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|  | <div>2016</div> <div>Aerial Ladder Inspection and Maintenance/Repair and Testing</div> | |
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Procedure:

The purpose of this guideline is to provide information regarding the inspection and maintenance of all department aerial ladders and apparatus, including the testing and repair process. Within the document, the responsibilities of Loveland Fire Rescue Authority (LFRA) members and the program manager will be defined.

Aerial Ladder/Apparatus Inspection and Maintenance:

Important Information on Testing Aerial Devices

Aerial ladders, elevating platforms and water towers are critical apparatus for LFRA. Inspection, testing and maintenance are vital to the prevention of aerial device failure and malfunction. Lack of periodic inspections and proper maintenance are common causes for costly repairs to or loss of these devices. To prevent physical and monetary loss and provide for safe operation, scheduled testing should be conducted in conjunction with routine inspection and maintenance. LFRA program managers of aerial devices need to fully understand the requirements for testing defined by Chapter 19 of the 2012 Edition of NFPA 1911, *Standard for the Inspection, Maintenance, Testing, and Retirement of In-Service Automotive Fire Apparatus*. The standard states that all inspections and tests specified in NFPA 1911, Chapter 19, except those specifically designated as nondestructive tests (NDT), shall be conducted annually and when the aerial device has been subjected to the following:

1. Major repairs or overhaul.
2. When the aerial device could have been subjected to unusual operating conditions of stress and load.
3. When there is reason to believe that usage exceeded the manufacturer's recommended aerial device operating procedures.

Annual Testing is essentially a visual inspection of all aerial components and a documented operational test, which may be conducted by any qualified individual, as defined in NFPA 1911, Chapter 19. There is no option to pick and choose which inspections and tests are conducted.

Whether aerial inspections and tests are performed by LFRA personnel, vehicle maintenance or test companies, it is important to make sure all required inspections and tests are conducted. It is not uncommon to discover that the following inspections and tests are not always performed on an annual basis:

1. Visual inspection of all accessible structural welds for defects and fractures.
2. Visual inspection of critical bolts for proper grade and installation.
3. Use of a calibrated torque wrench to verify proper torque on all accessible bolts.
4. Removal of ladder racks and some panels to gain access for inspection of welds and bolts.
5. Waterway system pressure and leakage testing, including the turntable swivel during 360 degree rotation.
6. For waterways equipped with a flowmeter, checks for flowmeter accuracy at the manufacturer's maximum rated flow.
7. Accuracy checks of water pressure gauges.
8. Hydraulic fluid tested for spectro-chemical analysis, particle count, viscosity and water content.

Nondestructive Testing (NDT). This test will be conducted every other year for LFRA. It is also referred to as a Five-Year Nondestructive Test and it must be conducted by a qualified and certified Level II NDT Technician, as specified in American Society of Nondestructive Testing (ASNT) CP-189, *Standard for Qualification and Certification of Non-Destructive Personnel*. This standard requires that Level II NDT Technician certification is signed-off by an ASNT Level III NDT having Level III Certification in the test methods used. Qualifications of a Level III NDT can be verified by visiting the ASNT website at www.asnt.org. Click on the "Certification" link and then "ASNT Certificate Holders". NDT is a general term for one of several methods that can be used to inspect the aerial device's structural components without physically altering or damaging the materials. These methods could include, but are not limited to, liquid penetrant inspection, magnetic particle inspection, radiography, metal hardness and ultrasonic testing. The tests are designed to detect cracks or deformities in the frame, ladder, ladder rails, turntable, outrigger, bolts or any other critical metal structural component. NDT inspections and tests specified in NFPA 1911, Chapter 19 shall be conducted as follows:

1. At least every 5 years (EVERY OTHER YEAR FOR LFRA).
2. Whenever visual inspection or load testing indicates a potential structural problem.

3. When there is a desire to further confirm continued operational safety.

The NFPA Standard requires that a successful NDT be completed at least every five years for any aerial device. The Annual Test shall be conducted every year, including the years that NDT are conducted. The NDT is a supplemental test, not a substitute test. If a third-party test company is employed to perform NDT, the test company shall meet the requirement of ISO/IEC 17020, *General criteria for the operation of various types of bodies performing inspections*.

LFRA aerial testing program manager may simply request that someone from Underwriter Laboratories (UL) come out and test the aerial device to meet NFPA 1911. If LFRA does not specify which test to perform, UL may perform an Annual Test when the situation calls for a NDT instead. In some cases, UL may only be qualified to perform an Annual Test. **The LFRA aerial testing program manager is responsible for knowing what test is required and when it is required, as well as contacting UL to conduct the proper test.** The program manager shall always obtain a certificate of insurance from the testing company under consideration to confirm that the company has liability insurance.

When purchasing a used aerial device, LFRA shall:

- Require the seller to conduct and provide the results of both an annual test and a NDT or,
- LFRA will require an inspection and testing prior to finalizing the purchase. If the aerial device fails the test, LFRA and the City of Loveland Fleet Services shall consider the cost of repairs and/or recertification prior to purchase.
- If the seller does possess a test report or certificate, LFRA personnel involved in the purchase of the used device should be aware that there are no industry standards for reporting test results. Although the report may indicate that testing has been accomplished in accordance with NFPA 1911, it may not fully disclose what tests have been completed including a NDT.

Important Steps to Maintaining an Aerial Device

Keeping up with the required maintenance and proper testing of aerial devices are the two most effective ways to help greatly reduce the risk of major structural repair or catastrophic failure. Follow these basic steps to ensure everyone's safety:

1. Follow NFPA 1911 and the manufacturer's maintenance recommendations closely. Clean and well-maintained aerial devices don't wear out as quickly. Make certain the budget is adequate to keep up with the service of the vehicle and the aerial device mounted on it.

2. Have a NFPA Annual Test conducted every year and the Nondestructive Test (NDT) at least every five years (EVERY OTHER YEAR FOR LFRA) as required by NFPA 1911 Standard, Chapter 19.
3. Have the Nondestructive Test (NDT) conducted in conjunction with the Annual Test.
4. When contracting for testing services, clearly identify which test (Annual, Nondestructive or both) you wish to have conducted and determine if the testing company is qualified to conduct those tests. Make sure the testing company performing NDT meets ISO/IEC 17020.
5. If you are buying a used aerial device, have both Annual and Nondestructive Tests conducted prior to completing the purchase. Obtain a copy of the test report indicating that the device passed these tests.
6. If the aerial device is unusually stressed during emergency operations, training or if it is damaged, have an NDT conducted prior to placing the aerial back into service.

Underwriters Laboratories

UL is a non-profit organization which has been working for over 25 years with the fire service inspecting and testing aerial devices, pumpers and ground ladders to ensure their minimum safety characteristics and to provide fire departments with dependable and unbiased testing of their fire apparatus and ground ladders. For more information visit: <http://www.UL.com/FES>.

An intergovernmental agreement shall be renewed every year between UL and LFRA and must be signed by the agencies' appropriate personnel. The point-of-contact at UL as of the date of this guideline is:

Christopher Baker
Field Specialist III
UL LLC
Fire Equipment Services
Follow Up Services
Denver, CO
303-815-2043

Revision History

References:

National Fire Protection Association (2012). *NFPA 1911, Standard for the inspection, maintenance, testing and retirement of in-service automotive fire apparatus* (National Fire Protection Association). Quincy, MA: National Fire Protection Association.

Underwriter Laboratories (n.d.). *Guidelines for preparation for in-service aerial device inspection*. Retrieved May 8, 2016 from <http://industries.ul.com/wp-content/uploads/sites/2/2015/10/In-Service-Aerial-Customer-Facing-Documents-2.pdf>