

FIRESAFETY
MAINTENANCE OF FIRE DETECTION SYSTEMS

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1. GENERAL

- 1.01 This practice outlines the general description, terminology, maintenance, and testing requirements for fire detection systems installed in telephone company buildings.
- 1.02 This practice is being issued to replace BSP 770-330-200 Issue 2, November 1980 and Addendum 770-300-200SW Issue A, April 1983 and to reflect changes in system function test intervals. Whenever this practice is reissued, the reason(s) for reissue will be stated in this paragraph.
- 1.03 Detailed information on the equipment associated with these systems and specialized maintenance operations should be obtained from the system manufacturer.
- 1.04 Basic design, installation, and acceptance requirements for fire detection systems are covered in Section 760-650-100.
- 1.05 Regardless of who installed the fire detection system, the force group that normally handles house service and building maintenance shall be responsible for the routine maintenance, testing, and repairs.

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- 1.06 Troubleshooting and routine maintenance may be performed by company employees or under a maintenance contract. In either case, those persons working on the systems shall be thoroughly familiar with the detection system. Maintenance work operations, procedures, and frequencies outlined in this practice shall be followed regardless of whether company or contract employees are used.
- 1.07 Response to alarms should be the responsibility of the building occupants as outlined in Sections 770-320-100, Occupancy Responsibilities; 770-300-200, Firesafety Plan; and 770-340-100, Principles of Firefighting and Use of Equipment.

2. TYPICAL SYSTEM DESCRIPTION

- 2.01 A fire detection system could be a single detector unit, equipped with internal contacts for remoting an alarm, or a multizoned system consisting of a panel supplying power to and continuously monitoring signals from identifiable groups of energized detector units.
- 2.02 Detector units are provided to sense the presence of heat, flame, smoke, or products of combustion. Detectors under alarm are identified by visible light indicators in their bases. The detector units are located in the space to be monitored and are connected together in groups called zones.
- 2.03 Remote alarm lamps are provided to identify, at visible locations, detectors which are not readily seen.
- 2.04 Manual fire alarm pull stations are provided for manual initiation of alarm and are integrated into the zone of the nearest detector unit.
- 2.05 A control panel is provided whenever more than one detector is used. The control panel provides distribution of electric power for operation of the detectors, indication of power, alarm and trouble indications, and relays for controlling coding devices, transmitting alarms, shutdown of ventilation systems, etc.
- 2.06 In multistory buildings, remote fire annunciator panels are provided for additional fire and trouble indications similar to those provided at the central control panel.
- 2.07 Complete system descriptions and design criteria are provided in Section 760-650-100, Fire Detection Systems.

3. CLASSIFICATION OF DETECTORS

- 3.01 There are basically three classes of fire detection devices:

- (a) Thermal Detectors: The thermal detectors are devices designed to sense abnormally high temperatures, abnormal rates of temperature rise, or a combination of both. Rate of rise contact elements are generally self-restoring, and fixed temperatures may be either self-restoring or nonrestoring.
- (b) Flame Detectors: The flame detectors are devices designed to sense rapidly developing fires with little or no incipient stage. These detectors sense infrared radiation emanating from flickering flames. The detectors have a built-in delay to eliminate response to normal activities as such as turning on lights.
- (c) Smoke Detectors: These devices are designed to detect visible or invisible products of combustion. Smoke detectors may operate on the multiple chamber ionization principle (ionization type) or by a balanced forward light-scattering principle (photoelectric type).
 - (1) Ionization Type - The chambers are similar in dimensions and materials such that one chamber (reference chamber) provides a standard voltage against a second chamber (sensing chamber), which is offset by a nominal voltage (sensitivity voltage). On the entry of smoke into the sensing chamber, the offset voltage changes such that the resultant voltage difference between the chambers initiates an electrical signal to the control panel.
 - (2) Photoelectric Type - A pulsed LED source of fixed sensitivity is mounted in a sensing chamber such that no light is directly incident on a photocell sensor within the same chamber. Any smoke particles entering the chamber result in the forward scattering of light and its measurement by the photocell sensor.

4. INSTALLATION ACCEPTANCE INSPECTION

- 4.01 Although the responsibility for the installation of fire detection systems rests with Real Estate and Architecture group, a management representative from the building operating force shall be present at the installation acceptance inspection, regardless of who installed the system.
- 4.02 The building operating force representative shall be primarily concerned with installation requirements relating to operation and maintenance and shall include the following:
 - (a) The detection system is connected to a battery standby power source.

- (b) Activation of the system shuts down the ventilation equipment serving the area under alarm.
- (c) If the building is not attended on a 7-day, 24-hour basis, trouble and fire indications are automatically transmitted to an attended location and are identifiable separately as trouble and fire at the remote location.
- (d) Detectors installed in an area not visible from the zone proper, such as in a closed room, are equipped with remote indicating lamps.
- (e) Access to detectors is not obstructed by air ducts, light fixtures, cable racks, etc.
- (f) Records, drawings, and instructions discussed in Part 5 are provided.
- (g) A local audible alarm is provided in new buildings prior to installation of equipment.

5. RECORDS, DRAWINGS, INSTRUCTIONS, AND REGISTRATION

- 5.01 Upon completion of installation it is required that a record be provided indicating the telephone company location, type of equipment installed, location of equipment, type of detectors, serial numbers of detectors, and individual detector sensitivity readings. This record shall be turned over to the building operations representative who shall assure that it is placed in permanent file for the building. Subsequent maintenance sensitivity checks shall be compared with the original sensitivities record.
- 5.02 Regardless of who installs the system, Real Estate and Architecture group shall provide drawings and literature, detailing the layout of the fire detection zones, detailing all interconnection wiring, providing all employed equipment specifications, and providing all employed equipment specifications, and providing maintenance and operating instructions. At the time of the acceptance inspection, a Real Estate and Architecture representative and a building operations representative shall review same to assure that all information is correct.
- 5.03 The building operations representative shall assist supervisory personnel from the forces occupying the building in preparation of a procedure to be followed upon receipt of an alarm. The procedure shall be compatible with the Firesafety Plan outlined in Section 770-300-200.

5.04 Some states require a registration of ionization detector heads. The building operations representative responsible for maintenance of the system shall arrange for registration where required.

6. SYSTEM FUNCTION TESTS

6.01 Semiannually, one detector in each zone (including duct detectors) shall be activated to assure that it responds and an alarm is initiated. The base lamp light on the detector and the proper alarm (and zone) indications on associated panels should be checked at this time. The particular detector selected for the test shall be systematically varied to assure ultimate total coverage of every detector in every zone.

(a) A detector tester (available from the system manufacturer) may be used for performance of this test. For ionization detectors, an inert gas is used as a substitute for combustion gases. For photoelectric detectors, a magnetic obstruction device is used that interferes with normal signaling.

(b) In large multizone systems where frequent testing could effect prompt response to alarms by building occupants, at least one test per floor should be conducted under normal fire detection system operating conditions. Further testing of zones on each floor may be conducted with audible alarms silenced and fan shutdowns deactivated. (A system equipped with these features should also provide trouble indication when operating in this mode.) Following reactivation of audible alarms, the system shall be checked for proper operation.

Note: For small buildings (less than 1500 square feet) which have only a few heads, the intent of the test may be achieved by testing all heads once a year.

6.02 Semiannually, one manual station per zone shall be activated to assure that an alarm is initiated.

7. MAINTENANCE

Note: The following generic operations should be completed at the recommended intervals. Maintenance guidelines for detector heads will be provided as appendices to this practice when received from system manufacturers.

A. Control and Annunciator Panels

7.01 Annually, make a visual inspection of the panel and tighten all terminal connections. Check by activating the remote trouble and alarm circuits.

B. Alarm Devices

7.02 Annually, make a visual inspection of each alarm device for evidence of physical damage or tampering.

C. Ionization Detectors

7.03 Every 4 years, the procedures outlined below shall be performed.

Note: In larger installations, it is recommended that approximately one-fourth of the detectors be scheduled each year.

- (1) Take a sensitivity reading for each detector in its operating location under maximum air flow conditions.
- (2) Remove the detector from its base and disassemble the detector unit.
- (3) Clean the components using the procedure for that model detector in the manufacturer's guidelines.
- (4) Reassemble the detector and take a sensitivity reading to make sure that the detector is within the operating limits recommended by the system manufacturer for the operating locations. Observe lamps located in detector bases when the sensitivity check is performed to assure that they are not burned out or broken.

D. Photoelectric Detectors

7.04 Every 4 years, the procedures outlined below shall be performed. (See note following paragraph 7.03.)

- (1) Remove the detector from its base and disassemble detector.
- (2) Clean the components using the procedure recommended for that model detector in the manufacturer's guidelines.
- (3) Reassemble the detector and take a sensitivity reading to make sure that the detector is within the operating limits recommended by the system manufacturer for the operating location. Observe lamps located in detector bases when the sensitivity check is performed to assure that they are not burned out or broken.

E. Ventilation Duct Detectors

7.05 Annually, the following procedures shall be performed.

- (1) Check the air sampling tubes and clean off any foreign matter or obstructions.
- (2) Clean the detector shell or screen using the procedure recommended by the system manufacturer for that model detector.

7.06 Every 4 years, the following procedures shall be performed.

- (1) Test the air flow through sampling tubes to assure minimum air flow for proper operation.
- (2) Clean the housing of dirt and dust accumulations.
- (3) Clean and sensitivity check the detector unit to make sure that the detector is within the operating limits recommended by the system and manufacturer.
- (4) Upon reassembly of the detector and housing, check the closure of the coverplate for air infiltration.

F. Flame Detectors

7.07 Every 4 years, the following procedures shall be performed.

- (1) No disassembly of the flame detector is required; however, the lenses should be cleaned with a cloth and a mild detergent solution.
- (2) Take a sensitivity reading to make sure that the detector is within the operating limits recommended by the system manufacturer.

G. Thermal Detectors

7.08 No specific routine maintenance is required for thermal detectors; however, a periodic check should be made to assure that no physical damage has occurred.

H. Recording of Required Maintenance

7.09 A record of the required maintenance and inspections of fire protection and detection equipment shall be made.

7.10 Form SW-6376 (Exhibit 1) is to be used for each building when inspection or maintenance is performed on any fire protection or detection equipment except portable fire extinguishers. Form E-5962 shall be used to record maintenance of portable fire extinguishers.

7.11 Form SW-6376 should be filed in the Fire Safety Plan binder which is kept at the fire command station or should be posted at the fire annunciator panel, whichever is applicable.

8. MAINTENANCE EQUIPMENT

8.01 The list of tools, test equipment, and spare parts for servicing fire detection systems should be obtained from the system manufacturer. Many tools listed are the same as, or similar to, those normally provided to mechanical maintenance personnel.

8.02 A tool for remote removal of detector heads may be obtained from the system manufacturer. The remote removal tool may be used in the performance of all routine maintenance operations associated with detector heads when they are accessible from directly below or a maximum of approximately 20 degrees off the vertical. Use of a remote removal tool requires care to prevent damage to equipment. A comparison of the hazard introduced through use of a ladder versus a remote removal tool should be made on a local basis to determine the preferred method.

9. TRAINING SERVICE PERSONNEL

9.01 System manufacturers should provide periodic training sessions for maintenance personnel. When exceptional training needs exist, it is recommended that a company management employee be selected to attend. Subsequent local training sessions should then be held with the qualified course-graduate supervisor serving as the instructor.

10. RADIATION PRECAUTIONS

10.01 No particular radiation precautions are required for normal maintenance operations associated with ionization detectors or detector systems.

10.02 Defective or damaged ionization heads shall be returned to the system manufacturer for disposal.

10.03 Where spare ionization is stored locally, they should be stored in locked metal cabinets for the purposes of security and protection from damage.

Note: Radiation readings indicate that no particular precautions are required when storing up to 100 ionization heads within the same area.

