

E-1 Design & Performance Standards of Ambulances

March 2016

Reference Materials: Note: This exam may contain some "accepted practice" type questions not found in the reference material listed
NFPA 1917, Standard for Automotive Ambulances, including annexes National Fire Protection Association

(800) 344-3555 or www.nfpa.org

OSHA Publications: Online order form for OSHA Publications- <http://www.osha.gov/pls/publications/publication.html> or call 202-693-1999
#3084 *Chemical Hazard Communication*,
#3186 *Model Plans and Programs for the OSHA Bloodborne Pathogens and Hazard Communications Standard*.

Any general truck repair maintenance manual, and any Material Safety Data Sheet/Safety Data Sheet/Global Harmonization System
Any professional automotive or manufacturers website

LEARNING OBJECTIVES FOR THE E-1 EXAM

1. Definitions or Terms

- a. Types of ambulances
- b. Gradeability
- c. Useable Payload
- d. Ramp breakover
- e. Ambulance
- f. Weight Distribution
- g. Approach & departure angle
- h. Radio frequency interference (R.F.I.)
- i. Battery chargers & invertors
- j. Rectifier
- k. Scope
- l. Wattage(power)/amperage(current)
- m. Relay
- n. Shall/Should
- o. Curb weight
- p. Test criteria
- q. FMVSS (Federal Motor Vehicle Safety Standards)
- r. AMECA (Automotive Manufacturers' Equipment Compliance Agency)
- s. OSHA (Occupational Safety and Health Administration)
- t. AD (Additional Duty)
- u. FSAM-Final Stage Ambulance Manufacturer
- v. EMSP-Emergency Medical Service Provider
- w. Medical devices (regulations)
- x. EPA
- y. Continuous duty
- z. Reserve capacity
- aa. Interlock

2. General Requirements

- a. Emergency lighting and mirrors
 - (1) Primary mode warning lights
 - (2) Secondary mode warning lights
 - (3) Warning light maximum average electrical load
 - (4) Check out lights
 - (5) Emergency lighting flash rate
 - (6) Proper emergency light configuration and types and interior lighting & mirrors
 - (7) Interior lighting requirements
- b. Proper operation of marker and turn signals
- c. Speed & acceleration
 - (1) Requirements
 - (2) Sustained speed
 - (3) Roadability
- d. Engine starting requirements
- e. Vehicle Physical Dimensions
 - (1) Maximum loading height
 - (2) Minimum angle for ramp breakover
 - (3) Minimum allowable departure angle
 - (4) Minimum angle of approach
 - (5) Ground clearance
- f. Vehicle weight rating and payload
 - (1) Payload calculations & axle loading
 - (2) Traction control
 - (3) Tire inflation pressure/balancing
 - (4) Occupant standard weight
- g. Heating system requirements
- h. Air-Conditioning system
 - (1) Requirements
 - (2) Cab defroster performance
- i. Ventilation systems
 - (1) Carbon monoxide requirement
- j. Radio Frequency (RF) grounding
 - (1) Radio frequency suppression for alternators
 - (2) Types of wire
- k. Battery system and components
 - (1) Battery conditioner
 - (2) 12 volt DC electrical test
- l. Fuel capacity & range
- m. Door
 - (1) Latch requirements
 - (2) Door open warning
- n. 125 volt Ac and invertor
 - (1) Operations
 - (2) 125 VAC grounds
 - (3) 125 VAC GFCI
 - (4) 125 VAC outlets & location
 - (5) Shoreline
- o. Noise level requirements
- p. Equipment
 - (1) Mounting
 - (2) IV Holders
- q. Cot retention & Patient Seating
 - (1) Requirements
 - (2) Cot mounting clearances
 - (3) Occupant Head Clearance
 - (4) Occupant restraints
- r. 12 volt electrical
 - (1) Service loop
 - (2) Generating system
 - (3) Wiring installation/antenna
 - (4) "Schottky" Diode
 - (5) 12 volt interruptible chassis & module power
 - (6) Master load disconnect device
 - (7) 12 volt circuit breaker panel
 - (8) Voltmeter
 - (9) Low voltage warning device
- s. Suction Aspirator System
 - (1) Suction aspirator primary
- t. Seats and seat belt requirements
- u. Oxygen system
 - (1) Oxygen system hose
 - (2) Oxygen pressure reducing & regulating valve
 - (3) Oxygen system leak testing
 - (4) Oxygen tank retention
 - (5) Amount of oxygen
- v. Grab handle requirement
- w. Fording requirements
- x. Siren and Speakers
 - (1) Performance tests
 - (2) Speaker mounting
- y. Mirrors, wipers, & safety equipment
 - (1) Requirements
 - (2) Head cushions
- z. Engine exhaust and cooling system
- aa. Engine protection requirements
- bb. Star of Life
 - (1) DOT requirements
- cc. Engine high idle speed control automatic
- dd. Back up alarm

- (1) Decibel rating
- ee. Rear step
 - (1) testing requirements
 - 1.1 weight
 - 1.2 flexing or deflection test
 - (2) Integrated rear step
- 3. Safety/FMVSS & OSHA**
 - a. Bloodborne pathogens-OSHA 3186
 - b. OPIM- Other Potentially Infectious Material
 - c. ECP- Exposure Control Plan
 - d. Hepatitis B training and immunization
 - e. Right-to-Know Law
 - f. Material Safety Data SHEET (MSDS) Information
 - g. Biohazard warning
 - h. Seat belts, seats, and air bags
 - i. Brake dust
 - j. Hazardous materials
 - (1) Employee training plan
- 4. Principles of Troubleshooting and Repair**
 - a. Heating and Air-Conditioning systems
 - b. Tire wear characteristics
 - (1) such as tire & wheel balance
 - c. Steps of Troubleshooting
 - d. Brakes
 - (1) Troubleshooting Procedure
 - (2) Uneven lining wear
 - (3) Brake fade
 - (4) Brake pull condition
 - (5) Heat checking
 - e. Starting system
 - (1) Troubleshooting procedure
 - (2) Proper engine starting procedures
 - (3) Glow plug systems
 - f. Cooling system
 - (1) Troubleshooting
 - (2) Overheat conditions
 - g. Battery boost procedure
 - h. Diesel engines
 - (1) Recommended idling procedure and shutdown
 - (2) Oil dilution/contamination
 - i. Electrical systems
 - (1) Purpose of a rectifier
 - (2) Purpose of a battery conditioner
 - (3) Problems caused by use of incorrect bulbs
 - (4) Faulty ground
- ff. CO levels
- gg. Legal requirement
- hh. Ambient temperature range
- ii. Average occupant weight
- k. Oxygen system safety/restraints
- l. NFPA Step and bumper requirements and safety
- m. Sharps storage area
- n. Electrical system hazards
- o. NHTSA (National Highway Traffic Safety Administration)
- p. Personal safety requirements
- q. Gasoline engines
- r. Fire extinguisher servicing
- s. Safety Data Sheet (SDS) information
- t. Global Harmonization System (GHS) information
- j. Radio antennas
 - (1) Ground plane
 - (2) Accessibility
- k. Suspension & steering systems
 - (1) Vehicle loading effects
 - (2) Ride height
 - (3) Spring Mounts & U bolts
 - (4) Air suspension
- l. Exhaust systems
- m. Diesel fuel injection systems
 - (1) Leaking/dripping injectors
 - (2) Cold start injection timing advance
- n. Vehicle charging systems
 - (1) Torsional vibrations
 - (2) Radio interference
 - (3) Alternators
 - (4) Radio Interference
- o. Towing procedures
- p. Welding precautions
- q. Batteries
- r. Transmission troubleshooting
- s. Wheel bearings
 - (1) Proper adjustment
 - (2) Wheel seats
- t. Alternators
 - (1) Radio interference
- u. Air filters/restriction indicators