A fully automatic transmission will be provided. The transmission will be in accordance with NFPA 414.

3.3.6 Driveline. The vehicle driveline will be in accordance with NFPA 414. 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. The operator's manual will also include a similar warning/caution. All moving parts requiring routine lubrication must have a means of providing for such lubrication. There must be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

3.3.7 Axle capacity. Each axle will have a rated capacity, as established by the axle manufacturer, in accordance with NFPA 414.

3.3.8 Suspension. The suspension system will be in accordance with NFPA 414 and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.3.9 Tires and wheels. Tires and wheels will be in accordance with NFPA 414. The vehicle will be equipped with single tires and wheels at all wheel positions. The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Tire and wheel assemblies will be identical at all positions. Tires and wheels will be certified by the manufacturer for not less than 25 miles of continuous operation at 60 mph at the normal operational inflation pressure. 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. Tires will be new. Retreads, recaps, or re-grooved tires will not be permitted.

Tire bead locks, where justified, may be installed on all tires and rims.

JUSTIFICATION
ADO/FAA Approval: ➡ _____

3.3.10 Towing connections. The vehicle will be equipped with towing connections in accordance with NFPA 414. The vehicle will be designed for flat towing; the capability to lift and tow the vehicle is not required. The tow connections may intrude into the 30 degree approach angle.

3.3.11 Brake system. The vehicle will be equipped with a multi-channel all-wheel antilock brake system with at least one channel for each axle. The brakes will be automatic, self-adjusting and fully air-actuated. Brakes will be in accordance with CFR 49 CFR 393.40 through 393.42(b)), 393.43, and 393.43 through 393.52. The braking system, complete with all necessary components will include:

- a. Air compressor having a capacity of not less than 16 standard cubic feet per minute (SCFM).
- b. Air storage reservoir(s), each tank equipped with drain (bleed) valves, and with safety and check valves between the compressor and the reservoir tank.
- c. Automatic moisture ejector on each air storage reservoir. Manual air tank drains are acceptable if they are labeled, are centrally located in one compartment and are accessible by an individual standing at the side of the vehicle.
- d. Automatic slack adjusters on cam brakes or internal self-adjusting brakes on wedge brakes on all axles.
- e. Spring set parking 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. Slack adjusters and air chambers will be located above the bottom edge of the axle carrier.

3.3.11.1 Air dryer. A replaceable cartridge desiccant air dryer will be installed in the air brake system. The dryer will have the capability of removing not less than 95 percent of the

moisture in the air being dried. The dryer will have a filter to screen out oil and solid contaminants. The dryer will have an automatic self-cleaning cycle and a thermostatically controlled heater to prevent icing of the purge valve.

3.3.11.2 Compressed air shoreline or vehicle-mounted auxiliary air compressor. A flush mounted, check valved, auto-eject compressed air shoreline connection will be provided to maintain brake system pressure while the vehicle is not running. The shoreline will be flush mounted (not to extend outside the body line), located on the exterior of the vehicle, either on the left side rear corner of the cab, or at the rear of the vehicle. In lieu of a compressed air shoreline connection, the vehicle may be equipped with a 110 volt shoreline connected vehicle-mounted auxiliary air compressor. In lieu of a compressed air shoreline connection, the vehicle may be equipped with an electrical shoreline connected vehicle mounted auxiliary air compressor.

3.3.12 Steering. The vehicle will be equipped with power steering. Rear-wheel steering technology is not an approved vehicle option.

3.3.12.1 Steering effort. The steering system performance will be in accordance with NFPA 414.

3.3.12.2 Turning diameter. The fully loaded vehicle will have a wall to wall turning diameter of less than three times the overall length of the vehicle in both directions in accordance with NFPA 414.

3.3.13 License plate bracket. A lighted license plate bracket will be provided at the left rear and left front of the vehicle. The location of the left front bracket will be placed so as not to interfere with the operation of fire fighting systems.

3.4 Cab. The vehicle will have a fully enclosed two door cab of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. Cab door openings will extend for the full vertical height of the side panels. Steps and handrails will be provided for all crew doors, and 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. A tilt and telescoping steering column will be provided.

3.4.1 Windshield and windows. The windshield and windows will be of tinted safety glass. Each door window will be capable of being opened far enough to facilitate emergency occupant escape in the event of a vehicle accident. If a roof hatch is provided to facilitate emergency occupant escape in the event of a vehicle accident. If powered door windows are used, a roof hatch will be provided to facilitate emergency occupant escape: it will have a label reading "Emergency Escape Hatch" located in a conspicuous position for occupants to read.

3.4.2 Cab interior sound level. The maximum cab interior sound level will be in accordance with NFPA 414.

3.4.3 Instruments and controls. All instruments and controls will be illuminated and designed to prevent or produce windshield glare. Gauges will be provided for oil pressure, coolant temperature, and automatic transmission temperature. In addition to the instruments and controls

required by NFPA 414, the following will be provided within convenient reach of the seated driver:

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

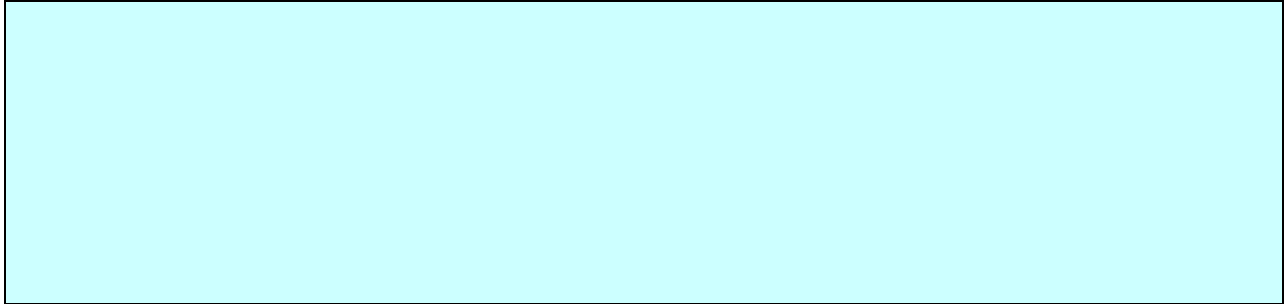
3.4.4 Windshield deluge system. The vehicle will be equipped with a powered windshield deluge system. The deluge system will be supplied from the agent water tank and will have an independent pumping system. The deluge system activation switch will be located within reach of the seated driver and turret operator.

3.4.5 Forward Looking Infrared (FLIR). Where justified, a forward looking infrared (FLIR) camera and in-cab monitor may be provided. If provided, the FLIR system must be in accordance with NFPA 414. In addition, the FLIR monitor described in NFPA 414 will have a minimum dimension of 10 in (25 cm) (measured diagonally) and be located in a position where it is visible to both the seated driver and turret operator.

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3.4.6 Climate control system. The offeror/contractor's standard heater/defroster and air conditioning system will be provided. The climate control system will induct at least 60 cubic feet per minute of fresh air into the cab. Cab mounted components will be protected from inadvertent damage by personnel.

3.4.7 Seats. The driver seat will be adjustable fore and aft and for height. The turret operator's seat, located to the right front of the driver's seat, will be a fixed (non-suspension) type. Both seats will be provided with a backrest and a bracket designed to store a Self-Contained Breathing Apparatus (SCBA). Each seat will be provided with a Type 3 seat belt assembly (i.e., 3-point retractable restraint) in accordance with CFR 49 CFR 571.209. Seat belts must be of sufficient length to accommodate crew members in full Personal Protective Equipment (PPE).



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3.4.8 Windshield wipers and washer. The vehicle will be equipped with electrically powered windshield wipers. The wiper arms and blades will be of sufficient length to clear the windshield area described by SAE J198, Windshield Wiper Systems - Trucks. 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. 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.

3.4.9 Warning signs. Signs that state "Occupants must be seated and wearing a seat belt when apparatus is in motion" will be provided in locations that are visible from each seated position in accordance with NFPA 414."

3.4.10 Lateral accelerometer and/or stability control system. The vehicle will be equipped with a lateral accelerometer and/or an electronic stability control system in accordance with NFPA 414.

3.4.11 Monitoring and Data Acquisition System (MADAS). The vehicle will be equipped with a MADAS as prescribed by NFPA 414.

3.5 Body, compartments, and equipment mounting.

3.5.1 Body. The vehicle will have a corrosion-resistant body.

3.5.2 Compartments. The vehicle body will have lighted compartments in accordance with NFPA 414 with a minimum of 10 cubic feet of enclosed storage space.

3.5.2.1 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 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.

3.5.2.2 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.

3.5.2.3 Drip rails. Drip rails will be provided over each compartment door.

3.5.2.4 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 200 pounds without permanent deformation. Each shelf will be accessible to crew members standing on the ground or using a pull out and tip-down configuration. Each shelf will have drain holes located so as to allow for drainage of any water from the stowed equipment.

3.5.2.5 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.

3.5.3 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.

3.5.4 Ladder, handrails, and walkways. Ladder, stepping, standing, and walking surfaces will be in accordance with NFPA 414. Handrails will be provided in accordance with NFPA 414. The lowermost step(s) or ladder rungs will be less than 20 inches (51 cm) above level ground when the vehicle is fully loaded. The lowermost steps may extend below the angle of approach or departure or ground clearance limits if they are designed to swing clear. The tread of the bottom steps must be at least 8 inches (20 cm) in width and succeeding steps at least 16 inches (40 cm) in width. The full width of all steps must have at least 6 inches (15 cm) of unobstructed toe room or depth when measured from, and perpendicular to, the front edge of the weight-bearing surface of the step.

3.5.5 Ancillary equipment. Ancillary equipment listed in NFPA 414 A.4.2.1 (1)-(17) is not covered by this Procurement Specification in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Ancillary equipment is funded separately by other sources.

NOTE: Equipment funding will be obtained as a separate contract under the provisions of AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing.

3.6 Agent system.

3.6.1 Agent (fire) pump. The vehicle will be equipped with a centrifugal pump capable of providing the performance specified herein as prescribed by NFPA 414.

3.6.1.1 Agent system piping. All piping, couplings, and valves and associated components that come into contact with the agent will be in accordance with NFPA 414.

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

3.6.1.3 Intake connections. The vehicle will be equipped with one valved 4½-inch intake connection on the left side. The vehicle will be equipped with one valved 2½-inch intake connection on the left side adjacent to the 4½-inch intake connection with both having either a 30° or 45° turn-down fitting. The 4½-inch intake connection will have male National Hose threads, a quarter-turn control valve, a bleeder valve, a strainer, a cap, and a slow-operating valve and an automatic pressure relief device. 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. The vehicle will be capable of filling its water tank by pumping from a draft, a hydrant, or a nurse truck through either of the intake connections without the use of a hose from a discharge connection to a tank fill connection.

3.6.1.4 Discharge connections. Two 2½-inch discharge connections with male National Hose threads will be provided. One 2½ - inch discharge will be provided on each side of the vehicle. Each connection will be equipped with a cap, a quarter-turn control valve, a bleeder valve, and a pressure gauge. Each connection will be rated at 250-gpm minimum.

3.6.1.5 Piping, couplings, and valves. All agent system piping will conform to NFPA 414 criteria.

3.6.1.6 Overheat protection. The agent system will be equipped with an overheat protection system in accordance with NFPA 414. Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

3.6.1.7 Pressure relief valves. The agent system will be equipped with pressure relief valves in accordance with NFPA 414.

3.6.1.8 Drains. The agent system will be equipped with a drainage system in accordance with NFPA 414.

3.6.2 Water tank. The vehicle will have a water tank with a manufacturer certified minimum capacity of at least 1500 gallons.

3.6.2.1 Water tank construction. The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP) construction. All materials used will be capable of storing water, foam concentrate, and water/foam solutions.

3.6.2.2 Water tank overhead fill cover and drain. The water tank will be equipped with a 20 inch fill tower. The tower will be designed to allow for video inspection of the water tank interior. The water tank will incorporate a drain and drain valve at the lowest point to allow for complete drainage of the plumbing system. 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.

3.6.2.3 Water tank overflow system and venting. The water tank will incorporate a venting system to relieve pressure on the tank during fill and discharge operations at maximum flow rates. It will have an overflow system to relieve excess fluid in the event of tank overflow. The vent and overflow system will prevent leakage of water when the tank is filled to capacity and the vehicle is operating on the maximum side slopes and grades specified herein. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.2.4 Water tank top fill opening. A top fill opening of not less than 8 inches internal diameter with a readily removable ¼-inch mesh strainer will be provided. The fill opening may be incorporated as part of the manhole cover, and will be sized to accommodate a 2½-inch fill hose.

3.6.2.5 Water tank fill connections. The water tank will incorporate one 4½-inch male National Hose thread connection and one 2½-inch rocker lug female National Hose thread connection on each side of the vehicle. Each connection will be fitted with a 30° turn-down fitting. The water fill will allow external re-supply of the water tank during discharge pumping operations. Each tank fill connection will be in accordance with NFPA 414.

3.6.3 Foam system. (**NOTE:** *The requirements of section 3.6.3 do not apply to pre-mixed pressurized foam systems.*)

3.6.3.1 Foam concentrate tank. 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 (i.e., 7.0-percent).

3.6.3.1.1 Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP construction. All materials used will be capable of storing foam concentrate.

3.6.3.1.2 Foam tank drain. 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.

3.6.3.1.3 Foam tank top fill trough. The foam tank will incorporate a top fill trough mounted in the top of the tank 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 two standard 5-gallon foam concentrate containers to be emptied simultaneously. The top fill trough neck will extend sufficiently close to the bottom of the tank to reduce foaming to a minimum during the fill operation. 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.

3.6.3.2 Foam tank fill connections. The foam tank will incorporate a 1-inch National Hose thread female hose connection on each side 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 check valves and readily removable, rigidly constructed ¼-inch mesh 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.

3.6.3.2.1 Foam tank vent and overflow system. The foam tank will incorporate a vent system to relieve pressure on the tank during fill and discharge operations at maximum flow rates and an overflow system to relieve excess liquid in the event of tank overflow. 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. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

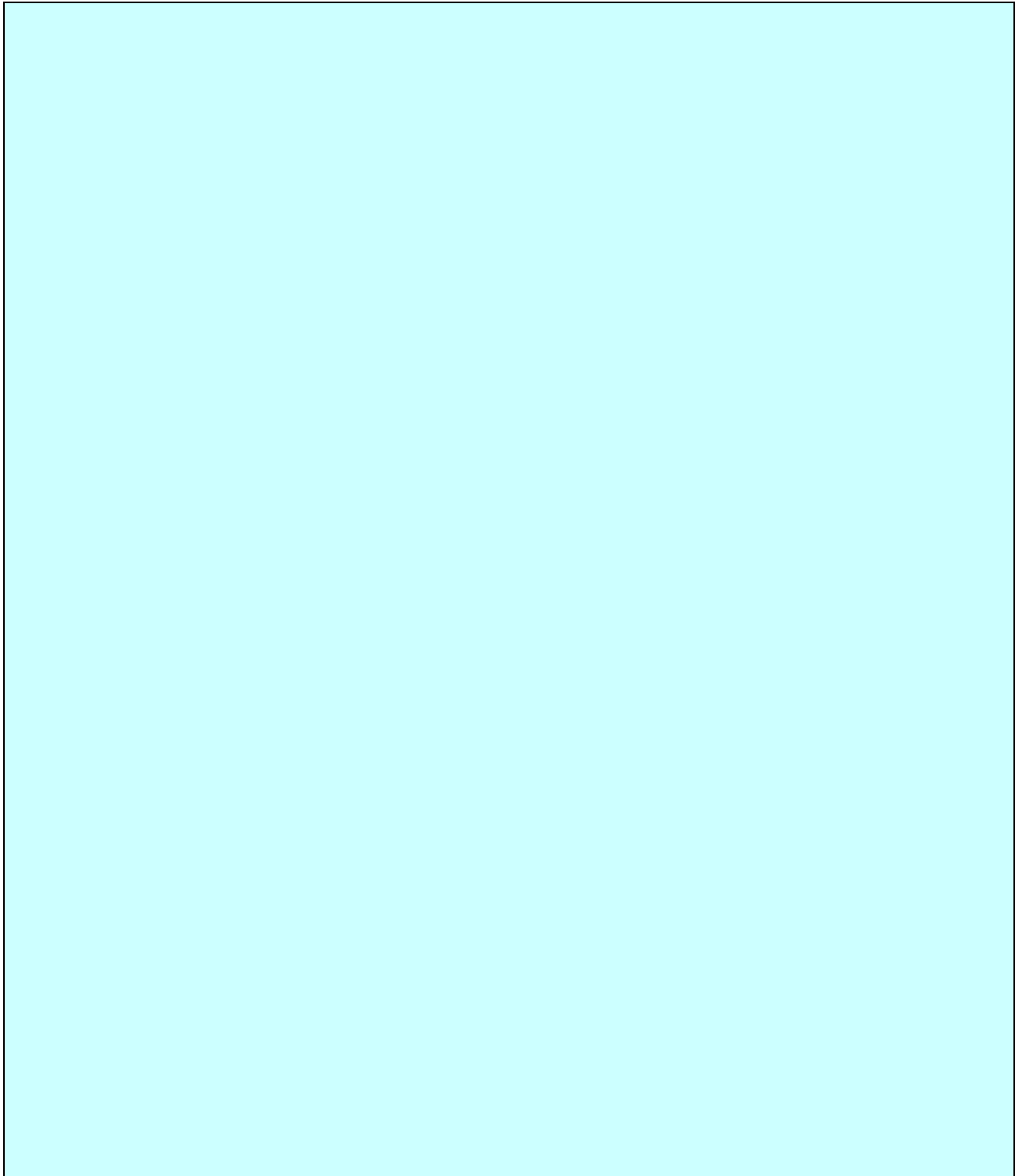
3.6.3.3 Foam transfer pump. A foam transfer pump will be provided and mounted in a compartment on the vehicle. The pump will be capable of transferring and drawing foam liquid concentrate at adjustable flow rates up to 25-gpm directly through the pump and loading connections (see 3.6.3.2). All materials 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. The pump will be removable as an assembly without disturbing other components. A suitable length of hose with appropriate connections will be provided for filling the foam tank from an external foam storage container.

3.6.3.4 Foam flushing system. The foam concentrate system will be designed in accordance with NFPA 414 so that the system can be readily flushed with clear water.

3.6.3.5 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. The foam concentrate piping will be in accordance with NFPA 414.

3.6.4 Foam proportioning system. The vehicle will have an around-the-pump or a direct injection foam proportioning system for Aqueous Film-Forming Foam (AFFF). The system will automatically and uniformly proportion water and 3-percent foam concentrate within a minimum ratio of 2.8-percent to a maximum ratio of 3.5-percent foam concentrate to water by volume. The system will also be capable of proportioning 6-percent foam concentrate (5.6-percent minimum, 7.0-percent maximum). If a fixed orifice plate system is used, a plate will be provided for each percentage foam concentrate; the additional plate will be securely mounted in a protected location on the vehicle. A fire vehicle mechanic will be able to interchange the plates using common hand tools.

3.6.5 Primary vehicle turret. The vehicle will be equipped with a standard roof-mounted turret, extendable turret, and/or high flow bumper mounted turret to serve as the primary source of agent delivery.



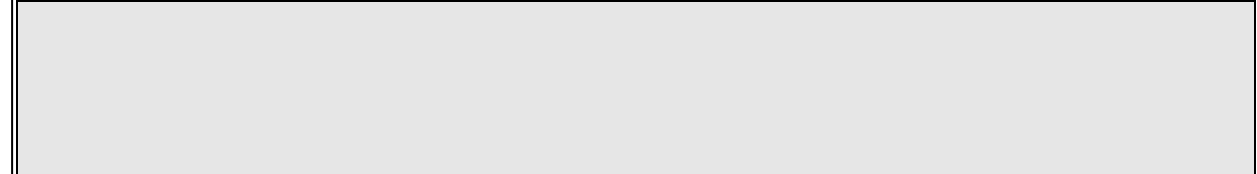
3.6.6 Bumper turret. The vehicle will be equipped with a joystick controlled, constant flow, non-air-aspirating, variable stream type:

The bumper turret will be capable of discharging at a minimum flow rates of foam or water as specified by the use, with a pattern infinitely variable from straight stream to fully dispersed. The bumper turret will be capable of automatic oscillation, with the range of oscillation adjustable up to 90° each side of center (left and right) with vertical travel capabilities of +45°/-20° meeting section 4.20.2 in NFPA 414.

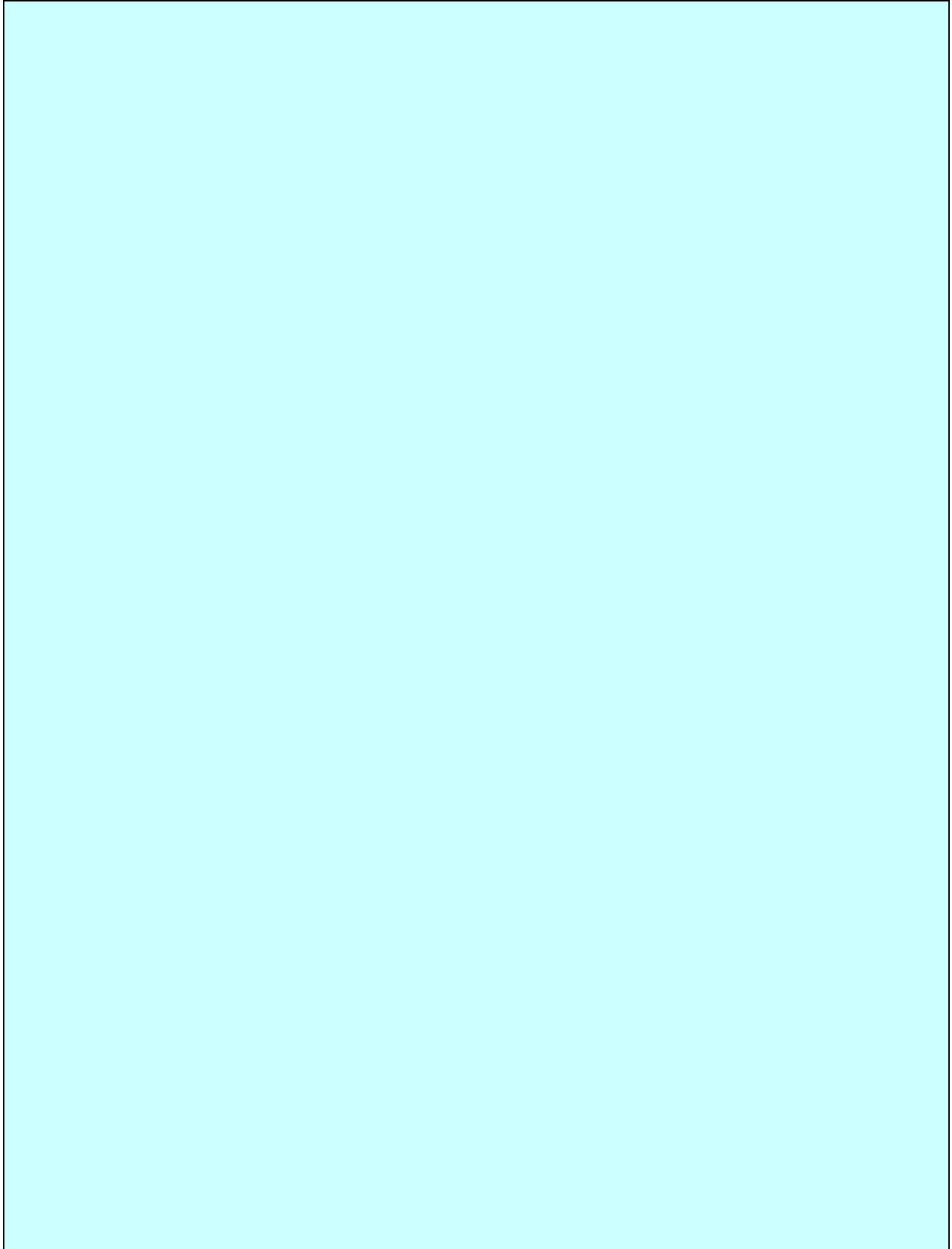
3.6.7 Preconnected handlines. A 200 foot, 1¾-inch pre-connected woven jacket handline, with a 1½-inch control valve and a pistol grip nozzle, will be located on each side of the vehicle. A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. The handlines and nozzles will be in accordance with NFPA 414, and will provide 95-125 gpm at 100 psi nozzle pressure. A control for charging each handline will be provided for operation by both the driver and the turret operator.

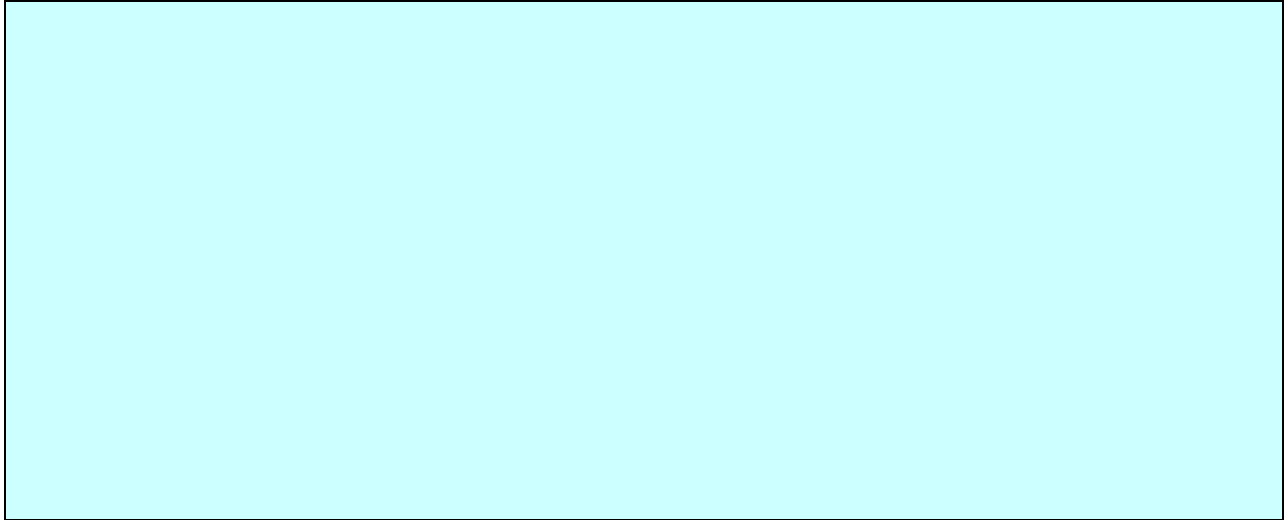


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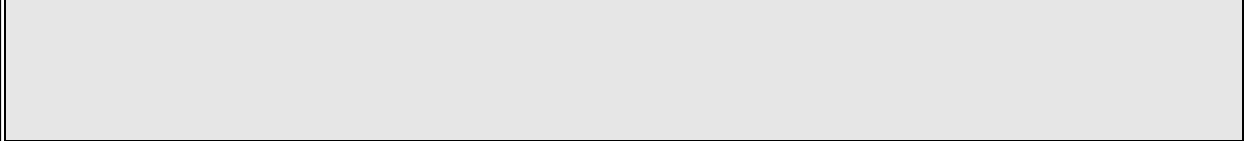


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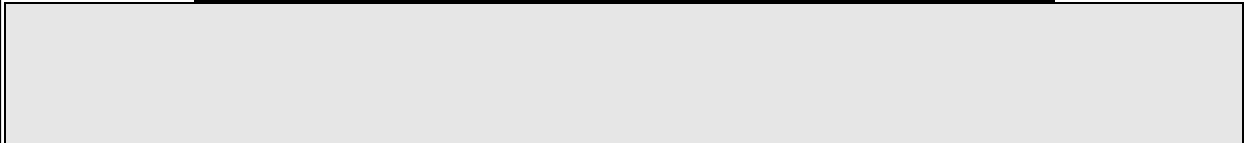
JUSTIFICATION (Dry Chemical Agent)



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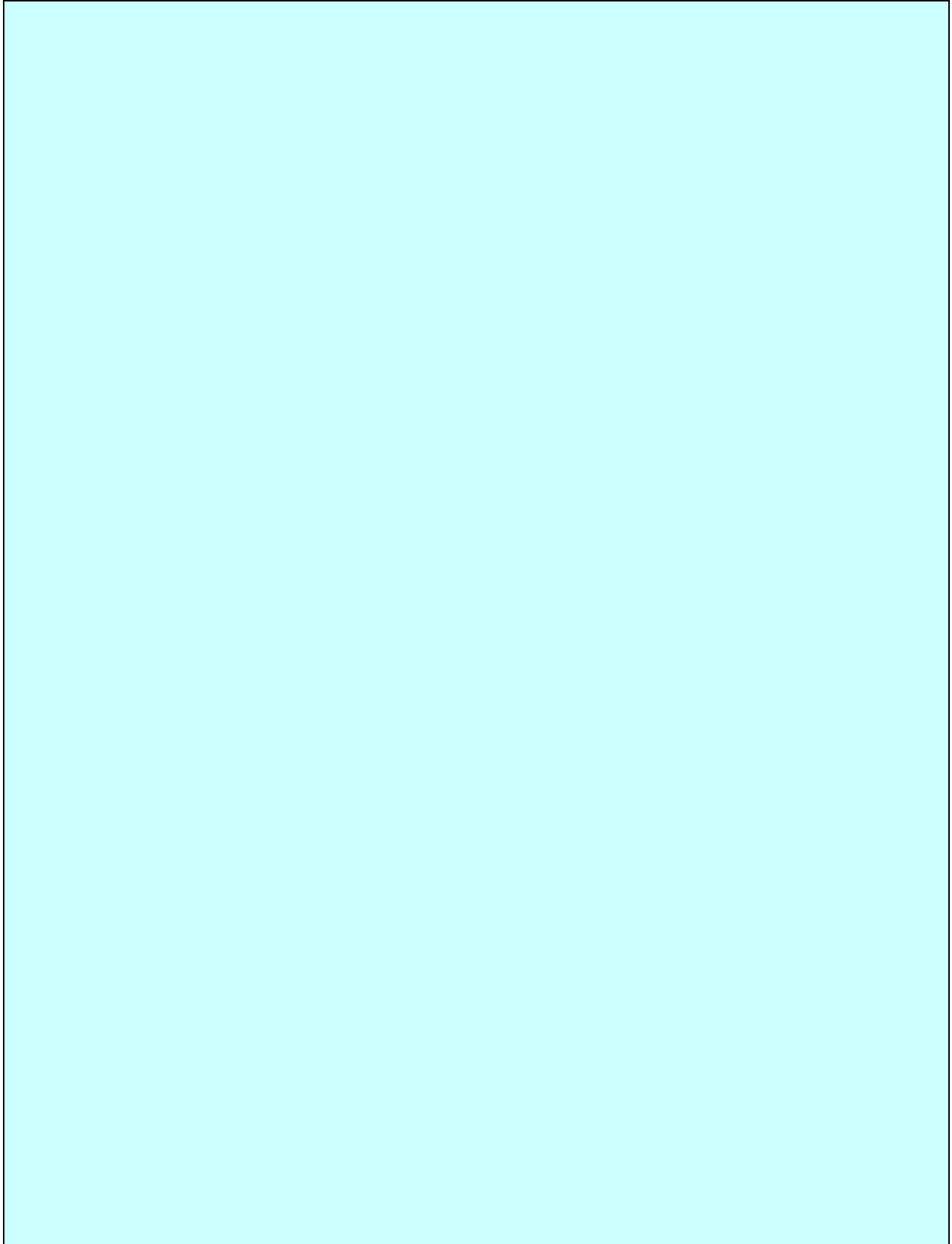


JUSTIFICATION (Dry Chemical Primary Turret Discharge Nozzle)



ADO/FAA Approval: ⇨ _____





3.9 Electrical systems and warning devices. The vehicle will have a 12-volt or 24-volt electrical and starting system.

3.9.1 Alternator. A single or dual alternator charging system will be provided. The minimum continuous electrical load will include operation of the air conditioning system.

3.9.2 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.

3.9.2.1 Battery compartment. The batteries will be enclosed in a weatherproof enclosure, cover, or compartment and be readily accessible.

3.9.3 Battery charger or conditioner. The vehicle will have a DC taper type battery charger or an automatic battery conditioner, or voltage monitoring system, 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 (see 3.9.1). 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.

3.9.4 Electromagnetic interference. The vehicle electrical system will be in accordance with SAE J551-2 for electromagnetic interference.

3.9.5 Work lighting.

3.9.5.1 Telescoping Flood Lights. Two 1,000 watt halogen floodlights will be provided. One light will be mounted on the left and right sides of the vehicle on extension tubes. Both lights will be controlled from switches in the cab. The floodlights will be powered by the auxiliary generator and manually raised.

3.9.5.2 Scene lights. A total of six high mounted floodlights will be provided to illuminate the work areas around the vehicle. Two will be mounted on each side and will be of the High Intensity Discharge (HID), LED, or halogen type. The two mounted on the front of the vehicle may be 110-volt or HID, LED, or halogen type. If front mounted lights are selected, they will be powered by the generator. A switch will also be mounted on the instrument panel to control the lights at the front.

3.9.5.3 Spot/Floodlights. Two spot/floodlights will be attached at the end of the primary turret or at the end of the ET assembly. The lights will illuminate the area covered by the turret. Both lights will be controlled from switches in the cab. NOTE: Halogen, LED, or HID lights may be used.

3.9.5.4 Telescoping Flood Lights. Two floodlights will be provided. One light will be mounted on the left and right sides of the vehicle on extension tubes. Both lights will be controlled from

switches in the cab. The lights will be powered by the auxiliary generator and manually raised. The lights will either be a 1000W halogen, 250W LED, or 200W HID type.

3.9.5.5 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 the front and two will be mounted on each side of the vehicle. The lights will be powered by the auxiliary generator, and the lights in the front will be controlled from switches in the cab. NOTE: Halogen, LED, or HID lights may be used.

3.9.6 Audible warning devices.

3.9.6.1 Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control and selection of "Radio," "PA," "Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and a magnetic noise canceling microphone. 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. 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.

3.9.6.2 Horn. Dual forward facing air horns will be installed in protected locations near the front of the vehicle. Air horn activating foot switches will be located in front of the driver and the turret operator.

3.9.7 Emergency warning lights. All emergency warning lights will use Light Emitting Diode (LED), strobe, or rotating beacon elements and will meet the requirements of AC 150/5210-5. Lighting units will be installed on the top front, sides, and rear of the vehicle to provide 360° visibility. A switch will be provided on the instrument panel to control all of the top, side, front and rear emergency warning lights. A switch will also be provided on the instrument panel to disable all lower emergency warning lights when desired. All lighting systems will meet NFPA 414 emergency lighting criteria.

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

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

3.9.8 Radio circuit. The vehicle will have three separate 30 amp circuits with breakers and connections provided in a space adjacent to the driver and turret operator for installation of radios and other communications equipment after the vehicle has been delivered. To facilitate the installation of the communications equipment the manufacturer will provide three antennas pre-installed on top of the cab. ***Radios are an airport responsibility and not part of this specification.***

3.9.9 Power receptacles.

3.9.9.1 Primary power receptacles. The vehicle will have two duplex 15-amp 110-volt power receptacles, one installed adjacent to the cab door on each side of the vehicle. Each duplex receptacle will include one straight blade and one twist-lock connection. These outlets will be powered by the generator.

3.9.9.2 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.

3.9.9.3 Cable reel. The vehicle will be equipped with an electrical cable reel, located within a compartment. The reel will be equipped with 200 feet of 20 amp, 600 volt, 90°C insulated electrical cable. The electrical cable will be equipped with a rubber ball stop to prevent cable pull through during rewinding operations. A four-way roller guide will be provided on the cable reel to prevent chafing of cable insulation. The cable reel will have an electric rewind motor with provisions for manual rewind in the event of motor failure; the manual rewind handle will be securely stored near the cable reel. A portable weatherproof duplex outlet box, with built-in circuit breakers and twist-lock receptacles, will be provided for on the cable end. The cable reel will be powered by the auxiliary generator.

3.9.10 Auxiliary generator. A minimum kilowatt (KW) (continuous rating), 120/240-volt, 60 hertz, diesel, hydraulic, or split shaft Power Takeoff (PTO)-driven generator will be provided.

3.10 Line voltage electrical system.

3.10.1 Electrical shoreline connection. The battery charger/conditioner will be powered from a covered, polarized, insulated, labeled, recessed (flush mounted), male, 110 volt AC auto-eject receptacle. The connection will be located on the exterior of the vehicle at the rear or on either side of the cab. A weatherproof charge meter will be installed next to the receptacle. A 15 amp rated, 110-120 volt, AC straight blade (non twist-lock) connector will be provided.

3.11 Air systems.

3.11.1 Air hose reel. An air hose reel will be provided in an enclosed compartment on the vehicle. The hose reel will be equipped with 200 feet of 3/8-inch I.D. hoseline. A 3/8 inch National Pipe Taper (NPT) fitting and female style quick disconnect will be connected to the end of the hoseline. A four-way roller guide will be provided for the hose reel to prevent hose chafing and kinking. The hoseline will be equipped with a rubber ball stop to prevent hose pull through on roller guides during rewinding operations. The hose reel will have an electric rewind motor and provisions for manual rewind in the event of motor failure; the manual rewind handle will be securely stored near the hose reel. A pressure protected air supply from the chassis air system will be connected to the hose reel. The air supply lines will be routed with minimum bends and located or guarded from damage from the carried equipment.

3.12 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.

4. REGULATORY REQUIREMENTS.

4.1 Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with Title 48: Federal Acquisition Regulations System, Part 2823—Environment, Conservation, Occupational Safety, and Drug-free Workplace, Subpart 2823.4 Use of Recovered Material, 403 Policy and 404 Procedures.

4.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired:

- a. competitively within a reasonable timeframe;
- b. meet appropriate performance standards, or
- c. at a reasonable price.

The prime contractor is responsible for ensuring that all subcontractors comply with this requirement. Information on the GPP can be found at:

http://www.dot.gov/ost/m60/DOT_policy_letters/apl8_04.pdf or FAR 23.404(b):
http://www.acquisition.gov/far/current/html/Subpart%2023_4.html.

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Performance inspection (see 5.2).
- b. Conformance inspection (see 5.3).

5.2 Performance inspection. The vehicle will be subjected to the examinations and tests described in 5.6.3.1 through 5.6.3.5 (if applicable). The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.

5.3 Conformance inspection. The vehicle will be subjected to the examinations and tests described in 5.6.3.1 through 5.6.3.5 (if applicable). The contractor will provide or arrange for all test equipment, personnel, and facilities.

5.4 Product conformance. The products provided will meet the performance characteristics of this PS, 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.

5.5 Technical proposal. The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this PS; a paragraph by paragraph response to the characteristics section of this PS 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 PS.

5.6 Inspection requirements.

5.6.1 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.

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

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

5.6.3 Detailed inspection requirements.

5.6.3.1 Examination of product. All Component Manufacturers Certifications, as well as Prototype Vehicle Testing and Operational Testing, 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. Proper operation of vehicle functions will be verified as defined by NFPA 414, Acceptance Criteria chapter. A copy of the vehicle manufacturer's certifications will be provided with each vehicle in accordance with NFPA 414. The airport performing the test may accept manufacturer and or third party certification that prior testing was performed and the vehicle meets the performance parameters of NFPA 414.

5.6.3.1.1 Roadability test. The fully loaded vehicle will be driven over ten miles of paved and ten miles of cross country terrain consisting of open fields, broken ground, and uneven terrain. After completing the driving portion of the roadability test, all loads will be removed and all structure and surfaces will be visibly inspected for failure or permanent deformation.

5.6.3.1.2 Gradeability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.2.

5.6.3.1.3 Tilt table test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.3. If an adjustable height suspension system is provided, the suspension system may be set to the height normally used on hard pavement.

5.6.3.1.4 Cornering stability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.4.

5.6.3.1.5 Weight and weight distribution measurement. Each vehicle will be weighed (full and empty) to demonstrate compliance with NFPA 414.

5.6.3.1.6 Dimension measurement. The vehicle will be measured in accordance with NFPA 414. In addition to the dimensions listed in NFPA 414, the overall length, width, and height will be measured to demonstrate compliance with 3.2.1.

5.6.3.1.7 Angles of approach and departure measurement. The angles of approach and departure of the fully loaded vehicle will be measured to demonstrate compliance with 3.2.2.

5.6.3.1.8 Acceleration test. Each vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.1.2. A time-distance recorder, engine electronic measurement or Global Positioning System (GPS) based electronic data collection system will be used to record data for this test.

5.6.3.1.9 Maximum speed test. Each vehicle will be tested in accordance with 5.4.4 of NFPA 414 to demonstrate compliance with 3.3.1.3. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.10 Pump and roll on a 40-percent grade test. The fully loaded vehicle will be tested in accordance with NFPA 414.

5.6.3.1.11 Service brake system test. Each vehicle will be tested in accordance with NFPA 414. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.12 Air system and air compressor test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.1.13 Turning diameter test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.12.2.

5.6.3.1.14 Evasive maneuver test. The fully loaded vehicle will be tested in accordance with NFPA 414 at 35 miles per hour (mph) (56 kilometers per hour (kph) to demonstrate compliance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.2 Cab interior sound level test. The cab interior sound levels of the vehicle will be measured in accordance with NFPA 414 to demonstrate compliance with 3.4.2.

5.6.3.3 Agent system tests.

5.6.3.3.1 Agent discharge pumping test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.2 Pump and maneuver test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.3 Hydrostatic pressure test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.4 Priming device test. Each vehicle that is equipped with a priming pump will be tested.

5.6.3.3.5 Agent tank capacity test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with the capacity requirements of 3.6.2 and 3.6.3.1.

5.6.3.3.6 Water tank fill and overflow test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.6.2.3.

5.6.3.3.7 Foam concentration test. Each vehicle will be tested in accordance with NFPA 414 at the 3-percent concentration setting to demonstrate compliance with the foam concentration quality requirements of 3.6.4.

5.6.3.3.8 Primary turret flow rate test. The vehicle will be tested in accordance with NFPA 414. Each vehicle will be tested to demonstrate compliance with NFPA 414.

5.6.3.4 Electrical system tests.

5.6.3.4.1 Electrical charging system test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with Annex B.4 of NFPA 414.

5.6.3.4.2 Electromagnetic interference test. The vehicle will be tested in accordance with NFPA 414 and SAE J551 to demonstrate compliance with 3.8.4.

5.6.3.5. Extendable turret. Each vehicle equipped with an extendable turret nozzle will be tested in accordance with NFPA 414 (2007 Edition) and NFPA 1901 (2003 Edition) as specified in AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.6 Piercing/penetrating nozzle test. Each vehicle equipped with a piercing/penetrating nozzle will be tested in accordance with NFPA 414.

6. PACKAGING.

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

6.2 The vehicle must be delivered 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.

6.3 The manufacturer may pre-ship chemical agents to a receiving airport to place a vehicle into operational status upon delivery. The manufacturer has the responsibility for provisioning these agents and propellants.

6.4. The vehicle manufacturer must provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.

7. TRAINING.

7.1 Upon delivery of the vehicle to the airport, the manufacturer must, at no additional cost, provide the services of a qualified technician for 5 consecutive days (or up to 8 days for an extendable turret) 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 must be provided by the manufacturer to allow various shifts to complete the training requirements.

7.2 The technician must provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup must 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 should 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.

7.3 Training must 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 must include materials that can be used to train subsequent new operators.

8. REFERENCED DOCUMENTS.

8.1 Source of documents.

8.1.1 The CFR may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

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

8.1.2 SAE documents may be obtained from SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096.

8.1.3 National Fire Protection Association (NFPA): NFPA documents may be obtained from NFPA, Batterymarch Park, Quincy MA 02269-9101.

NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2009 Edition)

NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition)

NFPA 1901, Standard for Automotive Fire Apparatus (2009 Edition)

8.1.4 Federal Aviation Administration (FAA): FAA ACs may be obtained from the FAA website: http://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: Federal Aviation Administration, ATO-W CM-NAS Documentation, Control Center, 800 Independence Avenue, SW, Washington, DC 20591. Telephone: (202) 548-5256, FAX: (202) 548-5501 and website: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_facilities/cm/cm_documentation/



3.5. VEHICLE PROCUREMENT SPECIFICATION, CLASS 5

PROCUREMENT SPECIFICATION Class 5 AIRCRAFT RESCUE AND FIRE FIGHTING (ARFF) VEHICLE

1. SCOPE. This Procurement Specification (PS) covers a commercially produced diesel engine driven ARFF vehicle for an [REDACTED] airport. It includes a 3000-4500 gallon water/Aqueous Film Forming Foam (AFFF) fire suppression system:

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.

2. CLASSIFICATION. The ARFF vehicle(s) covered by this PS 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, as follows:

Airport Index	Vehicle Class	Minimum Rated Capacities (gallons/liters)
[REDACTED]	5	3000 gallon/11,356 liter water/foam solution
[REDACTED]	5	3500 gallon/13,249 liter water/foam solution
[REDACTED]	5	4000 gallon/15,142 liter water/foam solution
[REDACTED]	5	4500 gallon/17,034 liter water/foam solution

3. VEHICLE CONFORMANCE/PERFORMANCE CHARACTERISTICS. The ARFF vehicle will be in accordance with the applicable requirements of National Fire Protection Association (NFPA) 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.1 General Administration Requirements.

3.1.1 Manuals. Technical manuals will consist of operator, service, and parts manuals. All manuals are required to be provided in digital format on CDs.

3.1.1.1 Technical manuals. The overall format for the manuals will be commercial. Each technical manual will have a title page. Line art will be used to the maximum extent possible for illustrations and parts lists. One complete set of engine and transmission parts, service and operator's manuals will be packed with each vehicle.

- a. The contractor may submit digitized technical manuals in lieu of printed paper copies.

- b. The contractor will pack two complete sets of both hardcopy and CDs (if applicable) reflecting the vehicle as built and ship them with the vehicle to the final destination.

3.1.1.1.1 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:

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

3.1.1.1.2 Service manual. The service manual will identify all special tools and test equipment required to perform servicing, inspection, and testing. The manual will cover troubleshooting and maintenance as well as minor and major repair procedures. The text will contain performance specifications, tolerances, and fluid capacities; current, voltage, and

resistance data; test procedures; and illustrations and exploded views as may be required to permit proper maintenance by qualified vehicle mechanics. The manual will contain an alphabetical subject index as well as a table of contents. The service manual will contain at least the following, where applicable:

- a. Fire fighting system schematic(s).
- b. Hydraulic schematic.
- c. Pneumatic schematic.
- d. Electrical schematic.
- e. Winterization schematic.
- f. Fuel schematic.
- g. Schedules for required preventative maintenance and required periodic maintenance.
- h. Lubrication locations, procedures, and intervals for parts of the vehicle and equipment that require lubrication.

3.1.1.1.3 Parts identification 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, thread dimensions, torque specifications, and special characteristics will be provided for all nonstandard 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.

3.1.2 Painting, plating, and corrosion control.

3.1.2.1 Finish. Exterior surfaces will be prepared, primed, and painted in accordance with all of the paint manufacturer's instructions and recommendations. 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.

3.1.2.2 Dissimilar metals. Dissimilar metals, as defined in MIL-STD-889, Dissimilar Metals, will not be in contact with each other. Metal plating or metal spraying of dissimilar base metals to provide electromotively compatible abutting surfaces is acceptable. The use of

dissimilar metals separated by suitable insulating material is permitted, except in systems where bridging of insulation materials by an electrically conductive fluid can occur.

3.1.2.3 Protection against deterioration. Materials that deteriorate when exposed to sunlight, weather, or operational conditions normally encountered during service will not be used or will have a means of protection against such deterioration that does not prevent compliance with performance requirements. Protective coatings that chip, crack, or scale with age or extremes of climatic conditions or when exposed to heat will not be used.

3.1.2.4 Reflective stripes. An eight (8) inch horizontal reflective stripe will be applied around the vehicle in accordance with AC 150/5210-5. Offsets in the reflective stripes will be made to maximize the length of reflective surface. Bright metal trim or anodized parts may interrupt the reflective stripes. The pattern will be eight (8) inch wide reflective striping.

3.1.2.5 Lettering. Vehicles will have the letters "insert Airport Name" and, if available, the Airport Insignia, applied 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).

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

- a. NOMENCLATURE
- b. MANUFACTURER'S MAKE AND MODEL
- c. MANUFACTURER'S SERIAL NUMBER
- d. STOCK NUMBER (SN)
- e. VEHICLE CURB WEIGHT: kg (pounds)
- f. PAYLOAD, MAXIMUM: kg (pounds)
- g. GROSS VEHICLE WEIGHT (GVW): kg (pounds)
- h. FUEL CAPACITY AND TYPE: gals (gallons)
- i. DATE OF DELIVERY (month and year)
- j. WARRANTY (months and km (miles))
- k. CONTRACT NUMBER
- l. PAINT COLOR AND NUMBER

A second permanently marked information data plate will be securely mounted on the interior of the driver's compartment. The plate will contain the information required by NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition), Section 1.3.5 Vehicle Information Data Plate. A single plate that combines or contains the information required for both plates is acceptable.

3.1.4 Environmental conditions.

3.1.4.1 Vehicle operation and storage temperature conditions will vary with geographical location. Thus, the locality temperature range can go from -40° to 110°F . Refer to NFPA 414 for vehicle winterization criteria.



3.1.5 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 panels, if provided, will be attached with captive fasteners.

3.1.6 Vehicle Mobility.

3.1.6.1 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. An off-road, high-mobility suspension system resulting in no more than $0.5 G_{\text{rms}}$ acceleration at the driver's seat of the vehicle when traversing an 8-inch (20 cm) diameter half round at 35 mph (56 kph) must be provided. The suspension design by which the manufacturer meets the suspension performance requirements is at the manufacturer's discretion.

3.1.6.2 Gradeability. The fully loaded vehicle will be able to ascend any paved slope up to and including 50-percent.

3.1.6.3 Side slope stability. The fully loaded vehicle will be stable on a 30° side slope when tested in accordance with NFPA 414.

3.1.6.4 Cornering stability. The fully loaded vehicle will be stable in accordance with NFPA 414 when tested in accordance with NFPA 414.

3.2 Weights and dimensions.

3.2.1 Overall dimensions. The maximum dimensions listed below are desirable to ensure vehicles can be accommodated in existing fire stations. Likewise, the overall dimensions should be held 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 in accordance with NFPA 414.

Vehicle Capacity /Dimensions	3000 Gallon	4500 Gallon
Length (inches/cm)	480/1219	540/1372
Width (inches/cm, excluding mirrors)	122/310	122/310
Height (inches/cm)	154/391	154/391

NOTE: For Airport Operator Validation: Consult AC 150/5210-15, Aircraft Rescue and Fire Fighting Station Building Design, Appendix A, to ensure vehicles measurements do not exceed existing airport fire station dimensions.

VEHICLE MEASUREMENT VALIDATION
ADO/FAA Approval: ➡ _____

3.2.2 Angles of approach and departure. The fully loaded vehicle will have angles of approach and departure of not less than 30°.

3.2.3 Field of vision. The vehicle will have a field of vision in accordance with NFPA 414.

3.2.3.1 Mirrors. Combination flat and convex outside rearview mirrors will be installed on each side of the cab. The flat mirrors will be of the motorized remote control type, providing not less than 60° horizontal rotational viewing range. The flat mirrors will also have electrically heated heads. Mirror remote and heating controls will be located on the instrument panel within reach of the seated driver. 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, but not within the driver's direct line of sight, having a minimum area of 35 square inches. Where justified, a rear view camera / monitor system that meets or

exceeds the field of vision provided by wide-angled mirrors may be substituted for mirrors. The system will include a rear view camera mounted on each side of the cab and a monitor for each camera mounted above the driver in the cab.

<u>JUSTIFICATION</u>
ADO/FAA Approval: ➡ _____

3.3 Chassis and vehicle components.

3.3.1 Engine. The vehicle will have a turbocharged diesel engine that is certified to comply with the Environmental Protection Agency (EPA) and state laws for off-highway emission requirements at the time of manufacture. The engine and transmission must operate efficiently and without detrimental effect to any drive train components when lubricated with standard, commercially available lubricants according to the recommendations of the engine and transmission manufacturers.

3.3.1.1 Acceleration. The fully loaded vehicle will accelerate from 0 to 50 miles per hour (mph) on a level paved road within 35 seconds.

3.3.1.2 Maximum speed. The fully loaded vehicle will attain a minimum top speed of 70 mph on a level, paved road.

3.3.1.3 Pump and roll on a 40-percent grade. The fully loaded vehicle will be capable of pump and roll operations on a paved, dry, 40-percent grade in accordance with NFPA 414.

3.3.1.4 Altitude. Where justified, the vehicle, including the pumping system, will be designed for operation at 2,000 feet above sea level.

<u>JUSTIFICATION</u>
ADO/FAA Approval: ➡ _____

3.3.2 Engine cooling system. The engine cooling system will be in accordance with NFPA 414. A label will be installed near the engine coolant reservoir reading “Engine Coolant Fill.”

3.3.3 Fuel system. The fuel system will be in accordance with NFPA 414.

3.3.3.1 Fuel priming pump. The vehicle will be equipped with an electric or pneumatic fuel pump in addition to the mechanical fuel pump. The electric/pneumatic pump will be used as a priming pump capable of re-priming the engines fuel system.

3.3.3.2 Fuel tank. The vehicle will have one or two fuel tanks with a minimum usable capacity in accordance with NFPA 414, as amended by NFPA 414. Each tank will have a fill opening of 3 inches minimum, readily accessible to personnel standing on the ground and designed to prevent fuel splash while refueling. Each tank will be located and mounted so as to provide maximum protection from damage, exhaust heat, and ground fires. If more than one tank is furnished, means will be provided to assure 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. Each fuel tank must be prominently labeled "Diesel Fuel Only".

3.3.4 Exhaust system. The exhaust system will be in accordance with NFPA 414. The exhaust system will be constructed of high grade rust resistant materials and protected from damage resulting from travel over rough terrain. 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 and the engine air intake, and will not be directed toward the ground.

3.3.5 Transmission. A fully automatic transmission will be provided. The transmission will be in accordance with NFPA 414.

3.3.6 Driveline. The vehicle driveline will be in accordance with NFPA 414. 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. The operator's manual will also include a similar warning/caution. All moving parts requiring routine lubrication must have a means of providing for such lubrication. There must be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

3.3.7 Axle capacity. Each axle will have a rated capacity, as established by the axle manufacturer, in accordance with NFPA 414.

3.3.8 Suspension. The suspension system will be in accordance with NFPA 414 and AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

3.3.9 Tires and wheels. Tires and wheels will be in accordance with NFPA 414. The vehicle will be equipped with single tires and wheels at all wheel positions. The vehicle will be equipped with tubeless steel belted radial tires with non-directional on/off-road type tread mounted on disc wheel assemblies. Tire and wheel assemblies will be identical at all positions. Tires and wheels will be certified by the manufacturer for not less than 25 miles of continuous operation at 60 mph at the normal operational inflation pressure. 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. Tires will be new. Retreads, recaps, or re-grooved tires will not be permitted.

Tire bead locks, where justified, may be installed on all tires and rims.

JUSTIFICATION
ADO/FAA Approval: ➡ _____

3.3.10 Towing connections. The vehicle will be equipped with towing connections in accordance with NFPA 414. The vehicle will be designed for flat towing; the capability to lift and tow the vehicle is not required. The tow connections may intrude into the 30 degree approach angle.

3.3.11 Brake system. The vehicle will be equipped with a multi-channel all-wheel antilock brake system with at least one channel for each axle. The brakes will be automatic, self-adjusting and fully air-actuated. Brakes will be in accordance with CFR 49 CFR 393.40 through 393.42(b)), 393.43, and 393.43 through 393.52. The braking system, complete with all necessary components will include:

- a. Air compressor having a capacity of not less than 16 standard cubic feet per minute (scfm).
- b. Air storage reservoir(s), each tank equipped with drain (bleed) valves, and with safety and check valves between the compressor and the reservoir tank.
- c. Automatic moisture ejector on each air storage reservoir. Manual air tank drains are acceptable if they are labeled, are centrally located in one compartment and are accessible by an individual standing at the side of the vehicle.
- d. Automatic slack adjusters on cam brakes or internal self-adjusting brakes on wedge brakes on all axles.
- e. Spring set parking 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. Slack adjusters and air chambers will be located above the bottom edge of the axle carrier.

3.3.11.1 Air dryer. A replaceable cartridge desiccant air dryer will be installed in the air brake system. The dryer will have the capability of removing not less than 95 percent of the moisture in the air being dried. The dryer will have a filter to screen out oil and solid contaminants. The dryer will have an automatic self-cleaning cycle and a thermostatically controlled heater to prevent icing of the purge valve.

3.3.11.2 Compressed air shoreline or vehicle-mounted auxiliary air compressor. A flush mounted, check valved, auto-eject compressed air shoreline connection will be provided to maintain brake system pressure while the vehicle is not running. The shoreline will be flush mounted (not to extend outside the body line), located on the exterior of the vehicle, either on the left side rear corner of the cab, or at the rear of the vehicle. In lieu of a compressed air shoreline connection, the vehicle may be equipped with a 110 volt shoreline connected vehicle-mounted auxiliary air compressor. In lieu of a compressed air shoreline connection, the vehicle may be equipped with an electrical shoreline connected vehicle mounted auxiliary air compressor.

3.3.12 Steering. The vehicle will be equipped with power steering. Rear-wheel steering technology is not an approved vehicle option.

3.3.12.1 Steering effort. The steering system performance will be in accordance with NFPA 414.

3.3.12.2 Turning diameter. The fully loaded vehicle will have a wall to wall turning diameter of less than three times the overall length of the vehicle in both directions in accordance with NFPA 414.

3.3.13 License plate bracket. A lighted license plate bracket will be provided at the left rear and left front of the vehicle. The location of the left front bracket will be placed so as not to interfere with the operation of fire fighting systems.

3.4 Cab. The vehicle will have a fully enclosed two door cab of materials which are corrosion resistant, such as aluminum, stainless steel, or glass reinforced polyester construction. Cab door openings will extend for the full vertical height of the side panels. Steps and handrails will be provided for all crew doors, and 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. A tilt and telescoping steering column will be provided.

3.4.1 Windshield and windows. The windshield and windows will be of tinted safety glass. Each door window will be capable of being opened far enough to facilitate emergency occupant escape in the event of a vehicle accident. If a roof hatch is provided to facilitate emergency occupant escape in the event of a vehicle accident. If powered door windows are used, a roof hatch will be provided to facilitate emergency occupant escape: it will have a label reading "Emergency Escape Hatch" located in a conspicuous position for occupants to read.

3.4.2 Cab interior sound level. The maximum cab interior sound level will be in accordance with NFPA 414.

3.4.3 Instruments and controls. All instruments and controls will be illuminated and designed to prevent or produce windshield glare. Gauges will be provided for oil pressure, coolant temperature, and automatic transmission temperature. In addition to the instruments and controls required by NFPA 414, the following will be provided within convenient reach of the seated driver:

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

3.4.4 Windshield deluge system. The vehicle will be equipped with a powered windshield deluge system. The deluge system will be supplied from the agent water tank and will have an independent pumping system. The deluge system activation switch will be located within reach of the seated driver and turret operator.

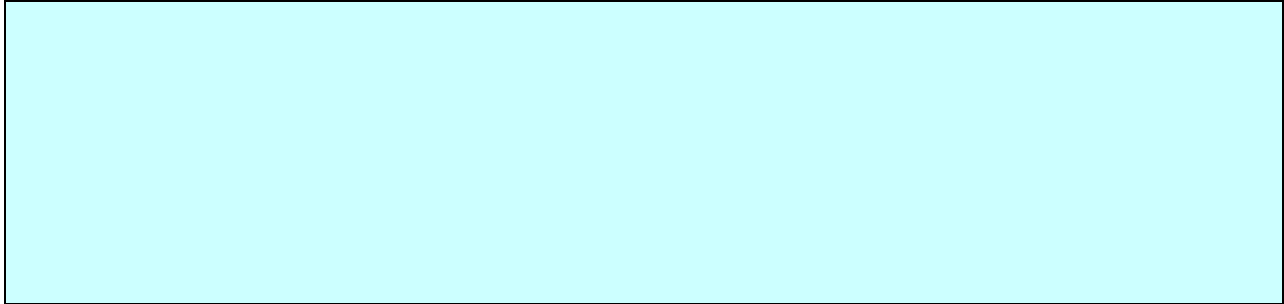
3.4.5 Forward Looking Infrared (FLIR). Where justified, a forward looking infrared (FLIR) camera and in-cab monitor may be provided. If provided, the FLIR system must be in accordance with NFPA 414. In addition, the FLIR monitor described in NFPA 414 will have a minimum dimension of 10 in (25 cm) (measured diagonally) and be located in a position where it is visible to both the seated driver and turret operator.

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3.4.6 Climate control system. The offeror/contractor's standard heater/defroster and air conditioning system will be provided. The climate control system will induct at least 60 cubic feet per minute of fresh air into the cab. Cab mounted components will be protected from inadvertent damage by personnel.

3.4.7 Seats. The driver seat will be adjustable fore and aft and for height. The turret operator's seat, located to the right front of the driver's seat, will be a fixed (non-suspension) type. Both seats will be provided with a backrest and a bracket designed to store a Self-Contained Breathing Apparatus (SCBA). Each seat will be provided with a Type 3 seat belt assembly (i.e., 3-point retractable restraint) in accordance with CFR 49 CFR 571.209. Seat belts must be of sufficient length to accommodate crew members in full Personal Protective Equipment (PPE).



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3.4.8 Windshield wipers and washer. The vehicle will be equipped with electrically powered windshield wipers. The wiper arms and blades will be of sufficient length to clear the windshield area described by SAE J198, Windshield Wiper Systems - Trucks. 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. 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.

3.4.9 Warning signs. Signs that state "Occupants must be seated and wearing a seat belt when apparatus is in motion" will be provided in locations that are visible from each seated position in accordance with NFPA 414."

3.4.10 Lateral accelerometer and/or stability control system. The vehicle will be equipped with a lateral accelerometer and/or an electronic stability control system in accordance with NFPA 414.

3.4.11 Monitoring and Data Acquisition System (MADAS). The vehicle will be equipped with a MADAS as prescribed by NFPA 414.

3.5 Body, compartments, and equipment mounting.

3.5.1 Body. The vehicle will have a corrosion-resistant body.

3.5.2 Compartments. The vehicle body will have lighted compartments in accordance with NFPA 414 with a minimum of 10 cubic feet of enclosed storage space.

3.5.2.1 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 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.

3.5.2.2 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.

3.5.2.3 Drip rails. Drip rails will be provided over each compartment door.

3.5.2.4 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 200 pounds without permanent deformation. Each shelf will be accessible to crew members standing on the ground or using a pull out and tip-down configuration. Each shelf will have drain holes located so as to allow for drainage of any water from the stowed equipment.

3.5.2.5 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.

3.5.3 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.

3.5.4 Ladder, handrails, and walkways. Ladder, stepping, standing, and walking surfaces will be in accordance with NFPA 414. Handrails will be provided in accordance with NFPA 414. The lowermost step(s) or ladder rungs will be less than 20 inches (51 cm) above level ground when the vehicle is fully loaded. The lowermost steps may extend below the angle of approach or departure or ground clearance limits if they are designed to swing clear. The tread of the bottom steps must be at least 8 inches (20 cm) in width and succeeding steps at least 16 inches (40 cm) in width. The full width of all steps must have at least 6 inches (15 cm) of unobstructed toe room or depth when measured from, and perpendicular to, the front edge of the weight-bearing surface of the step.

3.5.5 Ancillary equipment. Ancillary equipment listed in NFPA 414 A.4.2.1 (1)-(17) is not covered by this Procurement Specification in accordance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles. Ancillary equipment is funded separately by other sources.

NOTE: Equipment funding will be obtained as a separate contract under the provisions of AC 150/5210-14, Aircraft Rescue and Fire Fighting Equipment, Tools, and Clothing.

3.6 Agent system.

3.6.1 Agent (fire) pump. The vehicle will be equipped with a centrifugal pump capable of providing the performance specified herein as prescribed by NFPA 414.

3.6.1.1 Agent system piping. All piping, couplings, and valves and associated components that come into contact with the agent will be in accordance with NFPA 414.

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

3.6.1.3 Intake connections. The vehicle will be equipped with one valved 4½-inch intake connection on the left side. The vehicle will be equipped with one valved 2½-inch intake connection on the left side adjacent to the 4½-inch intake connection with both having either a 30° or 45° turn-down fitting. The 4½-inch intake connection will have male National Hose threads, a quarter-turn control valve, a bleeder valve, a strainer, a cap, and a slow-operating valve and an automatic pressure relief device. 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. The vehicle will be capable of filling its water tank by pumping from a draft, a hydrant, or a nurse truck through either of the intake connections without the use of a hose from a discharge connection to a tank fill connection.

3.6.1.4 Discharge connections. Two 2½-inch discharge connections with male National Hose threads will be provided. One 2½ - inch discharge will be provided on each side of the vehicle. Each connection will be equipped with a cap, a quarter-turn control valve, a bleeder valve, and a pressure gauge. Each connection will be rated at 250-gpm minimum.

3.6.1.5 Piping, couplings, and valves. All agent system piping will conform to NFPA 414 criteria.

3.6.1.6 Overheat protection. The agent system will be equipped with an overheat protection system in accordance with NFPA 414. Overheat protection is not required on vehicles utilizing a pre-mixed pressurized foam system.

3.6.1.7 Pressure relief valves. The agent system will be equipped with pressure relief valves in accordance with NFPA 414.

3.6.1.8 Drains. The agent system will be equipped with a drainage system in accordance with NFPA 414.

3.6.2 Water tank. The vehicle will have a water tank with a manufacturer certified minimum capacity of at least 3000 gallons.

3.6.2.1 Water tank construction. The water tank will be constructed of passivated stainless steel, polypropylene, or Glass Reinforced Polyester (GRP) construction. All materials used will be capable of storing water, foam concentrate, and water/foam solutions.

3.6.2.2 Water tank overhead fill cover and drain. The water tank will be equipped with a 20 inch fill tower. The tower will be designed to allow for video inspection of the water tank interior. The water tank will incorporate a drain and drain valve at the lowest point to allow for complete drainage of the plumbing system. 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.

3.6.2.3 Water tank overflow system and venting. The water tank will incorporate a venting system to relieve pressure on the tank during fill and discharge operations at maximum flow rates. It will have an overflow system to relieve excess fluid in the event of tank overflow. The vent and overflow system will prevent leakage of water when the tank is filled to capacity and the vehicle is operating on the maximum side slopes and grades specified herein. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in the track of any of the tires. Tank vent hoses will be of the non-collapsible type.

3.6.2.4 Water tank top fill opening. A top fill opening of not less than 8 inches internal diameter with a readily removable ¼-inch mesh strainer will be provided. The fill opening may be incorporated as part of the manhole cover, and will be sized to accommodate a 2½-inch fill hose.

3.6.2.5 Water tank fill connections. The water tank will incorporate one 4½-inch male National Hose thread connection and one 2½-inch rocker lug female National Hose thread connection on each side of the vehicle. Each connection will be fitted with a 30° turn-down fitting. The water fill will allow external re-supply of the water tank during discharge pumping operations. Each tank fill connection will be in accordance with NFPA 414.

3.6.3 Foam system. (**NOTE:** *The requirements of section 3.6.3 do not apply to pre-mixed pressurized foam systems.*)

3.6.3.1 Foam concentrate tank. 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 (i.e., 7.0-percent).

3.6.3.1.1 Foam tank construction. The foam tank will be constructed of passivated stainless steel, polypropylene, or GRP construction. All materials used will be capable of storing foam concentrate.

3.6.3.1.2 Foam tank drain. 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.

3.6.3.1.3 Foam tank top fill trough. The foam tank will incorporate a top fill trough mounted in the top of the tank 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 two standard 5-gallon foam concentrate containers to be emptied simultaneously. The top fill trough neck will extend sufficiently close to the bottom of the tank to reduce foaming to a minimum during the fill operation. 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.

3.6.3.2 Foam tank fill connections. The foam tank will incorporate a 1-inch National Hose thread female hose connection on each side 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 check valves and readily removable, rigidly constructed ¼-inch mesh 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.

3.6.3.2.1 Foam tank vent and overflow system. The foam tank will incorporate a vent system to relieve pressure on the tank during fill and discharge operations at maximum flow rates and an overflow system to relieve excess liquid in the event of tank overflow. 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. Drainage from the vent and overflow system will not flow over body panels or other vehicle components and will not be in front of or behind any of the tires. Tank vent hoses will be of the non-collapsible type.

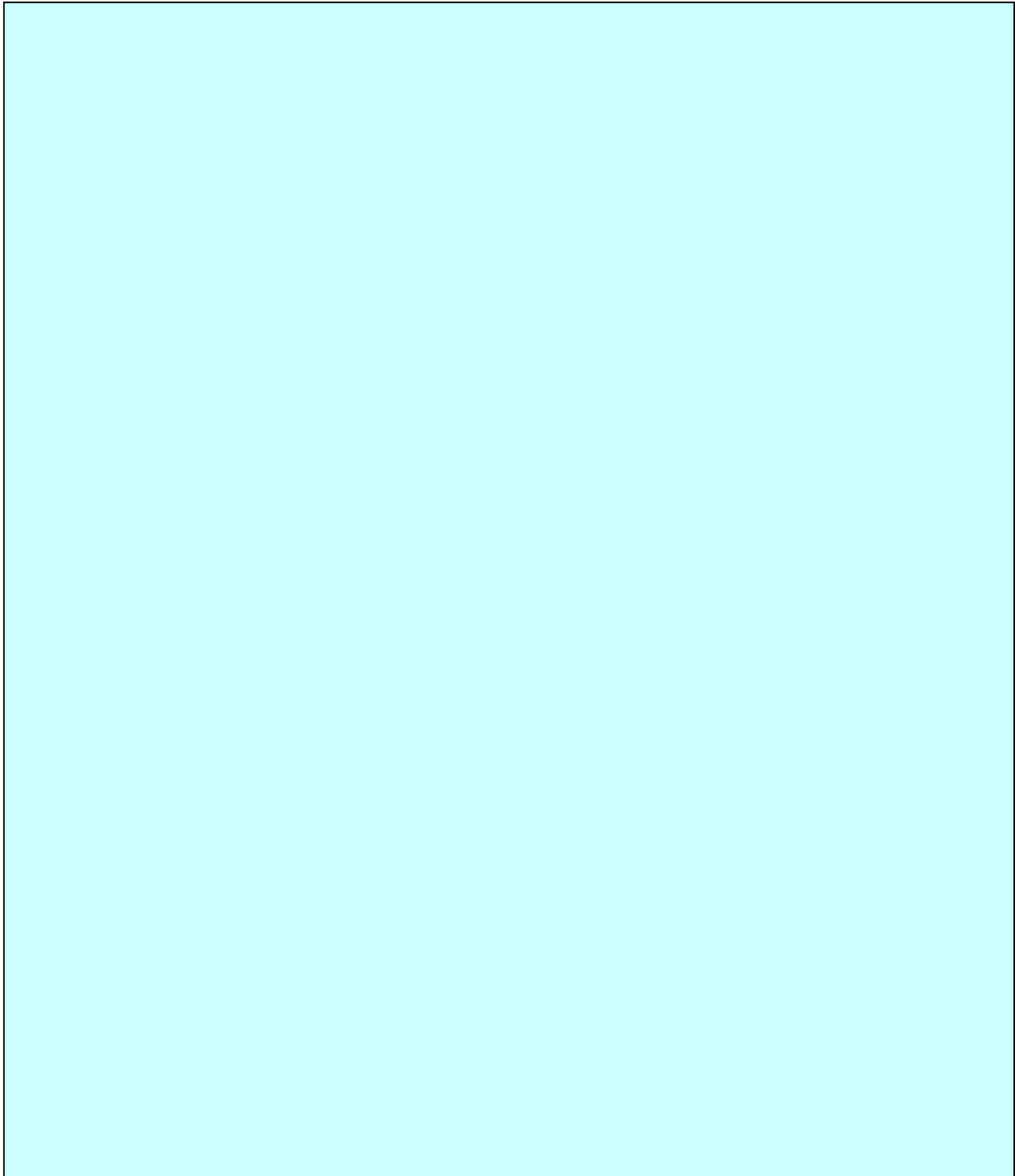
3.6.3.3 Foam transfer pump. A foam transfer pump will be provided and mounted in a compartment on the vehicle. The pump will be capable of transferring and drawing foam liquid concentrate at adjustable flow rates up to 25-gpm directly through the pump and loading connections (see 3.6.3.2). All materials 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. The pump will be removable as an assembly without disturbing other components. A suitable length of hose with appropriate connections will be provided for filling the foam tank from an external foam storage container.

3.6.3.4 Foam flushing system. The foam concentrate system will be designed in accordance with NFPA 414 so that the system can be readily flushed with clear water.

3.6.3.5 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. The foam concentrate piping will be in accordance with NFPA 414.

3.6.4 Foam proportioning system. The vehicle will have an around-the-pump or a direct injection foam proportioning system for Aqueous Film-Forming Foam (AFFF). The system will automatically and uniformly proportion water and 3-percent foam concentrate within a minimum ratio of 2.8-percent to a maximum ratio of 3.5-percent foam concentrate to water by volume. The system will also be capable of proportioning 6-percent foam concentrate (5.6-percent minimum, 7.0-percent maximum). If a fixed orifice plate system is used, a plate will be provided for each percentage foam concentrate; the additional plate will be securely mounted in a protected location on the vehicle. A fire vehicle mechanic will be able to interchange the plates using common hand tools.

3.6.5 Primary vehicle turret. The vehicle will be equipped with a standard roof-mounted turret, extendable turret, and/or high flow bumper mounted turret to serve as the primary source of agent delivery.



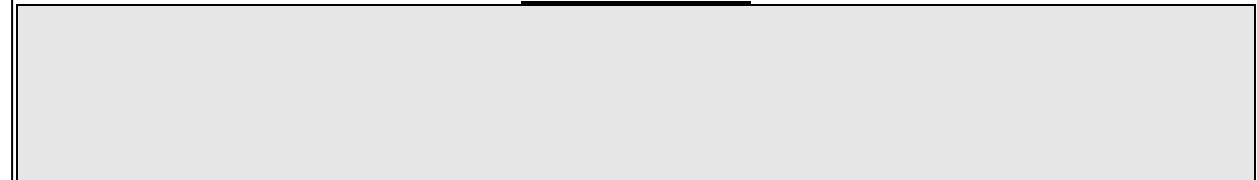
3.6.6 Bumper turret. The vehicle will be equipped with a joystick controlled, constant flow, non-air-aspirating, variable stream type:

The bumper turret will be capable of discharging at a minimum flow rate of foam or water as specified by the user, with a pattern infinitely variable from straight stream to fully dispersed. The bumper turret will be capable of automatic oscillation, with the range of oscillation adjustable up to 90° each side of center (left and right) with vertical travel capabilities of +45°/-20° meeting section 4.20.2 in NFPA 414.

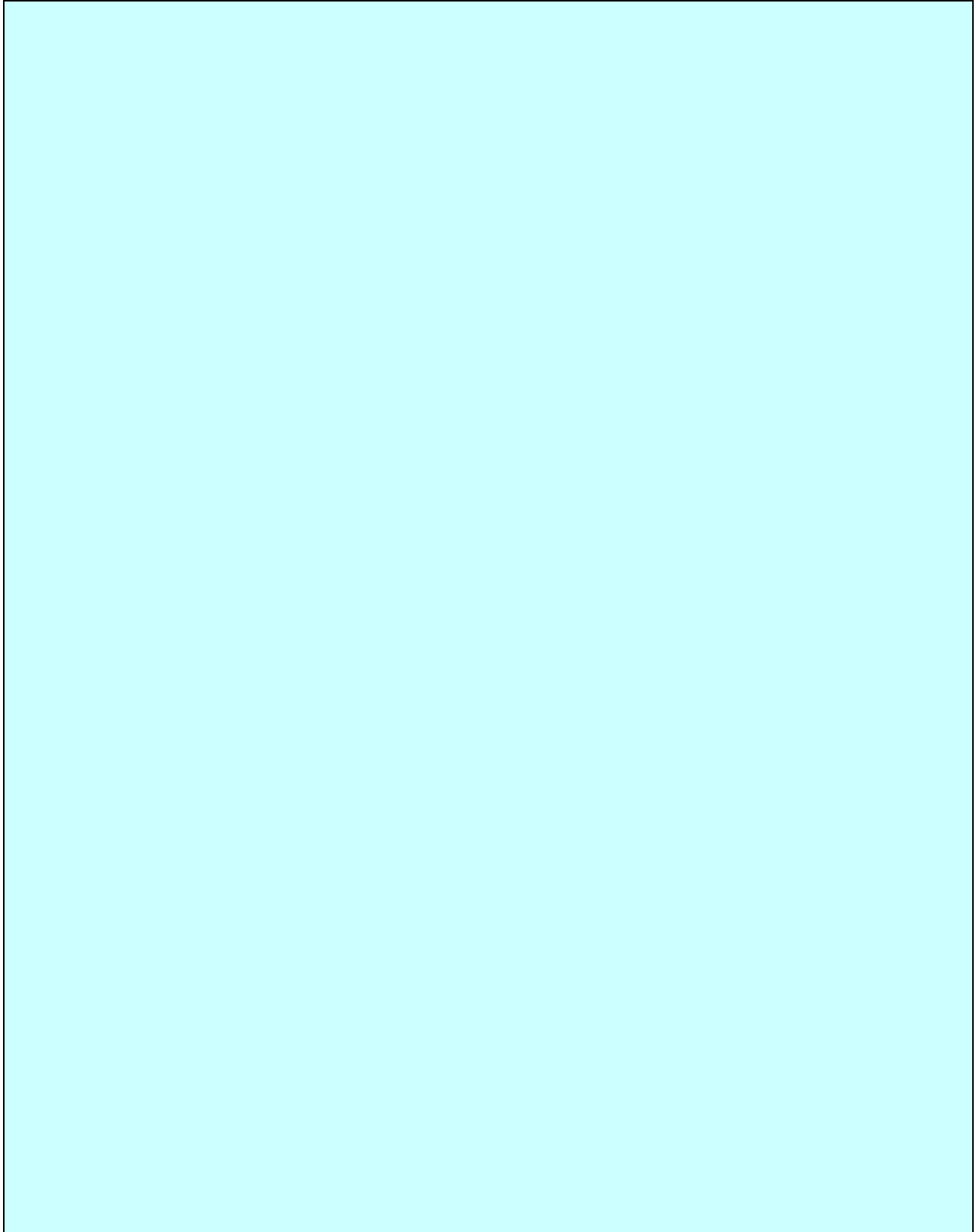
3.6.7 Preconnected handlines. A 200 foot, 1¾-inch pre-connected woven jacket handline, with a 1½-inch control valve and a pistol grip nozzle, will be located on each side of the vehicle. A safety system will be provided to prevent charging of the hose until the hose has been fully deployed. The handlines and nozzles will be in accordance with NFPA 414, and will provide 95-125 gpm at 100 psi nozzle pressure. A control for charging each handline will be provided for operation by both the driver and the turret operator.



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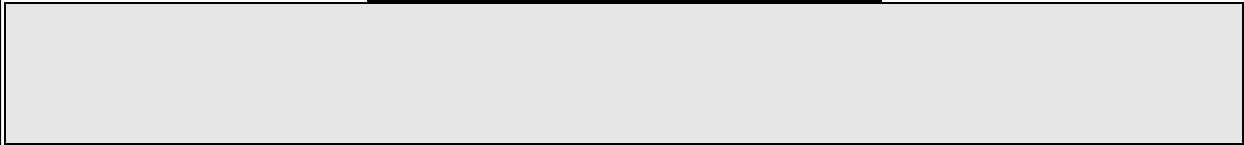


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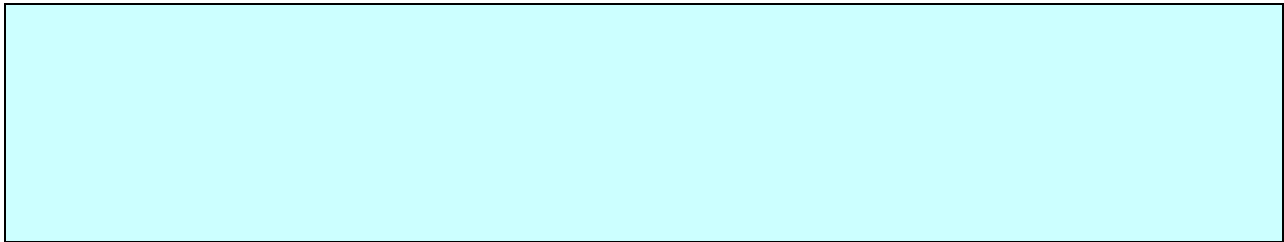




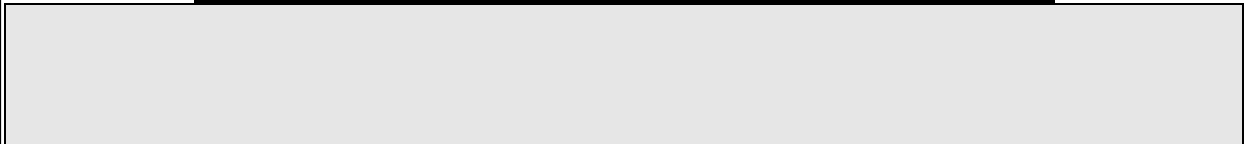
JUSTIFICATION (Dry Chemical Agent)



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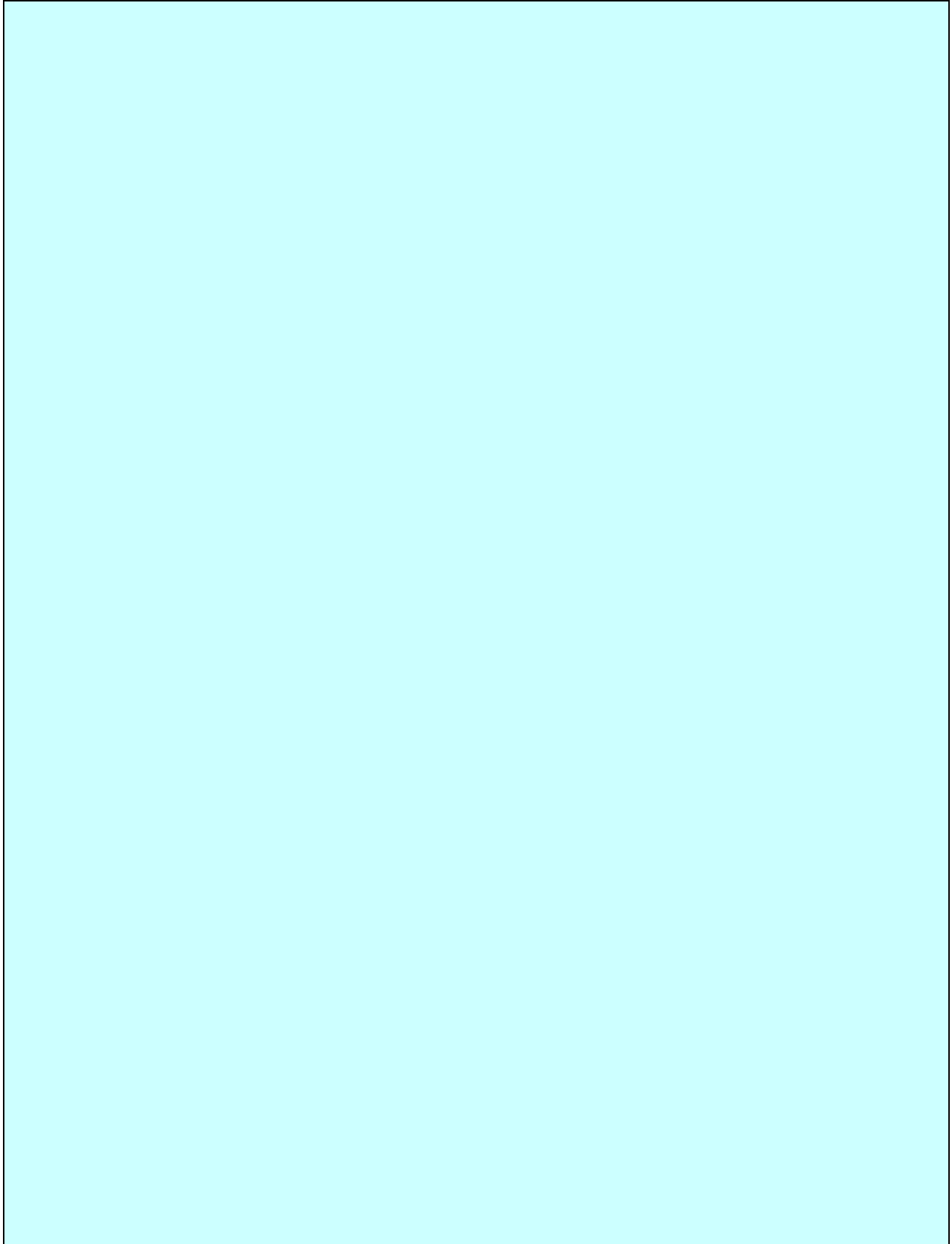


JUSTIFICATION (Dry Chemical Primary Turret Discharge Nozzle)



ADO/FAA Approval: ⇨ _____





3.9 Electrical systems and warning devices. The vehicle will have a 12-volt or 24-volt electrical and starting system.

3.9.1 Alternator. A single or dual alternator charging system will be provided. The minimum continuous electrical load will include operation of the air conditioning system.

3.9.2 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.

3.9.2.1 Battery compartment. The batteries will be enclosed in a weatherproof enclosure, cover, or compartment and be readily accessible.

3.9.3 Battery charger or conditioner. The vehicle will have a DC taper type battery charger or an automatic battery conditioner, or voltage monitoring system, 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 (see 3.9.1). 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.

3.9.4 Electromagnetic interference. The vehicle electrical system will be in accordance with SAE J551-2 for electromagnetic interference.

3.9.5 Work lighting.

3.9.5.1 Cab interior lights. Cab interior light levels will be sufficient for reading maps or manuals. At least one red and one white cab interior dome light will be provided.

3.9.5.2 Compartment lights. 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.

3.9.5.3 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. The switch located in the cab will be a master switch and must be turned on before auxiliary switches near the light sources are operational.

3.9.5.4 Spot/Floodlights. Two spot/floodlights will be attached at the end of the primary turret or at the end of the ET assembly. The lights will illuminate the area covered by the turret. Both lights will be controlled from switches in the cab. NOTE: Halogen, LED, or HID lights may be used.

3.9.5.5 Telescoping Flood Lights. Two floodlights will be provided. One light will be mounted on the left and right sides of the vehicle on extension tubes. Both lights will be controlled from switches in the cab. The lights will be powered by the auxiliary generator and manually raised. The lights will either be a 1000W halogen, 250W LED, or 200W HID type.

3.9.5.6 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 the front and two will be mounted on each side of the vehicle. The lights will be powered by the auxiliary generator, and the lights in the front will be controlled from switches in the cab. NOTE: Halogen, LED, or HID lights may be used.

3.9.6 Audible warning devices.

3.9.6.1 Siren. The vehicle will be equipped with an electronic siren system. The amplifier unit will include volume control and selection of "Radio," "PA," "Manual," "Yelp," "Wail," and "Hi-Lo" (European) modes, and a magnetic noise canceling microphone. 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. 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.

3.9.6.2 Horn. Dual forward facing air horns will be installed in protected locations near the front of the vehicle. Air horn activating foot switches will be located in front of the driver and the turret operator.

3.9.7 Emergency warning lights. All emergency warning lights will use Light Emitting Diode (LED), strobe, or rotating beacon elements and will meet the requirements of AC 150/5210-5. Lighting units will be installed on the top front, sides, and rear of the vehicle to provide 360° visibility. A switch will be provided on the instrument panel to control all of the top, side, front and rear emergency warning lights. A switch will also be provided on the instrument panel to disable all lower emergency warning lights when desired. All lighting systems will meet NFPA 414 emergency lighting criteria.

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

3.9.7.2 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.

3.9.8 Radio circuit. The vehicle will have three separate 30 amp circuits with breakers and connections provided in a space adjacent to the driver and turret operator for installation of radios and other communications equipment after the vehicle has been delivered. To facilitate the installation of the communications equipment the manufacturer will provide three antennas

pre-installed on top of the cab. ***Radios are an airport responsibility and not part of this specification.***

3.9.9 Power receptacles.

3.9.9.1 Primary power receptacles. The vehicle will have two duplex 15-amp 110-volt power receptacles, one installed adjacent to the cab door on each side of the vehicle. Each duplex receptacle will include one straight blade and one twist-lock connection. These outlets will be powered by the generator.

3.9.9.2 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.

3.9.9.3 Cable reel. The vehicle will be equipped with an electrical cable reel, located within a compartment. The reel will be equipped with 200 feet of 20 amp, 600 volt, 90°C insulated electrical cable. The electrical cable will be equipped with a rubber ball stop to prevent cable pull through during rewinding operations. A four-way roller guide will be provided on the cable reel to prevent chafing of cable insulation. The cable reel will have an electric rewind motor with provisions for manual rewind in the event of motor failure; the manual rewind handle will be securely stored near the cable reel. A portable weatherproof duplex outlet box, with built-in circuit breakers and twist-lock receptacles, will be provided for on the cable end. The cable reel will be powered by the auxiliary generator.

3.9.10 Auxiliary generator. A minimum [redacted] kilowatt (KW) (continuous rating), 120/240-volt, 60 hertz, diesel, hydraulic, or split shaft Power Takeoff (PTO)-driven generator will be provided.

3.10 Line voltage electrical system.

3.10.1 Electrical shoreline connection. The battery charger/conditioner will be powered from a covered, polarized, insulated, labeled, recessed (flush mounted), male, 110 volt AC auto-eject receptacle. The connection will be located on the exterior of the vehicle at the rear or on either side of the cab. A weatherproof charge meter will be installed next to the receptacle. A 15 amp rated, 110-120-volt, AC straight blade (non twist-lock) connector will be provided.

3.11 Air systems.

3.11.1 Air hose reel. An air hose reel will be provided in an enclosed compartment on the vehicle. The hose reel will be equipped with 200 feet of 3/8-inch I.D. hoseline. A 3/8 inch National Pipe Taper (NPT) fitting and female style quick disconnect will be connected to the end of the hoseline. A four-way roller guide will be provided for the hose reel to prevent hose chafing and kinking. The hoseline will be equipped with a rubber ball stop to prevent hose pull through on roller guides during rewinding operations. The hose reel will have an electric rewind motor and provisions for manual rewind in the event of motor failure; the manual rewind handle will be securely stored near the hose reel. A pressure protected air supply from the chassis air system will be connected to the hose reel. The air supply lines will be routed with minimum bends and located or guarded from damage from the carried equipment.

3.12 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.

4. REGULATORY REQUIREMENTS.

4.1 Recoverable Materials. The contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with Title 48: Federal Acquisition Regulations System, Part 2823—Environment, Conservation, Occupational Safety, and Drug-free Workplace, Subpart 2823.4 Use of Recovered Material, 403 Policy and 404 Procedures.

4.2 Green Procurement Program. Green Procurement Program (GPP) is a mandatory federal acquisition program that focuses on the purchase and use of environmentally preferable products and services. GPP requirements apply to all acquisitions using appropriated funds, including services and new requirements. FAR 23.404(b) applies and states the GPP requires 100% of EPA designated product purchase that are included in the Comprehensive Procurement Guidelines list that contains recovered materials, unless the item cannot be acquired:

- a. competitively within a reasonable timeframe;
- b. meet appropriate performance standards, or
- c. at a reasonable price.

The prime contractor is responsible for ensuring that all subcontractors comply with this requirement. Information on the GPP can be found at:

http://www.dot.gov/ost/m60/DOT_policy_letters/apl8_04.pdf or FAR 23.404(b):
http://www.acquisition.gov/far/current/html/Subpart%2023_4.html.

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. Performance inspection (see 5.2).
- b. Conformance inspection (see 5.3).

5.2 Performance inspection. The vehicle will be subjected to the examinations and tests described in 5.6.3.1 through 5.6.3.5 (if applicable). The contractor will provide or arrange for all test equipment, personnel, schedule, and facilities.

5.3 Conformance inspection. The vehicle will be subjected to the examinations and tests described in 5.6.3.1 through 5.6.3.5 (if applicable). The contractor will provide or arrange for all test equipment, personnel, and facilities.

5.4 Product conformance. The products provided will meet the performance characteristics

of this PS, 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.

5.5 Technical proposal. The offeror/contractor will provide an itemized technical proposal that describes how the proposed model complies with each characteristic of this PS; a paragraph by paragraph response to the characteristics section of this PS 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 PS.

5.6 Inspection requirements.

5.6.1 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.

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

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

5.6.3 Detailed inspection requirements.

5.6.3.1 Examination of product. All Component Manufacturers Certifications, as well as Prototype Vehicle Testing and Operational Testing, 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. Proper operation of vehicle functions will be verified as defined by NFPA 414, Acceptance Criteria chapter. A copy of the vehicle manufacturer's certifications will be provided with each vehicle in accordance with NFPA 414. The airport performing the test may accept manufacturer and or third party certification that prior testing was performed and the vehicle meets the performance parameters of NFPA 414.

5.6.3.1.1 Roadability test. The fully loaded vehicle will be driven over ten miles of paved and ten miles of cross country terrain consisting of open fields, broken ground, and uneven terrain. After completing the driving portion of the roadability test, all loads will be removed and all structure and surfaces will be visibly inspected for failure or permanent deformation.

5.6.3.1.2 Gradeability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.2.

5.6.3.1.3 Tilt table test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.3. If an adjustable height suspension system is provided, the suspension system may be set to the height normally used on hard pavement.

5.6.3.1.4 Cornering stability test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.1.6.4.

5.6.3.1.5 Weight and weight distribution measurement. Each vehicle will be weighed (full and empty) to demonstrate compliance with NFPA 414.

5.6.3.1.6 Dimension measurement. The vehicle will be measured in accordance with NFPA 414. In addition to the dimensions listed in NFPA 414, the overall length, width, and height will be measured to demonstrate compliance with 3.2.1.

5.6.3.1.7 Angles of approach and departure measurement. The angles of approach and departure of the fully loaded vehicle will be measured to demonstrate compliance with 3.2.2.

5.6.3.1.8 Acceleration test. Each vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.1.2. A time-distance recorder, engine electronic measurement or Global Positioning System (GPS) based electronic data collection system will be used to record data for this test.

5.6.3.1.9 Maximum speed test. Each vehicle will be tested in accordance with 5.4.4 of NFPA 414 to demonstrate compliance with 3.3.1.3. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.10 Pump and roll on a 40-percent grade test. The fully loaded vehicle will be tested in accordance with NFPA 414.

5.6.3.1.11 Service brake system test. Each vehicle will be tested in accordance with NFPA 414. A time-distance recorder or GPS based electronic data collection system will be used to record data for this test.

5.6.3.1.12 Air system and air compressor test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.1.13 Turning diameter test. The fully loaded vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.3.12.2.

5.6.3.1.14 Evasive maneuver test. The fully loaded vehicle will be tested in accordance with NFPA 414 at 35 miles per hour (mph) (56 kilometers per hour (kph) to demonstrate compliance with AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.2 Cab interior sound level test. The cab interior sound levels of the vehicle will be measured in accordance with NFPA 414 to demonstrate compliance with 3.4.2.

5.6.3.3 Agent system tests.

5.6.3.3.1 Agent discharge pumping test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.2 Pump and maneuver test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.3 Hydrostatic pressure test. Each vehicle will be tested in accordance with NFPA 414.

5.6.3.3.4 Priming device test. Each vehicle that is equipped with a priming pump will be tested.

5.6.3.3.5 Agent tank capacity test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with the capacity requirements of 3.6.2 and 3.6.3.1.

5.6.3.3.6 Water tank fill and overflow test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with 3.6.2.3.

5.6.3.3.7 Foam concentration test. Each vehicle will be tested in accordance with NFPA 414 at the 3-percent concentration setting to demonstrate compliance with the foam concentration quality requirements of 3.6.4.

5.6.3.3.8 Primary turret flow rate test. The vehicle will be tested in accordance with NFPA 414. Each vehicle will be tested to demonstrate compliance with NFPA 414.

5.6.3.4 Electrical system tests.

5.6.3.4.1 Electrical charging system test. The vehicle will be tested in accordance with NFPA 414 to demonstrate compliance with Annex B.4 of NFPA 414.

5.6.3.4.2 Electromagnetic interference test. The vehicle will be tested in accordance with NFPA 414 and SAE J551 to demonstrate compliance with 3.8.4.

5.6.3.5. Extendable turret. Each vehicle equipped with an extendable turret nozzle will be tested in accordance with NFPA 414 (2007 Edition) and NFPA 1901 (2009 Edition) as specified in AC 150/5220-10, Guide Specification for Aircraft Rescue and Fire Fighting (ARFF) Vehicles.

5.6.3.6 Piercing/penetrating nozzle test. Each vehicle equipped with a piercing/penetrating nozzle will be tested in accordance with NFPA 414.

6. PACKAGING.

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

6.2 The vehicle must be delivered 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.

6.3 The manufacturer may pre-ship chemical agents to a receiving airport to place a vehicle into operational status upon delivery. The manufacturer has the responsibility for provisioning these agents and propellants.

6.4. The vehicle manufacturer must provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.

7. TRAINING.

7.1 Upon delivery of the vehicle to the airport, the manufacturer must, at no additional cost, provide the services of a qualified technician for 5 consecutive days (or up to 8 days for an extendable turret) 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 must be provided by the manufacturer to allow various shifts to complete the training requirements.

7.2 The technician must provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup must 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 should 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.

7.3 Training must 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 must include materials that can be used to train subsequent new operators.

8. REFERENCED DOCUMENTS.

8.1 Source of documents.

8.1.1 The CFR may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington DC 20402.

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.

8.1.2 SAE documents may be obtained from SAE, Inc., 400 Commonwealth Drive, Warrendale PA 15096.

8.1.3 National Fire Protection Association (NFPA): NFPA documents may be obtained from NFPA, Batterymarch Park, Quincy MA 02269-9101.

NFPA 412, Standard for Evaluating Aircraft Rescue and Fire-Fighting Foam Equipment (2009 Edition)

NFPA 414, Standard for Aircraft Rescue and Fire Fighting Vehicles (2007 Edition)

NFPA 1901, Standard for Automotive Fire Apparatus (2009 Edition)

8.1.4 Federal Aviation Administration (FAA): FAA ACs may be obtained from the FAA website: http://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: Federal Aviation Administration, ATO-W CM-NAS Documentation, Control Center, 800 Independence Avenue, SW, Washington, DC 20591. Telephone: (202) 548-5256, FAX: (202) 548-5501 and website: http://www.faa.gov/about/office_org/headquarters_offices/ato/service_units/techops/atc_facilities/cm/cm_documentation/



Print Class 5 Specification

APPENDIX A. FUNDAMENTAL STANDARDS: FAA ADDITIONS, EXEMPTIONS, OR AMENDMENTS TO NFPA 414

NOTE: *The numbering system listed in this section directly corresponds to chapters in the NFPA 414 2007 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 or amendments (see NFPA 414 Chapter Three, below, for definitions).*

A.1. NFPA 414 CHAPTER ONE: ADMINISTRATION

For the purposes of this AC, the term "Manufacturer" is defined as the manufacturer, distributor, lessor, or supplier of ARFF vehicle equipment.

A.1.1 ADDITION: 1.1

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.

A.1.2 ADDITION: 1.3.4

Vehicles must be painted and marked in keeping with the standards of AC 150/5210-5, Painting, Marking, and Lighting of Vehicles Used on an Airport.

A.2. NFPA 414 CHAPTER THREE: DEFINITIONS

A.2.1 ADDITION:

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.

Vehicle Classes:

- Performance requirements for classes 1, 2 and 3 vehicles follow the NFPA 414 Performance requirements for ≥ 100 and ≤ 528 gallons.

- Performance requirements for class 4 vehicles follow the NFPA 414 Performance requirements for ≥ 528 and ≤ 1585 gallons.
- Performance requirements for class 5 vehicles follow the NFPA 414 Performance requirements for ≥ 1585 gallons.

Table A-1. Usable Capacities

Class of Vehicle	Water or Water/Foam Solution		Dry Chemical or Clean Agent *	
	Gallons (U.S.)	Liters	Pounds	Kilograms
1	100	454	500 / 450 / 460	225 / 204 / 209
2	300	1,136	500 / 450 / 460	225 / 204 / 209
3	500	1,900	500 / 450 / 460	225 / 204 / 209
4	1,500	5,685	See 14 CFR Part 139, Para 139.317	
5	3,000 to 4,500 in 500 gallon increments	11,360 to 17,035 in 1,900 liter increments	See 14 CFR Part 139, Para 139.317	

*500 lbs of Sodium- or 450 lbs Potassium-based (i.e. Purple K Powder), or 460 lbs Halogenated agent.

A.3. NFPA 414 CHAPTER FOUR: AIRCRAFT RESCUE AND FIRE-FIGHTING VEHICLES

14 CFR 139.317 requires at least one vehicle to be equipped with dry chemical or approved clean agent regardless of airport index. Approved equivalent complementary agent systems referenced in NFPA 414 Chapter 3 are acceptable optional additions to the basic vehicle when dictated by local operational needs.

NOTE: *Commercially manufactured chassis used to manufacture Class 1, 2 and 3 vehicles must comply with Federal Motor Vehicle Safety Standards (FMVSS). If NFPA requirements are more demanding, they take precedence.*

A.3.1 ADDITION: 4

All moving parts requiring routine lubrication must have a means of providing for such lubrication. There must be no pressure lubrication fittings where their normal use would damage grease seals or other parts.

A.3.2 AMENDMENT: 4.2.1.2.1 (2).and (3)

Class 1, 2 and 3 vehicles are exempt from this requirement.

A.3.3 ADDITION: 4.2.2.3

Class 4 and 5 vehicles must be provided with mirrors that effectively cover the blind spot area in front of the vehicle that is not within the operator's direct view.

A.3.4 ADDITION: 4.3

The engine and transmission must 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.

The engine oil and transmission fluid filters must be of the full-flow type with a replaceable spin-on element for class 4 and 5 vehicles.

A.3.5 AMENDMENT: 4.3.3.5.1

For class 1, 2 and 3 vehicles (refer to Table I-1) sufficient capacity must be provided for a minimum of 100 miles (160 km) of highway travel at 60 MPH (97 kph) and 1 hour of pumping at the full rated discharge if the foam/water agent discharge system is engine driven.

A.3.6 AMENDMENT: Table 4.1.1 (a) and (b)

Evasive Maneuver test must be conducted at 35 MPH (56 KPH).

A.3.7 AMENDMENT: Table 4.1.1 (c), (d), and 3b (a).

For class 1, 2 and 3 vehicles nozzle flow rate must be \geq 60 GPM.

A.3.8 ADDITION: 4.6

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 (20 cm) diameter half round at 35 mph (56 kph) must be provided.

The suspension design by which the manufacturer meets the suspension performance requirements is at the manufacturer's discretion.

A.3.9 AMENDMENT: 4.11.5.1(3)

Crew seats with individual retractable 3 point restraint seatbelts.

A.3.10 AMENDMENT: 4.11.5.1 (11).

Not applicable to Class 1, 2, and 3 vehicles.

A.3.11 ADDITION: 4.8

Pintle hooks on class I, II, and III vehicles not to exceed maximum towing capacity of the vehicle.

The towing devices may be allowed to intrude into the 30-degree approach angle in order to provide ease of connection if needed.

A.3.12 ADDITION: 4.12.3

All compartments will be provided with weatherproof lights that are switched to light automatically when compartment doors are opened and the vehicle master switch is in the 'on' position.

A.3.13 AMENDMENT: 4.12.6

The height between steps must be less than 20 inches (51 cm). For class 1, 2, and 3 vehicles the lower steps must be no more than 19 inches (49 cm) from the ground. The lowermost steps may extend below the angle of approach or departure or ground clearance limits if they are designed to swing clear. The tread of the bottom steps must be at least 8 inches (20 cm) in width and succeeding steps at least 16 inches (40 cm) in width. The full width of all steps must have at least 6 inches (15 cm) of unobstructed toe room or depth when measured from, and perpendicular to, the front edge of the weight-bearing surface of the step.

A.3.14 EXCEPTION: 4.12.8

Vehicles must be painted and marked in keeping with the standards of AC 150/5210-5.

A.3.15 EXCEPTION: 4.12.8.1

Vehicles must be painted and marked in keeping with the standards of AC 150/5210-5.

A.3.16 ADDITION: 4.13

Table A-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, 2, & 3 Vehicles	Class 4 & 5 Vehicles - This firefighting system has not been evaluated for Class 4 & 5 Vehicles
Foam Performance	See NFPA 414, 2007 Ed. Table 4.1.1	N/A
Dry Chemical Performance		
• Discharge rate	≥ 8 lbs/sec (4.9 liters/sec)	N/A
• Discharge rate with foam	≥ 8 lbs/sec (4.9 liters/sec)	N/A
• Discharge rate with foam and clean agent	≥ 6 lbs/sec (3.7 liters/sec)	N/A
• Hand Line Range	≥ 90 ft (27.5 M)	N/A
• Hose Length	See NFPA 414, 2007 Ed. Table 4.1.1	N/A
• Turret Range	≥ 100 ft (30.5 M)	N/A
• Turret Width	See NFPA 414, 2007 Ed. Table 4.1.1	N/A
Clean Agent Performance		
• Discharge with foam	≥ 1 lb/sec (0.61 liters/sec)	N/A
• Discharge with foam and dry chemical	≥ 1/3 lb/sec (0.2 liters/sec)	N/A
• Independent Clean Agent Range	≥ 40 ft (12.2 M)	N/A
• Inside Hose Diameter	≥ ¼ inch (0.64 cm)	N/A
• Hose Length	See NFPA 414, 2007 Ed. Table 4.1.1	N/A

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) Otherwise, the standards of Tables 4.1.1(c) and 4.1.1(d) apply.*

A.3.17 COMPRESSED AIR FOAM SYSTEM (CAFS):

Compressed Air Foam System (CAFS) allows for improved fire suppression capability. CAFS must have expansion ratios of 6:1 to 10:1 with 8:1 being optimal. CAFS is currently restricted to Class 1, 2 and 3 vehicles as it has not been demonstrated on primary or auxiliary turrets of Class 4 and 5 vehicles.

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

A.3.18 AMENDMENT: 4.15.2.2:

Manhole covers are not required for class 1, 2 and 3 vehicles.

A.3.19 AMENDMENT 4.16.1.6:

For Class 1, 2 and 3 vehicles, the foam tank must be equipped with at least one top fill opening of not less than 5 in (127 mm) internal diameter.

A.3.20 EXCEPTION: 4.18.6 (1).

The only sections of Chapter 20 of NFPA 1901, 2003 Edition that are applicable are the following:

- 20.14.2
- 20.14.3
- 20.19 through 20.19.6
- 20.20 Structure
- 20.23 Instruction Plates and Signs

A.3.21 AMENDMENT: 4.18.6.6

If an extendable boom is specified by the purchaser, a skin penetrating nozzle must be provided. The penetrating nozzle must be movable to allow for proper alignment of the penetrator to the aircraft fuselage for piercing operations. It must be capable of the minimum water/flow rate and pattern requirements of Tables 4.1.1(c) and 4.1.1(d) (not applicable to class 1, 2 and 3 vehicles).

A.3.22 EXCEPTION: 4.24.4

Vehicles must be lighted at a minimum in keeping with the standards of AC 150/5210-5. Refer to Appendix B for maximum allowable lighting.

A.4. NFPA 414 CHAPTER FIVE: INTERIOR ACCESS VEHICLE

A.4.1 ADDITION: Chapter 5

An Interior Access Vehicle (IAV) must meet at least the agent requirements of CFR Part 139.317(a).

A.4.2 AMENDMENT: 5.1.3

The vehicle must provide access to sill heights of between 7 feet (2.3 meters) and up to at least the lower sills of the largest aircraft operating at the airport. This sill height is sufficiently low enough to allow access to the lowest sill height aircraft currently in operation (e.g. DC9) that does not have its own integral stairs.

A.4.3 ADDITION: 5.4

While on a 15 degree tilt the platform and stairs must be able to be leveled as a unit to within 5 degrees of horizontal for operational use.

A.4.4 AMENDMENT: 5.4.2

The vehicle must pass a 15 degree tilt test with stairs fully extended without stabilizing equipment. However, the platform is not required to be fully loaded to the design weight capacity. Side wheel chocks may be used to prevent the vehicle from sliding on the table surface, but their height is not to exceed 5% of the tire diameter.

NOTE: *The FAA will allow side wheel chocks to prevent an IAV from sliding on a tilt table surface with a low coefficient of friction. The FAA has accomplished some IAV testing using a tilt table that followed standards from ANSI/ITSDF B56.6-2005 which allows chocking not to exceed 5% of the vehicle's tire diameter.*

A.4.5 ADDITION: 5.5

The vehicle must meet the requirements of the Society of Automotive Engineers (SAE) ARP1247, Aircraft Ground Support Equipment – General Requirements, Rev. D, Paragraphs:

3.13.1.9 – Equipment Stability: The stability of the unit will be stated in terms of Stability Ratio. The Stability Ratio is defined as the ratio of the restoring moment to the overturning movement. If the ratio is greater than one, the unit is increasingly stable as the ratio increases. If the ratio is less than one, the unit will overturn.

3.13.1.9.1 – The unit in operating condition, in its most unstable configuration, will have a minimum stability ratio of at least 1.2 when exposed to a wind load or jet blast of 19.4 lb/ft² (928.9 Pa) (80 mph) (128.7 km/h) applied from the direction most likely to cause instability. It must also withstand a wind load of 24.4 lb/ft² (1168.3 Pa) (90 mph) (144.8 km/h) without overturning.

Wind or jet blast unit forces will be based on:

$$F=0.00252 V^2 C_D$$

Where: C_D is the drag coefficient, assumed to be 1.20, $0.00252V^2$ is stagnation pressure of dry air at 68°F (20°C) and standard atmospheric pressure with velocity of V miles per hour, and F is the unit force in pounds per square foot.

3.13.1.9.3 – If stabilizers, outriggers, and/or spring lockouts are used or combination of same or similar device to gain stability, calculations or test data will be developed both with and without the devices.

A.5. NFPA 414 CHAPTER SIX: ACCEPTANCE CRITERIA

A.5.1 ADDITION: 6.1

The vehicle must be delivered 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.

The vehicle must be provided with all fire fighting agents and propellants to make it operational upon delivery.

The vehicle manufacturer must provide initial adjustments to the vehicle for operational readiness and mount any ancillary appliances purchased through the vehicle manufacturer as part of the vehicle.

A.5.2 AMENDMENT: 6.1.5

Upon delivery of the vehicle to the airport, the manufacturer must, at no additional cost, provide the services of a qualified technician for up to a maximum of 5 consecutive days (or up to 8 days for an extendable turret) for training. This is considered sufficient time for the purchaser to adjust shift work schedules in order to obtain maximum employee attendance at training sessions at some point during the training period. During this time sufficient repetitive learning opportunities must be provided by the manufacturer to allow various shifts to complete the training requirements. The technician must provide thorough instruction in the use, operation, maintenance and testing of the vehicle. This setup must 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 should 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. Training must include written operating instructions that depict the step-by-step operation of the vehicle. Written instructions must include materials that can be used to train subsequent new operators.

A.5.3 AMENDMENT: 6.3.2.6

Evasive maneuver test must be conducted at 35 MPH (56 KPH).

A.5.4 ADDITION: 6.4.3.2

GPS Based electronic data collection system.

A.6. NFPA 414 ANNEX A**A.6.1 AMENDMENT: A4.1.5**

All options listed in A4.1.5 are approved options as amended below.

- 4c. Auxiliary generator capacity as specified by the manufacturer.
- 5e. Spare tire(s) - Only one spare tire on a rim not mounted on the vehicle is automatically approved
- 8m. Video Recorder for color and or Forward Looking Infrared (FLIR) camera(s) – Digital Format Only
- 8o. Pre-connect handlines and nozzles.
- 8y. Remote mounted instrument and control panel (structural panel) includes:
 - (1) Engine instruments and pump controls, including a tachometer, an oil pressure gauge, a temperature gauge, and a pressure control; pump shift; manual metering control; two compound suction-pressure gauges; water tank isolation valve; and panel lights.
 - (2) Either one or two 2-1/2 inch discharge valves must be provided. Each discharge valve must be provided with pressure gauge and bleeder. One manual metering control will be provided.
 - (3) One 2-1/2 inch and one large diameter suction inlet connection with bleeder must be provided, if specified.
 - (4) A priming pump and reservoir must be provided if specified.

The following items from the options list A4.1.5 require justification to obtain FAA approval:

- 2a. Added payload capacity (GVWR) to carry special equipment where the purchaser identifies added equipment.
- 2c. Audio-visual devices that meet or exceed the field of vision provided by wide-angled mirrors.
- 3a. Engine that operates at necessary performance above 2000 ft (609.6 M) elevation.
- 3b. Radiator shutters.
- 3c. Engine coolant filter.
- 5f. Bead locks on all tires and rims.
- 7d. FLIR camera and in-cab monitor located in the cab.

- 8d. Foam tank drain valve(s), drain line and hose that facilitate draining the tank into specified container(s) positioned on the ground within 10 ft. (3 M) in either horizontal direction of the foam tank drainage system.
- 8g. Turret controls located in the cab or on the roof platform

The following items from the options list A4.1.5 are not allowed as user-specified options, but may be used by manufacturers to meet the stability requirements of this specification:

- 5a. Reduced under-axle and underbody clearances to provide a more stable performance on pavement when the vehicle suspension is designed to permit instantaneous adjustment to the required height for off-pavement travel.
- 5b. Tag or other non-powered axle(s) to assist weight distribution and/or stability requirements.
- 5c. Vehicle stability systems.
- 5d. Passive or active suspension components to increase the stability of the vehicle while decreasing the rollover threshold.

The following items from the options list A4.1.5 are not approved options:

- 2b. Increased overall width of the vehicle to facilitate increased performance and maneuverability with no concern for movement on public highway(s).
- 3f. Automatic drain(s) for the diesel fuel-water separator.
- 3g. Auxiliary fuel tank(s) commensurate with the need to meet local requirements.
- 5g. Run flat devices in all tires and wheels mounted on the vehicle.
- 8a. Water tank design that allows access with each baffled compartment of the tank for internal and external inspection/service.
- 8i. Turret(s) control(s) accessible both to the driver and the crew member.

A.6.2 AMENDMENT: A4.2.1.

Options 1-17 are not available for ARFF vehicle specification under this advisory circular.

A.6.3 ADDITIONAL OPTIONS.

The following options are available in addition to those discussed above in NFPA 414 Annex A.

A. The following are approved options and require no further justification.

WORKSHEET FOR SUBSYSTEM COMPONENT SELECTION

- Lubrication (Continuous duty cycle lubrication systems for suspension parts and other mechanical equipment joints have shown the ability to extend the time before repair and costly maintenance is required on over-the-road as well as heavy excavation equipment. The installation of this type of system is in line with the FAA's goal of extending vehicle service life.): Classes 4-5
- Backup Camera with Monitor: Classes 4-5
- Heated Mirrors (The heated mirrors might be helpful to the driver/crew member to see clearly in the inclement weather.): Classes 1-5
- CAFS (Improved Fire Suppression): Classes 1-3
- Means to keep brake system air reservoir up to operational pressure (The selected method of reservoir pressurization must be considered based on the local resource requirement. However, cost effectiveness must also be considered so it does not impact the "as-built" vehicle performance. It is viewed as a local operational decision.):
 1. (110V or 220V auxiliary on-board compressor): Classes 4-5
 2. (House air fitting): Classes 4-5
 3. (Both): Classes 4-5
- Hoisting System (Aid in propellant cylinder change.): Classes 4-5
- Height-adjustable shelf: Classes 1-5
- Height-adjustable roll-out trays: Classes 1-5
- SCBA storage (Recessed tubes in the vehicle body or racks in a side compartment):
 1. (Recessed tubes): Classes 1-5
 2. (Side compartment racks): Classes 1-5
- Air outlet receptacle: Classes 1-5
- Vehicle-mounted foam transfer pump: Classes 1-5
- Bleeder valves for water tank fills: Classes 1-5
- Air hose reel: Classes 1-5
- Electric cord reel with junction box: Classes 1-5
- Safety interlock system for pre-connect soft jacket hose. (Providing cab activation for each pre-connected soft jacket handline as well as preventing the hose from being charged in a compartment): Classes 1-5
- Swing-out hose reels. (When hose reel is mounted in lower side compartment): Classes 1-5
- Ground lighting (Activated when parking brake is engaged.): Classes 1-5
- Cab-mounted hand adjustable spotlights. (One in each corner (Class 1, 2 3 Only)): Classes 1-3
- Scene Lights (Two on each side (110v or 12 volt HID)): Classes 1-5
- Cab-Mounted Wide Lights (Two 110v or 12 volt HID lights.): Classes 1-5
- Telescoping Wide Lights (One or two 110v / 220v t on each side): Classes 1-5
- 110v receptacles on sides of cab: Classes 1-5
- Maximum Vehicle Lighting. Minimum lighting requirements are in AC 150/5210-5.
 1. (Two red or a combination of red-and-white front-mounted emergency lights): Classes 1-5
 2. (Two red or a combination of red-and-white rear-mounted emergency lights): Classes 1-5
 3. (Three red or a combination of red-and-white side-mounted emergency lights (each side)): Classes 1-5
 4. (Two amber non-emergency lights on top of vehicle): Classes 1-5
 5. (Four red or a combination of red-and-white emergency lights on top corners of the vehicle): Classes 1-5

B. The following clarifications are specifically noted in the AC as purchaser options that require approval by the local FAA Airports District or Regional Office.

(Name and Title of FAA Approving Official)

WORKSHEET FOR SUBSYSTEM COMPONENT SELECTION

Paragraph Title or Subsystem Description:	Rationale for Position:	Purchaser's Selection Class 1, 2, and 3	Purchaser's Selection Class 4 and 5
More than two Crew positions	The need for a seating configuration to accommodate more than two ARFF personnel for each vehicle is a function of local operational practices. Therefore, it is included as an option available to the purchaser.	<u>Number of seats:</u> <u>Justification:</u>	<u>Number of seats:</u> <u>Justification:</u>
Extendable Boom	FAA will fund one extendable boom for each station at each Index B through E airport.		<u>Extendable Boom:</u> Yes _____ No _____

A.7. NFPA 414 ANNEX E

A.7.1 EXCEPTION: Annex E.

AC 150/5210-19, Drivers Enhanced Vision System, supersedes NFPA 414, Standard for Aircraft Rescue and Firefighting Vehicles (2007 Edition), Annex E.

APPENDIX B. 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 must meet the following requirements:

B.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 must 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 must be located at a representative height to the predominant aircraft in use at the specific airport.
- c. Panels must be mounted on a structure (portable or stationary) that remains stable during training exercises.

B.2. COMPUTER TRAINING SYSTEM

A computer based simulator training program may be specified to increase and maintain proficiency in the employment of extendable turrets. The training package must include controls that simulate as closely as possible the actual cab environment (e.g. location of joystick, throttle, and steering wheel). The simulation software program must represent the actual maneuvering operation and controller interface of the actual operation of the elevated and extendable boom of the ARFF vehicle.

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