



**General Services Administration
Federal Supply Service**

Authorized Federal Supply Schedule Price List

On-line access to contract ordering information, terms and conditions, up-to-date pricing and the option to create an electronic delivery order are available through GSA Advantage![™], a menu driven database system. The INTERNET address for GSA Advantage![™] is: www.GSAAdvantage.gov



Professional Services Schedule

FSC Group: 87

FSC Class: 871

SIN: 871-4 and 871-4RC

Contract Number: GS-10F-0426Y

For more information on ordering from Federal Supply Schedules click on the FSS Schedules button at www.fss.gsa.gov

Period of Performance 08/13/2012 – 08/12/2022

UL LLC

**333 Pfingsten Rd.
Northbrook, IL 60062-2002**

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BUSINESS SIZE: LARGE

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Customer Ordering Information

1a. Awarded Special Item Numbers

871-4 Test and Evaluation

1b. Lowest Priced Model Number

Not Applicable

1c. Proposed Hourly Rates

Not Applicable, see Table of Inspection Services

2. Maximum Order

\$1,000,000.00

3. Minimum Order

\$100.00

4. Geographic Coverage

World-wide

5. Point of Production

UL LLC
333 Pfingsten Road
Northbrook, IL 60062-2002

6. Discount from list prices or statement of net price

Prices shown are NET prices.

7. Quantity Discounts

None

8. Prompt Payment Terms

Net 30 days. No prompt payment discounts

9. Government purchase cards.

9a. Government purchase cards are accepted at or below the micr0purchase threshold.

9b. Government purchase cards are accepted above the micro-purchase threshold.

10. Foreign items

Not applicable

11. Time of Delivery

11a. To Be Negotiated at time of Task Order



- 11b. Expedited Delivery: Agencies can contact UL LLC to effect a faster delivery.
11c. Overnight and 2nd day delivery – Agencies can contact UL LLC to determine the availability of service provision in this time frame.
11d. Urgent Requirements: Agency can contact UL LLC to effect a faster delivery.

12. F.O.B. points

Inspections are based on Travel Zone Pricing. Zone information is located on the last page of the Pricing Table. Zone 1 is within a 90 minute drive from van locations. Zone 2 is over a 90 minutes to 6 hours from van location. Zone 3 is over 6 hour drive from van locations. OCONUS pricing is based on Zone 1 pricing schedule plus travel expenses for the inspector, and shipping & handling of test equipment as required.

13. Ordering Address

13a. UL LLC
333 Pfingsten Rd.
Northbrook, IL 60062-2002
Attn: James Johannessen
Tel: 717-459-3391
Fax:
Email: field@ul.com

13b. Ordering Procedure: For services the ordering procedures information on Blanket Purchase Agreements (BPA's) are found in Federal Acquisition Regulation (FAR) 8.405-3

14. Payment address

UL LLC
c/o Northern Trust Company
50 LaSalle St.
Chicago, IL 06065
Tel: 847.664.2603
Fax: 847.664.2603
Email: James.Johannessen@ul.com

15. Warranty provision

Not applicable

16. Export Packing Charges

Not applicable

17. Terms and conditions of Government purchase card acceptance

Contract Contractors as 9a and 9b are both acceptable.



- 18. List of service and distribution points**
See Price List
 - 19. Data Universal Number System (DUNS) number**
07-85351534
 - 20. Notification regarding registration in System for Award Management (SAM) Database**
UL LLC is current with its SAM registration
 - 21. CAGE Code**
6N1Q9
-



Schedule Statement

871-4 and 871-4RC: Test and Evaluation

Test and Evaluation services required under this SIN involve the application of various techniques demonstrating that a system (subsystem, program, project or activity) performs in accordance with the objectives outlined in the original design. Typical associated tasks include, but are not limited to testing of a prototype, and first article(s) testing, environmental testing, performing inspections and witnessing acceptance testing of fire protection and life safety systems as they relate to professional services schedule, independent verification and validation, reverse engineering, simulation and modeling (to test the feasibility of a concept), system, quality assurance, physical testing of the product system, training, and consulting. Example: The navigation satellite-working model will be subjected to a series of tests, which may simulate and ultimately duplicate its operational environment. PES does not include architect-engineer services as defined in the Brooks Act and FAR Part 2. PES does not include design or construction services as defined in the Federal Acquisition Regulation Part 36 and Part 2.

Description of Services Examination and Test Specifications

SERVICE TESTS OF FIRE PUMPS EXAMINATION & TEST SPECIFICATIONS

GENERAL:

1. The Test Company shall not represent nor be in the manufacturer or repair of Fire Pumps.
2. All inspection and testing performed by a third-party certification organization shall be accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*.
3. The examination and test Report provided to Agency shall specify the method used to conduct each test performed on the Fire Pump Systems during the day of examination and results of such examinations and tests as specified in NFPA 1911, Chapter 21, 2017 Edition.
4. All test work outlined in NFPA 1911, Chapter 21, 2017 Edition shall be conducted.
5. Upon successfully meeting the requirements of all test work, as outlined here, the testing company shall issue a Certificate of Inspection stating compliance with the NFPA 1911, Standard for the Inspection, Maintenance, Testing and Retirement of In-Service Emergency Vehicles, Chapter 21, 2017 Edition.

UL QUALIFICATIONS:

1. UL is a nationally recognized testing laboratory recognized by OSHA in accordance with the OSHA regulations set forth at 29 Code of Federal Regulations set forth at 29



Code of Federal Regulations, Section 1910.7, Appendix A, "OSHA Recognition Process for Nationally Recognized Testing Laboratories."

2. UL complies with the following American Society for Testing and Materials Standard ASTM E548, "Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies."

3. UL has more than 35 years of fire department equipment safety testing experience.

LIABILITY INSURANCE:

UL will carry not less than one million dollars in excess liability insurance for bodily injury and property damage combined.

TEST SITE AND EQUIPMENT:

The NFPA 1911 Standard, 2017 Edition recommends that the test site be adjacent to a clean water source that is at least four feet deep, while allowing the strainer to be submerged at least two feet below the surface of the water when connected to the pump by twenty feet of suction hose. Testing using portable tanks that are not four feet deep but provide the ability to have the suction strainer at least two feet below the surface of the water is permissible. The advantage of the portable tank is that the water source is always clean and free of debris, which is not always the case when testing from underground tanks or stagnant ponds.

Accurate and calibrated flow measuring equipment as well as pressure monitoring and engine speed recording equipment is required and essential for a successful pump test.

The testing organization shall provide calibrated equipment and calibration records of their equipment as part of the testing program.

SERVICE TESTS OF FIRE PUMP SYSTEMS EXAMINATION AND TEST SPECIFICATIONS:

Prior to starting the test, air and water temperature, test site elevation, lift, and the barometric pressure shall be recorded. Use the same test location and schedule testing for the same time of year for each pump test. Always verify the govern engine speed.

If the chassis engine drives the pump, it is required that all engine driven accessories (low voltage devices) are engaged and running during the test. Load management systems may be employed during the test.

If the apparatus was built to the 1996 or later Editions of NFPA 1901, Standard for Automotive Fire Apparatus, and the apparatus is equipped with a fixed power source driven by the same engine that drives the fire pump, the power source shall be running at a minimum of 50 percent of its rated capacity throughout the pumping portion of the test.

1. Engine Speed Test - The engine speed shall be within ± 50 rpm of the govern speed as recorded of the pump test plate.

2. Pump Shift Indicator Test – A test of the pump shift indicators shall be made to verify that the pump shift indicators in-cab and on the operator's panel indicate proper status when the pump is shifted.



3. Pump Engine Control Interlock – For apparatus where the chassis engine drives the pump and electric or electronic engine throttle controls are provided, a test of the interlock shall be made to verify that engine speed cannot be advanced at the operator’s panel, under the following configurations:

- Stationary Pump Driven Through a Split-Shaft PTO
- Stationary Pump Driven Through Transmission-Mounted PTO
- Stationary Pump and “Pump and Roll” Pump

4. Priming Device Test - The priming device is only tested when pumping from draft. Pumps rated at 1250 gpm or less, time to prime shall not exceed 30 seconds. Pumps rated 1500 gpm or greater, time to prime shall not exceed 45 seconds. Time is measured from the engagement of the priming device until water is being discharged from the pump.

5. Vacuum Test – The interior of the pump shall be subjected to two vacuum tests.

- a. All intake valves are open and capped, all discharge valves closed and caps removed.
- b. All intake valves are closed and the caps and plugs are removed from the intake valves.

Using the priming device, develop 22 in. Hg. The vacuum cannot drop more than 10 in. Hg. in five minutes. Compensation may be made for tests conducted at more than 2000 ft. above sea level.

6. Pumping Test - The pumping portion of the test is divided into three separate sections. A 20-minute test at 100% rated capacity at 150-psi net pump pressure. A 10-minute test at 70% rated capacity at 200- psi net pump pressure. A 10-minute test at 50% rated capacity at 250-psi net pump pressure. It is important to remember that if the pump is a two-stage pump, the operator should use the transfer valve to operate the pump in parallel position for the 100% and 70 % capacity test. The 50 % capacity test should be performed in series position. At least five readings shall be taken during the 20-minute test, and at least three readings are to be taken during the 10-minute tests.

7. Overload Test - If the pump is rated at 750 gpm or greater, it must be subjected to an overload test which consists of pumping at rated capacity at 165 psi net pump pressure for at least five minutes. The overload test shall be conducted immediately after the 150-psi net pump pressure test. Two readings are to be taken during the overload test.

8. Pressure Control Test - With the pump delivering rated capacity at 150-psi net pump pressure, all discharges shall be closed no faster than three seconds and not slower than ten seconds. This test must be repeated at 90- psi and 250-psi net pump pressures. The pressure increase within the pump as measured on the test gauge may not rise more than 30 psi.

9. Intake Relief Valve System Test -The relief valve system is designed to relieve excessive pressure from incoming water. One method to test this system is to pump water into the pump being tested by increasing pressure from the feeder pump until the receiving pump relief system opens.

10. Pressure Gauge Accuracy Test - Pressure gauges shall be checked at 3 settings – 150 psi, 200 psi, and 250 psi. Pressure gauges shall be within 10 psi of each setting.



11. Flowmeter Accuracy Test - Using a flow-measuring device, flowmeters shall be checked for accuracy at specified flow rates. Flowmeters shall be within 10 percent of the specified flow rate.

12. Tank to Pump Flow Test - Tanks less than 500 gal. shall have appropriate piping to deliver at least 250 gpm. Tanks more than 500 gal. shall have appropriate piping to deliver 500 gpm. Rates less than the original tank to pump flow test rate may indicate a problem in the plumbing between the tank and the pump.

GROUND LADDER EXAMINATION AND TEST SPECIFICATIONS

NFPA 1932 REQUIREMENTS:

1. All ground ladder inspections and testing shall be performed in accordance with NFPA 1932 Specifications.
2. Test Company shall comply with the American Society for Testing and Materials Standard ASTM E548, "Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies."

UL QUALIFICATIONS:

1. UL has demonstrated compliance with ISO/IEC Standard 17020, *General criteria for the operation of various types of bodies performing inspection*, and has been accredited, commencing November 10, 2008 by International Accreditation Service. Proof of certification available upon request.
2. UL will comply with the following American Society for Testing and Materials Standard.
 - A. ASTM E548, "Preparation of Criteria for Use in the Evaluation of Testing Laboratories and Inspection Bodies."
3. UL has over 35 years of fire department equipment safety testing experience.

LIABILITY INSURANCE:

UL carries one million dollars in excess liability insurance for bodily injury and property damage combined.

PERSONNEL:

Prior to submittal to the Fire Department, the final Report will be reviewed by qualified staff that is directly involved with the ground ladder certification program at UL.

WELDING STANDARDS:

All aluminum structural weldments shall be inspected for compliance with the AWS Standard D1.2, "Structural Welding Code - Aluminum."



VISUAL INSPECTION

METHOD:

All heat sensor labels (when provided), rungs, rivets/bolts, welds, beams/rungs, butt spurs, halyards, roof hooks, ladder slide areas, and pawl assemblies, of the ladder are visually inspected for defects and proper installation.

RESULTS:

Heat Sensor Labels - No change indicating heat exposure.

Rivets/Bolts - Must be tight; bolts on wood ladders for tightness and snugness without crushing the wood.

Welds - No cracks of any type are permitted; welds should not contain any other apparent defects

Beams – No cracks, splintering, breaks, checks, wavy conditions or deformations. Gouges and dents discovered in a beam shall not be cause to fail a ladder if it passes the applicable load test.

Rungs – Must be snug and tight. Inspect for cracks, punctures, splintering, breaks, gouges, checks, wavy conditions, worn serrations in the foot contact areas, serrations worn down to base metal in ant location, or deformations.

Butt Spurs - No excessive wear or other defects

Halyards - No fraying or kinking

Roof Hooks - Must be sharp and operate properly

Corrosion – No loss of base material due to corrosion

Ladder Slide Areas – No galling or absence of wax

Loss of Gloss – No damage to gloss on fiberglass and wood ladder beams; no damage to varnish finish on wood ground ladders

Pawl Assemblies – Must operate properly

Wire Rope – Must be snug when ladder is in bedded position

Labels – Must be present and legible.

Folding Ladder Diagonal Braces – No damage to diagonal brace on the base of a folding ladder.

Multi-Purpose Ladder Hinge and Locking Pin Assemblies – No signs of visual damage and must operate properly.

HORIZONTAL BENDING TEST:

Metal and Fiberglass Ladders

METHOD:

The ladder is placed in a flat, horizontal position, supported under the first rung from each end of the ladder. The ladder is extended to its maximum extended length, with pawls engaged, for this test. The test load is applied equally to a center span covering

16 in. each side of the center of the ladder. A 350-lb preload is applied for 1 min. to a flat test surface resting on the beams of the ladder. The preload applied includes the weight of the test surface. After removal of the preload, the distance between the bottom edge of each side rail



and the ladder support surface is measured. All measurements are taken as close to the center of the center of the ladder as possible.

A 500-lb load is then applied and allowed to remain in place for 5 min. The load is then removed. After 5 min, the distance between the side rails and the ladder support surface is again measured. See Note below.

RESULTS:

Permanent set shall not exceed the following values:

Ladder Length Set Up to 25 ft 1/2 in. 26 - 34 ft 1 in. 35 ft and up 1-1/2 in.

There shall be no visible permanent change in the ladder or failure of any hardware.

Note - According to NFPA 1932, 2015 Edition, free weights or a loading system that does not restrict lateral movement of the ladder during loading may be employed. If a test fixture employs a dynamometer, the test fixture shall be designed to apply the load over the required area in a manner that allows a load shift to a weak beam and does not restrain the load directionally.

WOOD LADDERS

METHOD:

The ladder is placed in a flat, horizontal position, supported under the first rung from each end of the ladder. The ladder is extended to its maximum extended length, pawls are engaged if applicable. The test load is applied equally to a center span covering 16 in. each side of the center of the ladder. The test load is applied to a flat test surface resting on the beams of the ladder. The test load applied includes the weight of the test surface. The ladder is loaded with 500-lb and allowed to remain in place of 5 min. The load is then removed. See Note below.

Note - According to NFPA 1932, 2015 Edition, free weights or a loading system that does not restrict lateral movement of the ladder during loading may be employed. If a test fixture employs a dynamometer, the test fixture shall be designed to apply the load over the required area in a manner that allows a load shift to a weak beam and does not restrain the load directionally.

RESULTS:

The ladder and all components shall show no signs of ultimate failure.

ROOF HOOK TEST - (If equipped)

METHOD:

The ladder hook angle relative to the ladder side rail is recorded. A load of 1000-lb is then applied to the hook tip, parallel to the ladder side rails. The test load is maintained for 1 min. The test load is then removed and the roof hook angle relative to the ladder side rail is again measured.



RESULTS:

No visible deformation is permitted.

HARDWARE TEST - (Extension Ladders Only)

METHOD:

The ladder is placed in a flat horizontal position, extended a minimum of one rung beyond the bedded position. A test load is placed on the ladder in such a manner as to subject the lock hardware to a 1000-lb load. The test load is applied for a minimum of 1 min.

RESULTS:

The ladder shall sustain this test load with no permanent deformation or other visible weakening of the structure.

POMPIER LADDER STRENGTH TEST

METHOD:

The ladder hook is subjected to a 1000-lb test load parallel to the ladder rail and tangent to the rail handle. The load is maintained for 1 min.

RESULTS:

The ladder shall withstand the test load without ultimate failure.

METAL AND FIBERGLASS FOLDING AND MULTI-PURPOSE LADDERS TEST

METHOD:

The ladder is placed in a flat, horizontal position, supported under the first rung from each end of the ladder. The test load is applied equally to a center span covering 8 in. each side of the center of the ladder. A 160-lb preload is applied for 1 min. to a flat test surface resting on the beams of the ladder. The preload applied includes the weight of the test surface. After removal of the preload, the distance between the bottom edge of each side rail and the ladder support surface is measured. All measurements are taken as close to the center of the center of the ladder as possible. A 225-lb load is then applied and allowed to remain in place for 5 min. The load is then removed. After 5 min, the distance between the bottom of each side rail and the ladder support surface is again measured.

RESULTS:

There shall be no more than 0.5 in. difference between measurements. There shall be no signs of visible permanent change or failure of any hardware.



WOOD FOLDING LADDER TEST

METHOD:

The ladder is placed in a flat, horizontal position, supported under the first rung from each end of the ladder. The test load is applied equally to a center span covering 8 in. each side of the center of the ladder. A 225-lb load is then applied and allowed to remain in place for 5 min. The load is then removed.

RESULTS:

The ladder and all components shall not show any signs of permanent damage.

AERIAL DEVICE EXAMINATION AND TEST SPECIFICATIONS

GENERAL:

1. The Test Company shall not represent nor be a manufacturer or repairer of aerial equipment.
2. All inspection and testing performed by a third-party certification organization shall be accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*.
3. The examination and test report provided to the Agency shall specify the point of inspection and the results of such examinations and test. The test report as required by NFPA 1911, Chapter 22, 2017 Edition shall include the following:
 - (a) When the torque verification of mounting bolts, as required by, NFPA 1911, Chapter 22, 2017 Edition is performed; the bolt size, grade, and torque specification shall be recorded.
 - (b) Where NFPA 1911, Chapter 22, 2017 Edition requires measurements be taken such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base-rail thickness, extension brake drift, winch drift, and the like, these measurements shall be recorded in the test record in order that a year-to-year comparison can be made.
4. All test work outlined in NFPA 1911, Chapter 22, 2017 Edition shall be conducted.

UL QUALIFICATIONS:

1. UL is a nationally recognized testing laboratory recognized by OSHA in accordance with the OSHA regulations set forth at 29 Code of Federal Regulations, Section 1910.7, Appendix A, "OSHA Recognition Process for Nationally Recognized Testing Laboratories."
2. UL is accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*.
3. UL has more than 35 years of fire department equipment safety testing experience.



LIABILITY INSURANCE:

UL carries not less than one million dollars in excess liability insurance for bodily injury and property damage combined.

Fire Apparatus Manufacturer's Specifications:

UL has the following tolerances from the manufacturer.

1. Rotation bearing clearance and backlash.
2. Critical mounting bolt grade and torque.
3. Elevation cylinder drift tolerance.
4. Extension cylinder drift tolerance.
5. Outrigger cylinder drift tolerance.
6. Hydraulic relief pressure.
7. Ladder section twist.
8. Hardness for aluminum devices.
9. Hollow I-beam base-rails thickness.
10. Rated load of the device.
11. Maximum rated working pressure of water system.

AERIAL DEVICE EXAMINATION AND TEST EVALUATION

1. UL does not represent nor is in the manufacture or repair of aerial devices.
2. The examination and test Report provided to the Agency will specify the point of inspection and the results of such examinations and test.

CERTIFICATE:

When the unit successfully meets all the requirements outlined below, UL will issue a Certificate of Inspection stating the units compliance with NFPA 1911, Chapter 22, 2017 Edition.

1-6 Visual Inspection. A visual inspection, prior to any operation or load testing, shall be carried out in a systematic sequence with proper attention to detail. This visual inspection of the equipment shall be for the detection of any visible defects, damage, or improperly secured parts.

1-7 Weld Inspection. All accessible structural welds shall be visually inspected for fractures.

Testing Metal Aerial Ladders

2-1 General. In addition to the manufacturer's recommendations, the inspections detailed below shall be performed as required by 22.8.1.2 of NFPA 1911.

2-2 Service Records. The aerial ladders service records shall be checked for any reports that may indicate defective conditions.

2-3 Hydraulic Components. Hydraulic components shall show no signs of hydraulic fluid leakage.

2.3.1 A component shall be considered leaking if hydraulic fluid (oil) droplets are forming on the component.

2.3.2 A film of hydraulic fluid on the component shall not be considered severe enough to categorize the component as leaking.



2-4 Turntable, Torque Box, Suspension, and Tractor Drawn Components Inspection and Test. The turntable, torque box, suspension components, and tractor drawn components, where applicable, shall be inspected on all aerial ladders in accordance with 2-4.1 through 2-4.29.

2-4.1 Rotation Bearing Mounting Bolts. The rotation bearing mounting bolts shall be inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible bolts meets the apparatus manufacturer's specifications.

2-4.2 Torque Box Mounting to Frame. The torque box mounting to frame shall be inspected as follows:

- (a) If the torque box is bolted to the frame, inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications, if the torque box is bolted to the frame.
- (c) If the torque box is welded to the frame, visually inspect all accessible attaching welds for fractures

2-4.3 Tractor Drawn Components Mounting to Frame. If the tractor-drawn components are bolted to the frame, the mounting of the tractor drawn components to the frame shall be inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications.

2-4.3.1 If the tractor drawn components are welded to the frame, the mounting of the tractor-drawn components to the frame shall be inspected as follows:

- (a) Visually inspect all accessible attaching welds for fractures.

2-4.4 Suspension Systems. If the suspension system components are bolted to the frame, the mounting of the suspension system components to the frame shall be inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications.

2-4.4.1 If the suspension system components are welded to the frame, the mounting of the suspension system components to the frame shall be inspected as follows:

- (a) Visually inspect all accessible attaching welds for fractures.

2-4.5 Rotation Gear and Bearing. The rotation gear and bearing shall be inspected as follows:

- (a) Inspect the rotation gear for missing or damaged teeth, pinion-to-gear alignment, proper lubrication, and backlash.
- (b) Inspect the bearing clearance.

2-4.6 Rotation Gear Reduction Box Mounting. The rotation gear reduction box mounting shall be inspected as follows:

- (a) If the reduction box is bolted to the turntable, inspect all bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a calibrated torque wrench, verify that the torque on all bolts meets the apparatus manufacturer's specifications, if the reduction box is bolted to the turntable.
- (c) Visually inspect all accessible weldments for defects and welds for fractures.

2-4.7 Turntable Structural Components. The turntable structural components shall be inspected as follows:

- (a) Visually inspect all accessible turntable structural weldments for defects and welds for fractures.

2-4.8 Rotation Hydraulic Swivel. Inspect the swivel for external hydraulic fluid leakage.

2-4.9 Hydraulic Lines and Hoses. Inspect all hydraulic lines and hoses for kinks, cuts and abrasions, and hydraulic fluid leakage at connectors and fittings.

2-4.10 Elevation, Extension, and Rotation Lock(s). The elevation, extension, and rotation lock(s) shall be inspected as follows:

- (a) Inspect the manual valve elevation, extension, and rotation lock(s) for external hydraulic fluid leakage.
- (b) Test the manual valve elevation lock for proper operation by engaging the lock and then attempting to raise and lower the ladder with the main hydraulic system operating. No detectable movement shall occur as determined by visual inspection.
- (c) Test the manual valve extension lock for proper operation by engaging the lock and then attempting to extend or retract the ladder with the main hydraulic system operating. No detectable movement shall occur as determined by visual inspection.
- (d) Test the manual valve rotation lock for proper operation by engaging the lock and attempting to rotate the turntable clockwise and counterclockwise with the main hydraulic system. The movement shall not exceed the manufacturer's specifications.

2-4.11 Power Takeoff. Inspect the power takeoff for external hydraulic fluid leakage and proper operation (engagement and disengagement).

2-4.12 Hydraulic Pump. Inspect the hydraulic pump for external hydraulic fluid leakage.

2-4.13 Collector Rings. The collector rings shall be inspected as follows:

- (a) If accessible, inspect the collector rings for foreign material buildup on ring.
- (b) If accessible, inspect the collector ring terminals for damage.
- (c) Conduct tests to ensure the proper operation of the collector rings by rotating the aerial device while electric-powered devices are in operation.
- (d) If applicable, check for indications of moisture in the electrical chamber by visually inspecting the desiccant moisture indicators.

2.4.14 Elevation Cylinder Anchor Ears and Plates. The elevation cylinder anchor ears and plates shall be inspected as follows:

- (a) Visually inspect the elevation cylinder anchor ears and plates for defects and the attaching welds for fractures.

2.4.14.1 If the elevation cylinder anchor is bolted, it shall be further inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications.

2-4.15 Elevation Cylinder Pins. The elevation cylinder pins shall be inspected as follows:

(a) Inspect cylinder pins for alignment, proper installation, lubrication, operation, and retention.

2-4.16 Elevation Cylinders. The elevation cylinders shall be inspected as follows:

(a) Inspect the cylinder rods for pitting, scoring, and other defects.

(b) Inspect the cylinder rod-to-barrel seal and the end gland seal for excessive external hydraulic fluid leakage that exceeds the manufacturer's specifications.

(c) With the hydraulic oil at ambient temperature, subject the cylinders to a drift test by placing the aerial device at a 60-degree elevation, full extension, marking the cylinder position, closing manually operated locking valves, and allowing the device to stand for 1 hr with the engine off. Measure the drift and verify that the results do not exceed the manufacturer's specifications for allowable cylinder drift.

2-4.17 Holding Valves on Elevation Cylinders. Inspect the holding valves for external hydraulic fluid leakage.

2-4.18 Operating Controls. The operating controls shall be inspected as follows:

(a) Inspect the operating controls for missing or damaged control handles, proper identification, and hydraulic fluid leakage.

(b) Verify that the controls operate smoothly, return to neutral position when released, and do not bind during operation.

(c) If interlocks have been provided or are required to prevent unintentional operation of the aerial device, verify that the interlocks or locking devices are operating properly.

2-4.19 Load Limit Indicators. Inspect the load limit indicators for proper operation and legibility.

2-4.20 Emergency Hand Crank Controls. Inspect the hand crank control for proper operation.

2-4.21 Auxiliary Hydraulic Power. Inspect the auxiliary hydraulic power for proper operation.

2-4.22 Turntable Alignment Indicator. Verify the presence of a turntable alignment indicator.

2-4.23 Throttle Control. The throttle control shall be inspected for proper operation. The operating speed of the engine shall be measured using a tachometer or a revolution counter and shall be checked against the manufacturer's specifications.

2-4.24 Communication System. Inspect the communication system for proper installation and proper operation.

2-4.25 Relief Hydraulic Pressure. Verify that the main pump relief hydraulic pressure and compensator pressure does not exceed the manufacturer's specifications.

2-4.26 Unit Main Frame. The unit main frame shall be inspected as follows:

(a) Visually inspect the main frame for any cracks, bends, dents, twists, or other weldment defects and any welds for fractures.

2-4.27 Transmission/Aerial Device Interlocks. If interlocks are provided that prevent operation of the aerial device until both the parking brakes have been set and the transmission has been positioned properly, verify that the interlocks are operating properly.

2-4.28 Engine Speed Interlocks. If interlocks are provided that allow operation of the engine speed control only after both the parking brakes have been set and the transmission has been positioned properly, verify that the interlocks are operating properly.

2-4.29 Breathing Air Systems. If a breathing air system is provided, the system shall be inspected as follows:

(a) Verify that the breathing air system is properly installed including the integrity of the air cylinder mounting, the regulator, and the air lines from the air cylinder(s) to the top of the aerial device.

(b) Verify that all the component parts of the system are present and in serviceable condition.

(c) Visually inspect the air cylinder mounting brackets for defects and welds for fractures.

(d) Check that the air pressure regulator is set at the apparatus manufacturer's recommended pressure.

2-5 Stabilizer Examination and Test. The stabilizer components, where applicable, shall be inspected on all aerial ladder apparatus in accordance with 2-5.1 through 2-5.16.

2-5.1 Stabilizer Structural Components. The stabilizer structural components shall be inspected as follows:

(a) Visually inspect all stabilizer components for defects and welds for fractures.

2-5.2 Stabilizer Pads. Verify that the stabilizer pads are present, of proper construction, and in serviceable condition.

2-5.3 Stabilizer Mounting to Frame or Torque Box. The stabilizer mounting to the frame or torque box shall be inspected as follows:

(a) Visually inspect the stabilizer to frame or torque box attachment for defects such as weld cracks, dents, and bends.

(b) If bolted, inspect all bolts for proper fastener grade and installation as specified by the apparatus manufacturer.

(d) Verify that the torque on all bolts meets the apparatus manufacturer's specifications using a properly calibrated torque wrench.

2-5.4 Hydraulic Lines and Hoses in Stabilizer System. Inspect the hydraulic hose lines for kinks, cuts and abrasions, and leakage at connectors and fittings.

2-5.5 Stabilizer Interlock System. Verify that the stabilizer interlock system is operating properly.

2-5.6 Stabilizer Warning Device. The stabilizer warning device shall be inspected to verify that it is operating properly.

2-5.7 Stabilizer Extension Cylinder Pins and Hinge Pins. The stabilizer extension cylinder pins and hinge pins shall be inspected as follows:

(a) Inspect all stabilizer cylinder pins and hinge pins for proper installation, lubrication, operation, and retention.

2-5.8 Stabilizer Extension Cylinder. The stabilizer extension cylinder shall be inspected as follows:

(a) Inspect the stabilizer extension cylinder rods for pitting and scoring and other defects.

(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external fluid leakage.



(c) With the hydraulic oil at ambient temperature, and the stabilizer's cylinders properly set, measurements shall be taken to determine the amount of drift present in 1 hr with the engine off. The results shall not exceed the manufacturer's specifications for allowable stabilizer cylinder drift.

2-5.9 Holding Valves on Extension Cylinders. Inspect the holding valves for external leakage of hydraulic fluid.

2-5.10 Operating Controls. The operating controls shall be inspected as follows:

(a) Inspect the operating controls to ensure control handles are not damaged or missing, functions are identified, operating instructions and warnings are posted, and there is no hydraulic fluid leakage.

(b) Verify that the controls operate smoothly, return to the neutral position when released, and do not bind during operation.

(c) If interlocks have been provided or are required to prevent unintentional operation of the aerial device, verify that the interlocks or locking devices are operating properly.

2-5.11 Leveling Indicator. If a leveling indicator(s) is provided to aid the operator in leveling the apparatus, the accuracy and legibility of the leveling indicator shall be checked.

2-5.12 Diverter Valve. Inspect the diverter valve for external hydraulic fluid leakage.

2-5.13 Position Stops. Inspect the mechanical stabilizers for proper operation of the positive stops to prevent overextension.

2-5.14 Stabilizer Deployment. If the stabilizer system is hydraulically operated, verify that the system can be deployed within the time frame designated by the aerial device manufacturer.

2-5.15 Manual Spring Locks. Inspect the condition and operation of stabilizer manual spring locks for stowed position.

2-5.16 Tractor Spring Lockout Device. If the aerial ladder is tractor drawn, inspect the spring lockout device for any discontinuities and for proper operation.

2-6 Aerial Ladder Inspection and Test. The aerial ladder shall be inspected in accordance with 2-6.1 through 2-6.30

2-6.1 Structural Modifications, Improper Repairs or Added Weight. The aerial ladder shall be inspected for structural modifications or improper repairs.

2-6.1.1 The aerial ladder shall be inspected to determine that no extra equipment has been added to the aerial ladder without subtracting the weight of such equipment from the rated capacity.

2-6.1.2 Details of any structural modifications, improper repairs, or added weights shall be contained in the record required by Section 2.12

2-6.2 Aerial Ladder Weldments. All aerial ladder weldments shall be inspected as follows:

(a) Visually inspect all accessible aerial ladder weldments for defects and welds for fractures.

2-6.3 Aerial Ladder Fasteners. All aerial ladder structural fasteners and fastened connections shall be visually inspected for cracked fasteners and material cracks around the fasteners.

2-6.4 Ladder Section Alignment. Measurements shall be taken to determine the amount of ladder section twist or bow in the aerial ladder. Results shall not exceed manufacturer's specifications for allowable ladder section twist or bow.

2-6.5 Hydraulic, Pneumatic, and Electrical Lines in Ladder Sections. All hydraulic,

pneumatic, and electrical lines shall be inspected for proper mounting, wear, cracking, kinks, and abrasions.

2-6.6 Top Rails. The top rails shall be inspected as follows:

(a) Inspect the top rails for straightness or any signs of misalignment.

2-6.7 Vertical and Diagonal Braces. The vertical and diagonal braces shall be inspected as follows:

(a) Inspect the verticals and diagonals for straightness, dents, and other deformities.

2-6.8 Base Rails. The base rails shall be inspected as follows:

(a) Inspect the base rail for straightness and any signs of wear, ironing, dents, and corrosion.

2-6.9 Rungs. Inspect all rungs of the aerial ladder for straightness, signs of fly lock damage, damage or loose rung covers and rung cap castings, and signs of cracks or missing rivets, if applicable.

2-6.10 Folding Steps. The folding steps on the ladder shall be inspected as follows:

(a) Visually inspect the folding steps and folding step mounting brackets for defects and welds for fractures.

2-6.11 Rollers. Inspect all rollers for proper lubrication, operation, and any signs of wear. **2-**

6.12 Guides, Babbits, Wear Strips, Pads, and Slide Blocks. Visually inspect the guides for cracked welds, loose rivets, alignment, and any irregularities. Inspect babbits for signs of wear. Inspect wear strips, pads, and slide blocks for wear, gouging, and proper mounting.

2-6.13 Extension Sheaves. The extension sheaves shall be inspected as follows:

(a) Inspect extension sheaves for signs of wear, free movement during operation, proper retainers, and lubrication.

(b) Visually inspect all extension sheave mounting brackets for defects and welds for fractures.

2-6.14 Extension Cables. Inspect extension cables for compliance with Chapter 5-2 of ASME B30.5, *Mobile and Locomotive Cranes*.

2-6.15 Extension and Retraction Motor. Inspect the extension and retraction motor for signs of external hydraulic fluid leakage and, where applicable, brake wear and brake alignment with the shaft.

2-6.16 Cable Separation Guide. During operation of the aerial ladder, visually inspect the cable separation guide for free travel and any signs of misalignment.

2-6.17 Winch Holding Capacity. Inspect the winch for holding capacity by fully elevating the aerial ladder and extending it 10 ft (3 m). Winch slippage shall be measured for a 5-min period. Slippage shall not exceed the manufacturer's specifications.

2-6.18 Brake Holding Capacity. Inspect the brake holding capacity of the extension motor by fully elevating the aerial ladder and extending it 10 ft (3 m). Brake slippage shall be measured for a 5-min period. Slippage shall not exceed the manufacturer's specifications.

2-6.19 Extension, Elevation and Rung Alignment Indicators. The elevation, extension, and rung alignment indicators shall be inspected for legibility, clarity, and accuracy.

2-6.20 Fly Locks. Inspect the fly lock mechanisms for proper mounting, alignment, lubrication, and operation.

2-6.21 Ladder Cradle. The aerial ladder cradle shall be inspected as follows:

(a) Inspect the ladder cradle for wear, proper alignment, and the cradle pad for

damage.

(b) Visually inspect the ladder cradle for defects such as weld cracks, dents, or bends.

2-6.21.1 If the aerial ladder cradle is bolted, it shall be further inspected as follows:

(a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible mounting bolts meets the apparatus manufacturer's specifications.

2-6.22 Ladder Bed Lock. Inspect the ladder bed lock mechanism and hydraulic lines for proper mounting, signs of wear, and hydraulic fluid leakage at fittings.

2-6.23 Stop Mechanism. Inspect stop mechanisms to ensure that they prevent overextension or over-retraction of the aerial ladder.

2-6.24 Maximum Extension Warning Device. During operation of the aerial ladder, verify the proper operation of the audible device to warn of the approach of maximum extension.

2-6.25 Ladder Illumination. Inspect the operation of the lights that are used to illuminate the ladder.

2-6.26 Extension Cylinder Anchor Ears and Plates. The extension cylinder anchor ears and plates shall be inspected as follows:

(a) Visually inspect the extension cylinder anchor ears and plates for defects and the attaching welds for fractures.

2-6.26.1 If the extension cylinder anchor is bolted, it shall be further inspected as follows:

(a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible mounting bolts meets the apparatus manufacturer's specifications.

2-6.27 Extension Cylinder Pins. The extension cylinder pins shall be inspected as follows:

(a) Inspect the cylinder pins for proper installation and retention.

2-6.28 Extension Cylinder. The extension cylinders shall be inspected as follows:

(a) Inspect the cylinder rods for pitting, scoring, and other defects.

(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external fluid leakage that exceeds the manufacturer's specifications.

(c) With the hydraulic oil at ambient temperature, subject the cylinder(s) to drift by placing the aerial device at full elevation, 10 ft (3 m) extension, marking the cylinder position or the second section in relation to the base section, and allowing the ladder to stand for 1 hr with the engine off. The results shall not exceed the manufacturer's specifications for allowable cylinder drift.

2-6.29 Holding Valves on Extension Cylinder. Inspect the holding valves for external and internal hydraulic fluid leakage.

2-6.30 Tip Controls. If the aerial ladder is equipped with a secondary operating position at the tip, the controls shall be inspected as follows:

(a) Check that the control handles are not damaged or missing, functions are identified, and operating instructions and warnings are posted.

(b) Verify that the controls operate smoothly, return to neutral when released, and do not bind during operation.

(c) Verify that the turntable or lower controls will override the tip controls.



(d) Verify that any safety devices that are designed to operate in conjunction with the tip controls are fully operational.

(e) If the aerial ladder was built to the 1996 or a later edition of NFPA 1901, *Standard for Automotive Fire Apparatus*, verify that the speed of the aerial ladder, when being operated from the tip controls, does not exceed the speeds allowed in the edition of NFPA 1901 to which the aerial ladder was manufactured.

2-7 Operating Test.

2-7.1 A complete cycle of aerial ladder operation shall be carried out after starting the engine, setting the stabilizers, and transmitting power to the ladder. The ladder shall be fully elevated out of the bed, rotated 90 degrees, and extended to full extension.

2-7.2 The ladder shall complete this test smoothly and without jerking or undue vibration within the time allowed by the edition of NFPA 1901, *Standard for Automotive Fire Apparatus*, in effect at the time of manufacture.

2-7.3 The ladder shall be retracted, the turntable rotation completed through 360 degrees, and the ladder lowered to its bed, after which a thorough inspection shall be made of all moving parts. Special attention shall be given to the security and adjustment of the ladder cables or chains.

2-7.4 The test shall demonstrate successful operation of all ladder controls.

2-8 Load Testing.

2-8.1 Tests shall be conducted when wind velocity is less than 10 mph (16 kmph).

2-8.2 Only personnel essential to conduct the test shall be permitted near the apparatus during the test. A close watch shall be maintained during all load tests for any signs of instability, the development of conditions that could cause damage or permanent deformation, or twist that exceeds the aerial ladder manufacturer's allowance. The test shall be discontinued immediately if such conditions develop.

2-8.3 Horizontal Load Test.

2-8.3.1 The aerial ladder's turntable shall be level. The aerial apparatus vehicle shall be on a hard level surface. All stabilizers shall be deployed in accordance with the manufacturer's instructions.

2-8.3.2 A test cable hanger shall be attached to the top rung of the top ladder section and properly centered.

2-8.3.3 The rated capacity in the horizontal position at full extension shall be determined from the manufacturer's load chart or operator's manual. If full extension is not permitted in the horizontal position with a specified rated capacity, then the maximum permissible extension with a specified rated capacity shall be used for the purpose of this test.

2-8.3.4 For single chassis apparatus, the ladder shall be rotated, if necessary, until the ladder is positioned over the rear and parallel to the vehicle centerline. For tractor-drawn apparatus, the ladder shall be positioned in the most stable position as recommended by the manufacturer.

2-8.3.5 The ladder shall be placed in the horizontal position and extended to full extension or maximum permitted extension as determined in 2-8.3.3. The base section shall not be allowed to rest in the bed.

2-8.3.6 The ladder section locks, either manual pawls or hydraulic holding valves, shall be properly closed or applied.



2-8.3.7 The elevation cylinder integral holding valve or shutoff safety valve shall be properly closed or applied.

2-8.3.8 A weight equal to the manufacturer's specified rated live load, determined in 2-8.3.3, shall be gradually applied to the top rung of the aerial ladder by utilizing the test weight container or other suitable means of applying the weight.

2-8.3.9 The test weight shall be sustained by the unsupported aerial ladder for 5 min.

2-8.3.10 The test weight that is equal to the rated capacity shall be applied gradually to the top rung of the aerial ladder utilizing a test weight container or other suitable means of applying the weight. The weight shall be suspended by a cable and shall not be more than 3 ft. (1 m) above the ground. The combined weight of the test cable hanger and cable, the test weight container, and the test weights shall not exceed the rated capacity. The weights shall be added to the ladder in a manner that does not shock load the ladder.

2-8.3.10.1 The test weight shall hang freely from the tip of the aerial ladder. If the test weight hanger and ladder deflection are such that the test weight comes to rest on the ground, it shall be permissible to raise the ladder elevation slightly above the horizontal position. The ladder shall not be moved while the test weight is applied.

2-8.3.12 After removal of the test weight, a complete visual inspection shall be made of all load-supporting elements. Any visually detectable signs of damage, permanent deformation, or twist exceeding the manufacturer's allowance shall constitute noncompliance with the load test requirements. The aerial device shall also meet the requirements of Section 2-7 after the horizontal load test.

2-8.4 Maximum Elevation Load Test.

2-8.4.1 The ladder turntable shall be level. The aerial apparatus vehicle shall be on a hard level surface. All stabilizers shall be deployed in accordance with the manufacturer's instructions.

2-8.4.2 A test cable hanger shall be attached to the top rung of the top ladder section and properly centered.

2-8.4.3 The maximum rated capacity in the maximum-elevated position at full extension shall be determined from the manufacturer's load chart or operator's manuals.

2-8.4.4 The ladder shall be rotated, if necessary, until the ladder is positioned over the rear and parallel to the vehicle centerline. Midship-mounted devices may have to be rotated slightly off of the vehicle centerline in order to apply the test load without interference with the body of the apparatus.

2-8.4.5 The ladder shall be elevated to maximum elevation and fully extended.

2-8.4.6 The ladder section locks, either manual pawls or hydraulic holding valves, shall be properly applied.

2-8.4.7 The elevation cylinder integral holding valve or shutoff safety valve shall be properly closed or applied.

2-8.4.9 A free-hanging weight equal to the manufacturer's specified rated capacity, determined in 2-8.4.3, shall be gradually applied to the top rung of the aerial ladder by utilizing a test weight container or other suitable means of applying the weight. The weight shall be suspended by cable and shall be not more than 3 ft (1 m) above the ground. The combined weight of the test cable hanger and cable, the test weight container, and the test weights shall



not exceed the rated capacity. The weights shall be added to the ladder in a manner that does not shock load the ladder.

2-8.4.10 The test weight shall be sustained by the unsupported aerial ladder for 5 min.

2-8.4.11 The test weight will hang freely from the tip of the aerial ladder. The aerial ladder shall not be moved while the test weight is applied.

2-8.4.12 After removal of the test weight, a complete visual inspection shall be made of all load supporting elements. Any visually detectable signs of damage, permanent deformation, or twist exceeding the manufacturer's allowance shall constitute noncompliance with the load test requirements. The aerial device shall also meet the requirements of Section 2-7 after the load test.

2-9 Waterway System Test.

2-9.1 The following examination and test will apply only to permanently piped aerial ladder aerial ladder waterway systems.

2-9.2 The waterway system shall be inspected for proper operation of all components. It shall be free of rust, corrosion, blockage, or other defects.

2-9.3 The waterway attaching brackets shall be inspected as follows:

(a) Inspect the brackets for loose bolts, weld fractures or other defects.

2-9.4 Pressure Test. The water system shall be pressure tested.

2-9.4.1 The aerial ladder shall be positioned between 0 and 10 degrees elevation and fully retracted. The water system shall be filled with water and the valve at the discharge end closed. If there is not a valve at the discharge end, a valve shall be attached for the purpose of this test. The pressure on the system shall be raised to the water system manufacturer's maximum rated working pressure and maintained for the duration of the test. The aerial ladder shall be raised to full elevation and rotated 360 degrees. The water system, including the turntable swivel, shall be checked for leaks. Care shall be taken not to overheat the water pump.

2-9.4.2 The aerial ladder shall be positioned between 0 and 10 degrees elevation and extended to its maximum permissible limit. The water system shall be filled with water and the valve at the discharge end closed. If there is not a valve at the discharge end, a valve shall be attached for the purpose of this test.

The pressure on the system shall be raised to the water system manufacturer's maximum rated working pressure and maintained for the duration of the test. The entire length of the water system shall be checked for leaks. Care shall be taken to not overheat the water pump.

2-9.4.3 The water system will operate properly and with an absence of leaks during these tests.

2-9.5 Flow Meter(s). If the waterway system is equipped with a flow meter(s), the flow meter(s) shall be checked for accuracy. Flow meters shall be tested at the water system manufacturer's maximum rated water system flow. Any meter that reads off by more than 10 percent shall be recalibrated, repaired, or replaced.

2-9.6 Pressure Gauges. If the waterway system is equipped with a water pressure gauge(s), each water pressure gauge shall be checked for accuracy. Pressure gauges shall be checked at least three points, at 50 psi intervals (3.45 bar) without exceeding the maximum rated working pressure of the waterway system. Any gauge that reads off by more than 10 psi (0.7 bar) shall be recalibrated, repaired or replaced.

2-9.7 If the waterway system is equipped with a relief valve, this relief valve shall be checked to verify that it is operational at the waterway manufacturer's recommended pressure setting.



2-10 Signs. Ensure that all signs are in place and legible.

2-11 Hydraulic Fluid. After the operational tests have been conducted, a sample of the hydraulic fluid shall be removed from the hydraulic reservoir and subjected to pectro-chemical analysis, particle count, viscosity check, and water content analysis.

2-12 Records. A comprehensive record shall be completed for all tests conducted on the aerial ladder and signed by the person responsible for the test. The test record will include the following:

(a) When the torque verification of mounting bolts is conducted, as required by this standard, the bolt size, grade, and torque specification shall be recorded.

(b) Where this standard requires measurements be taken such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base rail thickness, extension brake drift, winch drift, and the like, these measurements shall be recorded in the test record in order that a year-to-year comparison can be made.

Testing Elevating Platforms

3-1 General. In addition to the manufacturer's recommendations, the inspections and tests detailed below shall be performed. as required by 22.9.1.1 of NFPA 1911.

3-2 Service Records. The elevating platform's service records shall be checked for any reports that may indicate defective conditions.

3-3 Hydraulic Components. Hydraulic components shall show no signs of hydraulic fluid leakage.

3-3.1 A component shall be considered leaking of hydraulic fluid (oil) when droplets are forming on the component.

3-3.2 A film of hydraulic fluid on the component shall not be considered severe enough to categorize the component as leaking.

3-3 Turntable and Torque Box Inspection and Test. The turntable and torque and torque box components, where applicable, shall be inspected on all elevating platforms in accordance with 2-4.1 & 2-4.2; 2-4.4 through 2-4.13; and 2-4.18 through 2-4.29

3-4 Stabilizer Examination and Test. The stabilizer components, where applicable, shall be inspected on all elevating platform apparatus in accordance with 2-5.1 through 2-5.16.

3-5 Platform and Boom Inspection and Test. All platforms and booms shall be inspected in accordance with 3-5.1 through 3-5.13.

3-5.1 Structural Modifications, Improper Repairs, or Added Weights. The platform and booms shall be inspected for structural modifications or improper repairs.

3-5.1.1 The platform shall be inspected to determine that no extra equipment has been added to the platform without subtracting the weight of such equipment from the rated capacity.

3-5.1.2 Details of any structural modifications or added weight shall be contained in the required report.

3-5.2 Platform Mounting Brackets. The platform mounting brackets shall be inspected as follows:

(a) Visually inspect all platform mounting brackets for defects such as weld cracks, dents, or bends.

3-5.3 Platform. The platform shall be inspected as follows:

(a) Visually inspect platform for defects, such as weld cracks, dents, or bends.



3-5.4 Hydraulic, Pneumatic, and Electrical Lines in Platform. Inspect all lines for proper mounting, wear, cracking, kinks, and abrasions.

3-5.5 Auxiliary Winch Mounting. The auxiliary winch mounting shall be inspected as follows:

(a) Inspect all mounting bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a calibrated torque wrench, verify that the torque on all winch mounting bolts meets the apparatus manufacturer's specifications.

(c) If welded, visually inspect the winch mounting for weld fractures.

3-5.6 Winch Controls. The winch controls shall be inspected as follows:

(a) Inspect controls for proper identification as to function and operation.

(b) Verify smooth operation of the winch controls.

3-5.7 Elevating Platform Rated Capacity Identification. Verify that the proper platform rated capacity identification plate is present, accurate, and legible.

3-5.8 Platform Gate Latches and Hinge Points. Inspect the platform gate latches for proper alignment and the latch and hinges for smooth operation.

3-5.9 Platform Hinge Pins. The platform hinge pins shall be inspected as follows:

(a) Inspect platform hinge pins for proper installation, lubrication, and any irregularities.

3-5.10 Platform Controls. The platform controls shall be inspected as follows:

(a) Inspect the platform operating controls for identification of functions, posted operating instructions, and warnings.

(b) Verify that the controls operate smoothly, return to neutral when released, and do not bind during operation.

(c) Verify that the turntable or lower controls will override the platform controls.

3-5.11 Platform Monitor and Nozzle. The platform monitor and nozzle shall be inspected as follows:

(a) Inspect the complete operation of the platform monitor and nozzle.

(b) Inspect the monitor's mounting brackets for any defects and welds for fractures.

3-5.12 Boom Illumination. Verify the operation of spotlights used to illuminate the boom.

3-6 Articulating Boom--Lower Boom Examination and Test. For apparatus equipment with an articulating boom, the lower boom shall be inspected and tested in accordance with 3-6.1 through 3-6.14.

3-6.1 Hinge Pins. The hinge pins shall be inspected as follows:

(a) Inspect the boom hinge pins for proper installation, lubrication, operation, and any discontinuities.

3-6.2 Lower Boom Elevation Cylinder Anchor Ears and Plates. The lower boom elevation cylinder anchor ears and plates shall be inspected as follows:

(a) Visually inspect the anchor ears and plates for defects and the attaching welds for fractures.

3-6.3 Lower Boom Elevation Cylinders. The boom elevation cylinder shall be inspected as follows:

(a) Inspect the cylinder rod(s) for pitting, scoring or other defects.

(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.

(c) With the hydraulic oil at ambient temperature, measurements shall be taken in accordance with the manufacturer's recommendations to determine the amount of drift present in the boom elevation cylinders. Results of this test shall not exceed the manufacturer's specifications for allowable lower boom cylinder drift.

3-6.4 Holding Valves on Boom Elevation Cylinder. Inspect the holding valves for signs of external hydraulic fluid leakage.

3-6.5 Boom Assembly. The lower boom assembly shall be inspected as follows:

(a) Visually inspect the boom for defects such as weld cracks, dents, or bends.

(b) Visually inspect all structural fasteners and fastened connections for cracked fasteners and material cracks around the fasteners.

3-6.6 Cylinder Link Pins. The cylinder link pins shall be inspected as follows:

(a) Inspect the cylinder link pins for proper installation, lubrication, operation, and any fractures.

3-6.7 Platform Leveling Linkages. The platform leveling linkages shall be inspected as follows:

(a) Visually inspect linkages for defects such as weld cracks, dents, and bends.

3-6.8 Hydraulic Lines and Hoses in Lower Boom. Inspect all hydraulic lines in the lower boom for proper mounting, abrasion, hydraulic fluid leakage, and wear.

3-6.9 Hydraulic Lines in Knuckle. Inspect all hydraulic lines in the knuckle for hydraulic fluid leakage, abrasion, and any signs of wear.

3-6.10 Cables, Chains, and Rods. Inspect all cables, chains, and rods for signs of wear and for proper adjustment.

3-6.11 Sprockets, Pulleys, and Hooks. Inspect all sprockets, pulleys, and hooks for proper lubrication, signs of wear, distortion, and proper operation.

3-6.12 Boom Support. The boom support shall be inspected as follows:

(a) Inspect the boom support for wear and proper alignment and the cradle pad for damage.

(b) Visually inspect the boom support for defects such as weld cracks, dents, or bends.

3-6.12.1 If the boom support is bolted, it shall be further inspected as follows:

(a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible mounting bolts meets the apparatus manufacturer's specific.

3-6.13 Lower Boom Angle Indicator Lights. Verify the proper operation of the lower boom angle indicator lights.

3-6.14 Pneumatic and Electrical Lines. Inspect all pneumatic and electrical lines in the lower boom and the knuckle for proper mounting, wear, cracking, kinks, and abrasions.

3-7 Articulating Boom--Upper Boom Examination and Test. For apparatus with an articulating boom, the upper boom shall be inspected and tested in accordance with 3-7.1 through 3-7.15.

3-7.1 Upper Boom for Alignment with Lower Boom. Verify that the upper boom is aligned with the lower boom.

3-7.2 Platform Leveling Linkages. The platform leveling linkages shall be inspected as follows:

(a) Visually inspect linkages for defects such as weld cracks, dents, or bends.

3-7.3 Boom Boost Cylinder Brackets. The boom boost cylinder brackets shall be inspected as follows:

(a) Visually inspect the boom boost cylinder brackets for defects such as weld cracks, dents, or bends.

3-7.4 Boom Boost Cylinders. Inspect the boom boost cylinders for any external hydraulic fluid leakage.

3-7.5 Cylinder Link Pins. The cylinder link pins shall be inspected as follows:

(a) Visually inspect the cylinder link pins for proper installation, lubrication, operation, and any irregularities.

3-7.6 Boom Assembly. The upper assembly shall be inspected as follows:

(a) Visually inspect the boom for defects such as weld cracks, dents, or bends.

(b) Visually inspect all structural fasteners and fastener connections for cracked fasteners and material cracks around the fasteners.

3-7.7 Hydraulic Lines and Hoses in Upper Boom. Inspect all hydraulic hoses/lines in the upper boom for proper mounting, abrasions, hydraulic fluid leakage, and wear.

3-7.8 Cables, Chains, and Rods. Inspect all cables, chains, and rods for signs of wear and for proper adjustment.

3-7.9 Sprockets, Pulleys, and Hooks. Inspect all sprockets, pulleys, and hooks for proper lubrication, signs of wear, distortion, and proper operation.

3-7.10 Upper Boom Hold-Down Device. The upper boom hold-down device shall be inspected as follows:

(a) Visually inspect the upper boom hold-down device for defects and for proper operation.

3-7.11 Safety Stop Mechanism. Verify that the safety stop mechanism operates properly.

3-7.12 Upper Boom Elevation Cylinder Anchor Ears and Plates. The upper boom elevation anchor ears and plates shall be inspected as follows:

(a) Visually inspect the anchor ears and plates for defects and welds for fractures. **3-**

7.13 Upper Boom Elevation Cylinder(s). The upper boom elevation cylinder(s) shall be inspected as follows:

(a) Inspect the cylinder rod(s) for pitting, scoring, and other defects.

(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.

(c) With the hydraulic oil at ambient temperature, measurements shall be taken in accordance with the manufacturer's recommendations to determine the amount of drift present. Results of this test shall not exceed the manufacturer's tolerance for allowable upper boom cylinder drift.

3-7.14 Holding Valves on Upper Boom Elevation Cylinder. Inspect the holding valve(s) for signs of external hydraulic fluid leakage.

3-7.15 Pneumatic and Electrical Lines. Inspect all pneumatic and electrical lines in the upper boom for proper mounting, wear, cracking, kinks, and abrasions.

3-8 Telescoping Boom Examination and Test. For platforms equipped with a telescoping boom, the boom shall be inspected and tested in accordance with 2-4.14 and 2-4.17, 3-6.10 through 3-6.12, and 3-8.1 through 3-8.14.



3-8.1 Boom Assemblies. The boom assemblies shall be inspected as follows:

- (a) Visually inspect booms for defects such as weld crack, dents, or bends.
- (b) Visually inspect all structural fasteners and fastened connections for cracked fasteners and material cracks around the fasteners.

3-8.2 Ancillary Boom Ladder. The ancillary boom ladder shall be inspected as follows:

- (a) Inspect the ancillary boom ladder for any defects and welds for fractures.
- (b) Inspect the mounting brackets for loose bolts, weld fractures, or other defects.

3-8.3 Guides, Wear Strips and Pads, and Slide Blocks. Inspect guides, wear strips, pads, and slide blocks for proper installation and signs of wear.

3-8.4 Extension Sheaves. The extension sheaves shall be inspected as follows:

- (a) Inspect the extension sheaves for proper mounting, alignment, and signs of wear.

3-8.5 Extension Cables. Inspect extension cables for compliance with Chapter 5-2 of ASME B30.5, *Mobile and Locomotive Cranes*.

3-8.6 Elevation Indicator. Inspect the elevation cylinder indicator for legibility and clarity.

3-8.7 Maximum Extension Warning Device. During operation, verify the proper operation of the audible device to warn of the approach to maximum extension, if so equipped.

3-8.8 Platform Leveling Cylinders. The platform leveling cylinders shall be inspected as follows:

- (a) Inspect the cylinder rod(s) for pitting, scoring, and other defects.
- (b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.
- (c) Visually inspect the leveling system for proper installation.
- (d) Visually inspect the mounting of the leveling system for defects and welds for fractures.

3-8.9 Hydraulic Lines and Hoses in Boom Assemblies. Inspect all hydraulic lines and hoses in the boom assemblies for hydraulic fluid leakage, abrasions, and any signs of wear.

3-8.10 Extension Cylinder Anchor Ears and Plates. The extension cylinder anchor ears and plates shall be inspected as follows:

- (a) Visually inspect the extension cylinder anchor ears and plates for defects and attaching welds for fractures.

3-8.11 Extension Cylinder Pins. The extension cylinder pins shall be inspected as follows:

- (a) Inspect the cylinder pins for proper installation and retention.

3-8.12 Extension Cylinder. The extension cylinders shall be inspected as follows:

- (a) Inspect the cylinder rods for pitting, scoring, and other defects.
- (b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.
- (c) With the hydraulic oil at ambient temperature, subject the cylinder(s) to drift by placing the aerial device at full elevation, 10 ft (3 m) extension, marking the cylinder piston or the second section in relation to the base section, and allowing the ladder to stand for 1 hr with the engine off. The results shall not exceed the manufacturer's specifications for allowable cylinder drift.

3-8.13 Holding Valves on Extension Cylinder. Inspect the holding valves for external hydraulic fluid leakage.

3-8.14 Pneumatic and Electrical Lines. Inspect all pneumatic and electrical lines in the booms for proper mounting, wear, cracking, kinks, and abrasions.

3-9 Operational Tests from Lower Controls.



3-9.1 With engine speed set to allow maximum speed as permitted by the manufacturer, the elevating platform shall be operated in all positions, as allowed by the manufacturer, using the lower or ground controls.

3-9.2 The operation of the elevating platform shall include, but not be limited to, movement of the platform basket from ground to maximum elevation as well as revolving the platform basket

360 degrees to the left and to the right while the unit is at its maximum horizontal reach.

3-9.3 The boom shall operate without any improper or unusual motion or sound.

3-9.4 All safety devices shall operate properly.

3-9.5 All controls shall operate smoothly, return to the neutral position when released and not bind during operation.

3-9.6 Telescoping elevating platforms, rollers, slides, and sheave wheels shall demonstrate proper alignment, function, and free operation.

3-9.7 A complete cycle of elevating platform operation shall be carried out after starting the engine, setting the stabilizers, and transmitting power to the platform booms or sections.

3-9.7.1 Operating the machine from the lower control station, the elevating platform shall be raised out of the bed, extended to full specified height, and rotated through a 90 degree turn.

This shall be completed smoothly and without undue vibration within the manufacturer's recommended time.

3-9.7.2 The elevating platform shall be retracted, and the turntable rotation completed through 360 degrees. The elevating platform shall be lowered to its bed and a thorough inspection made of all moving parts. Special attention shall be given to the platform leveling system.

3-9.7.3 The test shall demonstrate successful operation of all elevating platform controls.

3-10 Operational Tests from Platform Controls.

3-10.1 With engine speed set to allow maximum speed as permitted by the manufacturer, the elevating platform shall be operated in all positions, as allowed by the manufacturer, with only one operator in the platform basket operating from the platform control station.

3-10.2 The operation of the elevating platform will include, but not be limited to, movement of the platform basket from ground to maximum elevation, as well as revolving the platform basket 360 degrees to the left and to the right while the unit is at its maximum horizontal reach.

3-10.3 All safety devices shall operate properly.

3-10.4 The platform basket deactivation control, from the ground or lower controls, shall be demonstrated to operate properly.

3-10.5 The platform basket shall level properly as the booms are moved through all allowable positions.

3-10.6 The mechanical override on a hydraulically leveled elevating platform basket shall operate properly during emergency lowering of the boom without hydraulic power.

3-11 Load Test.

3-11.1 With the unit located on a hard level surface and allowing sufficient room for unrestricted boom movements, a stability and structural test shall be performed. This test shall determine the elevating platform's ability to perform properly while carrying rated capacity loads in the platform basket.



3-11.1.1 A close watch shall be maintained during all load tests for any signs of instability, the development of conditions that could cause damage or permanent deformation, or twist that exceeds the elevating platform manufacturer's allowance. The test shall be discontinued immediately if such conditions develop.

3-11.2 The unit shall be properly stabilized according to the manufacturer's recommendation.

3-11.3 The platform basket shall be placed near the ground and loaded to the manufacturer's rated capacity. Care shall be exercised to assure that the weight of equipment added to the platform basket after delivery is subtracted from the weight of the test load being added. The platform basket load shall be properly secured.

3-11.4 The unit shall be operated from the lower controls through all allowable phases of operation. The manufacturer's operational limits shall not be exceeded.

3-11.5 All boom movements shall exhibit no abnormal noise, vibration, or deflection.

3-11.6 The platform basket shall level properly as the booms are moved through all allowable positions.

3-11.7 At the conclusion of the load test, weld joints at stabilizer structure, stabilizers, frame, main frame, frame reinforcements, turntable, cylinder anchors, boom joints, leveling system, platform basket, and pivot pin bosses shall be inspected and shall show no signs of deterioration.

3-12 Water System Examination and Test.

3-12.1 The waterway and system shall be inspected for proper operation of all components. It shall be free of rust, corrosion, other defects, or blockage.

3-12.2 The waterway attaching brackets shall be inspected as follows:

(a) Inspect the brackets for loose bolts, weld fractures, or other defects.

3-12.3 Pressure Test. The water system shall be pressure tested.

3-12.3.1 If the elevating platform has a telescoping boom, the water system shall be tested following the procedure in 2-9.4.1 and 2-9.4.3.

3-12.3.2 If the elevating platform has an articulating boom, the boom shall be positioned in the road travel position. The water system shall be filled with water and the valve at the discharge end closed. If there is not a valve at the discharge end, a valve shall be attached for the purpose of this test.

The pressure on the system shall be raised to the water system manufacturer's maximum rated working pressure and maintained while the elevating platform is raised to its rated vertical height and rotated 360 degrees. The water system including the turntable swivel, shall be checked for leaks. Care shall be taken not to overheat the water pump.

3-12.3.3 If the elevating platform has both a telescoping boom and an articulating boom, it shall be tested in accordance with 3-12.3.1 and 3-12.3.2.

3-12.3.4 The water system shall operate properly and with an absence of leaks during these tests.

3-12.4 Flow Meter(s). If the waterway system is equipped with a flow meter(s), the flow meter(s) shall be checked for accuracy. Flow meters shall be tested at the water system manufacturer's maximum rated water system flow. Any meter that reads off by more than 10 percent shall be recalibrated, repaired, or replaced.

3-12.5 Pressure Gauge(s). If the waterway system is equipped with a water pressure



gauge(s), each water pressure gauge shall be checked for accuracy. Pressure gauges shall be checked at least three points at 50 psi (3.45 bar) intervals without exceeding the maximum rated working pressure of the waterway. Any gauge that reads off by more than 10 psi (0.7 bar) shall be replaced, repaired, or recalibrated.

3-12.6 If the waterway system is equipped with a relief valve(s), the relief valve(s) shall be checked to verify that it is operational at the waterway manufacturer's recommended pressure setting.

3-13 Signs. Ensure that all signs are in place and legible.

3-14 Hydraulic Fluid. After the operational tests have been performed, a sample of the hydraulic fluid shall be removed from the hydraulic reservoir and subjected to petro-chemical analysis, particle count, viscosity check, and water content analysis.

3-15 Records. A comprehensive record shall be completed for all tests of the elevating platform and signed by the personnel responsible for the test.

3-15.1 When torque verification of mounting bolts is performed as required by the standard, the bolt size, grade, and torque specifications shall be recorded.

3-16.3 Where this standard requires measurements to be taken – such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base rail thickness, extension brake drift, winch drift, and the like – these measurements shall be recorded in the test record so that a year-to-year comparison can be made.

Testing Water Towers

4-1 General. In addition to the manufacturer's recommendations, the inspections and tests detailed below shall be performed as required by 22.10.1.1 of NFPA 1911.

4-2 Service Records. The water tower's service records shall be checked for any reports that may indicate defective condition.

4-3 Hydraulic Components. Hydraulic components shall show no signs of hydraulic fluid leakage.

4-3.1 A component shall be considered leaking if hydraulic fluid (oil) droplets are forming on the component.

4-3.2 A film of hydraulic fluid on the component shall not be considered severe enough to categorize the component as leaking.

4-4 Turntable and Torque Box Inspection Test. The turntable and torque box components, where applicable, shall be inspected on all water tower apparatus in accordance with 2-4.1 through 2-4.29.

4-4 Stabilizer Examination and Test. The stabilizer components, where applicable, shall be inspected on all water tower apparatus in accordance with 2-5.1 through 2-5.16.

4-5 Articulating Boom--Lower Boom Examination and Test. For water tower apparatus equipped with an articulating boom, the lower boom shall be inspected and tested in accordance with 3-6.1 through 3-6.6 and 3-6.8 through 3-6.14, as applicable.

4-6 Articulating Boom--Upper Boom Examination and Test. For water tower apparatus equipped with an articulating boom, the upper boom shall be inspected and tested in accordance with 3-7.1 and 3-7.3 through 3-7.15, as applicable.

4-7 Telescoping Boom Examination and Test. For water tower apparatus equipped with a telescoping boom, the booms shall be inspected and tested in accordance with 3-6.10 through 3-6.14, 3-8.1 through 3-8.7, and 3-8.7 through 3-8.14, as applicable.



4-8 Operating Test.

4-8.1 A complete cycle of water tower operation shall be carried out after starting the engine, setting the stabilizers, and transmitting power to the water tower. The water tower shall be fully elevated out of the bed, rotated 90 degrees, and extended to full extension.

4-8.2 A water tower shall complete this test smoothly and without undue vibration within the time allowed by the current Edition of NFPA 1901, Standard for Automotive Fire Apparatus, in effect at the time of manufacture.

4-8.3 The water tower shall be retracted, the turntable rotation completed through 360 degrees, and then the water tower lowered to its bed, after which a thorough inspection shall be made of all moving parts.

4-8.4 The test shall demonstrate successful operation of all water tower controls.

4.9 Water System Examination and Test.

4-9.1 The waterway system shall be inspected for proper operation of all components. It shall be free of rust, corrosion, blockage or other defects.

4-9.2 The waterway attaching brackets shall be inspected as follows:

(a) Inspect the brackets for loose bolts, weld fractures, or other defects.

4-9.3 Pressure Test. The water system shall be pressure tested.

4-9.3.1 If the water tower has a telescoping boom, the water system shall be tested following the procedure in 2-8.4.1 and 2-8.4.2.

4-9.3.2 If the water tower has an articulating boom, the water system shall be tested following the procedure in 3-12.3.2.

4-9.3.3 If the water tower has both a telescoping boom and an articulating boom, it shall be tested in accordance with 4-9.3.1 and 4-9.3.2.

4-9.3.4 The water system shall operate properly and with an absence of leaks during these tests.

4-9.4 Flow Meter(s). If the waterway system is equipped with a flow meter(s), the flow meter(s) shall be checked for accuracy. Flow meters shall be tested at the water system manufacturer's maximum rated water system flow. Any meter that reads off by more than 10 percent shall be recalibrated, repaired, or replaced.

4-9.5 Pressure Gauge(s). If the waterway system is equipped with a water pressure gauge(s), each water pressure gauge shall be checked for accuracy. Pressure gauges shall be checked at least three points at 50 psi (3.45 bar) intervals without exceeding the maximum rated working pressure of the waterway system. Any gauge that reads off by more than 10 psi shall be replaced, repaired or recalibrated.

4-9.6 If the waterway system is equipped with a relief valve, the relief valve shall be checked to verify that it is operational at the waterway manufacturer's recommended pressure setting.

4-10 Signs. Ensure that all signs are in place and legible.

4-12 Hydraulic Fluid. After the operational tests have been performed, a sample of the hydraulic fluid shall be removed from the hydraulic reservoir and subjected to spectro-chemical analysis, particle count, viscosity check, and water content analysis.

4-13 Records. A proper record shall be completed for all tests of the water tower by the personnel responsible for the test. The test record shall include the following:

(a) When the torque verification of mounting bolts, as required by this standard, is performed, the bolt size, grade, and torque specifications shall be recorded.



(b) Where this standard requires measurements be taken such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base rail thickness, extension brake drift, winch drift, and the like, these measurements shall be recorded in the test record in order that a year-to-year comparison can be made.

NON- DESTRUCTIVE TESTING INSPECTION SPECIFICATIONS AERIAL DEVICE EXAMINATION AND TEST SPECIFICATIONS

GENERAL:

1. The Test Company shall not represent nor be a manufacturer or repairer of aerial equipment.
2. All inspection and testing performed by a third-party certification organization shall be accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*.
3. The inspectors performing the test work on the units shall be certified as meeting Level II requirements as outlined in American Society for
4. Nondestructive Testing (ASNT) document CP-189 in all methods used in the aerial inspection. The inspector shall also have had training at various aerial manufacturing locations so as to become familiar with the assembly and operation of aerial devices for fire service use.
5. Prior to award of contract, the personnel performing the inspection may be required to present for review, proof of his Level II Certification in the required NDT methods.
6. The examination and test report provided to the Agency shall specify the point of inspection and the results of such examinations and test. The test report as required by NFPA 1911, Chapter 22, 2017 Edition shall include the following:
 - (a) When the torque verification of mounting bolts, as required by, NFPA 1911, Chapter 22, 2017 Edition is performed; the bolt size, grade, and torque specification shall be recorded.
 - (b) When NDT is conducted, the test record will indicate the NDT method used in each area inspected.
 - (c) Where NFPA 1911, Chapter 22, 2017 Edition requires measurements be taken such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base-rail thickness, extension brake drift, winch



drift, and the like, these measurements shall be recorded in the test record in order that a year-to-year comparison can be made.

7. All test work outlined in NFPA 1911, Chapter 22, 2017 Edition including nondestructive testing shall be conducted.

UL QUALIFICATIONS:

1. UL is a nationally recognized testing laboratory recognized by OSHA in accordance with the OSHA regulations set forth at 29 Code of Federal Regulations, Section 1910.7, Appendix A, "OSHA Recognition Process for Nationally Recognized Testing Laboratories."
2. UL is accredited for inspection and testing systems on fire apparatus in accordance with ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspection*.
3. UL complies with the American Society for Testing and Material Standards ASTM E543, "Standard Practice for Agencies Performing Nondestructive Testing."
 1. UL has more than 35 years of fire department equipment safety testing experience.
 2. The inspectors performing the nondestructive test work on the units are certified as at least a Level II NDT technician in the test methods used, under the requirements outlined in ASNT document CP-189, Standard for Qualification and Certification of Nondestructive Testing Personnel. Trainees and personnel certified to Level I in the test method used shall be permitted to conduct the nondestructive tests as long as they work under the direct and immediate supervision of either a Level II or ASNT Level III technician holding current certification in the same test method. The inspector will also have had training at various aerial manufacturing locations so as to become familiar with the assembly and operation of aerial devices for fire service use.
 3. UL meets the American Society for Testing and Materials (ASTM) Standard ASTM E543 "Standard Specifications for Agencies Performing Nondestructive Testing."

LIABILITY INSURANCE:

UL carries not less than one million dollars in excess liability insurance for bodily injury and property damage combined.

CERTIFICATE:

When the unit successfully meets all NFPA 1911, Chapter 22, 2017 Edition requirements, UL shall issue a Certificate of Inspection stating the units compliance with NFPA 1911, Chapter 22, 2017 Edition.

Fire Apparatus Manufacturer's Specifications:

UL has the following tolerances from the manufacturer.

1. Rotation bearing clearance and backlash.
2. Critical mounting bolt grade and torque.
3. Elevation cylinder drift tolerance.
4. Extension cylinder drift tolerance.



5. Outrigger cylinder drift tolerance.
6. Hydraulic relief pressure.
7. Ladder section twist.
8. Hardness for aluminum devices.
9. Hollow I-beam base-rails thickness.
10. Rated load of the device.
11. Maximum rated working pressure of water system.

AERIAL DEVICE EXAMINATION AND TEST EVALUATION

1. UL does not represent nor is in the manufacture or repair of aerial devices.
2. Prior to examination and test of the units, the personnel performing the inspection will present for review, proof of Level II Certification in the required NDT methods.
3. The examination and test Report provided to the Agency will specify the point of inspection and the results of such examinations and test.
4. All test work outlined in NFPA 1911, Chapter 22, 2017 Edition including nondestructive testing shall be conducted.
 - A. All ferrous welds shall be magnetic particle inspected for defects.
 - B. All nonferrous welds shall be visually inspected, and if questionable defects are identified, dye penetrant shall be used to further evaluate the quality of the weld.
 - C. All bolts and pins shall be ultrasonically inspected for internal flaws.

CERTIFICATION:

When the unit successfully meets all the requirements outlined below, UL will issue a certificate of aerial lift device examination and test stating the units compliance with NFPA 1911, Chapter 22, 2017 Edition.

WELDING STANDARDS:

1. All accessible structural weldments on ferrous materials shall be inspected for compliance with American Welding Society (AWS) D1.1 "Structural Welding Code – Steel", 2011 edition. All structural weldments shall meet the requirements for weld quality as defined in 6.9, Visual Inspection. The acceptance criteria are outlined in Table 6.1, under the column labeled "Tubular Connections".

The following criteria will apply:

Cracks: No cracks of any type (transverse, toe, longitudinal, crater, etc.) are permitted.
Surface Holes: The sum of diameters of piping porosity in fillet welds shall not exceed 3/8 in. (10 mm) in any linear inch (25 mm) of weld and shall not exceed 3/4 in. (19 mm) of weld in any 12 in. (305 mm) length of weld.

Complete joint penetration groove welds in butt joints transverse to the direction of computed tensile strength shall have no piping porosity. For all other groove welds, piping porosity shall not exceed 3/8 in. (10 mm) in any linear inch (25 mm)



of weld and shall not exceed 3/4 in. (19 mm) in any 12 in. (305 mm) length of weld.
Lack of Fusion - Thorough fusion shall exist between adjacent layers of weld metal and between weld metal and base metal.

Undercut - Undercut shall not exceed 0.01 in. (0.25 mm) deep when its direction is transverse to primary tensile stress in the part that is undercut, nor more than 1/32 in. (1 mm) for all other situations.

2. All aluminum structural weldments shall meet the requirements in Paragraph 9.15.1 of the American Welding Society (AWS) Standard AWS D1.2 "Structural Welding Code -- Aluminum", 2014 edition.

The following criteria will apply:

Cracks - No cracks of any type (transverse, toe, longitudinal, crater, etc.) are permitted.

Undercut - Length, each undercut 0.20 in. (5 mm), maximum Depth 15 % of minimum base metal thickness, maximum. (See chart, below)

Distance between undercuts 2.0 in. (50 mm), minimum.

Base Metal Allowable Undercut Depth (in.)

Thickness (in.) 15 % of Base Metal

1/16 0.009 (approximately equal to 0)

1/8 0.019 (approximately equal to 1/64)

3/16 0.028 (approximately equal to 1/32)

1/4 0.038 (approximately equal to 1/32)

5/16 0.046 (approximately equal to 3/64)

3/8 0.056 (approximately equal to 3/64)

7/16 0.066 (approximately equal to 1/16)

1/2 0.075 (approximately equal to 1/16)

Scratch or Burn Marks - Depth 15 % of minimum base metal thickness, maximum.

1-6 Visual Inspection.

A visual inspection, prior to any operation or load testing, shall be carried out in a systematic sequence with proper attention to detail. This visual inspection of the equipment shall be for the detection of any visible defects, damage, or improperly secured parts.

1-7 Weld Inspection. All accessible structural welds shall be visually inspected for fractures. When the nondestructive testing is required by 1-4.2 and is performed, all accessible structural welds shall be inspected by ASNT Level II NDT technicians certified in the test methods used.

1-7.1 All accessible structural welds on steel shall be inspected in accordance with the appropriate provisions of the American Welding Society (AWS) Standard AWS D1.1, Structural Welding Code--Steel. All structural welds will comply with the weld quality as defined in Table 6.1 (Visual Inspection) of AWS D1.1.

1-7.2 All accessible structural welds on aluminum shall be inspected in accordance with the appropriate provisions of the American Welding Society (AWS) Standard AWS D1.2, Structural Welding Code--Aluminum. All structural welds will comply with the weld quality as outlined in Table 9.2 of AWS D1.2.



1-7.3 The application of a particular nondestructive weld inspection technique shall be as recommended by the American Welding Society (AWS) Standard AWS B1.10, Guide for the Nondestructive Examination of Welds.

1-8 Bolt, Pin, and Washer Inspection. Bolts and pins subjected to ultrasonic testing shall contain no ultrasonic CRT indications that can be interpreted as cracks or elongated material. All washers shall be inspected for correct installation.

1-9 Nondestructive Testing Procedure.

1-9.1 All ultrasonic inspections shall be conducted in accordance with the following American Society for Testing and Materials (ASTM) Standards:

(a) ASTM E114, Standard Practice for Ultrasonic Pulse-Echo Straight-Beam Examination by the Contact Method (b) ASTM E797, Standard Practice for Measuring Thickness by Manual Ultrasonic Pulse-Echo Contact Method

1-9.2 All magnetic particle inspection shall be conducted in accordance with the following American Society for Testing and Material (ASTM) standards:

(a) ASTM E709, Standard Guide for Magnetic Particle Examination

1-9.3 All liquid penetrant inspections shall be conducted in accordance with the following American Society for Testing and Materials (ASTM) standards:

(a) ASTM E165, Standard Test Method for Liquid Penetrant Examination

(b) ASTM E1220, Standard Test Method for Visible Penetrant Examination Using the Solvent-Removable Process

(c) ASTM E1418, Standard Test Method for Visible Penetrant Examination Using the Water-Washable Process

1-9.4 All radiographic inspections shall be conducted in accordance with the following American Society for Testing and Materials (ASTM) standards:

(a) ASTM E1032, Standard Test Method for Radiographic Examination of Weldments

1-9.5 All hardness readings shall be conducted in accordance with the following American Society for Testing and Materials (ASTM) standards:

(a) ASTM E6, Standard Terminology Relating to Methods of Mechanical Testing

(b) ASTM E10, Standard Test Method for Brinell Hardness of Metallic Materials

(c) ASTM E18, Standard Test Methods for Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

(d) ASTM E92, Standard Test Method for Vickers Hardness of Metallic Materials

(e) ASTM B647, Standard Test Method for Indentation Hardness of Aluminum Alloys by Means of a Webster Hardness Gauge

(f) ASTM B648, Standard Test Method for Indentation Hardness of Aluminum Alloys by Means of a Barcol Impressor

Testing Metal Aerial Ladders

2-1 General. In addition to the manufacturer's recommendations, the inspections detailed below shall be performed. An inspection preceded by a plus sign (+) indicates that an appropriate nondestructive test (NDT) shall be conducted as required by 22.8.1.3 of NFPA 1911.

2-2 Service Records. The aerial ladders service records shall be checked for any reports that may indicate defective conditions.

2-3 Hydraulic Components. Hydraulic components shall show no signs of hydraulic



fluid leakage.

2.3.1 A component shall be considered leaking if hydraulic fluid (oil) droplets are forming on the component.

2.3.2 A film of hydraulic fluid on the component shall not be considered severe enough to categorize the component as leaking.

2-4 Turntable, Torque Box, Suspension, and Tractor Drawn Components

Inspection and Test. The turntable, torque box, suspension components, and tractor drawn components, where applicable, shall be inspected on all aerial ladders in accordance with 2-4.1 through 2-4.29.

2-4.1 Rotation Bearing Mounting Bolts. The rotation bearing mounting bolts shall be inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible bolts meets the apparatus manufacturer's specifications.
- (c) (+) Inspect all accessible bolts for internal flaws.

2-4.2 Torque Box Mounting to Frame. The torque box mounting to frame shall be inspected as follows:

- (a) If the torque box is bolted to the frame, inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications, if the torque box is bolted to the frame.
- (c) If the torque box is welded to the frame, visually inspect all accessible attaching welds for fractures.
- (d) (+) If the torque box is bolted to the frame, inspect all bolts for internal flaws.
- (e) (+) If the torque box is welded to the frame, inspect all accessible attaching welds.

2-4.3 Tractor Drawn Components Mounting to Frame. If the tractor-drawn components are bolted to the frame, the mounting of the tractor drawn components to the frame shall be inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications.
- (c) (+) Inspect all bolts for internal flaws.

2-4.3.1 If the tractor drawn components are welded to the frame, the mounting of the tractor-drawn components to the frame shall be inspected as follows:

- (a) Visually inspect all accessible attaching welds for fractures.
- (b) (+) Inspect all accessible attaching welds.

2-4.4 Suspension Systems. If the suspension system components are bolted to the frame, the mounting of the suspension system components to the frame shall be inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by



the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications.

(c) (+) Inspect all bolts for internal flaws.

2-4.4.1 If the suspension system components are welded to the frame, the mounting of the suspension system components to the frame shall be inspected as follows:

(a) Visually inspect all accessible attaching welds for fractures.

(b) (+) Inspect all accessible attaching welds.

2-4.5 Rotation Gear and Bearing. The rotation gear and bearing shall be inspected as follows:

(a) Inspect the rotation gear for missing or damaged teeth, pinion-to-gear alignment, proper lubrication, and backlash.

(b) Inspect the bearing clearance.

2-4.6 Rotation Gear Reduction Box Mounting. The rotation gear reduction box mounting shall be inspected as follows:

(a) If the reduction box is bolted to the turntable, inspect all bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a calibrated torque wrench, verify that the torque on all bolts meets the apparatus manufacturer's specifications, if the reduction box is bolted to the turntable.

(c) Visually inspect all accessible weldments for defects and welds for fractures.

(d) (+) If the reduction box is bolted to the turntable, inspect all bolts for internal flaws.

(e) (+) If the reduction box is welded to the turntable, inspect all reduction box attaching welds.

2-4.7 Turntable Structural Components. The turntable structural components shall be inspected as follows:

(a) Visually inspect all accessible turntable structural weldments for defects and welds for fractures.

(b) (+) Inspect all accessible turntable structural component welds.

2-4.8 Rotation Hydraulic Swivel. Inspect the swivel for external hydraulic fluid leakage.

2-4.9 Hydraulic Lines and Hoses. Inspect all hydraulic lines and hoses for kinks, cuts, and abrasions, and hydraulic fluid leakage at connectors and fittings.

2-4.10 Elevation, Extension, and Rotation Lock(s). The elevation, extension, and rotation lock(s) shall be inspected as follows:

(a) Inspect the manual valve elevation, extension, and rotation lock(s) for external hydraulic fluid leakage.

(b) Test the manual valve elevation lock for proper operation by engaging the lock and then attempting to raise and lower the ladder with the main hydraulic system operating. No detectable movement shall occur as determined by visual inspection.

(c) Test the manual valve extension lock for proper operation by engaging the lock and then attempting to extend or retract the ladder with the main hydraulic system operating. No detectable movement shall occur as determined by visual inspection.

(d) Test the manual valve rotation lock for proper operation by engaging the lock and attempting to rotate the turntable clockwise and counterclockwise with the main hydraulic system. The movement shall not exceed the manufacturer's specifications.



2-4.11 Power Takeoff. Inspect the power takeoff for external hydraulic fluid leakage and proper operation (engagement and disengagement).

2-4.12 Hydraulic Pump. Inspect the hydraulic pump for external hydraulic fluid leakage.

2-4.13 Collector Rings. The collector rings shall be inspected as follows:

- (a) If accessible, inspect the collector rings for foreign material buildup on ring.
- (b) If accessible, inspect the collector ring terminals for damage.
- (c) Conduct tests to ensure the proper operation of the collector rings by rotating the aerial device while electric-powered devices are in operation.
- (d) If applicable, check for indications of moisture in the electrical chamber by visually inspecting the desiccant moisture indicators.

2.4.14 Elevation Cylinder Anchor Ears and Plates. The elevation cylinder anchor ears and plates shall be inspected as follows:

- (a) Visually inspect the elevation cylinder anchor ears and plates for defects and the attaching welds for fractures.
- (b) (+) Inspect the elevation cylinder anchor ears and plate-attaching welds.

2.4.14.1 If the elevation cylinder anchor is bolted, it shall be further inspected as follows:

- (a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a properly calibrated torque wrench, verify that the torque on all accessible bolts meets the apparatus manufacturer's specifications.
- (c) (+) Inspect all bolts for internal flaws.

2-4.15 Elevation Cylinder Pins. The elevation cylinder pins shall be inspected as follows:

- (a) Inspect cylinder pins for alignment, proper installation, lubrication, operation, and retention.
- (b) (+) Inspect cylinder pins for internal flaws.

2-4.16 Elevation Cylinders. The elevation cylinders shall be inspected as follows:

- (a) Inspect the cylinder rods for pitting, scoring, and other defects.
- (b) Inspect the cylinder rod-to-barrel seal and the end gland seal for excessive external hydraulic fluid leakage that exceeds the manufacturer's specifications.
- (c)* With the hydraulic oil at ambient temperature, subject the cylinders to a drift test by placing the aerial device at a 60-degree elevation, full extension, marking the cylinder position, closing manually operated locking valves, and allowing the device to stand for 1 hr with the engine off. Measure the drift and verify that the results do not exceed the manufacturer's specifications for allowable cylinder drift.

2-4.17 Holding Valves on Elevation Cylinders. Inspect the holding valves for external hydraulic fluid leakage.

2-4.18 Operating Controls. The operating controls shall be inspected as follows:

- (a) Inspect the operating controls for missing or damaged control handles, proper identification, and hydraulic fluid leakage.
- (b) Verify that the controls operate smoothly, return to neutral position when released, and do not bind during operation.
- (c) If interlocks have been provided or are required to prevent unintentional operation of the aerial device, verify that the interlocks or locking devices are operating properly.



2-4.19 Load Limit Indicators. Inspect the load limit indicators for proper operation and legibility.

2-4.20 Emergency Hand Crank Controls. Inspect the hand crank control for proper operation.

2-4.21 Auxiliary Hydraulic Power. Inspect the auxiliary hydraulic power for proper operation.

2-4.22 Turntable Alignment Indicator. Verify the presence of a turntable alignment indicator.

2-4.23 Throttle Control. The throttle control shall be inspected for proper operation. The operating speed of the engine shall be measured using a tachometer or a revolution counter and shall be checked against the manufacturer's specifications.

2-4.24 Communication System. Inspect the communication system for proper installation and proper operation.

2-4.25 Relief Hydraulic Pressure. Verify that the main pump relief hydraulic pressure and compensator pressure does not exceed the manufacturer's specifications.

2-4.26 Unit Main Frame. The unit main frame shall be inspected as follows:

(a) Visually inspect the main frame for any cracks, bends, dents, twists, or other weldment defects and any welds for fractures.

(b) (+) Inspect all main frame welds.

2-4.27 Transmission/Aerial Device Interlocks. If interlocks are provided that prevent operation of the aerial device until both the parking brakes have been set and the transmission has been positioned properly, verify that the interlocks are operating properly.

2-4.28 Engine Speed Interlocks. If interlocks are provided that allow operation of the engine speed control only after both the parking brakes have been set and the transmission has been positioned properly, verify that the interlocks are operating properly.

2-4.29 Breathing Air Systems. If a breathing air system is provided, the system shall be inspected as follows:

(a) Verify that the breathing air system is properly installed including the integrity of the air cylinder mounting, the regulator, and the air lines from the air cylinder(s) to the top of the aerial device.

(b) Verify that all the component parts of the system are present and in serviceable condition.

(c) Visually inspect the air cylinder mounting brackets for defects and welds for fractures.

(d) (+) Inspect all welds on air cylinder mounting brackets.

(e) Check that the air pressure regulator is set at the apparatus manufacturer's recommended pressure.

2-5 Stabilizer Examination and Test. The stabilizer components, where applicable, shall be inspected on all aerial ladder apparatus in accordance with 2-5.1 through 2-5.16.

2-5.1 Stabilizer Structural Components. The stabilizer structural components shall be inspected as follows:

(a) Visually inspect all stabilizer components for defects and welds for fractures.

(b) (+) Inspect all stabilizer structural component welds.

2-5.2 Stabilizer Pads. Verify that the stabilizer pads are present, of proper construction,

and in serviceable condition.

2-5.3 Stabilizer Mounting to Frame or Torque Box. The stabilizer mounting to the frame or torque box shall be inspected as follows:

- (a) Visually inspect the stabilizer to frame or torque box attachment for defects such as weld cracks, dents, and bends.
- (b) (+) If welded, inspect the stabilizer to frame or torque box mounting welds.
- (c) If bolted, inspect all bolts for proper fastener grade and installation as specified by the apparatus manufacturer.
- (d) Verify that the torque on all bolts meets the apparatus manufacturer's specifications using a properly calibrated torque wrench.
- (e) (+) Inspect all bolts for internal flaws.

2-5.4 Hydraulic Lines and Hoses in Stabilizer System. Inspect the hydraulic hose lines for kinks, cuts and abrasions, and leakage at connectors and fittings.

2-5.5 Stabilizer Interlock System. Verify that the stabilizer interlock system is operating properly.

2-5.6 Stabilizer Warning Device. The stabilizer warning device shall be inspected to verify that it is operating properly.

2-5.7 Stabilizer Extension Cylinder Pins and Hinge Pins. The stabilizer extension cylinder pins and hinge pins shall be inspected as follows:

- (a) Inspect all stabilizer cylinder pins and hinge pins for proper installation, lubrication, operation, and retention.
- (b) (+) Inspect all stabilizer pins and hinge pins for internal flaws.

2-5.8 Stabilizer Extension Cylinder. The stabilizer extension cylinder shall be inspected as follows:

- (a) Inspect the stabilizer extension cylinder rods for pitting and scoring and other defects.
- (b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external fluid leakage.
- (c) With the hydraulic oil at ambient temperature, and the stabilizer's cylinders properly set, measurements shall be taken to determine the amount of drift present in 1 hr with the engine off. The results shall not exceed the manufacturer's specifications for allowable stabilizer cylinder drift.

2-5.9 Holding Valves on Extension Cylinders. Inspect the holding valves for external leakage of hydraulic fluid.

2-5.10 Operating Controls. The operating controls shall be inspected as follows:

- (a) Inspect the operating controls to ensure control handles are not damaged or missing, functions are identified, operating instructions and warnings are posted, and there is no hydraulic fluid leakage.
- (b) Verify that the controls operate smoothly, return to the neutral position when released, and do not bind during operation.
- (c) If interlocks have been provided or are required to prevent unintentional operation of the aerial device, verify that the interlocks or locking devices are operating properly.

2-5.11 Leveling Indicator. If a leveling indicator(s) is provided to aid the operator in



leveling the apparatus, the accuracy and legibility of the leveling indicator shall be checked.

2-5.12 Diverter Valve. Inspect the diverter valve for external hydraulic fluid leakage.

2-5.13 Position Stops. Inspect the mechanical stabilizers for proper operation of the positive stops to prevent overextension.

2-5.14 Stabilizer Deployment. If the stabilizer system is hydraulically operated, verify that the system can be deployed within the time frame designated by the aerial device manufacturer.

2-5.15 Manual Spring Locks. Inspect the condition and operation of stabilizer manual spring locks for stowed position.

2-5.16 Tractor Spring Lockout Device. If the aerial ladder is tractor drawn, inspect the spring lockout device for any discontinuities and for proper operation.

2-6 Aerial Ladder Inspection and Test. The aerial ladder shall be inspected in accordance with 2-6.1 through 2-6.30

2-6.1 Structural Modifications, Improper Repairs or Added Weight. The aerial ladder shall be inspected for structural modifications or improper repairs.

2-6.1.1 The aerial ladder shall be inspected to determine that no extra equipment has been added to the aerial ladder without subtracting the weight of such equipment from the rated capacity.

2-6.1.2 Details of any structural modifications, improper repairs, or added weights shall be contained in the record required by Section 2.12

2-6.2 Aerial Ladder Weldments. All aerial ladder weldments shall be inspected as follows:

(a) Visually inspect all accessible aerial ladder weldments for defects and welds for fractures.

(b) (+) Inspect all accessible welds on the ladder.

2-6.3 Aerial Ladder Fasteners. All aerial ladder structural fasteners and fastened connections shall be visually inspected for cracked fasteners and material cracks around the fasteners.

2-6.4 Ladder Section Alignment. Measurements shall be taken to determine the amount of ladder section twist or bow in the aerial ladder. Results shall not exceed manufacturer's specifications for allowable ladder section twist or bow.

2-6.5 Hydraulic, Pneumatic, and Electrical Lines in Ladder Sections. All hydraulic, pneumatic, and electrical lines shall be inspected for proper mounting, wear, cracking, kinks, and abrasions.

2-6.6 Top Rails. The top rails shall be inspected as follows:

(a) Inspect the top rails for straightness or any signs of misalignment.

(b) (+) Hardness readings shall be taken at intervals of 28 in. (710 mm) or less along the entire length of both top rails of aluminum ladders. Results of this test shall be compared with the manufacturer's specifications for the hardness of the material used for construction of the top rail.

2-6.7 Vertical and Diagonal Braces. The vertical and diagonal braces shall be inspected as follows:

(a) Inspect the verticals and diagonals for straightness, dents, and other



deformities.

(b) (+) Inspect all accessible attachment welds.

2-6.8 Base Rails. The base rails shall be inspected as follows:

(a) Inspect the base rail for straightness and any signs of wear, ironing, dents, and corrosion.

(b) (+) Inspect the bottom of all hollow I-beam base rails to determine the thickness of the rail.

Results shall not be less than the manufacturer's minimum specifications.

(c) (+) Hardness readings shall be taken at intervals of 28 in. (710 mm) or less

along the entire length of both base rails of aluminum ladders. Results of this test shall be compared with the manufacturer's specifications for the hardness of the material used for construction of the base rail.

2-6.9 Rungs. Inspect all rungs of the aerial ladder for straightness, signs of fly lock damage, damage or loose rung covers and rung cap castings, and signs of cracks or missing rivets, if applicable.

2-6.10 Folding Steps. The folding steps on the ladder shall be inspected as follows:

(a) Visually inspect the folding steps and folding step mounting brackets for defects and welds for fractures.

(b) (+) Inspect all welds on the folding step(s) and folding step mounting brackets.

2-6.11 Rollers. Inspect all rollers for proper lubrication, operation, and any signs of wear.

2-6.12 Guides, Babbits, Wear Strips, Pads, and Slide Blocks. Visually inspect the guides for cracked welds, loose rivets, alignment, and any irregularities. Inspect babbits for signs of wear. Inspect wear strips, pads, and slide blocks for wear, gouging, and proper mounting.

2-6.13 Extension Sheaves. The extension sheaves shall be inspected as follows:

(a) Inspect extension sheaves for signs of wear, free movement during operation, proper retainers, and lubrication.

(b) Visually inspect all extension sheave mounting brackets for defects and welds for fractures.

(c) (+) Inspect all welds of extension sheave mounting brackets.

2-6.14 Extension Cables. Inspect extension cables for compliance with Chapter 5-2 of ASME B30.5 *Mobile and Locomotive Cranes*.

2-6.15 Extension and Retraction Motor. Inspect the extension and retraction motor for signs of external hydraulic fluid leakage and, where applicable, brake wear and brake alignment with the shaft.

2-6.16 Cable Separation Guide. During operation of the aerial ladder, visually inspect the cable separation guide for free travel and any signs of misalignment.

2-6.17 Winch Holding Capacity. Inspect the winch for holding capacity by fully elevating the aerial ladder and extending it 10 ft (3 m). Winch slippage shall be measured for a 5-min period. Slippage shall not exceed the manufacturer's specifications.

2-6.18 Brake Holding Capacity. Inspect the brake holding capacity of the extension motor by fully elevating the aerial ladder and extending it 10 ft (3 m). Brake slippage shall be measured for a 5-min period. Slippage shall not exceed the manufacturer's specifications.



2-6.19 Extension, Elevation and Rung Alignment Indicators. The elevation, extension, and rung alignment indicators shall be inspected for legibility, clarity, and accuracy.

2-6.20 Fly Locks. Inspect the fly lock mechanisms for proper mounting, alignment, lubrication, and operation.

2-6.21 Ladder Cradle. The aerial ladder cradle shall be inspected as follows:

(a) Inspect the ladder cradle for wear, proper alignment, and the cradle pad for damage.

(b) Visually inspect the ladder cradle for defects such as weld cracks, dents, or bends.

(c) (+) Inspect the ladder cradle welds and bracket attachments.

2-6.21.1 If the aerial ladder cradle is bolted, it shall be further inspected as follows:

(a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible mounting bolts meets the apparatus manufacturer's specifications.

(c) (+) Inspect all accessible bolts for internal flaws.

2-6.22 Ladder Bed Lock. Inspect the ladder bed lock mechanism and hydraulic lines for proper mounting, signs of wear, and hydraulic fluid leakage at fittings.

2-6.23 Stop Mechanism. Inspect stop mechanisms to ensure that they prevent overextension or over-retraction of the aerial ladder.

2-6.24 Maximum Extension Warning Device. During operation of the aerial ladder, verify the proper operation of the audible device to warn of the approach of maximum extension.

2-6.25 Ladder Illumination. Inspect the operation of the lights that are used to illuminate the ladder.

2-6.26 Extension Cylinder Anchor Ears and Plates. The extension cylinder anchor ears and plates shall be inspected as follows:

(a) Visually inspect the extension cylinder anchor ears and plates for defects and the attaching welds for fractures.

(b) (+) Inspect the attaching welds of the extension cylinder anchor ears and plates.

2-6.26.1 If the extension cylinder anchor is bolted, it shall be further inspected as follows:

(a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible mounting bolts meets the apparatus manufacturer's specifications.

(c) (+) Inspect all accessible bolts for internal flaws.

2-6.27 Extension Cylinder Pins. The extension cylinder pins shall be inspected as follows:

(a) Inspect the cylinder pins for proper installation and retention.

(b) (+) Inspect the cylinder pins for internal flaws.

2-6.28 Extension Cylinder. The extension cylinders shall be inspected as follows:

(a) Inspect the cylinder rods for pitting, scoring, and other defects.

- (b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external fluid leakage that exceeds the manufacturer's specifications.
- (c) With the hydraulic oil at ambient temperature, subject the cylinder(s) to drift by placing the aerial device at full elevation, 10 ft (3 m) extension, marking the cylinder position or the second section in relation to the base section, and allowing the ladder to stand for 1 hr with the engine off. The results shall not exceed the manufacturer's specifications for allowable cylinder drift.

2-6.29 Holding Valves on Extension Cylinder. Inspect the holding valves for external and internal hydraulic fluid leakage.

2-6.30 Tip Controls. If the aerial ladder is equipped with a secondary operating position at the tip, the controls shall be inspected as follows:

- (a) Check that the control handles are not damaged or missing, functions are identified, and operating instructions and warnings are posted.
- (b) Verify that the controls operate smoothly, return to neutral when released, and do not bind during operation.
- (c) Verify that the turntable or lower controls will override the tip controls.
- (d) Verify that any safety devices that are designed to operate in conjunction with the tip controls are fully operational.
- (e) If the aerial ladder was built to the 1996 or a later edition of NFPA 1901, *Standard for Automotive Fire Apparatus*, verify that the speed of the aerial ladder, when being operated from the tip controls, does not exceed the speeds allowed in the edition of NFPA 1901 to which the aerial ladder was manufactured.

2-7 Operating Test.

2-7.1 A complete cycle of aerial ladder operation shall be carried out after starting the engine, setting the stabilizers, and transmitting power to the ladder. The ladder shall be fully elevated out of the bed, rotated 90 degrees, and extended to full extension.

2-7.2 The ladder shall complete this test smoothly and without jerking or undue vibration within the time allowed by the edition of NFPA 1901, *Standard for Automotive Fire Apparatus*, in effect at the time of manufacture.

2-7.3 The ladder shall be retracted, the turntable rotation completed through 360 degrees, and the ladder lowered to its bed, after which a thorough inspection shall be made of all moving parts. Special attention shall be given to the security and adjustment of the ladder cables or chains.

2-7.4 The test shall demonstrate successful operation of all ladder controls.

2-8 Load Testing.

2-8.1 Tests shall be conducted when wind velocity is less than 10 mph (16 kmph).

2-8.2 Only personnel essential to conduct the test shall be permitted near the apparatus during the test. A close watch shall be maintained during all load tests for any signs of instability, the development of conditions that could cause damage or permanent deformation, or twist that exceeds the aerial ladder manufacturer's allowance. The test shall be discontinued immediately if such conditions develop.

2-8.3 Horizontal Load Test.

2-8.3.1 The aerial ladder's turntable shall be level. The aerial apparatus vehicle shall be on a hard level surface. All stabilizers shall be deployed in accordance with the



manufacturer's instructions.

2-8.3.2 A test cable hanger shall be attached to the top rung of the top ladder section and properly centered.

2-8.3.3 The rated capacity in the horizontal position at full extension shall be determined from the manufacturer's load chart or operator's manual. If full extension is not permitted in the horizontal position with a specified rated capacity, then the maximum permissible extension with a specified rated capacity shall be used for the purpose of this test.

2-8.3.4 For single chassis apparatus, the ladder shall be rotated, if necessary, until the ladder is positioned over the rear and parallel to the vehicle centerline. For tractor-drawn apparatus, the ladder shall be positioned in the most stable position as recommended by the manufacturer.

2-8.3.5 The ladder shall be placed in the horizontal position and extended to full extension or maximum permitted extension as determined in 2-8.3.3. The base section shall not be allowed to rest in the bed.

2-8.3.6 The ladder section locks, either manual pawls or hydraulic holding valves, shall be properly closed or applied.

2-8.3.7 The elevation cylinder integral holding valve or shutoff safety valve shall be properly closed or applied.

2-8.3.8 A weight equal to the manufacturer's specified rated live load, determined in 2-8.3.3, shall be gradually applied to the top rung of the aerial ladder by utilizing the test weight container or other suitable means of applying the weight.

2-8.3.9 The test weight shall be sustained by the unsupported aerial ladder for 5 min. **2-**

8.3.10 The test weight that is equal to the rated capacity shall be applied gradually to the top rung of the aerial ladder utilizing a test weight container or other suitable means of applying the weight. The weight shall be suspended by a cable and shall not be more than 3 ft. (1 m) above the ground. The combined weight of the test cable hanger and cable, the test weight container, and the test weights shall not exceed the rated capacity. The weights shall be added to the ladder in a manner that does not shock load the ladder.

2-8.3.10.1 The test weight shall hang freely from the tip of the aerial ladder. If the test weight hanger and ladder deflection are such that the test weight comes to rest on the ground, it shall be permissible to raise the ladder elevation slightly above the horizontal position. The ladder shall not be moved while the test weight is applied.

2-8.3.12 After removal of the test weight, a complete visual inspection shall be made of all load-supporting elements. Any visually detectable signs of damage, permanent deformation, or twist exceeding the manufacturer's allowance shall constitute noncompliance with the load test requirements. The aerial device shall also meet the requirements of Section 2-7 after the horizontal load test.

2-8.4 Maximum Elevation Load Test.

2-8.4.1 The ladder turntable shall be level. The aerial apparatus vehicle shall be on a hard level surface. All stabilizers shall be deployed in accordance with the manufacturer's instructions.

2-8.4.2 A test cable hanger shall be attached to the top rung of the top ladder section and properly centered.



2-8.4.3 The maximum rated capacity in the maximum-elevated position at full extension shall be determined from the manufacturer's load chart or operator's manuals.

2-8.4.4 The ladder shall be rotated, if necessary, until the ladder is positioned over the rear and parallel to the vehicle centerline. Midship-mounted devices may have to be rotated slightly off of the vehicle centerline in order to apply the test load without interference with the body of the apparatus.

2-8.4.5 The ladder shall be elevated to maximum elevation and fully extended.

2-8.4.6 The ladder section locks, either manual pawls or hydraulic holding valves, shall be properly applied.

2-8.4.7 The elevation cylinder integral holding valve or shutoff safety valve shall be properly closed or applied.

2-8.4.9 A free-hanging weight equal to the manufacturer's specified rated capacity, determined in 2-8.4.3, shall be gradually applied to the top rung of the aerial ladder by utilizing a test weight container or other suitable means of applying the weight. The weight shall be suspended by cable and shall be not more than 3 ft (1 m) above the ground. The combined weight of the test cable hanger and cable, the test weight container, and the test weights shall not exceed the rated capacity. The weights shall be added to the ladder in a manner that does not shock load the ladder.

2-8.4.10 The test weight shall be sustained by the unsupported aerial ladder for 5 min.

2-8.4.11 The test weight will hang freely from the tip of the aerial ladder. The aerial ladder shall not be moved while the test weight is applied.

2-8.4.12 After removal of the test weight, a complete visual inspection shall be made of all load supporting elements. Any visually detectable signs of damage, permanent deformation, or twist exceeding the manufacturer's allowance shall constitute noncompliance with the load test requirements. The aerial device shall also meet the requirements of Section 2-7 after the load test.

2-9 Waterway System Test.

2-9.1 The following examination and test will apply only to permanently piped aerial ladder aerial ladder waterway systems.

2-9.2 The waterway system shall be inspected for proper operation of all components. It shall be free of rust, corrosion, blockage, or other defects.

2-9.3 The waterway attaching brackets shall be inspected as follows:

- (a) Inspect the brackets for loose bolts, weld fractures or other defects.
- (b) (+) Inspect all attaching welds.

2-9.4 Pressure Test. The water system shall be pressure tested.

2-9.4.1 The aerial ladder shall be positioned between 0 and 10 degrees elevation and fully retracted. The water system shall be filled with water and the valve at the discharge end closed. If there is not a valve at the discharge end, a valve shall be attached for the purpose of this test.

The pressure on the system shall be raised to the water system manufacturer's maximum rated working pressure and maintained for the duration of the test. The aerial ladder shall be raised to full elevation and rotated 360 degrees. The water system, including the turntable swivel, shall be checked for leaks. Care shall be taken not to overheat the water pump.

2-9.4.2 The aerial ladder shall be positioned between 0 and 10 degrees elevation and



extended to its maximum permissible limit. The water system shall be filled with water and the valve at the discharge end closed. If there is not a valve at the discharge end, a valve shall be attached for the purpose of this test.

The pressure on the system shall be raised to the water system manufacturer's maximum rated working pressure and maintained for the duration of the test. The entire length of the water system shall be checked for leaks. Care shall be taken to not overheat the water pump.

2-9.4.3 The water system will operate properly and with an absence of leaks during these tests.

2-9.5 Flow Meter(s). If the waterway system is equipped with a flow meter(s), the flow meter(s) shall be checked for accuracy. Flow meters shall be tested at the water system manufacturer's maximum rated water system flow. Any meter that reads off by more than 10 percent shall be recalibrated, repaired, or replaced.

2-9.6 Pressure Gauges. If the waterway system is equipped with a water pressure gauge(s), each water pressure gauge shall be checked for accuracy. Pressure gauges shall be checked at least three points, at 50 psi intervals (3.45 bar) without exceeding the maximum rated working pressure of the waterway system. Any gauge that reads off by more than 10 psi (0.7 bar) shall be recalibrated, repaired or replaced.

2-9.7 If the waterway system is equipped with a relief valve, this relief valve shall be checked to verify that it is operational at the waterway manufacturer's recommended pressure setting.

2-10 Signs. Ensure that all signs are in place and legible.

2-11 Hydraulic Fluid. After the operational tests have been conducted, a sample of the hydraulic fluid shall be removed from the hydraulic reservoir and subjected to spectrochemical analysis, particle count, viscosity check, and water content analysis. **2-12**

Records. A comprehensive record shall be completed for all tests conducted on the aerial ladder and signed by the person responsible for the test. The test record will include the following:

(a) When the torque verification of mounting bolts is conducted, as required by this standard, the bolt size, grade, and torque specification shall be recorded.

(b) When NDT is conducted, the test record will indicate the NDT method used in each area inspected.

(c) Where this standard requires measurements be taken such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base rail thickness, extension brake drift, winch drift, and the like, these measurements shall be recorded in the test record in order that a year-to-year comparison can be made.

Testing Elevating Platforms

3-1 General. In addition to the manufacturer's recommendations, the inspections and tests detailed below shall be performed. An inspection preceded by a plus sign (+) indicates an appropriate nondestructive test (NDT) shall be conducted as required by 19.9.1.2 of NFPA 1911.

3-2 Service Records. The elevating platform's service records shall be checked for any reports that may indicate defective conditions.

3-3 Hydraulic Components. Hydraulic components shall show no signs of hydraulic fluid leakage.



3-3.1 A component shall be considered leaking of hydraulic fluid (oil) when droplets are forming on the component.

3-3.2 A film of hydraulic fluid on the component shall not be considered severe enough to categorize the component as leaking.

3-3 Turntable and Torque Box Inspection and Test. The turntable and torque and torque box components, where applicable, shall be inspected on all elevating platforms in accordance with 2-4.1 & 2-4.2; 2-4.4 through 2-4.13; and 2-4.18 through 2-4.29

3-4 Stabilizer Examination and Test. The stabilizer components, where applicable, shall be inspected on all elevating platform apparatus in accordance with 2-5.1 through 2-5.16.

3-5 Platform and Boom Inspection and Test. All platforms and booms shall be inspected in accordance with 3-5.1 through 3-5.13.

3-5.1 Structural Modifications, Improper Repairs, or Added Weights. The platform and booms shall be inspected for structural modifications or improper repairs.

3-5.1.1 The platform shall be inspected to determine that no extra equipment has been added to the platform without subtracting the weight of such equipment from the rated capacity.

3-5.1.2 Details of any structural modifications or added weight shall be contained in the required report.

3-5.2 Platform Mounting Brackets. The platform mounting brackets shall be inspected as follows:

- (a) Visually inspect all platform mounting brackets for defects such as weld cracks, dents, or bends.
- (b) (+) Inspect all welds in the platform mounting brackets.
- (c) (+) Inspect all bolts and pins structurally involved with the platform mounting to the ladder or boom for internal flaws.

3-5.3 Platform. The platform shall be inspected as follows:

- (a) Visually inspect platform for defects, such as weld cracks, dents, or bends.
- (b) (+) Inspect all welds on platforms.

3-5.4 Hydraulic, Pneumatic, and Electrical Lines in Platform. Inspect all lines for proper mounting, wear, cracking, kinks, and abrasions.

3-5.5 Auxiliary Winch Mounting. The auxiliary winch mounting shall be inspected as follows:

- (a) Inspect all mounting bolts for proper grade and installation as specified by the apparatus manufacturer.
- (b) Using a calibrated torque wrench, verify that the torque on all winch mounting bolts meets the apparatus manufacturer's specifications.
- (c) If welded, visually inspect the winch mounting for weld fractures.
- (d) (+) Inspect the mounting bolts for internal flaws.
- (e) (+) If brackets are welded, inspect all welds on mounting brackets.

3-5.6 Winch Controls. The winch controls shall be inspected as follows:

- (a) Inspect controls for proper identification as to function and operation.
- (b) Verify smooth operation of the winch controls.

3-5.7 Elevating Platform Rated Capacity Identification. Verify that the proper platform rated capacity identification plate is present, accurate, and legible.

3-5.8 Platform Gate Latches and Hinge Points. Inspect the platform gate latches for proper alignment and the latch and hinges for smooth operation.

3-5.9 Platform Hinge Pins. The platform hinge pins shall be inspected as follows:

(a) Inspect platform hinge pins for proper installation, lubrication, and any irregularities.

(b) (+) Inspect the platform's hinge pins for internal flaws.

3-5.10 Platform Controls. The platform controls shall be inspected as follows:

(a) Inspect the platform operating controls for identification of functions, posted operating instructions, and warnings.

(b) Verify that the controls operate smoothly, return to neutral when released, and do not bind during operation.

(c) Verify that the turntable or lower controls will override the platform controls.

3-5.11 Platform Monitor and Nozzle. The platform monitor and nozzle shall be inspected as follows:

(a) Inspect the complete operation of the platform monitor and nozzle.

(b) Inspect the monitor's mounting brackets for any defects and welds for fractures.

3-5.12 Boom Illumination. Verify the operation of spotlights used to illuminate the boom.

3-6 Articulating Boom--Lower Boom Examination and Test. For apparatus equipment with an articulating boom, the lower boom shall be inspected and tested in accordance with 3-6.1 through 3-6.14.

3-6.1 Hinge Pins. The hinge pins shall be inspected as follows:

(a) Inspect the boom hinge pins for proper installation, lubrication, operation, and any discontinuities.

(b) (+) Inspect the boom hinge pins for internal flaws.

3-6.2 Lower Boom Elevation Cylinder Anchor Ears and Plates. The lower boom elevation cylinder anchor ears and plates shall be inspected as follows:

(a) Visually inspect the anchor ears and plates for defects and the attaching welds for fractures.

(b) (+) Inspect all welds on the anchor ears and plates.

3-6.3 Lower Boom Elevation Cylinders. The boom elevation cylinder shall be inspected as follows:

(a) Inspect the cylinder rod(s) for pitting, scoring or other defects.

(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.

(c) With the hydraulic oil at ambient temperature, measurements shall be taken in accordance with the manufacturer's recommendations to determine the amount of drift present in the boom elevation cylinders. Results of this test shall not exceed the manufacturer's specifications for allowable lower boom cylinder drift.

3-6.4 Holding Valves on Boom Elevation Cylinder. Inspect the holding valves for signs of external hydraulic fluid leakage.

3-6.5 Boom Assembly. The lower boom assembly shall be inspected as follows:

(a) Visually inspect the boom for defects such as weld cracks, dents, or bends.

(b) Visually inspect all structural fasteners and fastened connections for cracked fasteners and material cracks around the fasteners.

(c) (+) Inspect all welds on the boom for any structural discontinuities.

(d) (+) Hardness readings shall be taken at intervals of 28 in. (710 mm) or less on booms constructed of aluminum. Results of this test shall be compared with the manufacturer's specifications for the hardness of the material used for construction of the boom assembly.

3-6.6 Cylinder Link Pins. The cylinder link pins shall be inspected as follows:

(a) Inspect the cylinder link pins for proper installation, lubrication, operation, and any fractures.

(b) (+) Inspect the cylinder link pins for internal flaws.

3-6.7 Platform Leveling Linkages. The platform leveling linkages shall be inspected as follows:

(a) Visually inspect linkages for defects such as weld cracks, dents, and bends.

(b) (+) Inspect all welds of the leveling assembly.

(c) (+) Inspect all leveling linkage pins for any internal flaws.

3-6.8 Hydraulic Lines and Hoses in Lower Boom. Inspect all hydraulic lines in the lower boom for proper mounting, abrasion, hydraulic fluid leakage, and wear.

3-6.9 Hydraulic Lines in Knuckle. Inspect all hydraulic lines in the knuckle for hydraulic fluid leakage, abrasion, and any signs of wear.

3-6.10 Cables, Chains, and Rods. Inspect all cables, chains, and rods for signs of wear and for proper adjustment.

3-6.11 Sprockets, Pulleys, and Hooks. Inspect all sprockets, pulleys, and hooks for proper lubrication, signs of wear, distortion, and proper operation.

3-6.12 Boom Support. The boom support shall be inspected as follows:

(a) Inspect the boom support for wear and proper alignment and the cradle pad for damage.

(b) Visually inspect the boom support for defects such as weld cracks, dents, or bends.

(c) (+) Inspect the boom support welds and bracket attachment.

3-6.12.1 If the boom support is bolted, it shall be further inspected as follows:

(a) Inspect all accessible bolts for proper grade and installation as specified by the apparatus manufacturer.

(b) Using a properly calibrated torque wrench, verify that the bolt torque on all accessible mounting bolts meets the apparatus manufacturer's specifications.

(c) (+) Inspect all accessible bolts for internal flaws.

3-6.13 Lower Boom Angle Indicator Lights. Verify the proper operation of the lower boom angle indicator lights.

3-6.14 Pneumatic and Electrical Lines. Inspect all pneumatic and electrical lines in the lower boom and the knuckle for proper mounting, wear, cracking, kinks, and abrasions.

3-7 Articulating Boom--Upper Boom Examination and Test. For apparatus with an articulating boom, the upper boom shall be inspected and tested in accordance with 3-7.1 through 3-7.15.

3-7.1 Upper Boom for Alignment with Lower Boom. Verify that the upper boom is

aligned with the lower boom.

3-7.2 Platform Leveling Linkages. The platform leveling linkages shall be inspected as follows:

- (a) Visually inspect linkages for defects such as weld cracks, dents, or bends.
- (b) (+) Inspect all welds of leveling assemblies.
- (c) (+) Inspect all leveling linkage pins for any internal flaws.

3-7.3 Boom Boost Cylinder Brackets. The boom boost cylinder brackets shall be inspected as follows:

- (a) Visually inspect the boom boost cylinder brackets for defects such as weld cracks, dents, or bends.
- (b) (+) Inspect the boom boost cylinder bracket welds.

3-7.4 Boom Boost Cylinders. Inspect the boom boost cylinders for any external hydraulic fluid leakage.

3-7.5 Cylinder Link Pins. The cylinder link pins shall be inspected as follows:

- (a) Visually inspect the cylinder link pins for proper installation, lubrication, operation, and any irregularities.
- (b) (+) Inspect the cylinder link pins for internal flaws.

3-7.6 Boom Assembly. The upper assembly shall be inspected as follows:

- (a) Visually inspect the boom for defects such as weld cracks, dents, or bends.
- (b) Visually inspect all structural fasteners and fastener connections for cracked fasteners and material cracks around the fasteners.
- (c) (+) Inspect all welds on the boom.
- (d) (+) Hardness readings shall be taken at intervals of 28 in. (710 mm) or less on booms constructed of aluminum. Results of this test shall be compared with the manufacturer's specifications for the hardness of the material used for construction of the boom assembly.

3-7.7 Hydraulic Lines and Hoses in Upper Boom. Inspect all hydraulic hoses/lines in the upper boom for proper mounting, abrasions, hydraulic fluid leakage, and wear.

3-7.8 Cables, Chains, and Rods. Inspect all cables, chains, and rods for signs of wear and for proper adjustment.

3-7.9 Sprockets, Pulleys, and Hooks. Inspect all sprockets, pulleys, and hooks for proper lubrication, signs of wear, distortion, and proper operation.

3-7.10 Upper Boom Hold-Down Device. The upper boom hold-down device shall be inspected as follows:

- (a) Visually inspect the upper boom hold-down device for defects and for proper operation.
- (b) (+) Inspect all welds of the upper boom hold-down device.

3-7.11 Safety Stop Mechanism. Verify that the safety stop mechanism operates properly.

3-7.12 Upper Boom Elevation Cylinder Anchor Ears and Plates. The upper boom elevation anchor ears and plates shall be inspected as follows:

- (a) Visually inspect the anchor ears and plates for defects and welds for fractures.
- (b) (+) Inspect all welds on the anchor ears and plates.

3-7.13 Upper Boom Elevation Cylinder(s). The upper boom elevation cylinder(s) shall be inspected as follows:



- (a) Inspect the cylinder rod(s) for pitting, scoring, and other defects.
- (b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.
- (c) With the hydraulic oil at ambient temperature, measurements shall be taken in accordance with the manufacturer's recommendations to determine the amount of drift present. Results of this test shall not exceed the manufacturer's tolerance for allowable upper boom cylinder drift.

3-7.14 Holding Valves on Upper Boom Elevation Cylinder. Inspect the holding valve(s) for signs of external hydraulic fluid leakage.

3-7.15 Pneumatic and Electrical Lines. Inspect all pneumatic and electrical lines in the upper boom for proper mounting, wear, cracking, kinks, and abrasions.

3-8 Telescoping Boom Examination and Test. For platforms equipped with a telescoping boom, the boom shall be inspected and tested in accordance with 2-4.14 and 2-4.17, 3-6.10 through 3-6.12, and 3-8.1 through 3-8.14.

3-8.1 Boom Assemblies. The boom assemblies shall be inspected as follows:

- (a) Visually inspect booms for defects such as weld crack, dents, or bends.
- (b) Visually inspect all structural fasteners and fastened connections for cracked fasteners and material cracks around the fasteners.
- (c) (+) Inspect all welds on booms.
- (d) (+) Hardness readings shall be taken at intervals of 28 in. (710 mm) or less on booms constructed of aluminum. Results of this test shall be compared with the manufacturer's specifications for the hardness of the material used for construction of the boom assembly.

3-8.2 Ancillary Boom Ladder. The ancillary boom ladder shall be inspected as follows:

- (a) Inspect the ancillary boom ladder for any defects and welds for fractures.
- (b) Inspect the mounting brackets for loose bolts, weld fractures, or other defects.
- (c) (+) Inspect all welds on the ladder and attaching welds.

3-8.3 Guides, Wear Strips and Pads, and Slide Blocks. Inspect guides, wear strips, pads, and slide blocks for proper installation and signs of wear.

3-8.4 Extension Sheaves. The extension sheaves shall be inspected as follows:

- (a) Inspect the extension sheaves for proper mounting, alignment, and signs of wear.
- (b) (+) Inspect all welds of the extension sheave mounting brackets.
- (c) (+) Inspect retaining bolt for internal flaws.

3-8.5 Extension. Inspect extension cables for compliance with Chapter 5-2 of ASME B30.5 *Mobile and Locomotive Cranes*.

3-8.6 Elevation Indicator. Inspect the elevation cylinder indicator for legibility and clarity.

3-8.7 Maximum Extension Warning Device. During operation, verify the proper operation of the audible device to warn of the approach to maximum extension, if so equipped.

3-8.8 Platform Leveling Cylinders. The platform leveling cylinders shall be inspected as follows:

- (a) Inspect the cylinder rod(s) for pitting, scoring, and other defects.



(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.

(c) Visually inspect the leveling system for proper installation.

(d) Visually inspect the mounting of the leveling system for defects and welds for fractures.

(e) (+) Inspect all welds for mounting of the leveling system.

(f) (+) Inspect all leveling cylinder pins for any internal flaws.

3-8.9 Hydraulic Lines and Hoses in Boom Assemblies. Inspect all hydraulic lines and hoses in the boom assemblies for hydraulic fluid leakage, abrasions, and any signs of wear.

3-8.10 Extension Cylinder Anchor Ears and Plates. The extension cylinder anchor ears and plates shall be inspected as follows:

(a) Visually inspect the extension cylinder anchor ears and plates for defects and attaching welds for fractures.

(b) (+) Inspect the extension cylinder anchor ears and plate attaching welds. **3-**

8.11 Extension Cylinder Pins. The extension cylinder pins shall be inspected as follows:

(a) Inspect the cylinder pins for proper installation and retention.

(b) (+) Inspect the cylinder pins for internal flaws.

3-8.12 Extension Cylinder. The extension cylinders shall be inspected as follows:

(a) Inspect the cylinder rods for pitting, scoring, and other defects.

(b) Inspect the cylinder rod to barrel seal and the end gland seal for excessive external hydraulic fluid leakage.

(c) With the hydraulic oil at ambient temperature, subject the cylinder(s) to drift by placing the aerial device at full elevation, 10 ft (3 m) extension, marking the cylinder piston or the second section in relation to the base section, and allowing the ladder to stand for 1 hr with the engine off. The results shall not exceed the manufacturer's specifications for allowable cylinder drift.

3-8.13 Holding Valves on Extension Cylinder. Inspect the holding valves for external hydraulic fluid leakage.

3-8.14 Pneumatic and Electrical Lines. Inspect all pneumatic and electrical lines in the booms for proper mounting, wear, cracking, kinks, and abrasions.

3-9 Operational Tests from Lower Controls.

3-9.1 With engine speed set to allow maximum speed as permitted by the manufacturer, the elevating platform shall be operated in all positions, as allowed by the manufacturer, using the lower or ground controls.

3-9.2 The operation of the elevating platform shall include, but not be limited to, movement of the platform basket from ground to maximum elevation as well as revolving the platform basket 360 degrees to the left and to the right while the unit is at its maximum horizontal reach.

3-9.3 The boom shall operate without any improper or unusual motion or sound.

3-9.4 All safety devices shall operate properly.

3-9.5 All controls shall operate smoothly, return to the neutral position when released and not bind during operation.

3-9.6 Telescoping elevating platforms, rollers, slides, and sheave wheels shall demonstrate proper alignment, function, and free operation.

3-9.7 A complete cycle of elevating platform operation shall be carried out after starting



the engine, setting the stabilizers, and transmitting power to the platform booms or sections.

3-9.7.1 Operating the machine from the lower control station, the elevating platform shall be raised out of the bed, extended to full specified height, and rotated through a 90 degree turn. This shall be completed smoothly and without undue vibration within the manufacturer's recommended time.

3-9.7.2 The elevating platform shall be retracted, and the turntable rotation completed through 360 degrees. The elevating platform shall be lowered to its bed and a thorough inspection made of all moving parts. Special attention shall be given to the platform leveling system.

3-9.7.3 The test shall demonstrate successful operation of all elevating platform controls.

3-10 Operational Tests from Platform Controls.

3-10.1 With engine speed set to allow maximum speed as permitted by the manufacturer, the elevating platform shall be operated in all positions, as allowed by the manufacturer, with only one operator in the platform basket operating from the platform control station.

3-10.2 The operation of the elevating platform will include, but not be limited to, movement of the platform basket from ground to maximum elevation, as well as revolving the platform basket 360 degrees to the left and to the right while the unit is at its maximum horizontal reach.

3-10.3 All safety devices shall operate properly.

3-10.4 The platform basket deactivation control, from the ground or lower controls, shall be demonstrated to operate properly.

3-10.5 The platform basket shall level properly as the booms are moved through all allowable positions.

3-10.6 The mechanical override on a hydraulically leveled elevating platform basket shall operate properly during emergency lowering of the boom without hydraulic power.

3-11 Load Test.

3-11.1 With the unit located on a hard level surface and allowing sufficient room for unrestricted boom movements, a stability and structural test shall be performed. This test shall determine the elevating platform's ability to perform properly while carrying rated capacity loads in the platform basket.

3-11.1.1 A close watch shall be maintained during all load tests for any signs of instability, the development of conditions that could cause damage or permanent deformation, or twist that exceeds the elevating platform manufacturer's allowance. The test shall be discontinued immediately if such conditions develop.

3-11.2 The unit shall be properly stabilized according to the manufacturer's recommendation.

3-11.3 The platform basket shall be placed near the ground and loaded to the manufacturer's rated capacity. Care shall be exercised to assure that the weight of equipment added to the platform basket after delivery is subtracted from the weight of the test load being added. The platform basket load shall be properly secured.

3-11.4 The unit shall be operated from the lower controls through all allowable phases of operation. The manufacturer's operational limits shall not be exceeded.



3-11.5 All boom movements shall exhibit no abnormal noise, vibration, or deflection. **3-**

11.6 The platform basket shall level properly as the booms are moved through all allowable positions.

3-11.7 At the conclusion of the load test, weld joints at stabilizer structure, stabilizers, frame, main frame, frame reinforcements, turntable, cylinder anchors, boom joints, leveling system, platform basket, and pivot pin bosses shall be inspected and shall show no signs of deterioration.

3-12 Water System Examination and Test.

3-12.1 The waterway and system shall be inspected for proper operation of all components. It shall be free of rust, corrosion, other defects, or blockage.

3-12.2 The waterway attaching brackets shall be inspected as follows:

(a) Inspect the brackets for loose bolts, weld fractures, or other defects.

(b) (+) Inspect all attaching welds.

3-12.3 Pressure Test. The water system shall be pressure tested.

3-12.3.1 If the elevating platform has a telescoping boom, the water system shall be tested following the procedure in 2-9.4.1 and 2-9.4.3.

3-12.3.2 If the elevating platform has an articulating boom, the boom shall be positioned in the road travel position. The water system shall be filled with water and the valve at the discharge end closed. If there is not a valve at the discharge end, a valve shall be attached for the purpose of this test.

The pressure on the system shall be raised to the water system manufacturer's maximum rated working pressure and maintained while the elevating platform is raised to its rated vertical height and rotated 360 degrees. The water system including the turntable swivel, shall be checked for leaks. Care shall be taken not to overheat the water pump.

3-12.3.3 If the elevating platform has both a telescoping boom and an articulating boom, it shall be tested in accordance with 3-12.3.1 and 3-12.3.2.

3-12.3.4 The water system shall operate properly and with an absence of leaks during these tests.

3-12.4 Flow Meter(s). If the waterway system is equipped with a flow meter(s), the flow meter(s) shall be checked for accuracy. Flow meters shall be tested at the water system manufacturer's maximum rated water system flow. Any meter that reads off by more than 10 percent shall be recalibrated, repaired, or replaced.

3-12.5 Pressure Gauge(s). If the waterway system is equipped with a water pressure gauge(s), each water pressure gauge shall be checked for accuracy. Pressure gauges shall be checked at least three points at 50 psi (3.45 bar) intervals without exceeding the maximum rated working pressure of the waterway. Any gauge that reads off by more than 10 psi (0.7 bar) shall be replaced, repaired, or recalibrated.

3-12.6 If the waterway system is equipped with a relief valve(s), the relief valve(s) shall be checked to verify that it is operational at the waterway manufacturer's recommended pressure setting.

3-13 Signs. Ensure that all signs are in place and legible.

3-14 Hydraulic Fluid. After the operational tests have been performed, a sample of the hydraulic fluid shall be removed from the hydraulic reservoir and subjected to spectrochemical analysis, particle count, viscosity check, and water content analysis.



3-15 Records. A comprehensive record shall be completed for all tests of the elevating platform and signed by the personnel responsible for the test.

3-15.1 When torque verification of mounting bolts is performed as required by the standard, the bolt size, grade, and torque specifications shall be recorded.

3-15.2 When NDT is conducted, the test record shall indicate the NDT method used in each inspected area.

3-16.3 Where this standard requires measurements to be taken – such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base rail thickness, extension brake drift, winch drift, and the like – these measurements shall be recorded in the test record so that a year-to-year comparison can be made.

Testing Water Towers

4-1 General. In addition to the manufacturer's recommendations, the inspections and tests detailed below shall be performed. An inspection preceded by a plus sign (+) indicates an appropriate nondestructive test (NDT) shall be conducted as required by 22.10.1.2 of NFPA 1911.

4-2 Service Records. The water tower's service records shall be checked for any reports that may indicate defective condition.

4-3 Hydraulic Components. Hydraulic components shall show no signs of hydraulic fluid leakage.

4-3.1 A component shall be considered leaking if hydraulic fluid (oil) droplets are forming on the component.

4-3.2 A film of hydraulic fluid on the component shall not be considered severe enough to categorize the component as leaking.

4-4 Turntable and Torque Box Inspection Test. The turntable and torque box components, where applicable, shall be inspected on all water tower apparatus in accordance with 2-4.1 through 2-4.29.

4-4 Stabilizer Examination and Test. The stabilizer components, where applicable, shall be inspected on all water tower apparatus in accordance with 2-5.1 through 2-5.16.

4-5 Articulating Boom--Lower Boom Examination and Test. For water tower apparatus equipped with an articulating boom, the lower boom shall be inspected and tested in accordance with 3-6.1 through 3-6.6 and 3-6.8 through 3-6.14, as applicable.

4-6 Articulating Boom--Upper Boom Examination and Test. For water tower apparatus equipped with an articulating boom, the upper boom shall be inspected and tested in accordance with 3-7.1 and 3-7.3 through 3-7.15, as applicable.

4-7 Telescoping Boom Examination and Test. For water tower apparatus equipped with a telescoping boom, the booms shall be inspected and tested in accordance with 3-6.10 through 3-6.14, 3-8.1 through 3-8.7, and 3-8.7 through 3-8.14, as applicable.

4-8 Operating Test.

4-8.1 A complete cycle of water tower operation shall be carried out after starting the engine, setting the stabilizers, and transmitting power to the water tower. The water tower shall be fully elevated out of the bed, rotated 90 degrees, and extended to full extension.

4-8.2 A water tower shall complete this test smoothly and without undue vibration within



the time allowed by the current Edition of NFPA 1901, Standard for Automotive Fire Apparatus, in effect at the time of manufacture.

4-8.3 The water tower shall be retracted, the turntable rotation completed through 360 degrees, and then the water tower lowered to its bed, after which a thorough inspection shall be made of all moving parts.

4-8.4 The test shall demonstrate successful operation of all water tower controls.

4.9 Water System Examination and Test.

4-9.1 The waterway system shall be inspected for proper operation of all components. It shall be free of rust, corrosion, blockage or other defects.

4-9.2 The waterway attaching brackets shall be inspected as follows:

(a) Inspect the brackets for loose bolts, weld fractures, or other defects.

(b) (+) Inspect all attaching welds.

4-9.3 Pressure Test. The water system shall be pressure tested.

4-9.3.1 If the water tower has a telescoping boom, the water system shall be tested following the procedure in 2-8.4.1 and 2-8.4.2.

4-9.3.2 If the water tower has an articulating boom, the water system shall be tested following the procedure in 3-12.3.2.

4-9.3.3 If the water tower has both a telescoping boom and an articulating boom, it shall be tested in accordance with 4-9.3.1 and 4-9.3.2.

4-9.3.4 The water system shall operate properly and with an absence of leaks during these tests.

4-9.4 Flow Meter(s). If the waterway system is equipped with a flow meter(s), the flow meter(s) shall be checked for accuracy. Flow meters shall be tested at the water system manufacturer's maximum rated water system flow. Any meter that reads off by more than 10 percent shall be recalibrated, repaired, or replaced.

4-9.5 Pressure Gauge(s). If the waterway system is equipped with a water pressure gauge(s), each water pressure gauge shall be checked for accuracy. Pressure gauges shall be checked at least three points at 50 psi (3.45 bar) intervals without exceeding the maximum rated working pressure of the waterway system. Any gauge that reads off by more than 10 psi shall be replaced, repaired or recalibrated.

4-9.6 If the waterway system is equipped with a relief valve, the relief valve shall be checked to verify that it is operational at the waterway manufacturer's recommended pressure setting.

4-10 Signs. Ensure that all signs are in place and legible.

4-12 Hydraulic Fluid. After the operational tests have been performed, a sample of the hydraulic fluid shall be removed from the hydraulic reservoir and subjected to spectrochemical analysis, particle count, viscosity check, and water content analysis.

4-13 Records. A proper record shall be completed for all tests of the water tower by the personnel responsible for the test. The test record shall include the following:

(a) When the torque verification of mounting bolts, as required by this standard, is performed, the bolt size, grade, and torque specifications shall be recorded.

(b) When NDT is conducted, the test record shall indicate the NDT method used in each area inspected.



(c) Where this standard requires measurements be taken such as bearing clearance and backlash, cylinder drift, relief pressure, ladder section twist, hardness readings, base rail thickness, extension brake drift, winch drift, and the like, these measurements shall be recorded in the test record in order that a year-to-year comparison can be made.

Referenced Publications

5-1 The following documents or portions thereof are referenced within this proposal and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

5-1.1 ASME Publications. American Society of Mechanical Engineer, Two Park Avenue, New York, NY 10016-5990

ASME B30.5 Mobile and Locomotive Cranes, 2014

5-1.2 ASTM Publications. American Society for Testing and Materials, 100 Barr Harbor Drive, P.O.Box C700, West Conshohocken, PA 19428-2959.

ASTM B648, Standard Test Method for Indentation Hardness of Aluminum Alloys by Means of a Barcol Impressor, 2010

ASTM E6, Standard Terminology Relating to Methods of Mechanical Testing, 2011 e l.

ASTM E114, Standard Practice for Ultrasonic Pulse- Echo Straight-Beam Examination by the Contact Method, 2010

ASTM E165/E165M, Standard Practice for Liquid Penetrant Examination for General Industry, 2012

ASTM E543-15, Standard Specifications for Agencies Performing Nondestructive Testing

ASTM E709, Standard Guide for Magnetic Particle Examination, 2014

ASTM E797/E797M, Standard Practice for Measuring Thickness by Manual Ultrasonic Pulse-Echo Contact Method, 2010

ASTM E1220, Standard Test Method for Visible Penetrant Examination Using the Solvent-Removable Process, 2010

ASTM E1316, Standard Terminology for Nondestructive Testing, 2013

ASTM E1418, Standard Practice for Visible Penetrant Testing Using the Water-Washable Process, 2010

5.1.3 ASNT Publication. American Society for Nondestructive Testing, Inc., 1711 Arlingate Lane, Columbus, OH 43228.

ASNT CP-189-2001, Standard for Qualification and Certification of Nondestructive Testing Personnel, 2011

5.1.4 AWS Publications. American Welding Society, Inc., 8669 NW 36 Street, #130 Miami, FL 33166-6672.

AWS B1.10/B1.10M, *Guide for the Nondestructive Examination of Welds*, 2009

AWS B1.11-2000, Guide for the Visual Examination of Welds

AWS D1.1-2006, Structural Welding Code—Steel

AWS D1.2/D1.2M, *Structural Welding Code—Aluminum*, 2014

UL LLC Fire Equipment Inspection Services Price List and Van Trailer Locations

INSPECTION CATEGORY	ZONE	Award Year 1 8/13/2017 - 8/12/2018	Award Year 2 8/13/2018 - 8/12/2019	Award Year 3 8/13/2019 - 8/12/2020	Award Year 4 8/13/2020 - 8/12/2021	Award Year 5 8/13/2021 - 8/12/2022
Using Pump Trailer						
One Pump	Zone 1	\$871.73	\$894.75	\$918.37	\$942.61	\$967.50
One Pump	Zone 2	\$1,181.06	\$1,212.24	\$1,244.24	\$1,277.09	\$1,310.80
Two Pumps	Zone 1	\$1,181.06	\$1,212.24	\$1,244.24	\$1,277.09	\$1,310.80
Two Pumps	Zone 2	\$1,406.01	\$1,443.13	\$1,481.23	\$1,520.34	\$1,560.47
Three Pumps	Zone 1	\$1,349.78	\$1,385.41	\$1,421.99	\$1,459.53	\$1,498.06
Three Pumps	Zone 2	\$1,434.13	\$1,471.99	\$1,510.85	\$1,550.73	\$1,591.67
Four Pumps	Zone 1	\$1,687.22	\$1,731.76	\$1,777.48	\$1,824.40	\$1,872.57
Four Pumps	Zone 2	\$1,799.70	\$1,847.21	\$1,895.98	\$1,946.03	\$1,997.41
Incremental increases per pump for greater than Four Pumps	Zone 1	\$421.81	\$432.95	\$444.37	\$456.11	\$468.15
Incremental increases per pump for greater than Four Pumps	Zone 2	\$449.92	\$461.80	\$473.99	\$486.51	\$499.35
Single Generator Test with Pump Test	All Zones	\$84.37	\$86.60	\$88.88	\$91.23	\$93.64
Using Pump Pit						
One Pump	Zone 3	\$1,068.57	\$1,096.79	\$1,125.74	\$1,155.46	\$1,185.96
Three Pumps	Zone 2	\$1,349.78	\$1,385.41	\$1,421.99	\$1,459.53	\$1,498.06
Incremental increases per pump for greater than Four Pumps	Zone 1	\$365.56	\$375.21	\$385.12	\$395.29	\$405.72
Single Generator Test with Pump Test	All Zones	\$84.37	\$86.60	\$88.88	\$91.23	\$93.64
Ground Ladder Footage						
Minimum Fee	Zone 1	\$478.05	\$490.67	\$503.62	\$516.92	\$530.56
Minimum Fee	Zone 2	\$674.88	\$692.70	\$710.98	\$729.75	\$749.02
Minimum Fee	Zone 3	\$871.73	\$894.75	\$918.37	\$942.61	\$967.50
Price-per-foot	Zone 1	\$2.81	\$2.89	\$2.96	\$3.04	\$3.12
Price-per-foot	Zone 2	\$2.93	\$3.00	\$3.08	\$3.16	\$3.25
Price-per-foot	Zone 3	\$3.04	\$3.12	\$3.20	\$3.29	\$3.37
Heat Sensor Labels Price per Label	All Zones	\$2.81	\$2.89	\$2.96	\$3.04	\$3.12
Aerial Inspection						
Annual Inspection	Zone 1	\$787.36	\$808.15	\$829.48	\$851.38	\$873.86
Annual Inspection	Zone 2	\$1,012.32	\$1,039.04	\$1,066.47	\$1,094.63	\$1,123.53
Annual Inspection	Zone 3	\$1,293.53	\$1,327.68	\$1,362.73	\$1,398.71	\$1,435.63
Annual Inspection with Non-Destructive Testing	Zone 1	\$1,140.07	\$1,170.17	\$1,201.06	\$1,232.77	\$1,265.32
Annual Inspection with Non-Destructive Testing	Zone 2	\$1,434.13	\$1,471.99	\$1,510.85	\$1,550.73	\$1,591.67
Annual Inspection with Non-Destructive Testing	Zone 3	\$1,630.98	\$1,674.04	\$1,718.23	\$1,763.59	\$1,810.15
Annual Inspection with Non-Destructive Testing	Rush Zone	\$4,218.03	\$4,329.39	\$4,443.68	\$4,561.00	\$4,681.41
Annual Inspection with Non-Destructive Testing for Bronto, Metz or Swing	Zone 1	\$1,827.71	\$1,875.96	\$1,925.49	\$1,976.32	\$2,028.50
Annual Inspection with Non-Destructive Testing for Bronto, Metz or Swing	Zone 2	\$2,024.66	\$2,078.11	\$2,132.97	\$2,189.28	\$2,247.08



ZONE 1 VAN LOCATIONS

Note: Zone 1 vans perform aerial, ground ladder and pump test.

Van Number	City	State	Zip
AK1	Palmer	AK	99645
CA 1	Temecula	CA	92591
CA 3	Roseville	CA	95661
CO 1	Northglenn	CO	80260
GA 1	Kennesaw	GA	30152
IL 2	Palatine	IL	60067
IL 3	Morton Grove	IL	60053
IL 4	Somonauk	IL	60552
IN 1	Plymouth	IN	46563
NE 1	Omaha	NE	68001
NC 1	Waxhaw	NC	28173
NJ 1	Neshanic Station	NJ	08853
NJ 2	Highland Park	NJ	08904
NH 1	Haverhill	MA	01835
NV 1	Las Vegas	NV	89108
NY 1	Dunkirk	NY	14048
OR 1	Hillsboro	OR	97123
TX 3	Fort Worth	TX	76116
WA 1	Buckley	WA	98321



Quantity Discount Schedule

Using Van	Zone	Unit Price Awarded
		Until August 12, 2022
Minimum 20 Pumps	Zone 1	\$425.00
Minimum 30 Pumps	Zone 1	\$400.00

Using Pump Pit	Zone	Unit Price Awarded
		Until August 12, 2022
Minimum 20 Pumps	Zone 1	\$400.00
Minimum 30 Pumps	Zone 1	\$375.00

Ground Ladder Footage	Zone	Unit Price Awarded
		Until August 12, 2022
Minimum 1500 feet	Zone 1	\$2.50
Minimum 3000 feet	Zone 1	\$2.35

Aerial Inspection	Zone	Unit Price Awarded
		Until August 12, 2022
Annual Inspection with Non-Destructive Testing - minimum 10 units	Zone 1	\$975.00
Annual Inspection with Non-Destructive Testing - minimum 30 units	Zone 1	\$850.00



Services Contract Act Statement

Service Contract Act: *The Service Contract Act (SCA) is applicable to this contract as it applies to the entire Professional Services Schedule (PSS) Schedule and all services provided. While no specific labor categories have been identified as being subject to SCA due to exemptions for professional employees (FAR 22.1101, 22.1102 and 29 CFR 541.300), this contract still maintains the provisions and protections for SCA eligible labor categories. If and / or when the contractor adds SCA labor categories / employees to the contract through the modification process, the contractor must inform the Contracting Officer and establish a SCA matrix identifying the GSA labor category titles, the occupational code, SCA labor category titles and the applicable WD number. Failure to do so may result in cancellation of the contract.*

