Course Learning Outcomes for Unit V

Upon completion of this unit, students should be able to:

1. Identify components of a fire detection and alarm system. (FESHE)
2. Discuss factors that affect signaling system requirements and types of specialty signals.
3. Explain protected premises alarm systems.
4. Distinguish among types of supervising station alarm systems.
5. Identify types of alarm initiating devices, including heat detectors and smoke detectors. (FESHE)
6. Discuss flame detectors, fire-gas detectors, and other detection devices. (FESHE)
7. Explain acceptance testing of fire detection and alarm systems.

Reading Assignment

Chapter 2:
Fire Detection and Alarm Systems

Unit Lesson

Early detection and notification of a fire or other emergency is critical in ensuring life safety for occupants. This may include an activation of a fire alarm system via manual pull station, notification of employees in a work area of a gas leak, or mass notification of occupants outside as a result of a domestic terrorist incident. The most important thing is occupant notification so that occupants can take action, be it evacuate or protect in place. Fire alarm systems also provide notification and alerting to the local fire department or emergency response agency.

Throughout this unit, the components of fire alarm and detection systems will be discussed, as well as the types of fire alarm systems. There are a number of different types of detectors, including smoke, heat, and flame, all of which will be discussed in this unit. Notification devices including audible and visual devices and alarm monitoring will be discussed. Lastly, as with any fire protection system, reliability of the system is paramount and the testing, inspection, and maintenance of the fire alarm systems will be covered.

Components of the modern fire alarm system can range from very basic to extremely complex based on the hazard to be protected. Components of fire alarm systems should be tested by a nationally recognized testing laboratory, and each system should be installed in accordance with the National Fire Protection Association (NFPA) 72 National Fire Alarm and Signaling Code.

The fire alarm control panel (FACP) is a system component that receives input from automatic and manual fire alarm devices and may provide power to detection devices or communication devices. The FACP is considered the brain of the fire alarm system. All components of the fire alarm system are generally tied into the FACP, including notification appliances, emergency voice communications systems, elevator recall, and signaling. Alarm signals can be confirmed at the FACP and the system can also be reset at the FACP. The fire alarm and detection system is also required to have a primary power supply, as well as a backup power supply to ensure that the system will operate even if the main power supply fails.
Fire alarm systems include initiating devices and notification appliances. Initiating devices essentially sense the presence of fire, smoke, heat, or other hazardous conditions. These devices then send a signal to the FACP. Examples include manual pull stations, heat detectors, smoke detectors, flame detectors, waterfall devices, or tamper switches. These devices are essentially telling the fire alarm system that it is seeing a problem and notifying the system. Notification appliances provide notification to building occupants that action may need to be taken. Notification includes audible, visual, textual, or tactile. Activation of fire alarm system may also close fire doors, pressurize stairwells, or recall elevators.

There are three general types of signals provided by the fire alarm and detection system. They include the alarm, supervisory signal, and trouble signal. Alarm signals are activated through the presence of fire, smoke, or heat. Supervisory signals indicate an off normal condition of the complete fire alarm system. Trouble signals indicate a problem with a monitored circuit or component of the fire alarm system or power system.

The major types of fire alarm systems are protected premises, supervising stations, and emergency communications systems. Local or protected premises systems provide notification to the building occupants at the premises. No signal is sent off-site. Supervising station alarm systems include auxiliary alarm systems, proprietary alarm systems, central station systems, and remote receiving systems. Each of these systems is continuously monitored at a remote location for the purpose of receiving alarm, taking action, and notifying the appropriate authority.

Manual pull stations allow occupants within a location to activate the fire alarm system. These pull stations generally send a signal, activate the fire alarm system, provide occupant notification, and may notify a monitoring company which in turn notifies the fire department.
There are number of initiating devices which include heat detectors, smoke detectors, flame detectors, fire gas detectors, and waterfall devices. Each of these has a specific purpose, and each device should be listed by a nationally recognized testing laboratory. Fixed temperature heat detectors are temperature sensitive devices that sense temperature changes and sound an alarm at a specific point. Smoke detectors send smoke either through photometric operation or ionization operation. Flame detectors operate by detecting the light in the ultraviolet (UV) wave spectrum or the infrared (IR) wave spectrum.

As with any fire protection system, it is important that the systems are reviewed, installed, and tested to ensure effective operation. Fire detection and alarm systems are no exception. Generally, there is a review of the proposed installation of the fire protection system (fire alarm system), given shop drawings and system specifications, to ensure the system is evaluated for code compliance and installed in accordance with the approved drawings. Deficiencies are identified, documented, and reported in accordance with the applicable codes and standards in the policies of the jurisdiction. The review of these construction documents may be done by a fire inspector, plan reviewer, fire protection engineer, or a fire code enforcement officer.

In many cases, fire alarm and detection systems are considered the first line of defense against fire. When properly installed and inspected, they can provide occupants with the warning needed to survive and evacuate.

References


Suggested Reading

Using the CSU Online Library, locate and read the following articles:


Learning Activities (Non-Graded)

Reflection Paper

For this activity, you are asked to reflect on the concepts covered in the reading assignment and the written lecture and write about them. What did you understand completely? What did not quite make sense? The purpose of this activity is to provide you with the opportunity to reflect on the material you finished reading and to expand upon those thoughts. If you are unclear about a concept, this will give you a chance to write those questions down and email them to your professor for feedback. Can you apply the concepts you learned in this unit toward your career? How?

This is not a summary, but is instead a chance for you to express your thoughts about the material learned in this unit by writing about it.

The reflection paper should meet the following requirements:

- At least one page;
- Contain your thoughts about the material and its value to you personally;
- Contain any questions you may have concerning the material.

Format your writing using APA style. Because this is not a graded assignment, it does not need to be submitted to your professor. This activity was designed to allow you an opportunity to put your thoughts down on paper so you can determine what concepts still may be foreign to you and give you a chance to ask your professor any questions you may have.

Non-graded Learning Activities are provided to aid students in their course of study. You do not have to submit them. If you have questions, contact your instructor for further guidance and information.

Key Terms

1. Acceptance test
2. Auxiliary alarm system
3. Central station system
4. Fire alarm control panel (FACP)
5. Ionization detector
6. Manual pull station
7. Photoelectric smoke detector
8. Proprietary alarm system
9. Protected premises system
10. Smoke detector
11. Supervisory signal
12. Trouble signal