PORTLAND FIRE & RESCUE

APRIL 3, 2020

FIR 6.02 – FIRE ALARM TEST INTERVALS

I. SCOPE

A. This policy is established May 15, 1987.

B. The purpose of this policy is to provide guidelines for the maintenance and testing of fire alarm systems and monitoring of automatic sprinkler systems.

C. This policy applies to all regulated occupancies in the City of Portland and unincorporated areas served by Portland Fire & Rescue (PF&R).

D. The 2016 Portland Fire Code (PFC), section 901.6 "Inspection, testing and maintenance" points to the National Fire Protection Association (NFPA) 72 as the standard for fire alarms. Chapter 10 of that standard describes the testing frequency and methods.

II. SPECIFIC

A. References
1. 2016 PFC
2. 2013 NFPA Standard 72
3. FMO Policy CE F-1 (FIR 6.01) and CE F-3 (FIR 6.03)

B. Definitions
1. Supervising Stations (2013) NFPA 72, Chapter 26: A facility that receives and rebroadcasts signals from fire alarm systems. There are four types of supervising stations:
   a. Protected Premise: alarm signal reports to panel on site, signals are not rebroadcast.
   b. Central Station: third party service that rebroadcasts alarm signals to the appropriate person or entity; service is Underwriter's Laboratory (UL) or Factory Mutual (FM) listed.
   c. Remote Station: may not be UL or FM listed, could be found in some 911 centers that act as supervising stations for municipal buildings in their jurisdiction.
   d. Proprietary Supervision Station: 24 hour staffed facility that receives the alarm signals and forwards the signals to the appropriate staff or entity. Facility must be under the same ownership as the protected premises, but not necessarily on the same site.

2. Semi-annual: every six months.
3. Fire alarm supervisory signals: non-alarm signals that report status of some fire protection component conditions: control valve tamper switches, water tank level, dry sprinkler system air pressure.
4. Qualified personnel per NFPA 72 10.5.3:
    a. Factory trained and certified for fire alarm systems service of the specific type and brand of system;
    b. Certified by a nationally recognized fire alarm certification organization such as the National Institute for Certification in Engineering Technologies (NICET);
    c. Registered, licensed, or certified by a State authority (State of Oregon Level A limited energy, Journeyman Electrician, Supervising Electrician);
    d. Employees where the personnel and company are qualified by a nationally recognized listing agency (central station service).
5. Competent person: person that the system owner determines to be trustworthy and possesses the skill to visually inspect or, in some cases, test fire alarm systems and record the outcome.

III. GUIDANCE

A. For system deficiencies found during alarm tests which cannot be repaired immediately: See PFC 901.7 and FMO Policy CE A-4, FIR 1.04 - Fire Watch.

B. Alarm systems found to be out of service or impaired upon inspection by PF&R: If an alarm system is out of service in an occupancy with a potential high life hazard, containing a significant amount of hazardous materials, or the facility presents a major fire fighting challenge, the building shall be immediately placed on fire watch or evacuated. For further information, see policy FIR 1.04 - Fire Watch.

   Citations may be issued for out of service fire alarms. FIR 1.05 - Citations.

C. System owners unable to produce documentation of the prior three years of testing: Fire alarm systems are critical life safety features that demand regular inspections, testing, and maintenance. It is incumbent on the system owner to keep documentation of the system tests, and the history of tests must be maintained for at least three years. If a system owner cannot provide documentation of the tests they may be subject to citations. See FMO Policy FIR 1.05 - Citations.

D. Non-monitored 110v bell and pull station: Pull stations shall have signage indicating “Local Alarm Only, Call 9-1-1”. Older installations served by low-voltage transformers or 110 volt circuits that provide local alarms only and which are not monitored by an approved supervising station shall be function tested quarterly by a competent person. All notification devices shall be tested during each test. All initiation devices shall be operated over the yearly span of the tests. Tests and deficiencies shall be recorded on

PF&R form 300.91 U - Unsupervised Alarm Quarterly Test Report. Records of tests shall be kept on site for three years. Deficiencies shall be corrected immediately.

E. Non-monitored alarm system: Pull stations shall have signage indicating "Local Alarm Only, Call 9-1-1". Protected premise alarm systems that include a fire alarm control panel (FACP) that electronically supervises the system but does not broadcast any of the signals from the panel to an approved supervising station shall be tested quarterly by a qualified individual per NFPA 72. Testing and deficiencies shall be recorded on PF&R form 300.91 F Fire Alarm - Report of Inspection. Records of tests shall be kept on site for three years. Deficiencies shall be corrected immediately.

   The FMO will approve the system owner's election to have quarterly tests performed by a competent individual if a full test is performed annually by a qualified individual.

   The quarterly test by a competent person shall consist of initiating an alarm condition (actuating a pull station) then walking the premises to verify that all the notification devices are operating properly. The system shall then be reset, and the panel shall be visually inspected to determine if the indicator lights are showing normal condition. A different actuating device (pull station) shall be used for each of the quarterly tests performed by the competent individual. Smoke detectors (if equipped) should not be used as actuating devices in the quarterly test performed by the competent individual. The tests and deficiencies shall be recorded on PF&R form 300.91 H - Non-monitored Alarm Quarterly Test Report. Records of tests shall be kept on site for three years. Deficiencies shall be corrected immediately.

F. Monitored fire alarm system, non-high rise: The complete system shall be tested annually by a qualified person per NFPA 72. Some components of the system are required to be tested more often than annually. Those components may be tested by a qualified individual, or if the system owner elects, a competent person can perform the semi-annual and quarterly tests. The components that require more frequent testing are fire sprinkler flow and tamper switches which need to be tested semiannually; and supervisory functions such as dry sprinkler system air pressure, riser room temperature, and heat trace all of which require quarterly tests.

   Note: Some newer alarm systems automatically query all the system components at least weekly. The electronic query does not constitute a test of the component (with the exception of sensitivity testing of smoke detectors).

   Report of the semi-annual and quarterly testing by a competent person shall be logged on PF&R form 300.91G - Alarm Test Report. Instructions on how to perform the test are included on the form.

All testing by a qualified individual shall be recorded on PF&R form 300.91 F Fire Alarm - Report of Inspection. Records of tests shall be kept on site for three years. Deficiencies shall be corrected immediately.

G. Fire alarm system that only monitors automatic sprinkler system: Systems that monitor automatic fire sprinkler system flow and tamper switches shall be tested by a qualified person semi-annually. If the system owner elects to have a competent person perform a semi-annual test, followed six months later by a qualified person's test of the system, the FMO will accept this arrangement.

   Report of the semi-annual and quarterly testing by a competent person shall be logged on PF&R form 300.91G - Alarm Test Report. Instructions on how to perform the tests are included on the form

   All tests performed by a qualified individual shall be recorded on PF&R form 300.91 F Fire Alarm System – Testing and Maintenance Report. Records of tests shall be kept on site for three years. Deficiencies shall be corrected immediately.

   The annual sprinkler test does not substitute as the annual alarm test unless the sprinkler technician is also qualified to test alarms and tests the alarm components per NFPA 72.

H. Fire alarm systems in high rise structures, atriums and covered mall buildings: Fire alarm systems in high rise structures shall be tested per NFPA 72 table 14.4.4. The tests shall be performed by a qualified individual.

   Exception: The FMO will accept tests performed by a competent individual of components that are on a quarterly testing cycle such as the water tank level, dry sprinkler system low air trouble, heat trace, etc. A log shall be kept of the quarterly tests performed by a competent person. As a result, tests would be required every six months by a qualified person, and tests between the six-month cycles could be performed by a competent person.

   All tests by qualified individuals shall be recorded on PF&R form 300.91 F Fire Alarm - Report of Inspection. Records of tests shall be kept on site for three years. Deficiencies shall be corrected immediately.

   A component of the semi-annual alarm tests by the qualified person is assessing the operating condition of the fire protection equipment initiated by the fire alarm system. The outcome of the tests shall be recorded on the alarm test report or other acceptable document. The report is the responsibility of the building owner or designee. Interfacing fire protection systems include door hold-opens, stairwell and elevator shaft pressurization fans, smoke dampers, and stairwell door unlocking functions.

Note: some newer alarm systems automatically query all the system components at least weekly. The electronic query does not constitute a test of the individual components (with the exception of sensitivity testing of smoke detectors).

I. Alarm systems in 5 story wood frame buildings: The alarm system shall be tested quarterly (Portland City Code Title 31.20.100). The testing should be scheduled such that each component of the system is tested no less than the required frequency found in NFPA 72 14.4.4.
   - All tests shall be performed by a qualified individual.
   - All tests shall be recorded on PF&R form 300.91 F Fire Alarm - Report of Inspection.

J. Sensitivity Testing of Single and Multi-Station Smoke Alarms: NFPA 72 14.4.4.3 (2013) requires that single and multiple station smoke alarms in other than one and two-family dwellings be periodically sensitivity tested. This provision can be problematic due to the difficulty in gaining access to individual dwelling units in residential occupancies. Further, 14.4.7 states that in one and two-family dwellings unless otherwise recommended by the manufacturer's instructions, smoke alarms shall be replaced when they fail to respond to operability tests, but shall not remain in service longer than 10 years from the date of manufacture.

   PF&R has determined that each of the two code references listed above provide equivalent levels of safety. As such, the Fire Marshal's Office will accept either concept in maintaining the confidence of single and multiple station alarms in the individual dwelling units of other than one and two-family dwellings.

   If the ten-year replacement option is chosen, the building owner or designee shall keep a log of the manufacture date of each single or multiple station alarm currently installed in each unit. This log will be made available to the fire inspector upon request.

K. System Documentation: NFPA 72 14.6 (2013) requires certain documents be housed on site for the life of the system and available to the authority having jurisdiction (AHJ) upon request. Without this documentation the testing, maintenance, and reconfiguration of the system can be costly.

   A lockable cabinet shall be installed near the fire alarm control panel (FACP) when a new fire alarm system is installed or the FACP on an existing system is replaced.

   Exception 1: the FACP is large enough to safely house the documents (this would be rare).
   Exception 2: the system owner may choose not to supply a lockable cabinet if the system owner agrees to be present during the acceptance test, and is willing to sign the record of completion upon conclusion of the successful test of the alarms, and indicates on the record of completion the location where the record drawings and associated documentation will be stored. The system owner's signature will act as documentation that the necessary records and plans have been transferred to the owner's control.

L. Cabinet Construction:
   - should be steel or other substantial material (old FACP boxes would be acceptable)
   - painted red
   - permanently marked “Fire Alarm Documentation”
   - keyed to match the FACP
   - large enough to house the following documents:
     - As-builts or record drawings (including battery calculations, riser diagram, system operation matrix, wiring diagram indicating end of circuit lines).
     - Operation and maintenance manuals.
     - Cut sheets pertaining to the devices used in the system.
     - A written sequence of operation.
     - For software based systems, a copy of the site-specific software containing all the files or data necessary to restore the system in case of a catastrophic system failure.

   Alternate methods to the documentation cabinet may be approved by PF&R.

K. See attached Fire Alarm Component Inspection, Testing and Maintenance Summary (Table 1)

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Reviewed By:	AJ Jackson
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Revised By:	Michael Silva
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Fire Alarm Component Inspection, Testing and Maintenance Summary

Component	Method	Frequency
Control Equipment		
Functions	At a minimum, control equipment shall be tested to verify correct receipt of alarm, supervisory, and trouble signals (inputs), operation of evacuation signals and auxiliary functions (outputs), circuit supervision including detection of open circuits and ground faults, and power supply supervision for detection of loss of ac power and disconnection of secondary batteries.	Annually monitored Quarterly non-monit.
Fuses	The rating and supervision shall be verified.	Annually monitored Quarterly non-monit.
Interfaced Equipment	Integrity of single or multiple circuits providing interface between two or more control panels shall be verified. Interfaced equipment connections shall be tested by operating or simulating operation of the equipment being supervised. Signals required to be transmitted shall be verified at the control panel.	Annually monitored Quarterly non-monit.
Lamps & LEDs	Lamps and LEDs shall be illuminated.	Annually monitored Quarterly non-monit.
Primary (main) Power Supply	All secondary (standby) power shall be disconnected and tested under maximum load, including all alarm appliances requiring simultaneous operation. All secondary (standby) power shall be reconnected at end of test. For redundant power supplies, each shall be tested separately.	Annually monitored Quarterly non-monit.
Engine Driven Generator	According to NFPA 110 with weekly operation/startup	Weekly & Monthly
Batteries for Backup Power	(Your service provider is required to list the battery type on your test reports)	
Lead-Acid Type Batteries Charger Test Discharge Test (30 minutes) Load Voltage Test Specific Gravity	With the batteries fully charged and connected to the charger, the voltage across the batteries shall be measured with a voltmeter. With the batteries fully charged and connected to the charger, the voltage across the batteries shall be measured with a voltmeter. With the battery charger disconnected, the terminal voltage shall be measured while supplying the maximum load required by its application. The specific gravity of the liquid in the pilot cell or all of the cells shall be measured as required. The specific gravity shall be within the range specified by the manufacturer.	 Annually Semiannually Semiannually Semiannually
Nickel-cadmium Batteries Charger Test Discharge Test (30 minutes) Load Voltage Test	See methods above	 Annually Annually Semiannually

Table 1

Dry Cell Batteries Load Voltage Test	See methods above	Monthly
Sealed lead-acid Type Charger Test Discharge Test (30 minutes) Load Voltage Test	See methods above	Annually Annually Semiannually
Emergency Voice/Alarm Evacuation Equipment	Proper function of phone jacks and operation of phone sets shall be tested. If applicable, emergency handset voice quality shall be verified.	Annually
Remote Annunciators	Correct operation and identification of annunciators shall be verified. If provided, the correct operation of annunciator under a fault condition shall be verified.	Annually
Initiating Devices		
Duct Detectors		Annually
Fire suppression system switches	Switch shall be electrically or mechanically operated and receipt of signal shall be verified at the fire alarm panel	Annually
Gas detectors	Tested as prescribed by the manufacturer. Sensitivity equipment shall be calibrated.	Annually
Heat Detectors		
Spot type (fixed temperature, rate of rise) restorable line type	Heat test shall be performed with heat source per the manufacturer's instructions with response within 1 minute. A test method shall be used that is recommended by the manufacturer or other method shall be used that will not damage the non-restorable fixed-temperature element of a combination rate-of-rise/fixed-temperature element detector.	Annually
Fixed-temperature non-restorable line type	Functional mechanical test and electrical loop resistance will be measured and recorded.	Annually
Fixed-temperature non-restorable spot type heat detector	All devices shall be replaced after 15 years from installation or two detectors out of 100 shall be laboratory tested. Failure of a detector will result in additional testing. Tests of tested detectors shall be repeated every 5 years. Functionality shall be tested mechanically and electrically.	Annually
Restorable line type, pneumatic tube	Heat test or a test with a pressure pump shall be conducted	Annually
Single- and multiple-station heat alarms	Functional test shall be conducted according to manufacturer's recommendations	Annually
Fire alarm boxes (pull-stations)	Functional test shall be performed for general alarm and key-operated pre-signal boxes	Annually
Radiant energy detectors (UV/IR)	Tested in accordance with manufacturers recommendations using calibrated method	Semiannually

Table 1

Smoke Detectors		
Single- and multiple-station smoke alarms in other than one and two family dwellings	Functional tests shall be conducted according to manufacturer's instructions. Sensitivity tested on same schedule as system type detectors, or, manufacturer's date logged and all single and multiple station detectors replaced at ten years.	See FMO Policy F-2
System Smoke Detectors (tied to the alarm system)	Shall be tested in place to ensure smoke entry into the sensing chamber and an alarm response. Testing with smoke or listed aerosol approved by the manufacturer shall be permitted as acceptable test methods. Other methods approved by the manufacturer that ensure smoke entry into the sensing chamber shall be permitted. Any of the following tests shall be performed to ensure that each smoke detector is within its listed and marked sensitivity range: (1) Calibrated test method (2) Manufacturer's calibrated sensitivity test instrument (3) Listed control equipment arranged for the purpose (4) Smoke detector/control unit arrangement whereby the detector causes a signal at the control unit when its sensitivity is outside its listed sensitivity range (5) Other calibrated sensitivity test method approved by the authority having jurisdiction	Function tested Annually Sensitivity checked one year after installation *and,* Sensitivity checked every alternate year *and*, Extended to maximum five years if within calibrated settings, *and*, Nuisance alarms will require return to alternating years
Duct type	Air duct detectors shall be tested or inspected to ensure that the device will sample the airstream. The test shall be made in accordance with the manufacturer's instructions.	
Projected beam type	The detector shall be tested by introducing smoke, other aerosol, or an optical filter into the beam path.	
Smoke detector with built-in thermal element	Both portions of the detector shall be operated independently as described for the respective devices.	
Smoke detectors with control output functions	It shall be verified that the control capability shall remain operable even if all of the initiating devices connected to the same initiating device circuit or signaling line circuit are in an alarm state.	
Supervisory Initiating Devices		
Control Valve Switches	Valve shall be operated and signal receipt shall be verified to be within the first two revolutions of the hand wheel or within one-fifth of the travel distance, or per the manufacturer's specifications.	Semiannually
High- or low-air pressure switch	Switch shall be operated. Receipt of signal obtained where the required pressure is increased or decreased a maximum 70 kPa (10 psi) from the required pressure level shall be verified.	Quarterly
Room temperature switch	Switch shall be operated. Receipt of signal to indicate the decrease in room temperature to 4.4°C (40°F) and its restoration to above 4.4°C (40°F) shall be verified.	Quarterly

Water level switch	Switch shall be operated. Receipt of signal indicating the water level raised or lowered 76.2 mm (3 in.) from the required level within a pressure tank, or 305 mm (12 in.) from the required level of a nonpressure tank, shall be verified, as shall its restoral to required level.	Quarterly
Water temperature switch	Switch shall be operated. Receipt of signal to indicate the decrease in water temperature to 4.4°C (40°F) and its restoration to above 4.4°C (40°F) shall be verified.	Quarterly
Mechanical, electronic, or pressure-type waterflow device	Water shall be flowed through an inspector's test connection indicating the flow of water equal to that from a single sprinkler of the smallest orifice size installed in the system for wet-pipe systems, or an alarm test bypass connection for dry-pipe, pre-action, or deluge systems in accordance with NFPA 25, Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems.	Semiannually
Alarm Notification Appliances		
Audible & textural notification appliances	Sound pressure level shall be measured with sound level meter and levels throughout protected area shall be recorded. Record the maximum output and verify audible information to be distinguishable if applicable	Annual
Visible	Test shall be performed per manufacturer's instructions. Verify proper distribution of appliances and confirm no floor plan changes have occurred and each appliance flashes with appropriate candela rating.	Annual
Special Hazard Equipment		
Abort Switch (IRI, recycle or special types)	Shall be operated with correct sequence or matrix with each sensor verified with sequence on as-built drawings.	Annual
Cross zone detection circuit	One detector on each zone shall be operated and occurrence of correct sequence with first and second zone verified.	Annual
Matrix-type circuit	All sensors in system shall be operated and development of correct matrix shall be verified	Annual
Release solenoid circuit	Operation shall be verified	Annual
Squibb release circuit	AGI flashbulb or other manufacture approved test light shall be used and verified.	Annual
Verified Sequence	Required sensors at minimum of four locations in circuit shall be operated. Correct sequence with first and second detector in alarm shall be verified.	Annual
All devices or circuits	Supervision shall be verified by creating an open circuit.	Annual
Transmission Equipment		
Phone dialers, radio transmitters, etc.	Tests shall be performed according to manufacturer's instructions. Verify receipt of initiating device signals at supervising station (monitoring company) within required time frame.	Annual