

# EMERGENCY VEHICLE TECHNICIAN II

## CERTIFICATION TRAINING STANDARDS



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# EMERGENCY VEHICLE TECHNICIAN CERTIFICATION TRAINING STANDARDS

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**EMERGENCY VEHICLE TECHNICIAN II**

**#1: THE ROLE OF THE EMERGENCY VEHICLE TECHNICIAN II**

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 5.1.1 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

**PERFORMANCE GOAL**

The following must be in accordance with department policy and standard operating procedures.

**GIVEN:**

1. *Federal Motor Carrier Safety Regulations*
2. *Applicable federal, state, and local regulations*
3. *A sample Hazardous Materials Communication Plan*

**REQUISITE KNOWLEDGE:**

1. *Describe the role of the EVT II within the organization*
2. *Identify AHJ standard operating procedures, rules, and regulations as they apply to the EVT II*
3. *Describe the critical aspects of NFPA standards as they apply to the EVT II:*
  - *NFPA 1500, Standard on Fire Department Occupational Safety and Health Program*
  - *NFPA 1901, Standard for Automotive Fire Apparatus*
  - *NFPA 1911, Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus*
4. *Apply Federal Motor Carrier Safety Regulations as they apply to EVT II roles and responsibilities*
5. *Apply federal, state, and local regulations as they apply to the EVT II roles and responsibilities*
6. *Apply a Hazardous Materials Management Plan, which at a minimum shall include:*
  - *A Hazardous Materials Identification System*
  - *MSDS (Material Safety Data Sheets)*
  - *Storage*
  - *Handling*
  - *Dispensation*
  - *Use*
  - *Disposal*

**JOB PERFORMANCE REQUIREMENT:**



1. *Inspect and verify the operation and condition of emergency response vehicles*
2. *Maintain or repair the operation and condition of emergency response vehicles in accordance with manufacturer specifications*
3. *Restore emergency response vehicle operational condition in accordance with manufacturer specifications*
4. *Conduct performance testing for emergency response vehicle systems and components*
5. *Operate emergency response vehicles in compliance with regulations*
6. *Locate, interpret, and use manufacturer specifications, inspection checklists, maintenance schedules, maintenance checklists, and AHJ standard operating procedures, documents, and standards*
7. *Handle hazardous materials*

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #2: INSPECTING AERIAL SYSTEM LADDERS, ELEVATING PLATFORMS, AND WATERWAYS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.6.1, 4.6.2, 4.6.9, 5.6.1, 5.6.7, AND THE STATE FIRE MARSHAL
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with an aerial ladder (4.6.1) (5.6.1)
2. An emergency response vehicle with an elevating platform or water tower (4.6.2) (5.6.1)
3. An emergency response vehicle with an aerial device waterway system (4.6.9) (5.6.1) (5.6.7)
4. Standard operating procedures (4.6.1) (4.6.2) (4.6.9) (5.6.1) (5.6.7)
5. Manufacturer specifications (4.6.1) (4.6.2) (4.6.9) (5.6.1) (5.6.7)
6. Tools (4.6.1) (4.6.2) (4.6.9) (5.6.1) (5.6.7)
7. Test and calibration equipment (4.6.1) (4.6.2) (4.6.9) (5.6.1) (5.6.7)
8. An inspection checklist (4.6.1) (4.6.2) (4.6.9)
9. An inspection report detailing a deficiency or deformation (5.6.1) (5.6.7)

#### **REQUISITE KNOWLEDGE:**

1. Describe principles of hydraulics (5.6.7)
2. Describe the function, operation, construction, and inspection practices of aerial ladders (4.6.1)
3. Describe types of defects, deficiencies, and potential problems associated with aerial ladders (4.6.1)
4. Describe the function, operation, and construction of elevating platforms or water towers (4.6.2)
5. Describe types of defects, deficiencies, and potential problems associated with elevating platforms or *water towers* (4.6.2)
6. Describe the function, operation, and construction of aerial device waterway systems (4.6.9)
7. Describe types of defects, deficiencies, and potential problems associated with aerial device waterway systems (4.6.9)
8. Select *tools* and test and calibration equipment (4.6.9)
9. Describe fluid types and lubricants (5.6.1)
10. Describe lubrication requirements (4.6.9)

11. Describe manufacturer and AHJ inspection procedures and documentation (4.6.1) (4.6.2) (4.6.9)

**JOB PERFORMANCE REQUIREMENT:**

1. Verify operation, condition, and mounting of the ladder sections, extension systems, and all related components of an aerial ladder utilizing manufacturer specifications and appropriate checklists:
  - Check for twists and bows
  - Check for corrosion, dents, wear, and defects
  - Check for compliance with applicable standards, specifications, and regulations (4.6.1)
2. Verify operation, condition, and mounting of an elevating platform or water tower and all related components utilizing manufacturer specifications and appropriate checklists:
  - Check for twists and bows
  - Check for corrosion, dents, wear, and defects
  - Check for compliance with applicable standards, specifications, and regulations
  - Check extension elevation and leveling systems for damage (4.6.2)
3. Verify operation, condition, and mounting of an aerial device waterway system and all related components utilizing manufacturer specifications and appropriate checklists:
  - Check for bows and leaks
  - Check for corrosion, dents, wear, and defects
  - Check for compliance with applicable standards, specifications, and regulations
  - Check legibility and operation of gauges (4.6.9)
4. Identify and report defects and deficiencies including broken, loose, worn, or missing components to the AHJ (4.6.1) (4.6.2) (4.6.9)
5. Document inspection and tests (4.6.1) (4.6.2) (4.6.9)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

### #3: MAINTAINING AND REPAIRING AERIAL SYSTEM LADDERS, ELEVATING PLATFORMS, AND WATERWAYS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.6.3, 4.6.6, 5.6.1, 5.6.3, 5.6.7, AND THE STATE FIRE MARSHAL
LEVEL OF LEARNING:	II

#### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### GIVEN:

1. An emergency response vehicle with an aerial ladder (4.6.6) (5.6.1) (5.6.3)
2. An emergency response vehicle with an elevating platform or water tower (4.6.6) (5.6.1) (5.6.3)
3. An emergency response vehicle with an aerial device waterway system (4.6.3) (4.6.6) (5.6.1) (5.6.3) (5.6.7)
4. Manufacturer specifications (4.6.3) (4.6.6) (5.6.1) (5.6.3) (5.6.7)
5. A maintenance schedule (4.6.3) (4.6.6) (5.6.3)
6. A maintenance checklist (4.6.3) (4.6.6) (5.6.3)
7. An inspection report detailing a deficiency or deformation (5.6.1) (5.6.7)
8. Standard operating procedures (4.6.3) (4.6.6) (5.6.1) (5.6.3) (5.6.7)
9. Test and calibration equipment (4.6.3) (4.6.6) (5.6.1) (5.6.3) (5.6.7)
10. Tools (4.6.3) (4.6.6) (5.6.1) (5.6.3) (5.6.7)

#### REQUISITE KNOWLEDGE:

1. Select *tools* and test and calibration equipment (5.6.1) (5.6.7)
2. Describe troubleshooting procedures (4.6.3)
3. Describe adjustment and alignment methods and procedures (4.6.3) (5.6.7)
4. Describe manufacturer and AHJ apparatus inspection, maintenance, and documentation procedures (4.6.3)
5. Describe manufacturer and AHJ diagnostic, repair, test, and documentation procedures (5.6.1) (5.6.7)

#### JOB PERFORMANCE REQUIREMENT:

1. Maintain or repair ladder sections, extension systems, elevating platforms, water towers, aerial device waterway systems, and all related components in accordance with manufacturer specifications:



- Cleaning
  - Lubrication
  - Adjustment (4.6.3) (5.6.1)
2. Diagnose defective components (5.6.1) (5.6.7)
  3. Repair, *rebuild*, or replace *defective*, broken, loose, worn, or missing components (4.6.3) (5.6.1) (5.6.7)
  4. Conduct performance tests (4.6.3) (5.6.1) (5.6.7)
  5. Document maintenance and repair activities and report additional required repairs to the AHJ (4.6.3) (5.6.1) (5.6.7)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #4: INSPECTING AERIAL HYDRAULIC SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.6.4, 4.6.5, 4.6.7, AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with an aerial device (4.6.4) (4.6.7)
2. An emergency response vehicle with an aerial device stabilization system (4.6.5)
3. Standard operating procedures (4.6.4) (4.6.5) (4.6.7)
4. Manufacturer specifications (4.6.4) (4.6.5) (4.6.7)
5. Tools (4.6.4) (4.6.5) (4.6.7)
6. Test and calibration equipment (4.6.4) (4.6.5) (4.6.7)
7. An inspection checklist (4.6.4) (4.6.5) (4.6.7)

#### **REQUISITE KNOWLEDGE:**

1. Describe the function, construction, and operation of an aerial device stabilization system, including wheels, tires, axles, frame, torque box, turntable, and related components (4.6.5)
2. Describe types of defects, deficiencies, and potential problems associated with stabilization systems *and related components* (4.6.5)
3. Describe the 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 *and related components* (4.6.4)
4. Describe fluid requirements (4.6.4)
5. Describe defects, deficiencies, and potential problems associated with hydraulic systems *and related components* (4.6.4)
6. Describe types of contamination sources (4.6.4)
7. Describe the function, construction, and operation of components of lifting, rotating, and extension systems of an aerial device *and related components* (4.6.7)
8. Describe types of defects, deficiencies, and potential problems associated with aerial device lifting, rotating, and extension systems and related *components* (4.6.7)
9. Describe normal operating conditions (4.6.4) (4.6.5) (4.6.7)
10. Describe manufacturer and AHJ inspection procedures and documentation (4.6.4) (4.6.5) (4.6.7)



**JOB PERFORMANCE REQUIREMENT:**

1. Verify operation, condition, and mounting of the stabilization system utilizing manufacturer specifications and appropriate checklists (4.6.5)
2. Verify operation, condition, and mounting of the hydraulic system components, warning systems, and gauges of an aerial device utilizing manufacturer specifications and appropriate checklists:
  - Verify recommended fluid levels
  - Identify visible leakage or contamination (4.6.4)
3. Verify operation, condition, and mounting of the lifting, rotating, and extension systems utilizing manufacturer specifications and appropriate checklists (4.6.7)
4. Complete performance tests (4.6.7)
5. Identify and report defects and deficiencies including broken, loose, worn, or missing components to the AHJ (4.6.4) (4.6.5) (4.6.7)
6. Document inspection and tests (4.6.4) (4.6.5) (4.6.7)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #5: MAINTAINING AND REPAIRING AERIAL HYDRAULIC SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.6.6, 5.6.2, 5.6.3, 5.6.4, AND 5.6.5
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with an aerial device (5.6.3) (5.6.4) (5.6.5)
2. An emergency response vehicle with an aerial device stabilization system (4.6.6) (5.6.2)
3. An inspection report detailing a deficiency or deformation (5.6.2) (5.6.4) (5.6.5)
4. A maintenance schedule (4.6.6) (5.6.3)
5. A maintenance checklist (4.6.6) (5.6.3)
6. Manufacturer specifications (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)
7. Standard operating procedures (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)
8. Test and calibration equipment (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)
9. Tools (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)

#### **REQUISITE KNOWLEDGE:**

1. Describe principles of hydraulics (5.6.3) (5.6.5)
2. Describe lubrication and fluid types (5.6.3) (5.6.5)
3. Select *tools* and test and calibration equipment (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)
4. Describe troubleshooting procedures (4.6.6) (5.6.3) (5.6.4) (5.6.5)
5. Describe adjustment methods and procedures (4.6.6) (5.6.3) (5.6.5)
6. Describe manufacturer and AHJ repair procedures and documentation for an aerial device (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Maintain or repair the aerial device stabilization system in accordance with manufacturer specifications (4.6.6) (5.6.2)
2. Maintain or repair the aerial device lifting, rotating, and extension systems in accordance with manufacturer specifications (5.6.3) (5.6.4)
3. Maintain or repair the hydraulic system components, warning systems, and gauges of an aerial device in accordance with manufacturer specifications (5.6.5)
4. Diagnose defective components (5.6.2) (5.6.3) (5.6.4) (5.6.5)



5. Repair, *rebuild*, or replace *defective*, broken, loose, worn, or missing components (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)
6. Conduct performance tests (5.6.2) (5.6.3) (5.6.4) (5.6.5)
7. Document maintenance and repair activities and report additional required repairs to the AHJ (4.6.6) (5.6.2) (5.6.3) (5.6.4) (5.6.5)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #6: INSPECTING AERIAL DEVICE ELECTRICAL SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 4.6.8 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with an aerial device (4.6.8)
2. Standard operating procedures (4.6.8)
3. Manufacturer specifications (4.6.8)
4. Tools (4.6.8)
5. Test equipment (4.6.8)
6. An inspection checklist (4.6.8)

#### **REQUISITE KNOWLEDGE:**

1. Describe the function, construction, operation, and inspection of aerial device electrical systems, warning systems, and related components (4.6.8)
2. Describe the normal condition of aerial device electrical and warning systems *and related components* (4.6.8)
3. Describe types of defects, deficiencies, and potential problems of aerial device electrical systems (4.6.8)
4. Select *tools*, test gauges and meters (4.6.8)
5. Describe manufacturer and AHJ inspection procedures and documentation (4.6.8)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Verify operation, condition, and mounting of the electrical system utilizing manufacturer specifications and appropriate checklists:
  - Interlocks
  - Warning systems
  - *Wiring harnesses (low voltage / line voltage)*
  - *Communication systems*
  - *Lighting systems (low voltage / line voltage)*
  - *Auxiliary component electrical controls*
  - *Electric over hydraulic controls* (4.6.8)
2. Verify operation and legibility of gauges (4.6.8)



3. Identify and report defects and deficiencies including broken, loose, worn, or missing components to the AHJ (4.6.8)
4. Document inspection (4.6.8)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #7: MAINTAINING AND REPAIRING AERIAL ELECTRICAL SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 5.6.6 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with an aerial device (5.6.6)
2. An inspection report detailing a deficiency or deformation (5.6.6)
3. Manufacturer specifications (5.6.6)
4. Standard operating procedures (5.6.6)
5. Test and calibration equipment (5.6.6)
6. Tools (5.6.6)

#### **REQUISITE KNOWLEDGE:**

1. Select test, calibration, and diagnostic equipment (5.6.6)
2. *Describe troubleshooting procedures*
3. *Describe adjustment methods and procedures*
4. Describe manufacturer and AHJ diagnostic, repair, test, and documentation procedures (5.6.6)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Maintain or repair the aerial device electrical systems in accordance with manufacturer specifications:
  - Interlocks
  - Warning systems
  - *Wiring harnesses (low voltage / line voltage)*
  - *Lighting systems (low voltage / line voltage)*
  - *Communication systems*
  - *Auxiliary component electrical controls*
  - *Electric over hydraulic controls* (5.6.6)
2. Diagnose defective components (5.6.6)
3. Repair, *rebuild*, or replace *defective*, broken, loose, worn, or missing components (5.6.6)
4. Conduct performance tests (5.6.6)

5. Document maintenance and repair activities and report additional required repairs to the AHJ (5.6.6)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #8: AERIAL SYSTEMS ANNUAL PERFORMANCE TESTING

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 5.6.8 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. *An emergency vehicle with an aerial device*
2. NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Automotive Fire Apparatus (5.6.8)
3. *Standard operating procedures*
4. Test and calibration equipment (5.6.8)
5. Tools (5.6.8)
6. Facilities (5.6.8)
7. Records and forms (5.6.8)

#### **REQUISITE KNOWLEDGE:**

1. Describe how to select and test calibration equipment (5.6.8)
2. Describe test equipment calibration requirements (5.6.8)
3. Describe aerial device performance requirements and test procedures (5.6.8)
4. Describe fireflow hydraulic calculations (5.6.8)

#### **JOB PERFORMANCE REQUIREMENT:**

1. *Conduct* annual performance testing on aerial devices, systems, and related components to evaluate the performance of *mechanical, hydraulic, and electrical systems* (5.6.8)
2. Identify defects and deficiencies (5.6.8)
3. Verify operation (5.6.8)
4. Document test results (5.6.8)

#### **STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy



## #9: INSPECTING LINE VOLTAGE SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 4.7.5 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a line voltage electrical system (4.7.5)
2. Standard operating procedures (4.7.5)
3. Manufacturer specifications (4.7.5)
4. Tools (4.7.5)
5. Test equipment (4.7.5)
6. An inspection checklist (4.7.5)

#### **REQUISITE KNOWLEDGE:**

1. Describe electricity safety and inspection procedures (4.7.5)
2. Describe the function, construction, operation, and inspection of components of electrical line voltage generation, controls, and instrumentation (4.7.5)
3. Describe types of defects, deficiencies, and potential problems associated with electrical line voltage generation systems (4.7.5)
4. *Describe performance tests applicable to line voltage electrical systems*
5. Describe required labels, plates, and signs (4.7.5)
6. Describe manufacturer and AHJ inspection procedures and documentation (4.7.5)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Verify operation, condition, and mounting of the electrical line voltage generation system, controls, and instrumentation utilizing manufacturer specifications and appropriate checklists:
  - Generators
  - System components
  - Drive unit
  - Instrumentation controls
  - Safety and load protection devices
  - Interlocks
  - *Shoreline systems* (4.7.5)



2. Verify condition and correct placement of information and warning signs (4.7.5)
3. *Complete performance tests*
4. Identify and report defects and deficiencies including broken, loose, worn, or missing components to the AHJ (4.7.5)
5. Document inspection and tests (4.7.5)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #10: MAINTAINING AND REPAIRING LINE VOLTAGE SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.7.6, 5.7.5, 5.7.6, AND 5.7.7
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a line voltage electrical system (4.7.6) (5.7.5) (5.7.6)
2. An emergency response vehicle with hardwired line voltage appliances and controls (5.7.7)
3. Manufacturer specifications (4.7.6) (5.7.5) (5.7.6) (5.7.7)
4. A maintenance schedule (4.7.6)
5. A maintenance checklist (4.7.6)
6. An inspection report detailing a deficiency or deformation (5.7.5) (5.7.7)
7. Standard operating procedures (4.7.6) (5.7.5) (5.7.6) (5.7.7)
8. Test and calibration equipment (4.7.6) (5.7.5) (5.7.6) (5.7.7)
9. Facilities (5.7.6)
10. Tools (4.7.6) (5.7.5) (5.7.6) (5.7.7)
11. NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Automotive Fire Apparatus (5.7.6)

#### **REQUISITE KNOWLEDGE:**

1. Describe safety procedures and protection devices (5.7.5) (5.7.6)
2. Describe local, state, and federal regulations regarding inspection and maintenance of line voltage installations (4.7.6)
3. Describe electrical load, grounding, and insulation calculations (5.7.6)
4. Describe wiring and grounding standards (5.7.6)
5. Describe fluid and lubrication requirements and types (4.7.6) (5.7.5)
6. Describe line voltage wiring procedures and requirements (5.7.5)
7. Describe troubleshooting or diagnostic procedures (4.7.6) (5.7.5) (5.7.6) (5.7.7)
8. Describe repair procedures (5.7.5)
9. Describe required calibrations (5.7.5)
10. Select *tools* and test and calibration equipment (5.7.5) (5.7.6) (5.7.7)
11. Describe operational and performance testing procedure and requirements (5.7.6)
12. Describe adjustment methods and procedures (4.7.6)

13. Describe manufacturer and AHJ inspection, maintenance, and documentation procedures (4.7.6)
14. Describe manufacturer and AHJ repair, diagnostic, and documentation procedures (5.7.5) (5.7.7)

**JOB PERFORMANCE REQUIREMENT:**

1. Maintain or repair the electrical line voltage generation system, controls, appliances, and instrumentation in accordance with manufacturer specifications:
  - Generators
  - System components
  - Drive unit
  - Instrumentation controls
  - Safety and load protection devices
  - Interlocks
  - *Shoreline systems* (4.7.6) (5.7.5)
2. Maintain or repair the hardwired line voltage appliances and controls in accordance with manufacturer specifications:
  - *System components*
  - *Safety and load protection devices* (5.7.7)
3. Diagnose defective components (5.7.5) (5.7.7)
4. Repair, *rebuild*, or replace *defective*, broken, loose, worn, or missing components (4.7.6) (5.7.5) (5.7.7)
5. Conduct performance tests on hardwired line voltage appliances and controls (5.7.7)
6. Document maintenance and repair activities and report additional required repairs to the AHJ (4.7.6) (5.7.5) (5.7.6) (5.7.7)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

## #11: INSPECTING BREATHING AIR SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 4.7.7 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a breathing air and purification system (4.7.7)
2. Standard operating procedures (4.7.7)
3. Manufacturer specifications (4.7.7)
4. Tools (4.7.7)
5. Test and calibration equipment (4.7.7)
6. Quality sample kits (4.7.7)
7. An inspection checklist (4.7.7)

#### **REQUISITE KNOWLEDGE:**

1. Describe the function, construction, and operation of a breathing air purification system, high-pressure air regulation, and related components (4.7.7)
2. Describe types of defects, deficiencies, and potential problems associated with breathing air and purification systems (4.7.7)
3. Describe cascading operations, high-pressure air regulation, and purification testing (4.7.7)
4. *Describe the function, construction, and operation of drive units and compressors*
5. Describe test methods and troubleshooting procedures (4.7.7)
6. Select *tools* and test and calibration equipment (4.7.7)
7. Describe manufacturer and AHJ system inspection, maintenance, and documentation procedures (4.7.7)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Verify operation, condition, and mounting of all components of a breathing air and purification system utilizing manufacturer specifications and appropriate checklists:
  - Drive unit and compressors
  - Electrical protection devices
  - Safety devices
  - Interlocks
  - Instrumentation



- Filtration systems (4.7.7)
- 2. Verify drive unit fluid levels (4.7.7)
- 3. Verify compressor fluid levels and condition (4.7.7)
- 4. Identify and report defects and deficiencies including broken, loose, worn, or missing components to the AHJ (4.7.7)
- 5. Document inspection (4.7.7)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #12: MAINTAINING, REPAIRING, AND PERFORMANCE TESTING BREATHING AIR SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.7.8, 5.7.8, AND 5.7.9
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a breathing air and purification system (4.7.8) (5.7.8) (5.7.9)
2. Manufacturer specifications (4.7.8) (5.7.8) (5.7.9)
3. A maintenance schedule (4.7.8)
4. A maintenance checklist (4.7.8)
5. An inspection report detailing a deficiency or deformation (5.7.8)
6. Standard operating procedures (4.7.8) (5.7.8) (5.7.9)
7. Test and calibration equipment (4.7.8) (5.7.8)
8. Tools (4.7.8) (5.7.8)
9. NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Automotive Fire Apparatus (5.7.9)
10. NFPA 1989, Standard on Breathing Air Quality for Emergency Services Respiratory Protection (5.7.9)

#### **REQUISITE KNOWLEDGE:**

1. Describe test procedures (5.7.8)
2. Describe troubleshooting procedures (4.7.8) (5.7.8)
3. Describe adjustment methods and procedures (4.7.8)
4. Inspect and repair or replace system components (4.7.8)
5. Describe lubricants and lubrication systems (4.7.8)
6. Select *tools* and test and calibration equipment (4.7.8) (5.7.8)
7. Identify compressed breathing air quality standards and air quality testing agencies (5.7.9)
8. Describe purification testing (5.7.8)
9. Identify compressor manufacturers or manufacturer representatives (5.7.9)
10. Describe manufacturer and AHJ inspection, maintenance, and documentation procedures (4.7.8)
11. Describe manufacturer and AHJ system diagnostic, repair, and documentation procedures (5.7.8)



**JOB PERFORMANCE REQUIREMENT:**

1. Maintain or repair all components of a breathing air and purification system in accordance with manufacturer specifications:
  - Drive unit and compressors
  - Electrical protection devices
  - Safety devices
  - Interlocks
  - Instrumentation
  - Filtration systems (4.7.8) (5.7.8)
2. Ensure breathing air is within purification standards and regulations (4.7.8) (5.7.9)
3. Diagnose defective components (5.7.8)
4. Repair, *rebuild*, or replace *defective*, broken, loose, worn, or missing components:
  - Mounts
  - Drive systems
  - Pumps
  - Piping
  - Valves
  - Fittings
  - Tanks (4.7.8) (5.7.8)
5. Conduct operational and performance tests (4.7.8) (5.7.8) (5.7.9)
  - Ensure that compressor performs to manufacturer original requirements
  - Document results in accordance with NFPA standards, manufacturer, and AHJ
6. Document maintenance and repair activities and report additional required repairs to the AHJ (4.7.8) (5.7.8) (5.7.9)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

## #13: INSPECTING AUXILIARY AIR SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.7.9 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An auxiliary air compressor
2. An emergency response vehicle with an auxiliary air compressor (4.7.9)
3. Standard operating procedures (4.7.9)
4. Manufacturer specifications (4.7.9)
5. Tools (4.7.9)
6. Test equipment (4.7.9)
7. An inspection checklist (4.7.9)

#### **REQUISITE KNOWLEDGE:**

1. Describe the function, construction, and operation of auxiliary air compressors, drive units, and related components (4.7.9)
2. Describe types of instrumentation (4.7.9)
3. Describe pressure control and safety devices, packing, and seals (4.7.9)
4. Describe warning and interlock systems (4.7.9)
5. Describe types, grades, and viscosity of lubricants (4.7.9)
6. Select *tools* and test and calibration equipment (4.7.9)
7. Describe types of defects, deficiencies, and potential problems associated with auxiliary air compressors, drive units, and related components (4.7.9)
8. Describe common failure symptoms associated with component interfaces of related equipment (4.7.9)
9. Describe manufacturer and AHJ inspection, operational testing, and documentation requirements and procedures (4.7.9)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Verify operation, condition, and mounting of an auxiliary air compressor, drive units, and related components utilizing manufacturer specifications and appropriate checklists:
  - Auxiliary air compressor
  - Warning systems

- Instrumentation
  - Interlock systems
  - Drive system (4.7.9)
2. Assess condition of air tank, dryer, reels, hoses, piping, valves, and fittings (4.7.9)
  3. Verify recommended fluid levels and condition (4.7.9)
  4. Identify and report defects and deficiencies including broken, loose, worn, or missing components to the AHJ (4.7.9)
  5. Document inspection and tests (4.7.9)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #14: MAINTAINING AND REPAIRING AUXILIARY AIR SYSTEMS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 4.7.10 AND 5.7.10
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with an auxiliary air compressor (4.7.10)
2. An emergency response vehicle with an auxiliary air system (5.7.10)
3. Manufacturer specifications (4.7.10) (5.7.10)
4. A maintenance schedule (4.7.10)
5. A maintenance checklist (4.7.10)
6. An inspection report detailing a deficiency or deformation (5.7.10)
7. Standard operating procedures (4.7.10) (5.7.10)
8. Test and calibration equipment (4.7.10) (5.7.10)
9. Tools (4.7.10) (5.7.10)

#### **REQUISITE KNOWLEDGE:**

1. Describe test procedures (5.7.10)
2. Describe lubricants and lubrication systems (4.7.10)
3. Select *tools* and test and calibration equipment (4.7.10) (5.7.10)
4. Describe troubleshooting procedures (4.7.10)
5. Describe adjustment and calibration methods and procedures (4.7.10) (5.7.10)
6. Describe the inspection and repair or replacement of system components (4.7.10)
7. Describe manufacturer and AHJ inspection, maintenance, and documentation procedures (4.7.10)
8. Describe manufacturer and AHJ repair, diagnostic, and documentation procedures (5.7.10)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Maintain or repair all components of auxiliary air compressors, drive units, and related components in accordance with manufacturer specifications:
  - Auxiliary air compressor
  - Warning systems
  - Instrumentation
  - Interlock systems



- Drive systems (4.7.10) (5.7.10)
- 2. Replace filters (4.7.10)
- 3. Repair leaks in hoses, piping, valves, and fittings (4.7.10)
- 4. Apply recommended lubricants (4.7.10)
- 5. Ensure all electrical connections are clean and tight (4.7.10)
- 6. Diagnose defective components (5.7.10)
- 7. Repair, *rebuild*, or replace *defective*, broken, loose, worn, or missing components (4.7.10) (5.7.10)
- 8. Conduct performance tests (5.7.10)
- 9. Document maintenance and repair activities and report additional required repairs to the AHJ (4.7.10) (5.7.10)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #15: REPAIRING CAB AND BODY

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 5.3.1, 5.3.2, 5.3.3, 5.3.4, AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a cab tilt system (5.3.1) (5.3.2) (5.3.3) (5.3.4)
2. Manufacturer specifications (5.3.1) (5.3.2) (5.3.3) (5.3.4)
3. An inspection report detailing a deficiency or deformation (5.3.1) (5.3.2) (5.3.3) (5.3.4)
4. Standard operating procedures (5.3.1) (5.3.2) (5.3.3) (5.3.4)
5. Test and calibration equipment (5.3.1) (5.3.2) (5.3.3) (5.3.4)
6. Tools (5.3.1) (5.3.2) (5.3.3) (5.3.4)

#### **REQUISITE KNOWLEDGE:**

1. Describe principles of welding and fabrication (5.3.2)
2. Describe welding and fabrication procedures (5.3.1) (5.3.3) (5.3.4)
3. Describe failures and restoration of finishes, signs, labels, and paint (5.3.3) (5.3.4)
4. Describe principles of pneumatic, hydraulic, and electric operation (5.3.1) (5.3.2)
5. *Describe safety precautions to avoid hazardous conditions*
6. *Select tools and equipment*
7. Describe troubleshooting procedures (5.3.1) (5.3.2) (5.3.3) (5.3.4)
8. Describe repair, rebuilding, and replacement procedures (5.3.1) (5.3.2)
9. Describe adjustment and alignment procedures (5.3.3) (5.3.4)
10. Describe verification testing (5.3.1) (5.3.2)
11. Describe manufacturer and AHJ repair, diagnostic, and documentation procedures (5.3.1) (5.3.2) (5.3.3) (5.3.4)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Follow safety precautions to avoid hazards during repairs (5.3.2) (5.3.3)
2. Diagnose defective components (5.3.1) (5.3.2) (5.3.3)
3. Repair, rebuild, or replace *defective*, broken, loose, worn, or missing parts to manufacturer specifications:
  - Cab
  - Cab tilt system



- Body
  - Compartment
  - Storage area
  - Equipment-mounting systems and racks (5.3.1) (5.3.2) (5.3.3) (5.3.4)
4. Fabricate, adjust, align, and lubricate components (5.3.3)
  5. Resolve hazardous conditions (5.3.3)
  6. Conduct operational tests and verify performance (5.3.1) (5.3.2) (5.3.3) (5.3.4)
  7. Document repairs in accordance with manufacturer and AHJ procedures (5.3.1) (5.3.2) (5.3.3) (5.3.4)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #16: REPAIRING ELECTRONIC CONTROLS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 5.4.2 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle (5.4.2)
2. Manufacturer specifications (5.4.2)
3. An inspection report detailing a deficiency or deformation (5.4.2)
4. Standard operating procedures (5.4.2)
5. Test and calibration equipment (5.4.2)
6. Tools (5.4.2)

#### **REQUISITE KNOWLEDGE:**

1. Describe safety procedures (5.4.2)
2. Describe the function, construction, operation, and requirements of electronic engine, transmission, and brake controls, instrumentation, load control devices, sequencers, interfaces, and interlocks (5.4.2)
3. *Describe correct testing and programming procedures*
4. Describe correct repair procedures (5.4.2)
5. Select *tools* and test and calibration equipment (5.4.2)
6. *Describe electronic schematic usage*
7. Describe digital volt-ohmmeter, electronic readers, and fault code interpretation (5.4.2)
8. Describe common deficiencies (5.4.2)
9. Describe manufacturer and AHJ diagnostic, repair, and documentation procedures (5.4.2)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Diagnose defective components
2. Perform repairs on electronic controls and instrumentation:
  - Engine
  - Transmission
  - Brake electronic control units
  - Electronic control modules
  - Pump throttles and pressure control devices

- Load control devices
  - Sequencer
  - Interfaces
  - Interlocks
3. Repair, rebuild, or replace *defective*, broken, loose, worn, or missing parts to manufacturer specifications
  4. Verify correct programming:
    - *Version*
    - *Calibration level*
  5. Conduct operational tests and verify performance
  6. Document repairs in accordance with manufacturer and AHJ procedures

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## #17: REPAIRING FOAM AND WATER TANKS

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTION 5.5.2 AND THE <i>STATE FIRE MARSHAL</i>
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a water or foam tank (5.5.2)
2. Manufacturer specifications (5.5.2)
3. An inspection report detailing a deficiency or deformation (5.5.2)
4. Standard operating procedures (5.5.2)
5. Tools (5.5.2)

#### **REQUISITE KNOWLEDGE:**

1. Describe materials recognition (5.5.2)
2. Describe cleaning and coating procedures (5.5.2)
3. Describe flow requirements (5.5.2)
4. Select *tools* and test and calibration equipment (5.5.2)
5. Describe testing procedures (5.5.2)
6. Describe troubleshooting (5.5.2)
7. Describe manufacturer an AHJ diagnostic, repair, and documentation procedures (5.5.2)

#### **JOB PERFORMANCE REQUIREMENT:**

1. *Diagnose defective components*
2. Repair, rebuild, or replace *defective*, broken, loose, worn, or missing parts to manufacturer specifications (5.5.2)
3. Verify interior and exterior surfaces are free of corrosion/*erosion* (5.5.2)
4. Renew coatings (5.5.2)
5. Conduct service flow test of the tank(s) (5.5.2)
6. Document repairs in accordance with manufacturer and AHJ procedures (5.5.2)

#### **STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy



## #18: REPAIRING AND PERFORMANCE TESTING COMPRESSED AIR FOAM SYSTEMS (CAFS)

AUTHORITY:	NFPA 1071 STANDARD FOR EMERGENCY VEHICLE TECHNICIAN PROFESSIONAL QUALIFICATIONS (2011): SECTIONS 5.7.3 AND 5.7.4
LEVEL OF LEARNING:	II

### PERFORMANCE GOAL

The following must be in accordance with department policy and standard operating procedures.

#### **GIVEN:**

1. An emergency response vehicle with a CAFS (5.7.3) (5.7.4)
2. An inspection report detailing a deficiency or deformation (5.7.3)
3. Manufacturer specifications (5.7.3) (5.7.4)
4. Standard operating procedures (5.7.3) (5.7.4)
5. Test and calibration equipment (5.7.3) (5.7.4)
6. Facilities (5.7.4)
7. Tools (5.7.3) (5.7.4)
8. NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Automotive Fire Apparatus (5.7.4)

#### **REQUISITE KNOWLEDGE:**

1. Describe principles of compressed air systems (5.7.4)
2. Describe safety procedures (5.7.4)
3. Describe foam proportioning systems (5.7.4)
4. Describe lubrication and fluid types (5.7.3)
5. Describe operational and performance testing procedure and requirements (5.7.4)
6. Describe foam and compressed air flow calculations (5.7.4)
7. Select *tools* and test and calibration equipment (5.7.3) (5.7.4)
8. Describe diagnostic procedures (5.7.4)
9. Describe adjustment methods and procedures (5.7.3)
10. Describe manufacturer and AHJ repair, diagnostic, and documentation procedures (5.7.3)

#### **JOB PERFORMANCE REQUIREMENT:**

1. Diagnose defective components (5.7.3)
2. Repair, rebuild, or replace *defective*, broken, loose, worn, or missing parts to manufacturer specifications:
  - Component mounts
  - Drive systems



- Pumps
  - Plumbing
  - Valves (5.7.3)
3. Restore fluid levels (5.7.3)
  4. Conduct operational tests and verify performance (5.7.3) (5.7.4)
  5. Document repairs in accordance with manufacturer and AHJ procedures (5.7.3) (5.7.4)
  6. Complete performance testing on a CAFS and related components in accordance with NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Automotive Fire Apparatus (5.7.4)
  7. Document testing in accordance with NFPA standards and AHJ requirements (5.7.3) (5.7.4)

**STANDARD:**

By successfully completing all assignments and activities, passing all performance tests, and passing all written tests with a minimum of 80% accuracy

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## REFERENCE RESOURCES

- Departmental Standard Operating Procedures
- Manufacturer Service Manuals
- Title 49 Code of Federal Regulations
- California Vehicle Code
- Title 21, Division 2, California Code of Regulations

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