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907.7 Acceptance tests and completion. Upon completion of the installation, the fire alarm system and all fire alarm components shall be tested in accordance with NFPA 72.

◆ A complete performance test of the fire alarm system must be conducted to determine that the system is operating as required by the code. The acceptance test must include a test of each circuit, alarm-initiating device, alarm notification appliance and any supplementary functions, such as activation of closers and dampers. The operation of the primary and secondary (emergency) power supplies must also be tested, as well as the supervisory function of the control panel.

Section 901.5 assigns responsibility for conducting the acceptance tests to the owner or the owner's representative. NFPA 72 contains specific acceptance test procedures. Additional guidance on periodic testing and inspection can be also obtained from Section 907.9 and NFPA 72.

907.7.1 Single- and multiple-station

alarm devices. When the installation of the alarm devices is complete, each device and interconnecting wiring for multiple-station alarm devices shall be tested in accordance with the smoke alarm provisions of NFPA 72.

◆ To determine that smoke alarms have been properly installed and are ready to function as intended, they must be actuated during an acceptance test. The test also confirms that interconnected detectors will operate simultaneously as required. The responsibility for conducting the acceptance tests rests with the owner or the owner representative as stated in Section 901.5.

907.7.2 Record of completion. A record of completion in accordance with NFPA 72 verifying that the system has been installed and tested in accordance with the approved plans and specifications shall be provided.

◆ In accordance with NFPA 72, this section requires a written statement from the installing contractor that the fire alarm system has been tested and installed in compliance with the



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approved plans and the manufacturer's specifications. Any deviations from the approved plans or the applicable provisions of NFPA 72 are to be noted in the record of completion.

907.7.3 Instructions. Operating, testing and maintenance instructions and record drawings ("as built") and equipment specifications shall be provided at an approved location.

◆ To permit adequate testing, maintenance and trouble-shooting of the installed fire alarm system, an owner's manual with complete installation instructions must be kept on site or in another approved location. The instructions include a description of the system, operating procedures and testing and maintenance requirements.

907.8 Inspection, testing and maintenance. The maintenance and testing schedules and procedures for fire alarm and fire detection systems shall be in accordance with Sections 907.8.1 through 907.8.5 and NFPA 72.

◆ Fire alarms and fire detection systems are to be inspected, tested and maintained in accordance with Sections 907.9.1 through 907.9.5 and the applicable requirements of NFPA 72. It is the building owner's responsibility to keep these systems operable at all times.

907.8.1 Maintenance required. Whenever required for compliance with the provisions of this code, devices, equipment, systems, conditions, arrangements, levels of protection or other features shall thereafter be continuously maintained in accordance with applicable NFPA requirements or as directed by the fire code official.

◆ Periodic maintenance keeps systems in good working order or allows repair of defects discovered during inspections or testing. Because specialized tools and training are needed, only properly trained technicians or specialists should perform required periodic maintenance. Most maintenance is required only as needed, but many manufacturers suggest or require regular periodic replacement of parts



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subject to wear or abuse.

907.8.2 Testing. Testing shall be performed in accordance with the schedules in NFPA 72 or more frequently where required by the fire code official.

Exception: Devices or equipment that are inaccessible for safety considerations shall be tested during scheduled shutdowns where approved by the fire code official, but not less than every 18 months.

◆ NFPA 72 includes schedules for testing frequencies of fire alarm and fire detection systems and their components. Periodic tests that follow standardized methods are intended to confirm the results of inspections, determine that all components function properly and that systems meet their original design specifications. Tools, devices or equipment are usually required to perform tests. Because tests are more detailed than inspections, they are usually done only once or twice per year in most cases. Some tests, however, may be required as frequently as bimonthly or quarterly.

Because specialized knowledge and equipment are required, tests must usually be performed by technicians or specialists trained in the test methods involved.

Although Section 907.9.2 specifically addresses testing, NFPA 72 also contains schedules for visual inspection frequencies. An inspection consists of a visual check of a system or device to verify it is in operating condition and free from visible defects or damage. Obvious damage and the general condition of the system must always be noted and recorded. Partly because of their cursory nature, inspections are conducted more frequently than tests and maintenance. Because special knowledge and tools are not required, inspections may be done by any competent person.

The exception recognizes the impracticality of testing every device or piece of equipment related to a fire alarm or fire detection system. Some devices may be inaccessible for safety considerations, such as those in continuous process operations. Testing, however, must be done during scheduled shutdowns.



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907.8.3 Smoke detector sensitivity. Smoke detector sensitivity shall be checked within one year after installation and every alternate year thereafter. After the second calibration test, where sensitivity tests indicate that the detector has remained within its listed and marked sensitivity range (or 4-percent obscuration light grey smoke, if not marked), the length of time between calibration tests shall be permitted to be extended to a maximum of five years. Where the frequency is extended, records of detector-caused nuisance alarms and subsequent trends of these alarms shall be maintained. In zones or areas where nuisance alarms show any increase over the previous year, calibration tests shall be performed.

◆ Usually, changes in detector sensitivity are caused by inadequate maintenance. Regular sensitivity testing is intended to determine whether detectors require recalibration, maintenance or replacement. This section prescribes the intervals for testing smoke detector sensitivity. Where two successful tests

have been conducted, the frequency of the calibration tests can be extended to a maximum of five years. This interval extension recognizes the stability of both the environment and the detector. However, if nuisance alarms occur during this time interval extension, calibration tests may be needed because of potential changes in the environment where the detector is located or in the performance of the detector itself.

907.8.4 Method. To verify that each smoke detector is within its listed and marked sensitivity range, it shall be tested using one of the following methods:

1. A calibrated test method;
2. The manufacturer's calibrated sensitivity test instrument;
3. Listed control equipment arranged for the purpose;
4. A smoke detector/control unit arrangement whereby the detector causes a signal at the control unit where the detector's sensitivity is outside its acceptable sensitivity range; or
5. Another calibrated sensitivity test



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method acceptable to the fire code official.

Detectors found to have a sensitivity outside the listed and marked sensitivity range shall be cleaned and recalibrated or replaced.

Exceptions:

1. Detectors listed as field adjustable shall be permitted to be either adjusted within the listed and marked sensitivity range and cleaned and recalibrated or they shall be replaced.
2. This requirement shall not apply to single-station smoke alarms.

◆ This section prescribes acceptable test methods to verify that each smoke detector is within its listed and marked sensitivity range; any of the listed test methods may be used.

With regard to a calibration test method, many manufacturers have designed their devices to be tested by the application of a magnet at a test point on the outside of the detector. This activates a reed switch or pulls a fine wire into the detection chamber to

simulate a predetermined level of obscuration.

Another test method may require that a test device such as a key-type tool be inserted in a test port. This either activates a test switch or produces the desired level of obscuration directly.

One detector manufacturer supplies an interface device for connecting a volt-ohm-amp meter to a test port. Pressing a button on the interface device permits a direct reading of detector chamber voltage in an alarm condition.

Other detectors must be removed and inserted in or connected to a device used to calibrate and test the device. The calibrated sensitivity test instrument must satisfy the manufacturer's recommendation for a specific detector.

Addressable/analog-type detectors produce direct readings of the chamber voltage by the control unit. Many of these systems permit sensitivity adjustments within acceptable limits from the control unit as well. This test method essentially allows remote



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sensitivity testing.

A system control/detector combination unit detects changes in the environment and in the detector by comparing current readings to previously stored information in the memory of the control unit. Significant changes would indicate that the stability of either the environment or the detector has changed and that further maintenance or recalibration is required.

Any other method or device that permits the user to check the voltage drop across a smoke detection chamber is acceptable subject to the approval of the fire code official. Test devices should be manufactured and supplied by the smoke detector manufacturer.

Exception 1 recognizes that some smoke detectors may be listed as being field-adjustable. If, however, such devices cannot be adjusted to their listed sensitivity, then they must be replaced.

Exception 2 exempts single station smoke alarms from sensitivity testing

because these devices are not designed with the same level of technical sophistication as system smoke detectors. Smoke alarm manufacturers also recommend that the devices be discarded and replaced at regular intervals to reduce the likelihood of failure.

907.8.4.1 Testing device. Smoke detector sensitivity shall not be tested or measured using a device that administers an unmeasured concentration of smoke or other aerosol into the detector.

◆ Functional testing using smoke or a smoke substitute, such as aerosols, must comply with the manufacturer's recommended test procedures. A precisely measured amount of smoke or other aerosol product must be used to adequately determine detector sensitivity.

Some detector manufacturers do not accept testing with aerosol products and void detector warranties when this product is used. The functional test method selected should not permanently affect detector



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performance.

907.8.5 Maintenance, inspection and testing. The building owner shall be responsible to maintain the fire and life safety systems in an operable condition at all times. Service personnel shall meet the qualification requirements of NFPA 72 for maintaining, inspecting and testing such systems. A written record shall be maintained and shall be made available to the fire code official.

◆ This section clearly indicates that it is the responsibility of the building owner to maintain all fire alarm systems in proper working order. Often, an outside agency that employs adequately trained personnel will provide any maintenance and testing that is needed. NFPA 72 contains additional guidance on the qualifications for service personnel. Some examples include factory trained and certified individuals; individuals certified for fire alarm by the NICET or other individuals tested and certified by the local authority. Proper maintenance of fire alarm systems is essential so that the systems will perform as intended.

Inspection and test records provide a means for determining compliance with the requirements of the code.

Inspectors should be prepared to determine that inspection, test and maintenance logs are accurate and complete. Records must include the nature of the activity or service performed; when the activity occurred; who performed the activity and who witnessed testing or approved the work upon completion.

907.9 Where required in existing buildings and structures.

An approved fire alarm system shall be provided in existing buildings and structures where required in Chapter 11.

◆ Retroactive requirements for fire alarms are found in Section 1103.7. All the retroactive code requirements are found in Chapter 11 for convenience and to help with consistent enforcement.

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