E-1 Design & Performance Standards of Ambulances February 2024

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

NFPA 1900: Standard for Aircraft Rescue and Firefighting Vehicles, Automotive Fire Apparatus, Wildland Fire Apparatus, and Automotive Ambulances **(NFPA 1917 Chapters)** 2024 edition (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

#3514 *Hazard Communication Standard: Safety Data Sheets - OSHA Brief*

#3186 *Model Plans and Programs for the OSHA Bloodborne Pathogens and Hazard Communications Standard.*

AMD Standardized Test Methods: http://www.ntea.com/NTEA/Who_we_are/Affiliate_divisions/AMD_Standardized_Test_Methods.aspx

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. FSM-Final Stage Manufacturer
v. EMSP-Emergency Medical Service Provider
w. Medical devices (regulations)
x. EPA
y. Continuous duty
z. Reserve capacity
aa. Interlock
bb. AHJ

2. General Requirements

a. Emergency lighting and mirrors
   (1) Calling for Right of Way
   (2) Blocking Right of Way
   (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
   (6) Structural integrity
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) Shorepower/shoreline
o. Noise level requirements
p. Equipment
   (1) Mounting
   (2) IV Holders
q. Patient Compartment, 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) 12 volt interruptible chassis & module power
   (5) Master load disconnect device
   (6) 12 volt circuit breaker panel
   (7) 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/handrail requirements
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
ff. CO levels
gg. Legal requirement
hh. Ambient temperature range
ii. Average occupant weight

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
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. Fire extinguisher servicing
r. Safety Data Sheet (SDS) information
s. Global Harmonization System (GHS) information

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
j. Radio antennas
(1) Ground plane
(2) Accessability
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
v. Gasoline Engines