

**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 10D, NFPA 414 will take precedence.

**FAA Advisory Circular, AC No: 150/5220-10D, Guide Specification for Water/Foam Aircraft Rescue and Firefighting Vehicle**, U.S. Department of Transportation, Federal Aviation Administration, available at [www.faa.gov](http://www.faa.gov)

**NFPA 414 Standard for Aircraft Rescue and Fire-Fighting Vehicles**, [www.nfpa.org](http://www.nfpa.org) or 1-800-344-3555

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

**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     | j. Complimentary agent system     |
| b. Chassis & vehicle components    | k. Water systems                  |
| c. Water agent pump and pump drive | l. Hand lines                     |
| d. Water (tank) reservoir          | m. Nozzles and turrets            |
| e. Performance requirements        | n. Independent suspension         |
| f. Foam systems                    | o. Documentation                  |
| g. Foam (tank) reservoir           | p. Approved Options               |
| h. Braking systems                 | q. Lateral acceleration indicator |
| i. Winterization systems           |                                   |

**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 | h. Pump and roll tests                  |
| b. Pump tests                  | i. Brake system performance tests       |
| c. Road tests                  | j. Foam concentration/Foam quality test |
| d. Complimentary agent tests   | k. Electrical charging system tests     |
| e. Water agent discharge tests | l. Body and chassis flexibility tests   |
| f. Halotron I discharge test   | m. Test requirements & procedures       |
| g. Water tank flow tests       | n. Test instrument requirements         |

continued next page

**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.

**4.1 Identify the elements of service and maintenance**

- a. Types of inspections and procedures
- b. Purpose of visual inspections
- c. Maintenance records
- d. Use of maintenance schedules
- e. Manufacturer's "Accepted Practice" methods

**4.2 Identify the frequency of service and preventive maintenance activities to include the following:**

- a. Daily inspections
- b. Weekly inspections
- c. Monthly inspections
- d. Periodic inspections
- e. Annual inspections

**4.3 Identify areas where maintenance problems are most commonly found:**

- a. Electrical system (low voltage)
- b. Engine system
- c. Vehicle air system
- d. Hydraulic system
- e. Fire/Water pump system
- f. Fire fighting system
- g. Drive train system
- h. Water/Foam agent systems
- i. Foam pump system
- j. Chassis and Body
- k. Complimentary agent system
- l. Control valve and plumbing
- m. Brake system