

Reference Materials Note: This exam may contain some "accepted practice" type questions not found in the reference material listed below.

NFPA reference listed below - National Fire Protection Association, Quincy, MA, (800) 344-3555 or www.nfpa.org

NFPA 1901, **Standard for Automotive Fire Apparatus** Chapters 3,4,12,14,19,22 & 24

NFPA 1911, **Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus**
Chapters 3,4,5,6,11,19 & 22

Introduction to Hydraulic Technology Student Workbook. \$25 Can be ordered online from
<http://www.hydraulicsliteraturestore.com/trma.html>

Any hydraulic reference material with symbols such as Fluid Power Designer Lightning Reference Handbook, 8th edition. Available at
www.ifps.org/Store/ord_form.htm#books or 856-489-8983

LEARNING OBJECTIVES FOR THE F-5 EXAM**1. Define the terms and phrases commonly used with aerial fire apparatus, operations, and/or testing.**

- | | | |
|------------------------------------|------------------------------------|--|
| a. NFPA 1901 Chapter 3 Definitions | b. NFPA 1911 Chapter 3 Definitions | c. General Knowledge |
| (1) rated capacity | (1) operator | (1) cantilever |
| (2) continuous egress | (2) acoustical testing | (2) races/base rail |
| (3) burst pressure | (3) ironing | d. Lightning Reference Glossary of Terms |
| (4) live load | (4) twist | (1) double acting cylinder |
| (5) dead load | (5) leak | (2) micron (micro-meter) |
| | (6) ultrasonic testing | (3) pilot valve |
| | (7) magnetic particle test | (4) shuttle valve |
| | | (5) cracking pressure |
| | | (6) Pascal's law |
| | | (7) motor |

2. Identify the design requirements for aerial fire apparatus:

- | | | |
|--------------------------------------|-----------------------------------|--------------------------------------|
| a. Aerial ladder requirements | h. Stabilizing systems | q. Signs |
| (1) rated capacity | (1) Deployment | r. Low voltage electrical systems |
| b. Elevating platform requirements | (2) Sloping surface | s. Driving and crew area |
| c. Water delivery systems on aerials | i. Operational time requirements | t. Aerial ladder operating positions |
| d. Safety systems used on aerials | j. Vehicle components | u. Communication systems |
| e. Operating controls | k. Aerial ladder rated capacity | v. Fold down step requirement |
| f. Hydraulic systems and components | l. Aerial platform rated capacity | w. Aerial platform water curtain |
| (1) Hose, Tubing, and Fittings | m. Tractor drawn vehicles | |
| g. Structural components | n. Aerial ladder mechanisms | |
| (1) Safety factor | o. Aerial platform mechanisms | |
| | p. Remote breathing air systems | |

3. Understand the testing, inspection, and documentation requirements of all aerial fire apparatus.

- a. Identify the "Test and Delivery Data Requirements" for aerial fire apparatus as stated in NFPA 1901.
- | | |
|-------------------------------|--------------------------|
| (1) Road test | (3) Quality control test |
| (2) Delivery data requirement | |
- b. Identify the types of inspections and tests for aerials as stated in NFPA 1911:
- | | |
|---|------------------------------------|
| (1) Requirements for inspection and testing | (8) Hardness test |
| (a) Water gauge test | (9) Operational test |
| (b) Water flow meter test | (10) Articulating boom test |
| (c) System pressure test | (11) Max elevation load test |
| (2) Extension cylinder | (12) Hydraulic oil testing |
| (a) Drift test | (13) Extension motor brake test |
| (3) Annual testing | (14) Turntable inspection and test |
| (4) N.D.T. testing | (15) Stabilizer test |
| (5) Horizontal load test | (16) Visual inspection |
| (6) Weld inspections | (17) Engine speed interlock |
| (7) Rotation gear inspection | (18) Winch holding capacity |
- c. General requirements and which standard contains the requirement for:
- | | |
|---------------------------------|---------------------------|
| (1) Out of service requirements | (3) Inspections personnel |
| (2) Test frequency | (4) Retired Vehicle |
- d. Required documentation as per NFPA 1911.
- e. Understand accepted procedures for aerial apparatus testing:
- | | |
|---------------------|------------------------|
| (1) Tool usage | (3) Pressure tests |
| (2) Extension cable | (4) Stabilizing system |

4. Understand and identify hydraulic systems of an aerial apparatus:

- a. Identify and understand hydraulic components
- | | |
|--------------------------------------|-----------------------------------|
| (1) Relief valve | (4) Counterbalance/holding valves |
| (2) Filter assemblies and indicators | (5) Pumps |
| (3) Hydraulic actuators | (6) Hoses and fittings |

- b. Identify and understand hydraulic schematics
- c. Identify hydraulic symbols
 - (1) Relief valve
 - (2) Hydraulic cooler
 - (3) Fixed displacement hydraulic pump
 - (4) Filter strainers
 - (5) Hydraulic check valves
 - (6) Metering valve
 - (7) Pressure reducing valve
 - (8) Flow Control Valve
- d. Understand principles of hydraulics
 - (1) Resistance to flow
 - (2) Causes of aerated hydraulic fluid
 - (3) Hose sizing and configuration
 - (4) Effect of hose size on fluid velocity
- e. Understanding and trouble shooting hydraulic systems
 - (1) Platform system
 - (2) Abnormal noises
 - (3) Oil conditions
 - (4) Valves
 - (5) Actuator
 - (6) Stabilizer systems
 - (7) Pressure compensated hydraulic pump
 - (8) Engine speed control

5. Understand and identify electrical systems of an aerial apparatus

- a. Identify electrical components
 - (1) Electrical monitors
 - (2) Electrical cable reel
- b. Identify and understand electrical schematics
- c. Identify electrical schematic symbols
 - (1) Motor
 - (2) Ground
 - (3) SPDT Switch
 - (4) Diode
- d. Understand and troubleshoot electrical systems
 - (1) Controllers
 - (2) Voltage drops
 - (3) Digital controllers
 - (4) Commutator/collector rings
 - (5) Line voltage systems
 - (6) GFCI circuits
 - (7) Water monitor electronic controls

6. Describe activities considered to be accepted practice in service and repair of aerial apparatus

- a. Maintenance
 - (1) Lubrication
 - (2) Cable adjustments
 - (3) Hydraulic hose replacement criteria
 - (4) Filtration
 - (5) Parts Criteria
- b. Repair procedures
 - (1) Identify hydraulic fluid leakage
 - (2) Identify fastening devices and requirements
 - (3) Line voltage repair procedures

7. Understand the principles of operating aerial apparatus

- a. Stabilizing the apparatus
 - (1) Emergency procedures
 - (2) Stability requirements
 - (3) Stabilizer pads
 - (4) Short jacking
- b. Operating aerial devices from lower controls
- c. Operating aerial devices from upper controls
- d. Proper cab tilting procedures as per manufacturer's recommendations
- e. Safety
- f. Interlocks