ARFF-1 Design & Performance Standards and Preventive Maintenance of Aircraft Rescue and Fire-Fighting Vehicles

Reference Material: Note: Exam may contain some “accepted practice” type questions not found in the reference material. When an inconsistency arises between NFPA 414 and FAA 10E, NFPA 414 will take precedence.


NFPA 414 Standard for Aircraft Rescue and Fire-Fighting Vehicles, www.nfpa.org or 1-800-344-3555

NFPA 1911 Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus, www.nfpa.org or 1-800-344-3555

Selective Catalytic Reduction https://www.dieselforum.org/about-clean-diesel/what-is-scr

Any recognized Manufacturer’s Training manual, Operator’s manual or Service manuals. Must cover recommended methods, procedures, work instructions and maintenance intervals.

**LEARNING OBJECTIVES FOR THE A-1 EXAM**

1. **Definitions:** The Aircraft Rescue Vehicle Technician shall be familiar with the definition of terms and phrases commonly used in connection with the design, performance, testing and preventative maintenance of Aircraft Rescue and Fire-Fighting vehicles to include the following:

   a. Operational tests
   b. ARFF
   c. Vehicle classification
   d. Vehicle types
   e. Ambient temperature
   f. Angle of approach
   g. Angle of departure
   h. Authority having jurisdiction
   i. Foam concentrate
   j. Center of gravity
   k. Complimentary extinguishment agent
   l. Component manufacturer’s certification
   m. Prototype vehicle
   n. In service condition
   o. Structural kit
   p. Radio Suppression
   q. Fully loaded vehicle
   r. Ramp angle
   s. Listed
   t. Off-pavement performance
   u. Percent grade
   v. SCR - Selective Catalytic Reduction
   w. Halotron I
   x. Dry chemical
   y. All wheel drive
   z. Under body clearance
   aa. Wall to wall turning diameter
   bb. water agent fire pump
   cc. Side slope stability
   dd. Gradeability
   ee. Cornering stability
   ff. Pump drive/pump & roll
   gg. Preventive maintenance
   hh. Service
   ii. Manufacturer’s certification test
   jj. No load condition
   kk. Foam expansion ratio
   ll. LSG-Limiting Speed Governor
   mm. VSG-Variable Speed Governor
   nn. AHJ-Authority Having Jurisdiction
   oo. Driver’s enhanced vision system
   pp. Forward looking infrared
   qq. Interior access vehicle
   rr. Power source rating

2. **General Requirements of Aircraft Rescue and Fire-Fighting Vehicles:** The Aircraft Rescue Vehicle Technician shall understand the Design & Performance Requirements for Aircraft Rescue and Fire-Fighting Vehicles as stated in the reference material listed above:

   a. General design requirements
      (1) Engine coolant preheater system
      (2) Engine Emissions
      (3) Fuel Systems
   b. Chassis, Cab & Vehicle components
      (1) Power assist steering
      (2) Crew allowance
   c. Water agent pump and pump drive
   d. Water (tank) reservoir
   e. Performance requirements
      (1) Suspension system
   f. Foam systems
   g. Foam (tank) reservoir
   h. Braking systems
      (1) Reservoir capacity
   i. Winterization systems
   j. Complimentary agent system
      (1) Dry Chemical
      (2) Pressure Regulator
   k. Water systems
   l. Hand lines
   m. Nozzles and turrets
   n. Independent suspension
   o. Documentation
   p. Approved Options
   q. Lateral acceleration indicator
   r. Aircraft Interior Access Vehicle
   s. Lighting & electrical
   t. Additional Vehicle Options

   continued next page
3. **Test Requirements for Aircraft Rescue and Fire-Fighting Vehicles**: The Aircraft Rescue Vehicle Technician shall understand the operational test procedures and delivery data requirements for Aircraft Rescue and Fire-Fighting Vehicles.

   a. Piping, valves and fittings
   b. Pump tests
   c. Road tests
   d. Complimentary agent tests
   e. Water agent discharge tests
   f. Halotron I discharge test
   g. Water tank flow tests
   h. Pump and roll tests
   i. Brake system performance tests
   j. Foam concentration/Foam quality test
   k. Electrical charging system tests
   l. Body and chassis flexibility tests
   m. Test requirements & procedures
      (1) Water tank fill and overflow test
   n. Test instrument requirements
   o. Low voltage & warning devices
   p. Cab interior noise test
   q. Acceleration
   r. Water tank fill & overflow test
   s. Air system/air compressor test

4. **Principles of Service and Preventive Maintenance**: The Aircraft Rescue Vehicle Technician shall understand the principles of service and preventive maintenance as applied to Aircraft Rescue and Fire-Fighting Vehicles.

   a. **Identify the elements of service and maintenance:**
      (1) Types of inspections and procedures
      (2) Visual inspections (define)
      (3) Maintenance records
      (4) Use of maintenance schedules
      (5) Manufacturer's "Accepted Practice" methods
      (6) Operational tests
         (a) hydraulic fluid

   b. **Identify the frequency of service and preventive maintenance activities to include the following:**
      (1) Daily inspections
      (2) Weekly inspections
      (3) Monthly inspections
      (4) Periodic inspections
      (5) Annual inspections

   c. **Identify areas where maintenance problems are most commonly found:**
      (1) Electrical system (low voltage)
         (a) starter wiring test
      (2) Engine system
      (3) Vehicle air system
      (4) Hydraulic system
      (5) Fire/Water pump system
      (6) Fire fighting system
      (7) Drive train system
      (8) Water/Foam agent systems
      (9) Foam pump system
      (10) Chassis and Body
      (11) Complimentary agent system
      (12) Control valve and plumbing
      (13) Brake system
      (14) SCR/DEF fluid