

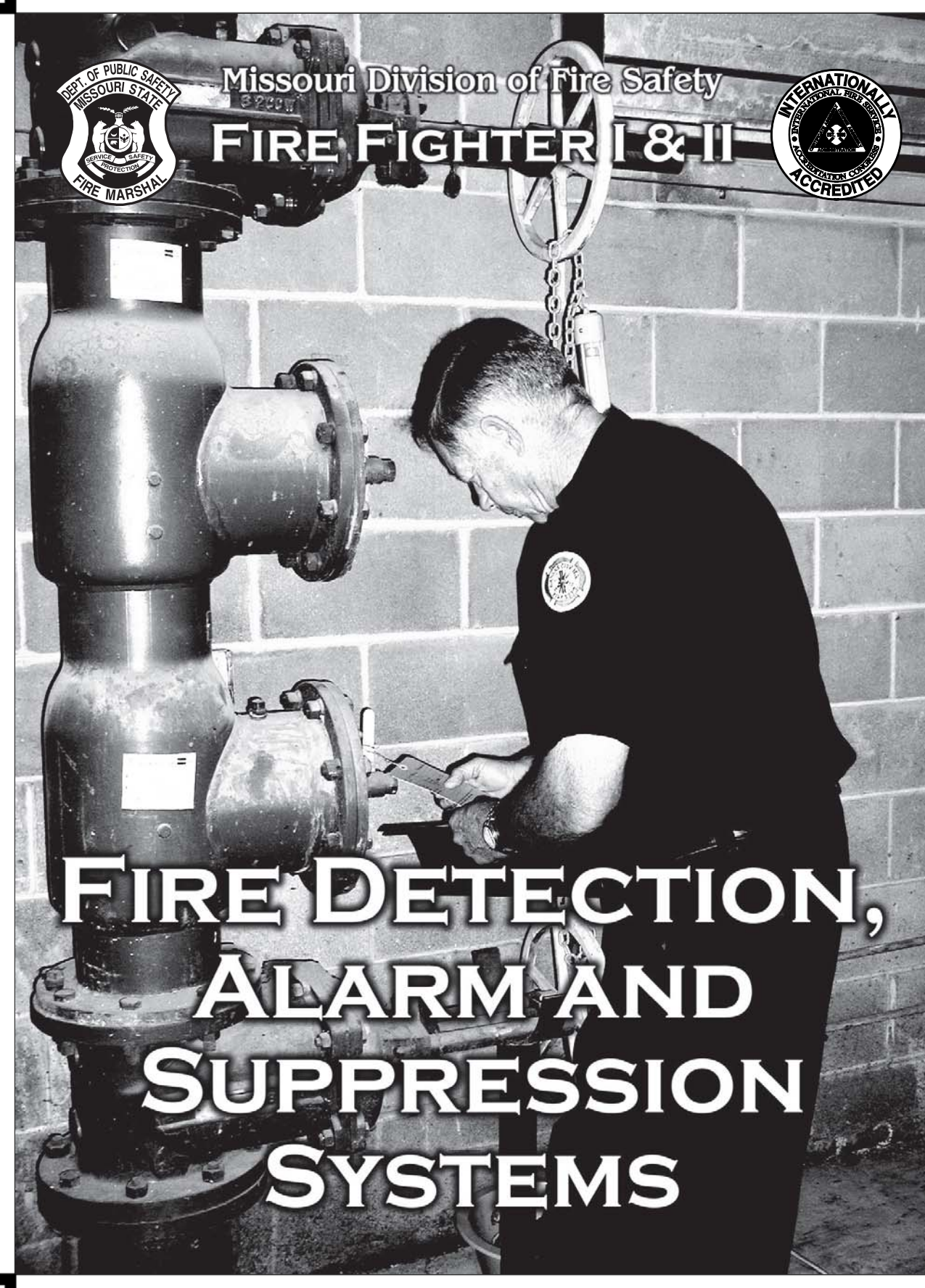


Missouri Division of Fire Safety

**FIRE FIGHTER I & II**



# **FIRE DETECTION, ALARM AND SUPPRESSION SYSTEMS**







### UNIT OBJECTIVES

Upon completion of this unit of study, the student should be able to:

1. Identify supervisory alarm equipment and demonstrate action to take upon receipt of an alarm according to local operating conditions.
2. Identify the various types of detection devices used in fire detection systems.
3. Identify the components of an automatic sprinkler system and their functions.
4. Identify the major sprinkler systems and describe their operation.
5. Identify the actions required for fire department support of an automatic sprinkler system.
6. Connect a fire department pumper to the fire department connection for a sprinkler system.
7. Demonstrate the procedure to temporarily stop the flow of water from a sprinkler head.
8. Identify and demonstrate the procedures for inspecting an automatic sprinkler system in order to determine the systems state of readiness.



### NFPA STANDARDS

*Successful completion of the information in this section is necessary to fulfill the requirements of the following sections of NFPA 1001-2008:*

#### **Fire Fighter I Standard**

**5.3.14** Conserve property as a member of a team, given salvage tools and equipment and an assignment, so that the building and its contents are protected from further damage.

**(A) Requisite Knowledge.** The purpose of property conservation and its value to the public, methods used to protect property, types of and uses for salvage covers, operations at properties protected with automatic sprinklers, how to stop the flow of water from an automatic sprinkler head, identification of the main control valve on an automatic sprinkler system, and forcible entry issues related to salvage.

**(B) Requisite Skills.** The ability to cluster furniture; deploy covering materials; roll and fold salvage covers for reuse; construct water chutes and catch-alls; remove water; cover building openings, including doors, windows, floor openings, and roof openings; separate, remove, and relocate charred material to a safe location while protecting the area of origin for cause determination; stop the flow of water from a sprinkler with sprinkler wedges or stoppers; and operate a main control valve on an automatic sprinkler system.

#### **Fire Fighter II Standard**

**6.5.3\*** Prepare a preincident survey, given forms, necessary tools, and an assignment, so that all required occupancy information is recorded, items of concern are noted, and accurate sketches or diagrams are prepared.

**(A) Requisite Knowledge.** The sources of water supply for fire protection; the fundamentals of fire suppression and detection systems; common symbols used in diagramming construction features, utilities, hazards, and fire protection systems; departmental requirements for a preincident survey and form completion; and the importance of accurate diagrams.

**(B) Requisite Skills.** The ability to identify the components of fire suppression and detection systems; sketch the site, buildings, and special features; detect hazards and special considerations to include in the preincident sketch; and complete all related departmental forms.



NOTES	STUDENT GUIDE
	<p><b>I. Fire Detection, Alarm, and Suppression Systems</b></p> <p>A. Fire detection, alarm, and suppression systems are installed to:</p> <ol style="list-style-type: none"><li>1. Notify occupants to escape a fire</li><li>2. Summon emergency responders</li><li>3. Initiate fire control and suppression systems and sound an alarm</li><li>4. Supervise suppression systems for operational status</li><li>5. Initiate environmental and utility controls</li></ol> <p>B. Fire fighters must understand the various types of fire protection systems which may be encountered in different occupancies and</p> <ol style="list-style-type: none"><li>1. How these systems function</li><li>2. Their role when these systems function in an emergency</li></ol> <p><b>II. Types of Alarm Systems</b> (<i>Essentials p. 826</i>)</p> <p>A.</p> <ol style="list-style-type: none"><li>1. Also known as "local warning systems"</li><li>2. Designed to be initiated manually by pull stations</li><li>3. Installed in small schools and public properties</li><li>4.</li></ol>

# FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>5. Does not notify the fire department</li><li>6. Automatic detection devices may be added to the system to detect a fire and initiate the signal</li></ul> <p>B. Heat detectors</p> <ul style="list-style-type: none"><li>1. Respond to the thermal energy of a fire<ul style="list-style-type: none"><li>a.</li><li>b. Activate at a predetermined temperature or when a specified temperature rate of rise occurs</li><li>c. Used in areas unoccupied or environmentally unsuitable for application of smoke detectors</li><li>d.</li></ul></li><li>2. Fixed temperature heat detectors<ul style="list-style-type: none"><li>a.</li><li>b. In a large area, a fire could burn for some time without activating a fixed-temperature detector</li><li>c. Fusible devices/frangible bulbs<ul style="list-style-type: none"><li>(1) Operate identically to fusible links or frangible bulbs used in automatic sprinkler systems</li><li>(2)</li></ul></li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>(3) Many of these devices are still in service, however, they are no longer manufactured</li><li>(4) A fusible device is held in place with solder with known melting (fusing) temperature</li><li>(5) When the temperature rises to the fusing temperature, the solder melts, and a spring closes the contact points</li><li>(6) The action completes the circuit and initiates the alarm signal</li><li>(7) A frangible bulb holds the electrical contacts apart like a fusible link does</li><li>(8) The bulb is a small glass vial containing a liquid with a small air bubble</li><li>(9) When the rated temperature is reached, the bulb fractures and falls out and the contacts complete the circuit to initiate the alarm</li></ul> <p>d.</p> <ul style="list-style-type: none"><li>(1) Designed to detect heat over a linear area parallel to the detector</li><li>(2)</li><li>(3) One type is a cable with a conductive metal inner core sheathed in stainless steel tubing<ul style="list-style-type: none"><li>(a) The core and sheathing are separated by an insulating material</li><li>(b) At a predetermined temperature, the insulation loses some of its electrical resistance</li></ul></li></ul>

# FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>(c) The current flow between the core and sheathing increases and initiates the alarm</li><li>(4) Another system uses two insulated wires with an outer covering<ul style="list-style-type: none"><li>(a) When the rated temperature is reached, the insulation melts and the wires touch</li><li>(b) The circuit is then completed and the alarm initiated</li></ul></li><li>e.<ul style="list-style-type: none"><li>(1)</li><li>(2) When heated, one metal expands faster, causing the strip to bend</li><li>(3) The deflection makes or breaks the circuit causing alarm activation</li><li>(4) Most bimetallic detector reset automatically when cooled</li></ul></li><li>3.<ul style="list-style-type: none"><li>a. Operates on the assumption that the temperature from a fire will increase faster than normal atmospheric heating</li><li>b. Designed to operate when the temperature rise exceeds 12°F to 15°F in one minute</li><li>c.</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>d. Automatically reset if undamaged</li><li>e. Pneumatic rate-of-rise spot detector<ul style="list-style-type: none"><li>(1)</li><li>(2) Consists of a dome-shaped air chamber with a flexible metal diaphragm in the base</li><li>(3) A small hole allows air to enter and exit the chamber during normal temperature changes</li><li>(4) During a fire, the air in the chamber expands faster than it can escape</li><li>(5) The expansion causes the pressure in the chamber to increase and forces the metal diaphragm against the contact points, initiating the alarm</li></ul></li><li>f. Rate-compensated detector<ul style="list-style-type: none"><li>(1) Consists of an outer metallic sleeve housing two bowed struts with slower expansion rates than the sleeve</li><li>(2) When heated rapidly, the outer sleeve expands in length</li><li>(3) The tension is reduced on the inner strips causing the contacts to come together</li></ul></li></ul>

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## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<p>C. Smoke detectors/alarms</p> <ol style="list-style-type: none"><li>1. Smoke detectors<ol style="list-style-type: none"><li>a. Typically installed in nonresidential and multi-family occupancies</li><li>b. Detect smoke and transmit a signal to another device that sounds the alarm</li></ol></li><li>2.<ol style="list-style-type: none"><li>a.</li><li>b. Self-contained unit capable of detecting smoke and sounding an alarm</li></ol></li><li>3.<ol style="list-style-type: none"><li>a. Also called a "visible products-of-combustion detector"</li><li>b. Use a photoelectric cell coupled with a small light source</li><li>c.</li><li>d. Beam application type<ol style="list-style-type: none"><li>(1) A beam of light is focused onto a photoelectric cell which converts the beam into an electric current</li><li>(2) When smoke obscures the light beam, the amount of current is reduced and an alarm sounds</li></ol></li></ol></li></ol>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>e. Refractory photocell type<ul style="list-style-type: none"><li>(1) A light beam passes through a small chamber away from the light source</li><li>(2) The light does not strike the photocell and no current is produced</li><li>(3) When smoke enters the chamber, the light beam is refracted in all directions and strikes the photocell, activating the alarm</li></ul></li><li>4. Ionization smoke detectors<ul style="list-style-type: none"><li>a. Tiny particles and aerosols are produced during combustion</li><li>b. These particles can be detected by devices using a small amount of radioactive material to ionize air molecules as they enter the detector</li><li>c. The ionized air particles allow an electrical current to flow between plates in the ionization chamber</li><li>d. When smoke enters the chamber, its particles attach to the air ions making the air less conductive</li><li>e. The decrease in current activates the alarm</li></ul></li><li>D.<ul style="list-style-type: none"><li>1.<ul style="list-style-type: none"><li>a. Prone to activation by sunlight, welding and other bright lights</li></ul></li></ul></li></ul>

# FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>b. Usually positioned where other light sources are unlikely</li><li>c.</li><li>d. Used where immediate reaction is necessary such as flammable liquid manufacturing and dispensing facilities</li></ul> <p>2. Infrared detectors</p> <ul style="list-style-type: none"><li>a. Sensitive to sunlight and usually installed in fully enclosed areas</li><li>b. Most are designed to require flickering motion of flame to activate</li></ul> <p>3.</p> <ul style="list-style-type: none"><li>a. Virtually insensitive to sunlight</li><li>b.</li></ul> <p>E. Fire-gas detectors</p> <ul style="list-style-type: none"><li>1. Used to detect the gases produced by a fire in a confined space</li><li>2. The gases produced will vary depending on the chemical makeup of the burning fuel</li><li>3. Will initiate an alarm more quickly than a heat detector but slower than a smoke detector</li><li>4. Can be designed to be sensitive only to those gases produced by a hostile fire and ignore those produced by a friendly fire in an industrial operation</li></ul>



NOTES	STUDENT GUIDE
	<p>5. Fire fighters will encounter very few fire-gas detectors except in special occupancies</p> <p>F.</p> <ol style="list-style-type: none"><li>1. Fixed temperature/rate-of-rise heat detectors</li><li>2. Smoke/heat detectors</li><li>3. Smoke/fire-gas detectors</li></ol> <p>G. Detectors have a variety of audible and visual indicating devices</p> <p>H. Fire department response to heat/smoke alarm calls</p> <ol style="list-style-type: none"><li>1. Normally a full structure fire response is dispatched to the location of a activated smoke or heat alarm</li><li>2. If there are no signs of smoke or fire when they arrive, a fire fighter with a portable radio should go to the alarm control panel to silence the alarm so it can be further investigated</li><li>3.</li><li>4. The individual assigned to the alarm panel must remain and monitor the panel in case of another alarm</li><li>5. If a second alarm sounds, the Incident Commander should be immediately notified</li><li>6. The system can be reset after the source of the alarm is determined and stabilized</li></ol>



NOTES	STUDENT GUIDE
	<p data-bbox="570 409 1365 443"><b>III. Automatic Alarm Signaling Systems</b> (<i>Essentials p. 837</i>)</p> <p data-bbox="618 485 1370 596">A. Fire codes or insurance companies may require an occupancy to have an alarm system which transmits a signal off site to summon help</p> <p data-bbox="618 638 902 672">B. Auxiliary systems</p> <p data-bbox="667 714 1005 747">1. Local energy systems:</p> <ul data-bbox="716 869 1390 1087" style="list-style-type: none"><li data-bbox="716 869 1357 940">a. An occupancy's alarm system is directly connected to the municipal master alarm box</li><li data-bbox="716 982 1390 1087">b. When the occupancy's alarm activates, it trips the alarm box to which it is attached and transmits the alarm to the alarm center</li></ul> <p data-bbox="667 1136 1365 1207">2. Shunt systems where the municipal alarm circuit extends ("is shunted") into the protected property</p> <p data-bbox="667 1249 1065 1283">3. Parallel telephone systems</p> <ul data-bbox="716 1325 1398 1514" style="list-style-type: none"><li data-bbox="716 1325 1357 1358">a. Do not connect to the municipal alarm system</li><li data-bbox="716 1400 1398 1514">b. Transmits the alarm over municipally controlled telephone circuits, which are not used for any other purpose</li></ul> <p data-bbox="618 1556 651 1589">C.</p> <ul data-bbox="667 1631 1382 1850" style="list-style-type: none"><li data-bbox="667 1631 1382 1703">1. Connected directly to the public dispatch center or other approved answering service</li><li data-bbox="667 1745 1325 1778">2. Usually connected over leased telephone lines</li><li data-bbox="667 1820 691 1854">3.</li></ul>



NOTES	STUDENT GUIDE
	<p>D.</p> <ol style="list-style-type: none"><li>1.</li><li>2. Have a central alarm receiving point on the property that is constantly staffed by trained personnel</li><li>3. Alarms are transmitted to a supervising stations where operators can call the fire department or the fire department is automatically notified</li></ol> <p>E. Central station alarm systems</p> <ol style="list-style-type: none"><li>1.</li><li>2. Connected to protected properties by dedicated phone lines or radio transmitter</li><li>3. When an alarm is received, central station employees initiate an appropriate emergency response</li></ol> <p>F. Fire alarm systems are designed to be self-supervising</p> <ol style="list-style-type: none"><li>1. A distinct trouble signal is generated anytime the system is not operating normally, such as when:<ol style="list-style-type: none"><li>a. A utility power outage occurs and the system switches to battery power</li><li>b. A break in a detector or notification circuit occurs</li></ol></li><li>2. Older systems use closed, supervised circuits where a tiny current always flows</li></ol>

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## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>3. Newer systems microprocessors do an internal diagnostic system test at specified intervals</li><li>4.</li><li>5. Some fixed suppression systems depend on a signal from a manual pull station or an automatic detection device to activate</li><li>6. Alarm systems must also be "addressable," indicating the location of an activated detector or pull station or a trouble signal</li></ul> <p>G.</p> <ul style="list-style-type: none"><li>1. Modern alarm systems may incorporate environmental controls, security, and personnel access controls</li><li>2. These auxiliary services may include:<ul style="list-style-type: none"><li>a.</li><li>b. Closing smoke or fire-rated doors and dampers</li><li>c. Increasing air pressure in stairwells to exclude smoke from means of egress</li><li>d.</li><li>e. Monitoring refrigeration systems and cold-storage areas</li><li>f. Controlling personnel access to restricted areas</li><li>g. Detecting combustible or toxic gases</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<p><b>IV. Sprinkler Systems</b> (<i>Essentials p. 842</i>)</p> <p>A. Consists of a series of sprinkler heads (sprinklers) arranged to automatically apply water directly on a fire to either extinguish it or control it until fire fighters arrive</p> <ol style="list-style-type: none"><li>1. NFPA Standards set minimum guidelines for:<ol style="list-style-type: none"><li>a. Spacing of sprinklers</li><li>b. Size of piping to be used</li><li>c. Methods for hanging piping</li><li>d. Minimum design area per sprinkler</li><li>e. Installation details</li></ol></li><li>2. General types<ol style="list-style-type: none"><li>a. _____: protects an entire building</li><li>b. _____: protects only certain areas, such as high hazard areas and exit routes</li></ol></li></ol> <p>B. Factors affecting sprinkler system reliability and performance:</p> <ol style="list-style-type: none"><li>1. Partially or completely closed valves</li><li>2.</li><li>3. Improper design</li><li>4. Hazards of the occupancy</li><li>5.</li></ol>

# FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>6. Deficient water supply</li><li>7. Partial sprinkler protection</li><li>8. Frozen or broken pipes</li><li>9. Damaged or painted sprinkler heads</li><li>10. Tampering or vandalism</li></ul> <p>C. Properly operating sprinkler systems:</p> <ul style="list-style-type: none"><li>1. Improve the life safety of a building's occupants by applying water when a fire is relatively small</li><li>2. Prevent vertical fire spread in multistory buildings</li><li>3. Protect occupants in other parts of a building from fire spread</li></ul> <p>D. Sprinklers alone may not be as effective if:</p> <ul style="list-style-type: none"><li>1. Fires are too small to activate the sprinkler system</li><li>2. Smoke reaches the occupants before the system activates</li><li>3. Sleeping, intoxicated, or handicapped people occupy the building</li></ul> <p>E. Sprinkler system components</p> <ul style="list-style-type: none"><li>1. Water supply<ul style="list-style-type: none"><li>a. Public water supply</li><li>b. Gravity tanks</li><li>c. Fire pumps</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>2. Basic piping<ul style="list-style-type: none"><li>a. Supply main</li><li>b. _____: larger vertical piping</li><li>c. Feed main: connects riser to cross mains</li><li>d. Cross mains: services branch lines</li><li>e. _____: smaller piping on which sprinklers are installed</li></ul></li><li>3. Sprinkler heads<ul style="list-style-type: none"><li>a. Parts<ul style="list-style-type: none"><li>(1) Valve cap</li><li>(2) Frame arms</li><li>(3) Deflector</li><li>(4) Toggle joint</li><li>(5) Lever arms</li><li>(6) Fusible link</li></ul></li><li>b. Temperature ratings: may be identified by color-coded frame arms, colored liquid, or temperature stamped into the head<ul style="list-style-type: none"><li>(1) Fusible link sprinkler heads<ul style="list-style-type: none"><li>(a) 135° to 170°: uncolored or black</li><li>(b) 175° to 225°: white</li></ul></li></ul></li></ul></li></ul>

# FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS

## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>(c) 250° to 300°: blue</li><li>(d) 325° to 375°: red</li><li>(2) Frangible bulb heads<ul style="list-style-type: none"><li>(a) 135° to 170°: orange or red glass bulb</li><li>(b) 175° to 225°: yellow or green bulb</li><li>(c) 250° to 300°: blue bulb</li><li>(d) 325° to 375°: purple bulb</li></ul></li><li>c. Release mechanisms<ul style="list-style-type: none"><li>(1)</li><li>(2) Chemical pellet</li><li>(3)</li><li>(4) Quick-response: has a specially designed fusible link with an increased surface area</li></ul></li><li>d. Fusible link sprinkler head operation<ul style="list-style-type: none"><li>(1) Two lever arms press against the frame arms and valve cap to hold back the water</li><li>(2) The fusible link holds the levers together</li><li>(3) The link melts or fuses when exposed to heat and the water pushes the levers and cap out of the way</li><li>(4) Water strikes the deflector and becomes a spray</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>e. Frangible bulb sprinkler head operation<ul style="list-style-type: none"><li>(1) The bulb filled with liquid and a bubble holds the orifice shut</li><li>(2) Heat expands the liquid until the bubble is absorbed by the liquid</li><li>(3) The increase in internal pressure shatters the bulb and the orifice opens</li><li>(4) Water strikes the deflector and becomes a spray</li></ul></li><li>f. Chemical pellet sprinklers<ul style="list-style-type: none"><li>(1) A pellet of solder, under compression, within a small cylinder, melts at a predetermined temperature</li><li>(2) A plunger then moves down and releases the valve cap</li></ul></li><li>g. Sprinkler head position<ul style="list-style-type: none"><li>(1) Pendant:</li><li>(2) Upright:</li><li>(3) Sidewall: extends from the side of the pipe and has a special deflector to create a fan-shaped pattern</li><li>(4) Special purpose<ul style="list-style-type: none"><li>(a) Corrosive-resistant coated</li></ul></li></ul></li></ul>

# FIRE DETECTION, ALARM, & SUPPRESSION SYSTEMS



## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<p>(b) Recessed</p> <p>4. Sprinkler head storage</p> <ul style="list-style-type: none"><li>a. A storage cabinet for extra heads and a wrench should be installed near the sprinkler system</li><li>b. Normally holds minimum of six extra heads</li></ul> <p>5. Control indicator valves</p> <ul style="list-style-type: none"><li>a. Located between water source and sprinkler system to shut off water supply</li><li>b. Indicating valves visually show if opened or closed</li><li>c.<ul style="list-style-type: none"><li>(1) Has a yoke on the outside with a threaded stem which controls the opening and closing of the valve gate</li><li>(2)</li></ul></li><li>d.<ul style="list-style-type: none"><li>(1)</li><li>(2) Has small window on post where "OPEN" or "SHUT" is displayed</li></ul></li><li>e. Wall post indicator valve (WPIV) - similar to PIV but extends through wall</li><li>f. Post indicator valve assembly (PIVA)<ul style="list-style-type: none"><li>(1) Does not have the small window and words</li></ul></li></ul>



NOTES	STUDENT GUIDE
	<p>(2) Has a sight area that is open when the valve is open</p> <p>6. Operating valves</p> <ul style="list-style-type: none"><li>a. Alarm test valve: simulates activation of the system</li><li>b. Inspector's test valve: equipped with a same size opening as a sprinkler head to simulate activation of a head</li><li>c. Main drain valve:</li></ul> <p>7. Water flow alarms</p> <ul style="list-style-type: none"><li>a. Hydraulically operated: to alert occupants and a passerby that water is flowing through the system</li><li>b. Electrically operated: to alert occupants and transmits an alarm when water is flowing through the system</li></ul> <p>8. Fire department connection (FDC)</p> <ul style="list-style-type: none"><li>a.</li><li>b. A check valve is located between the fire department connection and the system to prevent water from the system flowing into the FDC</li><li>c. Fire department support</li></ul> <p>(1) Supply pumper should have a capacity of at least 1,000 gpm</p>

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NOTES	STUDENT GUIDE
	<p>(2) Using same water main as that supplying system will rob the sprinkler system of water</p> <p>(3) A minimum of two 2<sup>1</sup>/<sub>2</sub>-inch or larger lines should be attached to the FDC</p> <p>(4)</p> <p>E. Types of sprinkler systems (<i>Essentials p. 852</i>)</p> <p>1.</p> <p>a.</p> <p>b. Contain water under pressure at all times</p> <p>c. Sprinkler heads will discharge water immediately on activation</p> <p>d. Usually equipped with an alarm check valve on the main riser</p> <p>e. Newer systems may have a backflow prevention check valve and electronic flow alarm instead of an alarm check valve ("straight stick systems")</p> <p>f. Maybe equipped with a retard chamber</p> <p>(1) Designed to catch excess water that may come through the alarm valve in a water pressure surge</p> <p>(2) Reduces chances of false alarms</p>



NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li data-bbox="716 411 857 443">g. Gauges<ul style="list-style-type: none"><li data-bbox="764 489 1321 554">(1) Installed above and below each alarm check valve</li><li data-bbox="764 600 1370 665">(2) Riser pressure gauge showing pressure in system</li><li data-bbox="764 711 1386 821">(3) Owner or owner's representative should check and record monthly to ensure normal water supply pressure</li></ul></li> <li data-bbox="667 867 691 898">2.<ul style="list-style-type: none"><li data-bbox="716 945 740 976">a.</li> <li data-bbox="716 1056 740 1087">b.<ul style="list-style-type: none"><li data-bbox="764 1171 1349 1278">(1) When a sprinkler head opens, air leaves piping and dry-pipe valve automatically opens to fill the system with water</li><li data-bbox="764 1325 1357 1467">(2) Designed with a dry-pipe valve so that a small amount of air pressure holds the valve closed over the water pressure on other side</li></ul></li> <li data-bbox="716 1514 857 1545">c. Gauges<ul style="list-style-type: none"><li data-bbox="764 1591 1386 1698">(1) One gauge on the water side and another gauge on the air side of dry pipe valve and at the air pump supplying air</li><li data-bbox="764 1745 1386 1887">(2) Owner or owner's representative should check and record gauge readings weekly to ensure normal air and water pressures are being maintained</li></ul></li></ul></li></ul>

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## MISSOURI DIVISION OF FIRE SAFETY FIRE FIGHTER I & II

NOTES	STUDENT GUIDE
	<ul style="list-style-type: none"><li>3.<ul style="list-style-type: none"><li>a. Used in properties where it is important to prevent water damage, even if pipes are broken</li><li>b.</li><li>c. Uses a deluge type valve, fire detection devices, and closed sprinkler heads</li><li>d. The operation of detectors releases water into the system and sounds an alarm</li><li>e. Sprinkler heads open only from functioning of fusible links</li></ul></li><li>4.<ul style="list-style-type: none"><li>a. Used to protect extra hazardous occupancies</li><li>b.<ul style="list-style-type: none"><li>(1) System activated by flame or heat detectors</li><li>(2) When system activates, water flows from all sprinkler heads</li></ul></li></ul></li><li>5. Residential sprinkler systems<ul style="list-style-type: none"><li>a. Used to prevent fire involvement in area of origin and allow occupants to escape</li><li>b. Typically equipped with quick-response sprinkler heads</li><li>c. May be wet or dry system</li></ul></li></ul>



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	<ul style="list-style-type: none"><li>d. Components<ul style="list-style-type: none"><li>(1) May use plastic or steel piping</li><li>(2) Must have a pressure gauge, flow detector, and means for draining system</li></ul></li><li>F. Fire department operations with sprinkler systems<ul style="list-style-type: none"><li>1. Whenever possible, pumpers supplying hose streams should operate from mains other than that supplying system</li><li>2. Control valves should not be closed until fire has been extinguished unless the incident commander determines need to prevent further damage</li><li>3. If control valve is closed, a fire fighter should be stationed at valve with a radio to officer-in-charge in case the valve needs to be reopened</li><li>4. Fire department personnel should not service system components or restore a system to service due to the potential liability</li><li>5. Restoring the system to service should be done by representatives of the owners or occupants or a commercial sprinkler service company</li><li>6. Control of water flow from sprinkler heads<ul style="list-style-type: none"><li>a. Remove sprinkler wedge or clamp from apparatus</li><li>b. Raise ladder under activated head</li><li>c. Climb ladder</li><li>d. Insert wedge or clamp into flowing head</li></ul></li></ul></li></ul>



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	<p>e. Gently tap wedge into place to stop flow</p> <p><b>V. Standpipe Systems</b></p> <p>A. Allow connection of hoses on various levels of a structure to avoid carrying hoselines up several levels</p> <p>B. Components</p> <ol style="list-style-type: none"><li>1. Fire department connection: usually a clappered siamese with at least two 2<sup>1</sup>/<sub>2</sub>-inch male connections</li><li>2. Piping</li><li>3. Interior fire department valves and connections</li></ol> <p>C. _____: have 2<sup>1</sup>/<sub>2</sub>-inch hose connections for use by fire fighters</p> <p>D. Class II standpipe</p> <ol style="list-style-type: none"><li>1. Have 1<sup>1</sup>/<sub>2</sub>-inch single jacket linen hose with a lightweight nozzle attached</li><li>2. Designed for use by building occupants with no fire training</li><li>3. Most have been taken out of service</li></ol> <p>E.</p> <ol style="list-style-type: none"><li>1. Have 2<sup>1</sup>/<sub>2</sub>-inch hose connections and 1<sup>1</sup>/<sub>2</sub> inch single jacket linen hose with a lightweight nozzle attached</li><li>2.</li></ol>



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	<p><b>VI. Fire Detection, Alarm, and Suppression Systems Summary</b></p> <ul style="list-style-type: none"><li>A. Fire fighters are likely to encounter detection and/or suppression systems in many commercial occupancies and must be familiar with their operations</li><li>B. Personnel have to understand their role in dealing with detection and alarm system activations and always keep in mind that a sounding alarm should not be taken lightly</li><li>C. Sprinkler systems have the capacity to control small fires in early stages but should not be depended on to completely control every fire</li></ul>