

NFPA 1071

Standard for Emergency Vehicle Technician Professional Qualifications

2000 Edition



NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101
An International Codes and Standards Organization

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NFPA 1071

Standard for

Emergency Vehicle Technician Professional Qualifications

2000 Edition

This edition of NFPA 1071, *Standard for Emergency Vehicle Technician Professional Qualifications*, was prepared by the Technical Committee on Emergency Vehicle Mechanic Technicians Professional Qualifications, released by the Technical Correlating Committee on Professional Qualifications, and acted on by the National Fire Protection Association, Inc., at its World Fire Safety Congress and Exposition™ held May 14–17, 2000, in Denver, CO. It was issued by the Standards Council on July 20, 2000, with an effective date of August 18, 2000.

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Origin and Development of NFPA 1071

In July 1995 the Standards Council, after receipt of a request from the Maintenance Section of the International Association of Fire Chiefs for the development of a standard for the professional qualifications of emergency vehicle technician, approved the establishment of a technical committee on Emergency Vehicle Technician Professional Qualifications under the Professional Qualifications project. The Committee developed this first edition of NFPA 1071, *Standard for Emergency Vehicle Technician Professional Qualifications*, which establishes the minimum job performance requirements for a person qualified as an emergency vehicle technician who is engaged in the inspection, diagnosis, maintenance, repair, and testing of an emergency response vehicle.

Technical Correlating Committee on Professional Qualifications (PQU-AAC)

Douglas P. Forsman, *Chair*
Oklahoma State University, OK [M]

Fred G. Allinson, Nat'l Volunteer Fire Council, WA [L]
Stephen P. Austin, State Farm Fire & Casualty Co., DE [I]
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 Rep. TC on Emergency Vehicle Mechanic Technicians
 Pro Qual
 (Vote Ltd. to Pro Qual System Mgmt.)
David T. Endicott, Prince William County Fire & Rescue
 Service, VA [U]
 Rep. TC on Fire Fighter Pro Qual
 (Vote Ltd. to Pro Qual System Mgmt.)
Gerald C. Evans, Salt Lake City Fire Dept., UT [L]
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Charles E. Kirtley, City of Guymon Oklahoma Fire Dept.,
 OK [U]
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 (Vote Ltd. to Pro Qual System Mgmt.)
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William E. Peterson, Plano Fire Dept., TX [M]
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Johnny G. Wilson, Georgia Firefighter Standards &
 Training Council, GA [E]
 Rep. Nat'l Board on Fire Service Professional
 Qualification
John P. Wolf, University of Kansas, KS [SE]
 Rep. TC on Accreditation and Certification to Fire
 Service Pro Qual
 (Vote Ltd. to Pro Qual System Mgmt.)

Alternate

Michael W. Robinson, Baltimore County Fire Dept.,
 MD [E]
 (Alt. to J. G. Wilson)

Frank Florence, NFPA Staff Liaison

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SunnyCor Inc., IL [M]

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Allan Burnham, United Plastic Fabricating, Inc., MA [M]
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John A. Soos, Oklahoma City Fire Dept., OK [U]
Michael L. Thorn, Oregon Apparatus Repair, Inc. [L]
Rep. Oregon Fire Apparatus & Equipment Mechanics Assn.
Stephen Wilde, Mid-America Truck & Equipment Co., IL [U]
Rep. Emergency Vehicle Technician Certification Commission

Alternates

James Heinke, Lisle-Woodbridge Fire District, IL [L]
(Alt. to R. Clark)
Gerald E. Lee, Sr., Lakeside Fire Protection District, CA [L]
(Alt. to R. Huston)

Terry M. Sutphen, Illinois Fire Service Inst., IL [U]
(Alt. to S. Wilde)

Frank Florence, NFPA Staff Liaison

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Committee Scope: This Committee shall have primary responsibility for documents on professional qualifications required of personnel engaged in the diagnosis, maintenance, and repair of systems and components that are unique to emergency response vehicles.

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NFPA 1071

Standard for

Emergency Vehicle Technician
Professional Qualifications

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NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates that explanatory material on the paragraph can be found in Appendix A.

Information on referenced publications can be found in Chapter 4 and Appendix C.

Chapter 1 Administration

1.1* Scope. This standard shall identify and define the minimum job performance requirements (JPRs) for a person to be considered qualified as an emergency vehicle technician (EVT) and shall apply to personnel who are engaged in the inspection, diagnosis, maintenance, repair, and testing of emergency response vehicles.

1.2 Purpose. The purpose of this standard shall be to ensure that persons meeting the requirements of this standard who are engaged in the inspection, diagnosis, maintenance, repair, and testing of emergency response vehicles are qualified. It shall not be the intent of the standard to restrict any jurisdiction from exceeding these requirements.

1.3 General.

1.3.1 The job performance requirements shall be accomplished in accordance with the requirements of the authority having jurisdiction; NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*; and NFPA 1915, *Standard for Fire Apparatus Preventive Maintenance Program*.

1.3.2 It shall not be required that the job performance requirements be mastered in the order in which they appear. The authority having jurisdiction shall establish instructional priority and the training program content to prepare individuals to meet the job performance requirements of this standard.

1.3.3 Performance of each requirement of this standard shall be evaluated by qualified individuals approved by the authority having jurisdiction.

1.3.4 Wherever in this standard the terms *rules*, *regulations*, *procedures*, *supplies*, *apparatus*, and *equipment* are referred to, it shall be implied that they are those of the authority having jurisdiction.

1.3.5 All inspection, diagnosis, maintenance, repair, and testing functions described in the job performance requirements shall be completed according to all applicable manufacturer specifications and department- or agency-recognized standard operating procedures (SOPs).

1.4* Definitions.

1.4.1 Aerial Device. An aerial ladder, elevating platform, aerial ladder platform, or water tower that is designed to position personnel, handle materials, provide continuous egress, or discharge water.

1.4.2* Approved. Acceptable to the authority having jurisdiction.

1.4.3* Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, materials, an installation, or a procedure.

1.4.4 Breathing Air System. The complete assembly of equipment such as compressors, purification system, pressure regulators, safety devices, manifolds, air tanks or receivers, and interconnected piping required to deliver air for breathing.

1.4.5 Defect. A discontinuity in a part or a failure to function that interferes with the service or reliability for which the part was intended.

1.4.6 Deficiency. The application of the component is not within its designed limits or specifications.

1.4.7 Deformation. Abnormal wear, defects, cracks or fractures, warpage, and deviations from the original condition that would affect safe and correct operation.

1.4.8 Diagnosis. The act of determining the cause of a problem.

1.4.9 Documentation. A process of gathering, classifying, and storing information.

1.4.10 Duty. A fire-related service, function, or task identified in the fire brigade organizational statement and assigned to a member to perform.

1.4.11 Emergency Response Vehicle. Any motorized vehicle designated by an organization or agency to respond to emergency incidents where provisions have been made to include warning systems and specialized components such as pumps, aerial devices, and rescue equipment and that is capable of transporting emergency response personnel.

1.4.12 Emergency Vehicle Technician (EVT). An individual who performs inspection, diagnosis, maintenance, repair, and testing activities on emergency response vehicles and who, by possession of a recognized certificate, professional standing, or skill, has acquired the knowledge, training, and experience and has demonstrated the ability to deal with issues related to the subject matter, the work, or the project.

1.4.13 Fire Department. An organization providing rescue, fire suppression, and related activities. The term *fire department* shall include any public, governmental, private, industrial, or military organization engaging in this type of activity.

1.4.14 Incident Management System. An organized system of roles, responsibilities, and standard operating procedures used to manage and direct emergency operations.

1.4.15 Inspect. To determine through examination by sight, sound, or feel the condition and operation of systems or components by comparing physical, mechanical, and/or electrical characteristics with established standards, recommendations, and requirements.

1.4.16 Job. An organized segment of instruction designed to develop sensory motor skills or technical knowledge.

1.4.17 Job Performance Requirement (JPR). A statement that describes a specific job task, lists the items necessary to complete the task, and defines measurable or observable outcomes and evaluation areas for the specific task.

1.4.18 Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation, that maintains periodic inspection of production of labeled equipment or materials, and by whose labeling the manufacturer indicates

compliance with appropriate standards or performance in a specified manner.

1.4.19 Line Voltage Circuit, Equipment, or System. An ac or dc electrical circuit, equipment, or system where the voltage to ground or from line to line is 30 volts rms (ac) or 42.4 volts peak (dc) or greater, but does not exceed 250 volts rms (ac) or peak (dc).

1.4.20* Listed. Equipment, materials, or services included in a list published by an organization that is acceptable to the authority having jurisdiction and concerned with evaluation of products or services, that maintains periodic inspection of production of listed equipment or materials or periodic evaluation of services, and whose listing states that either the equipment, material, or service meets appropriate designated standards or has been tested and found suitable for a specified purpose.

1.4.21 Low-Voltage Circuit, Equipment, or System. An electrical circuit, equipment, or system where the voltage does not exceed 30 volts rms (ac) or 42.4 volts peak (dc), usually 12 volts dc in fire apparatus.

1.4.22 Maintenance. The act of servicing an emergency response vehicle or a component within a scheduled time frame prescribed by the manufacturer or department SOP to keep the vehicle and its components in operating condition. Maintenance includes minor repair such as replacing missing fasteners; changing lamps, fuses, or belts; and removing and replacing small self-contained components.

1.4.23 Manufacturer's Specifications. Any requirement or service bulletin an emergency response vehicle builder or component producer provides with regard to the use, care, and maintenance of its product(s).

1.4.24 Qualified Person. A person who, by possession of a recognized degree, certificate, professional standing, or skill, and who, by knowledge, training, and experience, has demonstrated the ability to deal with problems relating to a particular subject matter, work, or project.

1.4.25 Rebuild. To make extensive repairs in order to restore a component to like-new condition in accordance with the original manufacturer's specifications.

1.4.26 Repair. To restore to sound condition after failure or damage.

1.4.27 Requisite Knowledge. Fundamental knowledge one must have in order to perform a specific task.

1.4.28 Requisite Skills. The essential skills one must have in order to perform the specific task.

1.4.29 Shall. Indicates a mandatory requirement.

1.4.30 Should. Indicates a recommendation or that which is advised but not required.

1.4.31 Standard Operating Procedures (SOPs). Written instructions that document and define the manner in which activities are conducted.

1.4.32 Structural Integrity. An unimpaired condition of any component.

1.4.33 Task. A specific job behavior or activity.

1.4.34 Test. To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

Chapter 2 Emergency Vehicle Technician I

2.1* General. To be considered qualified as an Emergency Vehicle Technician I, the individual shall have the general knowledge defined in 2.1.1 and the general skills defined in 2.1.2 and shall meet the job performance requirements of Section 2.2 through Section 2.5 and at least one specialty area as defined in Section 2.6, Section 2.7, or Section 2.8.

2.1.1* General Knowledge Requirements. The organization of the fire department and the maintenance facility; the role of the EVT in the organization; the mission of the fire service; the fire department's standard operating procedures and rules and regulations as they apply to the EVT; the critical aspects of NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, as they apply to the EVT; federal motor carrier safety regulations; applicable federal, state, and local regulations; interpretation and use of manufacturer's specifications, inspection checklists, maintenance schedules, maintenance checklists, and department SOPs; selection of appropriate tools; fastener types and their proper usage; maintenance equipment and its proper usage; workplace safety practices; proper selection and use of cleaning products and procedures; proper housekeeping; and identification and handling of hazardous materials.

2.1.2 General Skill Requirements. The ability to use appropriate tools safely; operate emergency response vehicles in compliance with applicable federal, state, and local regulations; and locate information in departmental documents as well as in appropriate standards and reference materials.

2.2 Chassis. This duty involves the inspection and preventive maintenance practices involved with an emergency response vehicle chassis, including the vehicle systems such as engines, transmissions, drivelines, brakes, steering and suspension, fuel, electrical, exhaust, and climate control.

2.2.1 Inspect the chassis systems, given an emergency response vehicle, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the structural integrity, the operation, and the condition of the engine, transmission, driveline, brakes, steering and suspension system, fuel system, electrical system, exhaust system, and climate control system are verified to be within manufacturer's specifications; mounting security is verified; the chassis components are operational and within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspections and tests are documented.

(a) *Requisite Knowledge:* Function, operation, and construction of chassis and vehicle systems; type of defects, deficiencies, and potential problems associated with chassis systems; use of a checklist; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify symptoms and conditions of the chassis and vehicle systems; determine defects, deficiencies, and potential problems; perform operational tests; and complete checklist and inspection documentation.

2.2.2 Perform maintenance on the chassis system, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, appropriate test and calibration

equipment, and appropriate tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustment are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, and operation of chassis and vehicle systems; types of defects, deficiencies, and potential problems associated with chassis and vehicle systems; troubleshooting procedures; adjustment methods and procedures; selection of test and calibration equipment; role of a maintenance schedule and a maintenance checklist; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Perform operational verification tests, evaluate reported conditions, recognize and correct deficiencies, use test and calibration equipment, perform all required maintenance including all items on a maintenance checklist, and complete required documentation.

2.2.3 Inspect chassis systems and components unique to emergency response vehicles, given an emergency response vehicle, appropriate SOPs, manufacturer's specifications, appropriate tools, test and calibration equipment, an assignment, and an inspection checklist, so that the structural integrity of the frame is verified; the operation and condition of independent suspension systems, all-wheel steering systems, secondary braking systems, and auxiliary cooling systems is verified to be within manufacturer's specifications; multiplexing, interface electronics, and load management systems are operationally tested; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented.

(a) *Requisite Knowledge:* Function, operation, construction, and interface of frames, independent suspension systems, all-wheel steering systems, secondary braking systems, and auxiliary cooling systems; the principles of electricity and operational theory of electronics; selection of test and calibration equipment; types of defects, deficiencies, and potential problems associated with chassis systems and components unique to emergency response vehicles; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify symptoms and conditions; use test and calibration equipment; determine defects, deficiencies, and potential problems; perform operational tests; and complete checklist and inspection documentation.

2.2.4 Perform maintenance on chassis systems and components unique to emergency response vehicles, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools and diagnostic equipment, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; fluid levels are maintained; calibrations and adjustment are performed; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, and operation of chassis and vehicle systems; types of defects, deficiencies,

and potential problems associated with chassis and vehicle systems; the theory of electronics; selection of test, calibration, and diagnostic equipment; role of a maintenance schedule and a maintenance checklist; troubleshooting procedures; adjustment methods and procedures; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Perform operational verification tests; evaluate reported conditions; recognize and correct deficiencies; use test, calibration, and diagnostic equipment; perform all required maintenance including all items on a maintenance checklist; and complete required documentation.

2.3 Cab and Body Components. This duty involves the inspection and maintenance of cabs (fixed and tilt) and the vehicle body, including compartments, warning systems, mounting racks, brackets, and latches, and steps and ladders.

2.3.1 Inspect the cab, given an emergency response vehicle, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation of the cab and components is verified; the condition of finishes, signs, labels, and paint are determined; the operation and condition of the doors, latches, trays, glass, and associated hardware is verified to be within manufacturer's specifications; climate control systems are operationally tested; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented.

(a) *Requisite Knowledge:* Function, construction, and operation of doors and latches, seats, self-contained breathing apparatus (SCBA) mounting, safety restraints, instrumentation, window glass and mirrors, steps, handrails, and skid-resistant walking surfaces; types of defects, deficiencies, and potential problems associated with cabs; types of lubricants; failures of finishes, signs, labels, and paint; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Perform operational verification tests; recognize and identify symptoms and conditions; determine defects, deficiencies, and potential problems; perform operational tests; and complete checklist and inspection documentation.

2.3.2 Perform maintenance on the cab, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, and appropriate tools and test equipment, so that the operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function and construction of cab and components including steps, handrails, skid-resistant walking surfaces, and storage areas; types of defects or deficiencies associated with cabs; role of a maintenance schedule and a maintenance checklist; troubleshooting procedures; adjustment methods and procedures; types of lubricants; operation of doors; common problems and failures of finishes, paint, signs, and labels; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Perform operational verification tests, evaluate reported conditions, perform all required maintenance including all items on a maintenance checklist, and complete required documentation.

2.3.3 Inspect equipment mounting systems and mounting racks, brackets, and latches, given an emergency response vehicle and its assigned equipment, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the mounting system and mounting racks is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented.

(a) *Requisite Knowledge*: Function, operation, and construction of assigned equipment mounting systems, warning systems, and mounting racks, brackets, and latches; types of defects, deficiencies, and potential problems associated with equipment mounting systems, warning systems, and mounting racks, brackets, and latches; use of checklists; selection of test and calibration equipment; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Recognize and identify symptoms and conditions of equipment mounting systems and mounting racks, brackets, and locks; use test and calibration equipment; perform operational tests; determine defects, deficiencies, and potential problems; and complete checklist and inspection documentation.

2.3.4 Perform maintenance on equipment mounting systems and mounting racks, brackets, and latches, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, and appropriate tools and test equipment, so that warning system components function; all hoses are tight; leaks are stopped; latches are aligned and adjusted to operational condition; fluids are checked and filled; lubricants are applied; any electrical connections are clean and tight; worn pads are replaced; deformed, broken, loose, worn, or missing parts are repaired or replaced; operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge*: Function, construction, and operation of equipment mounting systems and mounting racks, brackets, and latches; components of warning systems; common requirements of maintenance; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with equipment mounting systems, warning systems, and mounting racks, brackets, and latches; adjustment methods and procedures; methods to stop leaks; types of fluids and lubricants; adjustment and calibration procedures; electrical connection theory and maintenance; record-keeping requirements; troubleshooting procedures; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Perform operational verification tests, evaluate reported conditions, perform all required maintenance including all items on a maintenance checklist, correct deficiencies, and complete required documentation.

2.3.5 Inspect the operation of the cab tilt system and components, given an emergency response vehicle with a cab tilt system, appropriate SOPs, manufacturer's specifications, appropriate

tools and test equipment, an assignment, and an inspection checklist, so that the tilt mechanism is readied safe; the structural integrity is visually assessed; the operation and condition of all cab tilt components and warning systems is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented.

(a) *Requisite Knowledge*: Function, operation, and construction of the cab tilt system, safety and latch systems, and warning systems; types of defects, deficiencies, and potential problems associated with cab tilt systems; use of checklist; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Perform operational verification test; recognize and identify symptoms and conditions of the cab tilt systems; determine defects, deficiencies, and potential problems; and complete checklist and inspection documentation.

2.3.6 Inspect body, compartments, and storage areas, given an emergency response vehicle, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the body, compartments, doors, latches, trays, and associated hardware is verified to be within manufacturer's specifications; the condition of finishes, signs, labels, and paint is determined and documented; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, construction, and operation of body, compartments, shelves and dividers, steps, ladders, platforms, handrails, and skid-resistant walking surfaces; operation of doors, latches, trays, and associated hardware; types of defects, deficiencies, and potential problems associated with the body, compartments, shelves and dividers, steps, ladders, platforms, handrails, and skid-resistant walking surfaces; use of checklist; common problems and failures of finishes and paint, signs, and labels; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Perform operational verification tests; recognize and identify symptoms and conditions; determine defects, deficiencies, and potential problems; and complete checklist and inspection documentation.

2.3.7 Perform maintenance on body, compartments, and storage areas, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, and appropriate tools and test equipment, so that operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; components are lubricated; skid-resistant walking surfaces are intact; finishes and surfaces are clean and preserved; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge*: Function and construction of body, compartments, shelves and dividers, steps, ladders, platforms, handrails, skid-resistant walking surfaces, and storage areas; types of defects or deficiencies; troubleshooting procedures; role of a maintenance schedule and a maintenance checklist; adjustment methods and procedures; types of lubricants; operation of doors and trays; common problems and failures of finishes, paint, signs,

and labels; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Perform operational verification tests, evaluate reported conditions, perform all required maintenance including all items on a maintenance checklist, correct deficiencies, and complete required documentation.

2.4 Electronic and Electrical Systems (Low Voltage). This duty involves the operational checks of the vehicle's charging systems, starting systems, lighting system, electronic pump controls, and other low-voltage electronic and electrical systems and devices.

2.4.1 Inspect the low-voltage electrical system, given an emergency response vehicle, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment including a belt tension gauge and a multimeter, an assignment, and an inspection checklist, so that the mounting security is verified; operation and condition of the low-voltage electrical system is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, operation, and requirements of starting and charging systems, chassis lighting and electrical components, emergency lighting, and accessory lighting; selection of test and calibration equipment; principles of electricity (Ohm's law), magnetism, and voltage drop; types of defects, deficiencies, and potential problems associated with low-voltage electrical systems; mounting and adjustment requirements; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify symptoms and conditions of low-voltage electrical systems, determine defects and deficiencies, use test and calibration equipment, perform operational tests, and complete checklist and inspection documentation.

2.4.2 Perform maintenance on the low-voltage electrical system, given an emergency response vehicle, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; calibration and adjustments are performed; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, operation, and requirements of starting and charging systems, chassis lighting and electrical components, emergency lighting, and accessory lighting; types of defects or deficiencies associated with low-voltage electrical systems; role of a maintenance schedule and a maintenance checklist; troubleshooting procedures; adjustment methods and procedures; selection of test and calibration equipment; principles of electricity (Ohm's law), magnetism, and voltage drop; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Evaluate reported conditions, perform operational tests, perform all required maintenance including all items on a maintenance checklist, correct deficiencies, use

test and calibration equipment, and complete required documentation.

2.4.3* Inspect electronic controls and instrumentation, given an emergency response vehicle, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the instrumentation and control systems is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented.

(a) *Requisite Knowledge:* Function, construction, and operation of engine, transmission, fire pump, aerial device, low-voltage electrical instrumentation, and controls; selection of test and calibration equipment; principles of electricity (Ohm's law), magnetism, and voltage drop; types of defects, deficiencies, and potential problems associated with electronic controls and instrumentation; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify symptoms and conditions; use test and calibration equipment; determine defects, deficiencies, and potential problems; perform operational tests; and complete checklist and inspection documentation.

2.5 Auxiliary Drive Devices. This duty involves inspection, maintenance, and operational testing of auxiliary drive devices.

2.5.1 Inspect the auxiliary drive systems [power take-off (PTO)], given an emergency response vehicle with an auxiliary drive system, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the mounting, operation, and condition of the auxiliary drive system and its associated components including linkage, hoses, propeller shafts, warning, and interlock systems are verified to be within manufacturer's specifications; all checklist items are inspected; adjustments are made where indicated; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of the PTO systems, pneumatic, electric, and hydraulic engagement devices, and warning and interlock systems; common defects associated with component interfaces of related equipment; types of defects, deficiencies, and potential problems associated with auxiliary drive systems; selection of test and calibration equipment; principles of hydraulics; adjustment methods and procedures; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify symptoms and conditions of mounting systems and components; determine defects and deficiencies; recognize and use test and calibration equipment; perform operational tests; and complete checklist and inspection documentation.

2.5.2 Perform maintenance on an auxiliary drive (PTO), given an emergency response vehicle with an auxiliary drive, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; hoses, valves, and fittings are in good condition

and are leak free; fluids are free of contaminants and at recommended levels; proper lubricants are applied; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; propeller shafts and controls are adjusted, lubricated, and operational; system operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge*: Function, construction, and operation of auxiliary drive systems and warning and interlock systems; common defects associated with interfaces of related equipment, fluids, and lubrication; types of defects and deficiencies associated with auxiliary drive systems; troubleshooting procedures; adjustment methods and procedures; role of a maintenance schedule and a maintenance checklist; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Evaluate reported conditions, perform operational tests, perform all required maintenance including all items on a maintenance checklist, correct deficiencies, use test and calibration equipment, and complete required documentation.

2.6 Fire Pump, Auxiliary Pump, and Tank Systems. This duty involves inspection, maintenance, and operational testing of the fire pump system, auxiliary pump system, and onboard water/foam tank.

2.6.1 Inspect fire pumps or auxiliary pump and related components, given an emergency response vehicle with a fire pump or an auxiliary pump, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the security of the mounting of all system components (e.g., primer pump, plumbing and valves, pressure control devices, gauges) is verified; operation and condition of the system components, warning system, and interlocks is verified to be within manufacturer's specifications; adjustments are made where required; recommended fluid levels are verified; leaks and fluid contamination are identified and reported; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, construction, and operation of fire pumps, auxiliary pumps, primer pumps, and related components; pressure control devices; plumbing and valves; packing and seals; types, grades, and viscosity of lubricating oils; pump packing adjustment methods and procedures; pump operational procedures; types of defects, deficiencies, and potential problems associated with fire pumps, auxiliary pumps, primer pumps, and related components; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Recognize and identify symptoms and conditions of pumps and components, determine defects and deficiencies, recognize characteristics of fluid contamination, perform operational test, and complete checklist and inspection documentation.

2.6.2 Inspect water/foam agent tanks, given an emergency response vehicle with a water or foam tank, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so

that the mounting and condition of the water/foam agent tank is verified; all coated and noncoated surfaces are free of corrosion; sacrificial anodes are evaluated for life cycle condition and replaced if necessary; the tank is flushed; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, operation, and construction of water/foam tanks and related components; flushing procedures; sacrificial anode replacement procedures and schedules; types of defects, deficiencies, and potential problems associated with water/foam agent tanks; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Recognize and identify the effects of corrosion by different types of water and foam agents on selected tank materials, determine defects and deficiencies, perform operational tests, and complete checklist and inspection documentation.

2.6.3* Perform maintenance on a fire pump or auxiliary pump and related components, given an emergency response vehicle with a fire pump or an auxiliary pump, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; all packing and seals are adjusted to proper specification; hoses, valves, and fittings are in good condition and are leak free; fluids are at recommended levels; recommended lubricants are applied; indicator lights are operational and electrical connections are clean and tight; instrumentation is operational; controls are adjusted, lubricated, and operational; the system's operational condition is preserved or restored; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge*: Function, construction, and operation of a fire pump, auxiliary pump priming device, and related components; packing and seal adjustment procedures; instrumentation and controls; sacrificial anode replacement procedure and schedules; types of defects or deficiencies associated with fire pumps, auxiliary pumps, priming devices, and related components; role of a maintenance schedule and a maintenance checklist; troubleshooting procedures; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Evaluate reported conditions, perform operational tests, use test and calibration equipment, perform all required maintenance including all items on a maintenance checklist, correct deficiencies, and complete required documentation.

2.7 Aerial Systems. This duty involves inspection, maintenance, and operational testing of aerial ladder, elevating platform, and water tower systems.

2.7.1 Inspect the ladder sections of an aerial ladder, given an emergency response vehicle with an aerial ladder, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the ladder sections and extension systems is verified to be within manufacturer's specification; the mounting security is verified; the alignment of the sections is visually checked for twists and bows; rails and rungs are checked for corrosion and dents; all checklist items

are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, operation, construction, and inspection practices of aerial ladders; types of defects, deficiencies, and potential problems associated with aerial ladders; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify physical and operational conditions of ladder sections, components, and systems; determine defects and deficiencies; perform operational tests; and complete checklist and inspection documentation.

2.7.2 Inspect the sections of an elevating platform or water tower, given an emergency response vehicle with an elevating platform or water tower, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the boom sections is verified to be within manufacturer's specifications; the mounting security of all components is verified; the alignment of the booms is visually checked for twists and bows; booms are checked for corrosion, dents, wear, and discontinuities; extension, elevation, and leveling systems are checked for damage; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, operation, and construction of elevating platforms or water towers; types of defects, deficiencies, and potential problems associated with elevating platforms; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify physical and operational conditions of elevating platforms or water towers and components, perform operational tests, determine defects and deficiencies, and complete checklist and inspection documentation.

2.7.3 Perform maintenance on aerial sections, booms, platforms and waterways, given an emergency response vehicle with an aerial device and waterway, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that the aerial sections, booms, platforms, and waterways are maintained in accordance with specifications; are cleaned, lubricated, and adjusted; deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; the aerial device is operationally tested; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, and operation of aerial device, components, and systems; fluid types and lubricants; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with aerial devices; troubleshooting procedures; adjustment methods and procedures; record-keeping requirements; and apparatus inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Evaluate reported conditions, perform operational tests, perform all required maintenance includ-

ing all items on a maintenance checklist, use test and calibration equipment, correct deficiencies, and complete required documentation.

2.7.4 Inspect the hydraulic system components of an aerial device, given an emergency response vehicle with an aerial device, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the hydraulic system components, warning systems, and gauges is verified to be within manufacturer's specifications; the security of the mounting of components is verified; recommended fluid levels are verified; visible leakage or contamination is identified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, operation, and inspection procedures of stabilizers, rotation motors, extension cylinders, elevation cylinders, leveling cylinders, gauges, and parts of an aerial device hydraulic system; normal operating condition; fluid requirements; types of defects, deficiencies and potential problems associated with hydraulic systems; sources of contamination; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify the condition of the aerial device hydraulic system, recognize and identify recommended fluid levels and sources of contamination, determine defects and deficiencies, read and interpret gauges, perform operational tests, and complete checklist and inspection documentation.

2.7.5 Inspect all mechanical components of the stabilization system, given an emergency response vehicle with an aerial device stabilization system, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the security of the mounting is verified; operation and condition of the mechanical components of the stabilization system are verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of an aerial device stabilization system, including wheels, tires, axles, frame, torque box, turntable, and related components; normal operating condition; types of defects, deficiencies, and potential problems associated with stabilization systems; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify the condition of an aerial device stabilization system, determine defects and deficiencies, perform operational tests, and complete checklist and inspection documentation.

2.7.6 Perform maintenance on the aerial device stabilization system, given an emergency response vehicle with an aerial device stabilization system, a maintenance schedule or an assignment, manufacturer's specifications, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the stabilization system is maintained in

accordance with manufacturer's specifications; the operational condition is preserved or restored; the stabilization system is operationally tested; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device stabilization system; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with stabilization systems; troubleshooting procedures; adjustment methods and procedures; record-keeping requirements; selection of test and calibration equipment; and aerial device inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Evaluate reported conditions, perform operational tests, perform all required maintenance including all items on a maintenance checklist, use test and calibration equipment, correct deficiencies, and complete required documentation.

2.7.7 Inspect all components of aerial device lifting, rotating, and extension systems, given an emergency response vehicle with an aerial device, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the aerial device lifting, rotating, and extension systems, including the rotation motor and cables, and warning systems is verified to be within manufacturer's specifications; the security of mounting of the components is verified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of components of lifting, rotating, and extension systems of an aerial device; normal condition; types of defects, deficiencies, and potential problems associated with aerial device lifting, rotating, and extension systems; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify conditions of components of lifting, rotating, and extension systems of an aerial device that are abnormal or operating outside manufacturer's requirements; determine defects and deficiencies; perform operational tests; and complete checklist and inspection documentation.

2.7.8 Inspect the components of the aerial device electrical system, given an emergency response vehicle with an aerial device, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the security of mounting is verified; operation and condition of the electrical system, interlocks, and warning systems is verified to be within manufacturer's specifications; the operation and legibility of the gauges is verified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, operation, and inspection of components of the aerial device electrical and warning systems; normal condition; types of defects, deficiencies, and potential problems of aerial device electrical systems; selection of test gauges and meters; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify conditions of components of aerial device electrical systems that are deficient or operating outside manufacturer's requirements, read and interpret test gauges and meters, perform operational tests, and complete checklist and inspection documentation.

2.7.9 Inspect all components of an aerial device waterway system, given an emergency response vehicle with an aerial device and waterway system, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the security of mounting is verified; the operation and condition of the aerial device waterway system is verified to be within manufacturer's specifications; the operation and legibility of the gauges is verified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of components of the waterway system; selection of test and calibration equipment; lubrication requirements; types of defects, deficiencies, and potential problems associated with aerial device waterway systems; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify symptoms and the condition of components of aerial device waterway systems that are deficient or operating outside manufacturer's requirements, use test and calibration equipment, read and interpret test gauges and flowmeters, perform operational tests, and complete checklist and inspection documentation.

2.8 Specialized Systems. This duty involves inspection, operational testing, and maintenance of foam systems, line-voltage electrical systems, breathing air systems, and auxiliary air systems.

2.8.1* Inspect the foam proportioning system, given an emergency response vehicle with a foam proportioning system, appropriate SOPs, manufacturer's specifications, appropriate tools, test and calibration equipment, an assignment, and an inspection checklist, so that the mounting security and structural integrity are verified; operation and condition of the system is verified to be within manufacturer's specifications; recommended fluid levels are verified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of foam proportioning systems including construction and operation of eduction, injection, and venturi proportioning systems and related components; characteristics of system design including foam concentrate agents; characteristics of water flow and pressure; flushing procedures; backflow prevention; the use of filters and strainers; basic principles of operating controls, metering devices, and indicators; selection of test and calibration equipment; types of defects, deficiencies, and potential problems associated with foam proportioning systems; use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Interpret manufacturer's operational and maintenance guidelines, identify and operate proportioning systems, recognize symptoms and conditions, determine defects and deficiencies, use test and calibration equipment,

perform operational tests, and complete checklist and inspection documentation.

2.8.2 Perform maintenance on a foam proportioning system, given an emergency response vehicle with a foam proportioning system, a maintenance schedule or an assignment, a maintenance checklist, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools so that deformed, broken, loose, worn, or missing parts are repaired or replaced; the system operates within manufacturer's guidelines; fluid levels are maintained; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, and operation of a foam proportioning system; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with foam proportioning systems; troubleshooting procedures; adjustment methods and procedures; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Evaluate reported conditions, perform all required maintenance including all items on a maintenance checklist, use test and calibration equipment, correct deficiencies, perform operational tests on the foam proportioning system, and complete required documentation.

2.8.3 Inspect the compressed air foam system (CAFS) and associated components, given an emergency response vehicle with a CAFS, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the security of mounting of the system is verified; the operation and condition of the system and its associated components including air tank, hoses, valves and fittings, warning and interlock systems, linkage, and drive shafts is verified to be within manufacturer's specifications; recommended fluid levels are verified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of CAFSs; warning and interlock systems; common failure symptoms associated with component interfaces of related equipment; types of defects, deficiencies, and potential problems associated with CAFSs; pressure control devices; packing and seals; types, grades, and viscosity of lubricants; use of checklists; record-keeping requirements; operational testing requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify normal operating conditions of CAFSs; identify components that are damaged, worn, or missing; determine defects and deficiencies; use test and calibration equipment; perform operational tests; and complete checklists and inspection documentation.

2.8.4 Perform maintenance on a CAFS and its components, given an emergency response vehicle with a compressed air foam system, manufacturer's specifications, a maintenance schedule or assignment, a maintenance checklist, appropriate SOPs, and appropriate tools and test equipment, so that the operational condition of the CAFS is preserved or restored; CAFS compressor and system components function to the recommended specifications; all hoses are tight; adjustments are made to stop all fluid leaks; lubricants are applied; all electrical connections are clean and tight; system operation is veri-

fied; deformed, broken, loose, worn, or missing parts including component mounts, drive system, pump, plumbing, and valves are repaired or replaced; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Function, construction, and operation of CAFS, including foam types, drive systems, flowmeters, proportioners, valves, eductors, and nozzles; the use of test and calibration equipment; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with CAFSs; troubleshooting procedures; adjustment methods and procedures; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Ability to evaluate the reported condition of a CAFS; perform all required maintenance including all items on a maintenance checklist; recognize and correct deficiencies; interpret and follow operational test procedures; use test and calibration equipment; and complete required documentation.

2.8.5* Inspect all components and accessories of the electrical line voltage generation system, controls, and instrumentation, given an emergency response vehicle with a line voltage electrical system, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the security of mounting is verified; the operation and condition of the system and drive units, cord reels, lighting, accessories and equipment, safety and protection devices, and instrumentation is verified to be within manufacturer's specifications; the condition and correct placement of information and warning signs and labels is verified; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Electricity safety and inspection procedures; function, construction, operation, and inspection of components of electrical line voltage generation, controls, and instrumentation; types of defects, deficiencies, and potential problems associated with electrical line voltage generation systems; required labels, plates, and signs, use of checklists; record-keeping requirements; and inspection procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize and identify the symptoms and conditions of components of electrical line voltage generation including controls and instrumentation, determine defects and deficiencies, perform operational tests, and complete checklist and inspection documentation.

2.8.6 Perform maintenance on electrical line voltage generation system, controls, and instrumentation, given an emergency response vehicle with a line voltage electrical system, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that the operational condition of generators, system components, instrumentation, controls, safety and load protection devices, and the drive unit is preserved or restored; lubrication and fluid levels are checked; deformed, broken, loose, worn, or missing parts are repaired or replaced; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge:* Knowledge of local, state, and federal regulation regarding inspection and maintenance of line voltage installations; function, construction, and operation of

generators, instrumentation, controls, and drive units; lubrication requirements and types; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with line voltage electrical systems; troubleshooting procedures; adjustment methods and procedures; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Evaluate reported conditions, perform operational tests, perform all required maintenance including all items on a maintenance checklist, use test and calibration equipment, correct deficiencies, and complete required documentation.

2.8.7 Inspect all components of a breathing-air and purification system, given an emergency response vehicle with a breathing-air and purification system, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, quality sample kits, an assignment, and an inspection checklist, so that the security of mounting is verified; operation and condition of the breathing-air and purification system, including the drive unit and compressors, electrical protection devices, safety devices, interlocks, and instrumentation, is verified to be within manufacturer's specifications; the condition of the separator filters is verified; recommended fluid levels of drive units and compressors are verified; the condition and adjustment of drive belts is verified to be within manufacturer's specifications; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, construction, and operation of a breathing-air purification system; understanding of cascading operations, high-pressure air regulation, and purification testing; types of defects, deficiencies, and potential problems associated with breathing-air and purification systems; use of checklists; record-keeping requirements; system inspection and maintenance procedures of the authority having jurisdiction and manufacturer; selection of test and calibration equipment; and test methods and troubleshooting procedures.

(b) *Requisite Skills*: Evaluate reported conditions, recognize symptoms and conditions, determine defects and deficiencies, perform operational tests, use test and calibration equipment, and complete checklist and inspection documentation.

2.8.8 Perform maintenance on a breathing-air and purification system, given an emergency response vehicle with a breathing-air and purification system, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that drive units and compressors are maintained; breathing air is within purification standards; deformed, broken, loose, worn, or missing parts are repaired or replaced; the operational condition is preserved or restored; the system is operationally tested; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge*: Function, construction, and operation of drive units and compressors; selection of test and calibration equipment; lubricants and lubrication systems; role of a maintenance schedule and a maintenance checklist; types of defects or deficiencies associated with breathing-air and purification systems; troubleshooting procedures; adjustment

methods and procedures; inspection and repair or replacement of system components; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Evaluate reported conditions of the compressor and drive unit, perform all required maintenance including all items on a maintenance checklist, recognize and correct deficiencies, interpret and follow operational test methods and procedures, use test and calibration equipment, and complete required documentation.

2.8.9 Inspect an auxiliary air compressor, given an emergency response vehicle with an auxiliary air compressor, appropriate SOPs, manufacturer's specifications, appropriate tools and test equipment, an assignment, and an inspection checklist, so that the operation and condition of the auxiliary air compressor, warning systems, instrumentation, and interlock systems is verified to be within manufacturer's specifications; the security of mounting of the system and its associated components is verified; linkage and drive shafts are inspected for wear and alignment; the condition of air tank, dryer, reels, hoses, piping, valves, and fittings is assessed; recommended fluid levels are verified and fluids are inspected for any visible contamination; all checklist items are inspected; defects and deficiencies including broken, loose, worn, or missing parts are identified and reported; and inspection and tests are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, construction, and operation of auxiliary air compressors, drive units, and related components; warning and interlock systems; common failure symptoms associated with component interfaces of related equipment; purpose for and use of checklists; types of defects, deficiencies, and potential problems associated with auxiliary air compressors, drive units, and related components; types of instrumentation; selection of test and calibration equipment; pressure control and safety devices, packing, and seals; types, grades, and viscosity of lubricants; use of checklists; record-keeping requirements; and inspection and operational testing requirements and procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Recognize and identify symptoms and conditions of compressors, drive units, and related components that are damaged, worn, or missing; determine defects and deficiencies; use test and calibration equipment; perform operational tests; and complete checklists and inspection documentation.

2.8.10 Perform maintenance on auxiliary air compressors, drive units, and related components, given an emergency response vehicle with an auxiliary air compressor, manufacturer's specifications, a maintenance schedule or an assignment, a maintenance checklist, appropriate SOPs, and appropriate tools and test equipment, so that the compressor, drive unit, and related components are operational and functioning within the manufacturer's specifications; filters are replaced; any leaks in hoses, piping, valves, and fittings are repaired; lubricants are applied; all electrical connections are clean and tight; deformed, broken, loose, worn, or missing parts are repaired or replaced; system operation is verified; activities are documented; and additional repair needs are reported.

(a) *Requisite Knowledge*: Function, construction, and operation of a drive unit, compressor, and related components; selection of test and calibration equipment; role of a maintenance schedule and a maintenance checklist; lubricants and

lubrication systems; types of defects or deficiencies associated with auxiliary air compressors, drive units, and related components; troubleshooting procedures; adjustment methods and procedures; inspection and repair or replacement of system components; record-keeping requirements; and inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Evaluate the reported condition of compressors, drive units, and related components; perform operational tests; perform all required maintenance including all items on a maintenance checklist; determine and correct defects and deficiencies; use test and calibration equipment; and complete checklists and required documentation.

Chapter 3 Emergency Vehicle Technician II

3.1 General. To be considered qualified as an Emergency Vehicle Technician II, the individual shall meet the requirements of an Emergency Vehicle Technician I and shall meet the job performance requirements of Section 3.2 through Section 3.5 and at least one of the specialty areas as defined in Section 3.6, Section 3.7, or Section 3.8. The Emergency Vehicle Technician II shall not be considered qualified in a specialty area as defined in Section 3.6, Section 3.7, or Section 3.8 unless he or she is first qualified in the equivalent specialty as defined in Section 2.6, Section 2.7, or Section 2.8 as an Emergency Vehicle Technician I.

3.2 Chassis. This duty involves the repair and testing on an emergency response vehicle of chassis and interdependent systems such as engines, transmissions, drivelines, brakes, steering and suspension, fuel, electrical, exhaust, and climate control.

3.2.1 Perform repairs on chassis systems, given an emergency response vehicle with an identified defective component(s), manufacturer's specifications, appropriate SOPs, an assignment or inspection report detailing a deficiency or deformation, test and calibration equipment, and appropriate tools, so that the defective component is diagnosed; deformed, broken, loose, worn, or missing parts of a chassis system are repaired, rebuilt, or replaced to manufacturer's specifications; operational tests are conducted and performance is verified; and the repairs are documented.

(a) *Requisite Knowledge*: Function, operation, and construction of chassis and vehicle systems; type of defects, deficiencies, and potential problems; selecting test and calibration equipment; repair and overhaul procedures; theory of electricity; operational, diagnostic, and performance tests; adjustment and calibration procedures; use of test equipment; common defects; electrical troubleshooting procedures; record-keeping requirements; and diagnostic and repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Identify and evaluate reported conditions, recognize deficiencies, perform required repairs to resolve deficiencies, conduct required testing, use test and calibration equipment, and complete required documentation.

3.2.2 Perform repairs on chassis systems and components unique to emergency response vehicles, given an emergency response vehicle with an identified defective component(s), manufacturer's specifications, appropriate SOPs, an assignment or inspection report detailing a deficiency or deformation, and appropriate test and calibration equipment and

tools, so that the identified defective component is diagnosed; deformed, broken, loose, worn, or missing parts of a chassis system or its components are repaired, rebuilt, or replaced to manufacturer's specifications; operational tests are conducted and performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, operation, and construction of chassis and vehicle systems; type of defects, deficiencies, and potential problems; selecting test and calibration equipment; repair and overhaul procedures; theory of electricity and electronics; types of cooling systems; types of suspension and steering systems; basic principles of suspension and steering geometry; types of brake systems including secondary braking systems; principles of hydraulics; operational, diagnostic, and performance tests; adjustment and calibration procedures; selection of test and calibration equipment; common defects; electrical troubleshooting procedures; record-keeping requirements; and diagnostic and repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Identify and evaluate conditions, recognize deficiencies, perform required repairs to resolve deficiencies, conduct required testing, use test and calibration equipment, and complete required documentation.

3.3 Cab and Body Components. This duty involves the repairs of cabs (fixed and tilt) and the vehicle body, including compartments, mounting brackets, steps, and ladders.

3.3.1 Perform repairs on equipment mounting systems and racks, given an emergency response vehicle, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, and appropriate test and calibration equipment and tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an equipment mounting system or rack are repaired, rebuilt, or replaced to manufacturer's specifications; operational tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge*: Function, construction, and operation of equipment mounting systems, mounting racks, brackets, and locks; selection of test and calibration equipment; principles of welding and fabrication; principles of pneumatic, hydraulic, and electric operation; troubleshooting procedures; repairing, rebuilding, and replacement procedures; verification testing; types of fluids; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills*: Recognize, evaluate, and identify reported conditions; use test and calibration equipment; measure voltage, amperage, and resistance; recognize metals; perform welding and fabrication; perform required repairs to resolve deficiencies; perform operational tests; and complete required documentation.

3.3.2 Perform repairs on cab tilt systems, given an emergency response vehicle with a cab tilt system, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, and appropriate test and calibration equipment and tools, so that defective components are diagnosed and deformed, broken, loose, worn, or missing parts of a cab tilt system are repaired, replaced, or rebuilt to manufacturer's specifications; operational tests are conducted and performance is

verified; hazards are avoided; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of cab tilt systems and safety locks; selection of test and calibration equipment; principles of welding and fabrication; principles of pneumatic, hydraulic, and electric operation; troubleshooting procedures; repairing, rebuilding, and replacement procedures; verification testing; types of fluids; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; use testing and calibration equipment; measure voltage, amperage and resistance; recognize metals; perform welding and fabrication; perform required repairs to resolve deficiencies; perform operational tests; and complete required documentation.

3.3.3 Perform repairs on body, compartments, and storage areas, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a body, compartment, or storage area are repaired, replaced, or rebuilt to manufacturer's specifications; components are fabricated, adjusted, aligned, and lubricated; hazardous conditions are resolved; operational tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of doors, compartment shelves, trays, and dividers, steps, ladders, platforms, handrails, skid-resistant walking surfaces, and storage areas; types of lubricants; failures and restoration of finishes, signs, labels, and paint; welding and fabrication procedures; selection of test and calibration equipment; adjustment and alignment procedures; troubleshooting procedures; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; use test and calibration equipment; recognize metals; apply paint and finish materials; perform welding and fabrication; perform required repairs to resolve deficiencies; perform operational tests; and complete required documentation.

3.3.4 Perform repairs on a cab, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a cab are repaired, replaced, or rebuilt to manufacturer's specifications; operational tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of doors and latches, seats, SCBA mounting and safety restraints, instrumentation, window glass and mirrors, steps, handrails, and skid-resistant walking surfaces; types of lubricants; failures and restoration of finishes, signs, labels, and paint; welding and fabrication procedures; selection of test and calibration equipment; adjustment and alignment procedures; troubleshooting procedures; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; use test and calibration equipment; recognize metals; apply paint and finish materials; perform welding and fabrication; perform required repairs to resolve deficiencies; perform operational tests; and complete required documentation.

3.4 Electronic and Electrical Systems (Low Voltage). This duty involves the repair and testing of the charging systems, starting systems, lighting systems, electronic pump controls, and other low-voltage electronic and electrical devices.

3.4.1 Perform repairs on low-voltage electrical system components, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of low-voltage electrical system components are repaired, replaced, or rebuilt to manufacturer's specifications; charging systems, starting systems, lighting systems, electrical accessories, and other electrical systems are returned to operation; correct test equipment is used; hazards are avoided; correct parts are used; operational tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of starting motors, alternators, and accessory electric motors, relays, solenoids, and regulators; repair and overhaul procedures; theory of electricity; operational, diagnostic, and performance tests; adjustment and calibration procedures; selection of test and calibration equipment; common defects; electrical troubleshooting procedures; record-keeping requirements; and diagnostic and repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; perform required repairs to resolve deficiencies; use test and calibration equipment; measure voltage, amperage, and resistance; distinguish defects and deficiencies; operate and test system; perform electrical calculations; and complete required documentation.

3.4.2 Perform repairs on electronic controls and instrumentation, given an emergency response vehicle, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electronic control or instrumentation are repaired, replaced, or rebuilt to manufacturer's specifications; engine, transmission, and brake electronic control units or electronic control modules, pump throttles and pressure control devices, and instrumentation are returned to operation; programming is correct; load control devices, sequencer, interfaces, and interlocks are operational; correct test equipment is used; correct parts are used; correct tests and programming procedures are followed; operational tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, operation, and requirements of electronic engine, transmission, and brake controls, instrumentation, load control devices, sequencers, interfaces, and interlocks; selection of appropriate test and calibration equipment; digital volt-ohmmeter, electronic readers, and fault code interpretation; safety procedures; common deficiencies;

correct repair procedures; record-keeping requirements; diagnostic and repair procedures of the authority having jurisdiction and manufacturer; and troubleshooting procedures.

(b) *Requisite Skills:* Recognize, evaluate, and analyze reported conditions, defects, and deficiencies; perform required repairs to resolve deficiencies; use test and calibration equipment properly; operate and test system(s); perform calculations; use correct parts; and complete required documentation.

3.5 Auxiliary Drive Systems. This duty involves the repair and operational testing of auxiliary drive systems.

3.5.1 Perform repairs on the auxiliary drive system (PTO), given an emergency response vehicle with an auxiliary drive system, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an auxiliary drive system are repaired, replaced, or rebuilt to manufacturer's specifications; the system is checked for fluid and air leaks; deficiencies are resolved; operational tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of auxiliary drive systems, warning systems, and interlock systems; hydraulic, air, and electric principles; types of fluids and lubricants; selection of test and calibration equipment; adjustment and alignment procedures; record-keeping requirements; and diagnostic and repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; use test and calibration equipment; perform required repairs to resolve deficiencies; operate and test systems; and complete required documentation.

3.6 Pump and Tank Systems. This duty involves the maintenance, repairs, and service testing of pump systems and water/foam tanks.

3.6.1 Perform repairs on fire pumps or auxiliary pumps and related components, given an emergency response vehicle with a fire pump or auxiliary pump, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts on a fire pump, auxiliary pumps, or related components are repaired, replaced, or rebuilt to manufacturer's specifications; operational and service tests are conducted and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of a pump and its related components; overhaul procedures; principles of pressure control devices; packing and seal replacement and adjustment procedures; operational and service testing procedure and requirements; selection of test and calibration equipment; safety procedures; troubleshooting procedures; record-keeping requirements; and diagnostic and repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; perform required repairs to resolve deficiencies; use test and calibration equipment; identify defects

and deficiencies; operate and test systems; perform fire flow hydraulic calculations; and complete required documentation.

3.6.2 Perform repairs on water/foam tanks, given an emergency response vehicle with a water or foam tank, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, and appropriate tools, so that leaks are repaired; interior and exterior surfaces are free of corrosion; coatings are renewed; deformed, broken, loose, worn, or missing parts are repaired, replaced, or rebuilt to manufacturer's specifications; service flow test of the tank(s) is conducted; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of water/tanks; flow requirements; cleaning and coating procedures; principles of welding and fabrication; recognition of materials; selection of test and calibration equipment; testing procedures; troubleshooting; record-keeping requirements; and diagnostic and repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and identify reported conditions; recognize tank materials; perform welding and fabrication; perform required repairs to resolve deficiencies; use test and calibration equipment; perform service flow tests; and complete required documentation.

3.6.3 Perform service tests on fire pump systems and components, given an emergency response vehicle with a fire pump; NFPA 1911, *Standard for Service Tests of Fire Pump Systems on Fire Apparatus*; appropriate SOPs; appropriate tools; test and calibration equipment and facilities; records; and forms, so that pump performance can be evaluated; defects and deficiencies are discovered; operation of pump system components is verified; the accuracy of pump system instrumentation is determined; and test results are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of pump systems, controls, and instrumentation; selection of test and calibration equipment; test equipment calibration requirements; pump system performance requirements and test procedures; repair methods and procedures; fire flow hydraulic calculations; and record-keeping requirements.

(b) *Requisite Skills:* Evaluate conditions, recognize deficiencies, interpret and follow test procedures, conduct required testing, use test and calibration equipment, and complete test forms and required documentation.

3.7 Aerial Systems. This duty involves inspection, maintenance, repair, and testing of an aerial system.

3.7.1 Perform repair on aerial sections, booms and platforms, given an emergency response vehicle with an aerial device, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial section, boom, or platform are repaired, replaced, or rebuilt to manufacturer's specifications; the aerial device is operationally tested and performance is verified; and the repairs are documented in accordance with the procedures of the authority having jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of an aerial device, components, and systems; selection of test and calibration equipment; fluid types and lubricants; record-keeping requirements; and repair and diagnostic

procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions; interpret the manufacturer's specifications; perform required repairs to resolve deficiencies; use test and calibration equipment; perform operational tests; and complete required documentation.

3.7.2 Perform repairs on the aerial device stabilization system, given an emergency response vehicle with an aerial device stabilization system, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device stabilization system are repaired, replaced, or rebuilt to manufacturer's specifications; the stabilization system is operationally tested and performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device stabilization system; record-keeping requirements; selection of test and calibration equipment; and aerial device repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions, interpret the manufacturer's specifications, perform required repairs to resolve deficiencies, use required test and calibration equipment, perform operational tests, and complete required documentation.

3.7.3 Perform maintenance on an aerial device lifting, rotating, and extension system, given an emergency response vehicle with an aerial device, a maintenance schedule or an assignment, manufacturer's specifications, a maintenance checklist, appropriate SOPs, test and calibration equipment, and appropriate tools, so that the lifting, rotating, and extension systems are maintained in accordance with manufacturer's specifications; electrical connections are clean and tight; hoses, valves, and fittings are leak free and in good condition; instrumentation is operational; controls are operational; lubricants are applied; fluids are at recommended levels; the operational condition is preserved or restored; deformed, broken, loose, worn, or missing parts are repaired or replaced; the aerial system is operationally tested and the performance is verified; additional repair needs are reported; and the maintenance is documented.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device lifting, rotating, and extension systems; role of a maintenance schedule and a maintenance checklist; lubrication and fluid types; adjustment methods and procedures; troubleshooting procedures; types of defects and deficiencies; principles of hydraulics; selection of test and calibration equipment; record-keeping requirements; and aerial device inspection and maintenance procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Evaluate reported conditions, perform all required maintenance including all items on a maintenance checklist, correct deficiencies, use required test and calibration equipment, perform operational tests, and complete required documentation.

3.7.4 Perform repairs on an aerial device lifting, rotating, and extension system, given an emergency response vehicle with an aerial device, an assignment or inspection report detailing

a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device lifting, rotating, and extension system are repaired, replaced, or rebuilt to manufacturer's specifications; the aerial device is operationally tested and the performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device lifting, rotating, and extension systems; troubleshooting procedures; selection of test and calibration equipment; record-keeping requirements; and aerial device repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions, interpret manufacturer's specifications, perform required repairs to resolve deficiencies, use required test and calibration equipment, perform operational test, and complete required documentation.

3.7.5 Perform repairs on an aerial hydraulic system, given an emergency response vehicle with an aerial device, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, and appropriate tools, test, and calibration equipment, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial hydraulic system are repaired, rebuilt, or replaced according to manufacturer's specifications; fluids are restored to recommended levels; the aerial device is operationally tested and the performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device hydraulic system and components; principles of hydraulics; lubricants and fluid types; troubleshooting procedures; selection of test and calibration equipment; adjustment methods and procedures; record-keeping requirements; and aerial device repair procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions, perform required repairs to resolve deficiencies, use required test and calibration equipment, perform operational tests, and complete required documentation.

3.7.6 Perform repairs on aerial device electrical and electronic systems, given an emergency response vehicle with an aerial device, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device electrical or electronic system are repaired, rebuilt, or replaced to manufacturer's specifications; the aerial device is operationally tested and the performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device electrical or electronic system; principles of electricity; electronic theory; selection of test, calibration, and diagnostic equipment; record-keeping requirements; and diagnostic, repair, and test procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions; interpret manufacturer's specifications; perform required diagnosis; perform required repairs to resolve deficiencies; use required test, calibration, and diagnostic equipment; perform operational tests; and complete required documentation.

3.7.7 Perform repairs on an aerial device waterway system, given an emergency response vehicle with an aerial device and a prepped waterway system, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an aerial device waterway system are repaired, rebuilt, or replaced and tested according to manufacturer's specifications; the aerial device and the waterway is operationally tested and the performance is verified; and the repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of the aerial device waterway system; principles of hydraulics; selection of test and calibration equipment; adjustment and alignment procedures; record-keeping requirements; and aerial device waterway diagnostic, repair, and test procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions, interpret manufacturer specifications, perform required repairs to resolve deficiencies, use required test and calibration equipment, perform operational tests, and complete required documentation.

3.7.8 Perform annual tests on the aerial device, given an emergency response vehicle with an aerial device; NFPA 1914, *Standard for Testing Fire Department Aerial Devices*; appropriate SOPs; test and calibration equipment; appropriate tools; facilities; records; and forms, so that aerial device performance can be evaluated; defects and deficiencies are discovered; operation of aerial device systems is verified; and test results are documented.

(a) *Requisite Knowledge:* Function, construction, and operation of aerial devices, controls, and instrumentation; selection of test and calibration equipment; test equipment calibration requirements; aerial device performance requirements and test procedures; fire flow hydraulic calculations; and record-keeping requirements.

(b) *Requisite Skills:* Evaluate conditions, recognize deficiencies, interpret and follow test procedures, conduct required testing, use test and calibration equipment, and complete test forms and required documentation.

3.8 Specialized Systems. This duty involves the repair and operational testing of foam systems, line voltage electrical systems, breathing air, and auxiliary air systems.

3.8.1 Repair foam proportioning system components, given an emergency response vehicle with a foam proportioning system, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a foam proportioning system including component mounts, drive systems, pumps, plumbing, and valves are repaired, replaced, or rebuilt to manufacturer's specifications; the foam system is operationally tested and performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of foam proportioning systems, including foam types, drive systems, foam concentrate pumps, flowmeters, proportioners, valves, eductors, and nozzles; the selection of testing and calibration equipment; methods and procedures; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions, interpret manufacturer's specifications, use required test and calibration equipment, perform diagnostic procedures, perform required repairs to resolve deficiencies, perform operational tests, and complete required documentation of the jurisdiction and the manufacturer.

3.8.2 Repair CAFSs, given an emergency response vehicle with a CAFS, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, department SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a CAFS including component mounts, drive systems, pumps, plumbing, and valves are repaired, replaced, or rebuilt to manufacturer's specifications; fluid levels are restored; the CAFS is operationally tested and its performance is verified; and repairs are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, and operation of CAFS, including foam types, drive systems, air compressors, flowmeters, proportioners, valves, eductors, and nozzles; the selection of test and calibration equipment; adjustment methods and procedures; lubrication and fluid types; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and analyze reported conditions; perform required repairs to resolve deficiencies; interpret manufacturer's specifications; use test and calibration equipment; perform operational tests; and complete required documentation of the jurisdiction and the manufacturer.

3.8.3* Repair all components of an electrical line voltage generation system, its controls, and its instrumentation, given an emergency response vehicle with an electrical line voltage system, manufacturer's specifications, an assignment or an inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an electrical line voltage generation system are repaired, replaced, or rebuilt to manufacturer's specifications; fluids and lubricants are restored; the system is operationally tested and performance is verified; and the repair and test results are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, operation, and requirements of generators, drive units, controls and instrumentation, interfaces, and interlocks; selection of test and calibration equipment; defects and deficiencies; repair procedures; troubleshooting procedures; line voltage wiring procedures and requirements; safety protection devices; fluid and lubricant types; required calibrations; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, evaluate, and analyze conditions, perform required testing and repairs to resolve deficiencies, use test and calibration equipment, perform system

operational tests, perform calculations, and complete required documentation.

3.8.4* Repair all hardwired line voltage appliances and controls, given an emergency response vehicle with hardwired line voltage appliances and controls, manufacturer's specifications, an assignment or inspection report detailing a deficiency or deformation, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components and accessories are diagnosed; deformed, broken, loose, worn, or missing parts of a hardwired line voltage appliance or control are repaired, replaced, or rebuilt to manufacturer's specifications; systems are operationally tested and performance verified; and repairs and test results are documented in accordance with the procedures of the jurisdiction.

(a) *Requisite Knowledge:* Function, construction, operation, and requirements of hardwired line voltage appliances and controls, accessories, and equipment; selection of test and calibration equipment; types of defects and deficiencies; troubleshooting procedures; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Recognize, identify, and evaluate reported conditions of line voltage components and accessories; perform repairs to resolve deficiencies; use test and calibration equipment; perform operational tests; and complete required documentation.

3.8.5 Repair a breathing-air and air purification system, given an emergency response vehicle with a breathing-air and air purification system, an assignment or inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that all defective components are diagnosed; deformed, broken, loose, worn, or missing parts of a breathing-air and air purification system including mounts, drive systems, pumps, piping, valves, fittings, tanks, and other components are repaired, replaced, or rebuilt to manufacturer's specifications; the system is operationally tested and performance is verified; and the repairs and test results are documented in accordance with the procedures of the jurisdiction and the manufacturer.

(a) *Requisite Knowledge:* Function, construction, and operation of the complete breathing-air system and high-pressure air regulation; purification testing; record-keeping requirements; system diagnostic and repair procedures of the authority having jurisdiction and the manufacturer; selection of test and calibration equipment; troubleshooting procedures; and test procedures.

(b) *Requisite Skills:* Identify and evaluate reported conditions, use test and calibration equipment, perform diagnostic procedures, perform required repairs to resolve deficiencies, calibrate equipment, perform operational tests, and complete required documentation.

3.8.6 Repair an auxiliary air system and its components, given an emergency response vehicle with an auxiliary air system, an assignment, or an inspection report detailing a deficiency or deformation, manufacturer's specifications, appropriate SOPs, test and calibration equipment, and appropriate tools, so that defective components are diagnosed; deformed, broken, loose, worn, or missing parts of an auxiliary air system including mounts, drive systems, pumps, piping, valves, fittings, and tanks, and other components are repaired, replaced, or rebuilt to manufacturer's specifications; the auxiliary air system is opera-

tionally tested and its performance is verified; and the repair and test results are documented in accordance with the procedures of the jurisdiction and the manufacturer.

(a) *Requisite Knowledge:* Function, construction, and operation of the auxiliary air system, low-pressure regulation, valves, and controls; testing procedures; the selection of test and calibration equipment; adjustment and calibration methods and procedures; record-keeping requirements; and repair and diagnostic procedures of the authority having jurisdiction and the manufacturer.

(b) *Requisite Skills:* Identify and evaluate reported conditions, use test and calibration equipment, perform diagnostic procedures, perform tests and calibrations, perform required repairs to resolve deficiencies, perform operational tests, and complete required documentation.

Chapter 4 Referenced Publications

4.1 The following documents or portions thereof are referenced within this standard as mandatory requirements and shall be considered part of the requirements of this standard. The edition indicated for each referenced mandatory document is the current edition as of the date of the NFPA issuance of this standard. Some of these mandatory documents might also be referenced in this standard for specific informational purposes and, therefore, are also listed in Appendix C.

4.1.1 NFPA Publications. NFPA, 1 Batterymarch Park, PO Box 9101, Quincy, MA 02269-9101.

NFPA 1500, *Standard on Fire Department Occupational Safety and Health Program*, 1997 edition.

NFPA 1911, *Standard for Service Tests of Fire Pump Systems on Fire Apparatus*, 1997 edition.

NFPA 1914, *Standard for Testing Fire Department Aerial Devices*, 1997 edition.

NFPA 1915, *Standard for Fire Apparatus Preventive Maintenance Program*, 2000 edition.

Appendix A Explanatory Material

Appendix A is not a part of the requirements of this NFPA document but is included for informational purposes only. This appendix contains explanatory material, numbered to correspond with the applicable text paragraphs.

A.1.1 There are certain components on emergency response vehicles that are not considered unique. It is not the intent of this document to restrict the authority having jurisdiction from using persons they feel are qualified to perform inspection, diagnosis, maintenance, repair, and testing of those components. However, an emergency response vehicle is a complex piece of machinery and there are many components that are highly integrated (e.g., the engine, transmission, and pump with the electronic lockups and interlocks, remote engine controls, multiplexing, special cooling considerations). For that reason, this document requires that a person qualified as an emergency vehicle technician possess minimum skills and knowledge to inspect, diagnose, and perform repairs. The root cause can be beyond the unique component where the symptom is present and in fact can be related to a component that otherwise might not be considered unique.

There are certain other tasks that are generic to all motor vehicles and can be performed by persons considered qualified

by the authority having jurisdiction. Examples of these tasks include changing engine and transmission oil and filters, servicing and changing tires, servicing differentials, adjusting brakes, servicing wheelbearings, body work, and painting.

A.1.4 Definitions of action verbs used within this document are based upon the first definition of the word found in *Webster's Third New International Dictionary of the English Language*.

A.1.4.2 Approved. The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization that is concerned with product evaluations and is thus in a position to determine compliance with appropriate standards for the current production of listed items.

A.1.4.3 Authority Having Jurisdiction. The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

A.1.4.20 Listed. The means for identifying listed equipment may vary for each organization concerned with product evaluation; some organizations do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

A.2.1 This document does not require a person to be certified but outlines the requirements for qualification. Ways of evaluating those qualifications are schooling, training, practical experience, and existing certification programs. Programs such as Automotive Service Excellence (ASE), Emergency Vehicle Technicians Certification Commission (EVT), the Canadian provincial journeyman license for heavy equipment, the Canadian registered apprentice program under the supervision of a licensed journeyman, a technician certification program recognized by a federal or state agency, or equivalent programs can be utilized to help the authority having jurisdiction determine the requisite knowledge and skills of a candidate.

For emergency response vehicles, some of the following ASE certifications could apply.

- (1) A-1 Automobile, Engine Repair
- (2) A-2 Automobile, Automatic Transmission and Transaxle

- (3) A-3 Automobile, Manual Drive Train and Axles
- (4) A-4 Automobile, Suspension and Steering
- (5) A-5 Automobile, Brakes
- (6) A-6 Automobile, Electrical and Electronic Systems
- (7) A-7 Automobile, Heating and Air Conditioning
- (8) T-1 Heavy Duty Truck, Gasoline Engine
- (9) T-2 Heavy Duty Truck, Diesel Engine
- (10) T-3 Heavy Duty Truck, Drive Train
- (11) T-4 Heavy Duty Truck, Brakes
- (12) T-5 Heavy Duty Truck, Suspension and Steering
- (13) T-6 Heavy Duty Truck, Electrical Systems
- (14) T-7 Heavy Duty Truck, Heating, Ventilation, and Air Conditioning
- (15) T-8 Heavy Duty Truck, Preventive Maintenance Inspection

For emergency response vehicles, some of the following EVT certifications could apply.

- (1) F-2 Design and Performance Standards and Preventive Maintenance of Fire Apparatus
- (2) F-3 Fire Pumps and Accessories
- (3) F-4 Fire Apparatus Electrical Systems
- (4) F-5 Aerial Fire Apparatus
- (5) F-6 Allison Automatic Transmissions
- (6) E-1 Design and Performance Standards and Preventive Maintenance of Ambulances
- (7) E-2 Ambulance Electrical Systems
- (8) E-3 Ambulance Heating, Air Conditioning, and Ventilation
- (9) E-4 Ambulance Cab, Chassis, and Body

Table A.2.1(a) can be used as a guide to distinguish the appropriate ASE and EVT certifications available to persons performing maintenance on emergency response vehicles of 15,000 gross vehicle weight rating (GVWR) and above.

Table A.2.1(a) ASE and EVT by Component, for 15,000 GVWR and Above

Component	ASE	EVT
Chassis	T-3, T-4, T-6, T-8	F-2, E-1, E-4
Cab and body	T-all	F-2, E-1, E-3, E-4
Transmission	T-1, T-2, T-3, T-6, T-8	F-6, E-4
Pump and tank	T-8, T-6, T-3	F-3
Electrical	T-6, T-7, T-8	F-4, E-2
Aerial	T-3, T-5, T-6	F-5
Foam	T-8, T-6, T-3	F-2
Auxiliary systems	T-1, T-2, T-3, T-6	F-2

Table A.2.1(b) can be used as a guide to distinguish the appropriate ASE and EVT certifications available to persons performing maintenance on emergency response vehicles under 15,000 GVWR.

Table A.2.1(b) ASE and EVT by Component, for 15,000 GVWR and Below

Component	ASE	EVT
Chassis	A-2, A-3, A-4, A-5,	F-2, E-1, E-4
Cab and body	A-all, T-2	F-2, E-1, E-3, E-4
Transmission	A-1, A-2, A-3, A-6, T-2	E-4
Pump and tank	A-2, A-3, A-6	F-3
Electrical	A-6, A-7	F-4, E-2
Foam	A-2, A-3, A-6	F-2
Auxiliary systems	A-1, A-2, A-3, A-6, T-2	F-2

A.2.1.1 There are several requirements in NFPA 1002, *Standard for Fire Apparatus Driver/Operator Professional Qualifications*, that make the driver/operator responsible for performing certain daily and weekly inspection checks on the apparatus. The technician needs to be aware of what the responsibilities of the driver/operator are. The beginning of preventive maintenance starts with the driver/operator, and in many cases the driver/operator and the technician are the same person. In order to perform these inspections, it is critical that this person(s) possess a minimum degree of general knowledge and skills as they apply to the EVT.

A.2.4.3 Electronic controls that are inspected under this duty include electrical control modules (ECMs), sensors, thermal switches, vehicle interface modules (VIMs), switch interface modules (SIMs), and aerial interface modules (AIMs). Test equipment includes diagnostic readers.

A.2.6.3 Related components include priming devices, transfer valves, pressure-governing systems, thermal sensors, sacrificial anodes, lubrication systems, and so forth.

A.2.8.1 Foam proportioning systems can include in-line educator foam proportioning systems, self-educating master stream nozzles, intake-side foam proportioning systems, around-the-pump proportioning systems, balanced pressure foam proportioning systems, direct injection foam proportioning systems, and water motor-type foam proportioning systems.

Refer to NFPA 1901, *Standard for Automotive Fire Apparatus*, for guidance on foam proportioning systems.

A.2.8.5 See NFPA 70, *National Electrical Code®*, NFPA 70B, *Recommended Practice for Electrical Equipment Maintenance*, NFPA 70E, *Standard for Electrical Safety Requirements for Employee Workplaces*, and NFPA 1901, *Standard for Automotive Fire Apparatus*, for information on electrical safety.

A.3.8.3 The repair facility should check with local and state authorities for required licensing requirements for persons working on line voltage systems. See NFPA 70, *National Electrical Code*, and NFPA 1901, *Standard for Automotive Fire Apparatus*, for additional information on electrical systems.

A.3.8.4 The repair facility should check with local and state authorities for required licensing requirements for persons working on line voltage systems.

Appendix B Job Performance Requirements

This appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

B.1 Explanation of the Standards and Concepts of Job Performance Requirements (JPRs). The primary benefit of establishing national professional qualification standards is to provide both public and private sectors with a framework of the job requirements for the fire service. Other benefits include enhancement of the profession, individual as well as organizational growth and development, and standardization of practices.

NFPA professional qualification standards identify the minimum JPRs for specific fire service positions. The standards can be used for training design and evaluation; certification; measuring and critiquing on-the-job performance; defining hiring practices; and setting organizational policies, procedures, and goals. (Other applications are encouraged.)

Professional qualification standards for a specific job are organized by major areas of responsibility defined as duties. For example, the fire fighter's duties might include fire suppression, rescue, and water supply; and the public fire educator's duties might include education, planning and development, and administration. Duties are major functional areas of responsibility within a job.

The professional qualification standards are written as JPRs. JPRs describe the performance required for a specific job. JPRs are grouped according to the duties of a job. The complete list of JPRs for each duty defines what an individual must be able to do in order to successfully perform that duty. Together, the duties and their JPRs define the job parameters; that is, the standard as a whole is a description of a job.

B.2 Breaking Down the Components of a JPR. The JPR is the assembly of three critical components. (See Table B.2.) These components are as follows:

- (1) Task that is to be performed
- (2) Tools, equipment, or materials that must be provided to successfully complete the task
- (3) Evaluation parameters and/or performance outcomes

Table B.2 Example of a JPR

(1) Task	(1) Ventilate a pitched roof
(2) Tools, equipment, or materials	(2) Given an ax, a pike pole, an extension ladder, and a roof ladder
(3) Evaluation parameters and performance outcomes	(3) So that a 4-ft × 4-ft hole is created; all ventilation barriers are removed; ladders are properly positioned for ventilation; ventilation holes are correctly placed; and smoke, heat, and combustion by-products are released from the structure