

# **LESSON ONE**

# **FIREFIGHTER I**

## **Ventilation**

**DOMAIN:** COGNITIVE

**LEVEL OF LEARNING:** COMPREHENSION

### **MATERIALS**

Overhead projector or laptop computer and multimedia projector; projection screen; VCR/DVD & monitor; IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2<sup>nd</sup> Edition or Delmar Firefighter's Handbook 3<sup>rd</sup> Edition.

### **NFPA 1001 JPR, 2008 edition**

5.3.11 Perform horizontal ventilation on a structure

### **Junior Member Statement:**

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

## **TERMINAL OBJECTIVE**

The Firefighter I candidate shall correctly list the principles of ventilation, its advantages, and its safety considerations.

## **ENABLING OBJECTIVES**

1. The Firefighter I candidate shall correctly define in writing the term ventilation, and state the principles of ventilation.
2. The Firefighter I candidate shall correctly list in writing six reasons for ventilation.
3. The Firefighter I candidate shall correctly list the signs, causes, effects, and prevention of backdraft and flashover situations.
4. The Firefighter I candidate when given a structure fire scenario shall correctly list in writing at least four safety considerations for ventilation.

# LESSON ONE

# FIREFIGHTER I

## Ventilation

### MOTIVATION

Less than one half of the nation's fire loss is due to direct fire loss. Only 20% of our fire fatalities are actually due to burns. Suffocation or smoke inhalation accounts for the remainder. Many fire officials believe that a considerable portion of large-life-loss and large-dollar-loss fires is a direct result of either inadequate or ineffective ventilation procedures. Having said all of the above, what can we do as fire fighters to alleviate some or most of these problems? An appropriate place to start would be with sound ventilation practices on all structural fire incidents. Not only would this make a significant reduction in property and civilian losses, it would also make our jobs easier and a great deal safer.

### PRESENTATION

#### ENABLING OBJECTIVE #1

The Firefighter I candidate shall correctly define in writing the term ventilation, and state the principles of ventilation.

1. Define the term ventilation.
2. Describe the principles of ventilation. The operation of a fireplace or wood stove works well for this.
3. Explain the theory of ventilation as it would apply to a structure fire, and how the firefighter can aid in ventilation.
4. Review the phases of fire and how they apply to ventilation and the spread of fire products.

#### Reference:

Delmar Handbook 3<sup>rd</sup> edition, page 631  
J&B Fundamentals 2<sup>nd</sup> edition, pages 135-136, 403-405  
IFSTA Essentials 5th edition, pages 548-549

## **APPLICATION**

Using an overlay of a single and a multi-story structure, beginning with an incipient fire, have the candidates describe the progression of a non-vented fire and a vented fire.

## **PRESENTATION**

### **ENABLING OBJECTIVE #2**

The Firefighter I candidate shall correctly list in writing six reasons for ventilation.

1. Discuss in detail the six reasons for ventilation and the causes and effects of each on the task firefighters must perform on the fire scene.
  - a) Rescue operations.
  - b) Fire attack and extinguishment.
  - c) Property conservation.
  - d) Fire spread control.
  - e) Reduces flashover potential.
  - f) Reduces backdraft potential.
2. Emphasize how airtight modern structures are and the increased use of petroleum products (plastics) within the structures.
3. Point out the hazards of truss roof design in new construction.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 631

J&B Fundamentals 2<sup>nd</sup> edition, pages 405-406, 410-411, 422-423

IFSTA Essentials 5th edition, pages 543-547 and 560-567

**NOTE: It is important to explain how modern building construction is affecting the need to ventilate. Where appropriate, explain the effects of building construction on the ventilation operation.**

## **PRESENTATION**

### **ENABLING OBJECTIVE #3**

The Firefighter I candidate shall correctly list the signs, causes, effects and prevention of backdraft and flashover situations.

1. State the theory of backdraft and list the safety precautions needed during ventilation operations.
2. State the causes of backdraft.
3. Discuss the signs of backdraft in different structures.
  - a) Residential (smaller) structures.
  - b) Manufacturing / Commercial (larger) structures.
4. Discuss the effects of a backdraft explosion to the structure and to personnel.
5. Discuss timing in relation to the firefighters' response, arrival and extinguishment, and when backdrafts generally occur, and in the context of the whole fire, when one might occur?
6. Describe how a backdraft may be averted by proper and timely ventilation especially if it can be initiated at the buildings highest point.

**NOTE: Stress to the candidates that the color of smoke is dictated by what is burning. Don't allow them to leave the class with the mindset that all potential backdrafts exhibit grayish yellow smoke. Also, discuss the effects of new energy efficient construction on backdraft potential.**

**Stress again the role of new building materials and design. Talk about the "what ifs" - the attic floor has decking on it, the use of double pane and thermoplastic windows, etc.**

7. State the theory of flashover.
8. Discuss the causes of flashover.
9. Discuss the limited signs that predict flashover.
10. Discuss the effects of a flashover from the perspective of fire involvement and also firefighter injury and death.

11. Explain the ways of reducing or eliminating flashover conditions.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 635-639

J&B Fundamentals 2<sup>nd</sup> edition, pages 405-406

IFSTA Essentials 5th edition, pages 118-120, 122-125 and 543-547

**NOTE: Review with the candidates the need to develop their senses to help them to survive a firefight. Discuss protective clothing and SCBA, the effect it has had on fire fighting, and how it may be the principle cause of firefighters being caught in flashovers.**

## **PRESENTATION**

### **ENABLING OBJECTIVE #4**

The Firefighter I candidate, given a structure fire scenario, shall correctly list in writing at least four safety considerations for ventilation.

1. Discuss the requirements for ventilation and the decision making process.
2. Discuss "reading" the building to try and determine the type so that you will be aware of any shortcomings.
  - a) Is the fire showing through the roof?
  - b) Is the roof sagging?
  - c) What is the type of roof?
  - d) Are the ventilations showing smoke or fire?
3. Explain potential hazards to firefighters such as power lines and overhangs, and the need to have a secondary means of escape.
4. Discuss the effect of ventilation on occupants who may still be in the building.
5. Emphasize the need to assess visible smoke, heat and fire conditions.
6. Emphasize the importance of always having a hose line present during ventilation.

7. Discuss exposures and weather conditions, such as wind direction, temperature, and humidity.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 632-635

J&B Fundamentals 2<sup>nd</sup> edition, pages 403-425

IFSTA Essentials 5th edition, pages 547-548, 548-556, 558-560, 570-572

## **APPLICATION**

Divide the class into groups. Using overlays, other media, or elevation drawings of different types of structures, draw in the desired amount of smoke or fire. Assign each group one of the overlays or drawings. Each group should determine if ventilation is necessary, why they are performing ventilation and what safety Considerations influenced their decision. Allow approximately 10 minutes. Have a member of each group report and then solicit class comments.

## **SUMMARY**

Restate the principles of ventilation.

Reiterate the reasons for ventilation.

Summarize the causes, signs and effects of backdraft.

Summarize the causes, signs and effects of flashover.

Review the considerations to ventilation.

# **LESSON TWO**

# **FIREFIGHTER I**

## **Ventilation**

**DOMAIN:** COGNITIVE / PSYCHOMOTOR

**LEVEL OF LEARNING:** COMPREHENSION /  
APPLICATION

### **MATERIALS**

Overhead projector or laptop computer and multimedia projector; projection screen; VCR/DVD and monitor; IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2<sup>nd</sup> Edition or Delmar Firefighter's Handbook 3<sup>rd</sup> Edition.

### **NFPA 1001 JPRs, 2008 edition**

- 5.3.11 Perform horizontal ventilation on a structure
- 5.3.12 Perform vertical ventilation on a structure

### **Junior Member Statement:**

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

## **TERMINAL OBJECTIVE**

The Firefighter I shall correctly list the considerations for ventilation, the ways to ventilate, and be able to list the tools needed along with the advantages and disadvantages of each.

## **ENABLING OBJECTIVES**

1. The Firefighter I candidate shall correctly list in writing considerations for the ventilation of any structure.
2. The Firefighter I candidate shall correctly identify the tools necessary to perform ventilation.
3. The Firefighter I candidate shall correctly describe in writing the ways of ventilating a structure and the advantages and disadvantages of each.

# LESSON TWO

# FIREFIGHTER I

## Ventilation

### MOTIVATION

Why do firefighters ventilate? Where do firefighters ventilate? These are questions that every firefighter should ask during a structure fire, and questions that a firefighter cannot answer based only on experience. Modern structures burn differently from older buildings. If you do not possess the knowledge to recognize modern building features and understand the ways to suppress these fires, the result could be unnecessary damage and possibly death.

### PRESENTATION

#### ENABLING OBJECTIVE #1

The Firefighter I candidate shall correctly list in writing considerations for the ventilation of any structure.

1. Discuss the decision-making questions that firefighters use when deciding to ventilate.
2. Discuss life safety and rescue.
3. Describe smoke conditions such as colors, volume and speed of smoke. Also illustrate the stack effect and mushrooming.
4. Stress the importance of knowing the building such as the construction features, design, materials and contents.
5. Discuss high-rise buildings and their associated ventilation problems.
6. Discuss fires in windowless buildings, below ground level and basement fires.

7. Create a discussion on determining the location, extent of the fire and the likely fire-spread and discuss the types of building construction.
8. Explain how to locate the most appropriate place to ventilate a structure.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 632-635  
J&B Fundamentals 2<sup>nd</sup> edition, pages 403-405, 407-411, 434-436  
IFSTA Essentials 5th edition, pages 543-556

**NOTE: Because of the complex nature of ventilating high rise buildings, this topic should only be discussed in general terms. However, if the class deals with high-rise structures it may be necessary to expand the discussion. You should stress that a pre-plan for ventilation is a must and should be developed and referenced.**

## **APPLICATION**

Using the same groups and overlays or elevation drawings as in the previous lesson, carry the process one step further. Put the overlays on the board and have each group determine where ventilation would be performed and what considerations were taken into account to make a decision. Allow approximately 10 minutes and have each group report and solicit comments.

## **PRESENTATION**

### **ENABLING OBJECTIVE #2**

The Firefighter I candidate shall correctly identify the tools necessary or available to perform ventilation.

1. Point out the fact that most tools are designed to cut a particular material. Misuse of a tool could result in destroying a tool or injury to the operator.
2. Discuss cutting tools - ordinary.
  - a) Axes.
  - b) Circular saws with and without carbide tipped.

- c) Chain saws with and without carbide tipped chains.
3. Discuss metal cutting tools.
    - a) Bolt cutters.
    - b) Oxyacetylene torches.
    - c) Hydraulic cutters.
  4. Discuss prying tools.
    - a) Crowbars.
    - b) Pry bars.
    - c) Halligan tool.
    - d) Cheater bars.
  5. Discuss pushing & pulling tools.
    - a) Pike pole.
    - b) Plaster hooks.
    - c) Trash hooks.
  6. Discuss striking tools.
    - a) Sledgehammer.
    - b) Mallet.
    - c) Battering rams.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 647-664  
J&B Fundamentals 2<sup>nd</sup> edition, pages 215-226  
IFSTA Essentials 5th edition, pages 397-407

**NOTE: Not all departments will have the same resources available to perform ventilation. Every effort should be made by the instructor to determine the available tools prior to delivering this portion of the lesson. There is no need to have an in-depth discussion in power saws if the only tool available is an ax. Also, since ventilation tools and forcible entry tools are so closely linked there will be some natural cross over in these two areas.**

### **APPLICATION**

Each firefighter I candidate should identify by name and describe the general function of each tool that is available for their use.

### **PRESENTATION**

### **ENABLING OBJECTIVE #3**

The Firefighter I candidate shall correctly describe in writing the ways of ventilating a structure and the advantages and disadvantages of each.

1. Remind candidates that so single type of ventilation will be effective on every type of fire.
2. Discuss safety consideration, building construction, considerations to ventilation and tools available to ventilate as you discuss the following types.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 647-664  
IFSTA Essentials 5th edition, pages 558-560

**NOTE: Before beginning to talk about the different types of ventilation the instructor should explain some exceptional factors that will influence the selection of a particular type and those influencing factors that will affect all types of ventilation operations. Examples would be something like severe weather conditions, high humidity, high winds.**

### **VERTICAL VENTILATION**

1. Discuss the advantages of vertical ventilation, especially in backdraft situations.
2. Explain the need for vertical ventilation in large single floor occupancies.
3. Discuss the use of natural roof openings such as skylights for ventilation.
4. Discuss the disadvantages of vertical ventilation. Sample the candidates to see how many could cut a hole open with an ax in an acceptable time.
5. Point out how newer roofs are built of lightweight materials and will not hold up under the amount of fire as would older conventional roofs.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 643-664  
J&B Fundamentals 2<sup>nd</sup> edition, pages 419-433  
IFSTA Essentials 5th edition, pages 556-558, 560-561

## **HORIZONTAL VENTILATION**

1. Explain why it is the most common type of ventilation.
2. Discuss the advantages of horizontal ventilation.
3. Explain the problems associated with window screens.
4. Discuss the disadvantages of horizontal ventilation.
5. Highlight the increased use of double pane and thermoplastic windows and the implication of these on horizontal ventilation.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 643-664  
J&B Fundamentals 2<sup>nd</sup> edition, pages 411-419  
IFSTA Essentials 5th edition, pages 440-441, 444, 570

## **TRENCHING OR STRIP VENTILATION**

1. Point out that trench or strip ventilation is vertical ventilation performed to stop the horizontal advancement of fire. Also stress that this ventilation must be completed before the fire reaches the trench.
2. Stress the disadvantages to this type of venting; time, people and resources.
3. When done successfully, discuss the advantages.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 660-661  
J&B Fundamentals 2<sup>nd</sup> edition, pages 413-433  
IFSTA Essentials 5th edition, pages 567

## **MECHANICAL VENTILATION (Forced Ventilation)**

**NOTE: For the purposes of updated information, this section will be divided into two parts. One dealing with fixed mechanical or building HVAC systems, and the**

## **second dealing with portable mechanical units or blowers and smoke ejectors.**

### **FIXED MECHANICAL SYSTEMS**

1. Explain how fixed systems many times negate the use of fire service ventilators.
2. Explain how newer systems allow for zone control or the ability to activate the system in selected areas and keep it off in others.
3. Discuss the need to verify that no fire extension has occurred inside or around the ductwork.
4. Stress the importance of having a building maintenance person on scene that is familiar with the system.

#### Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 644

J&B Fundamentals 2<sup>nd</sup> edition, page 415

IFSTA Essentials 5th edition, page 579

### **PORTABLE MECHANICAL SYSTEMS**

1. Illustrate the two methods, negative and positive pressure; and emphasize that mechanical ventilation is most efficient when used in conjunction with natural ventilation.
2. Discuss the advantages and disadvantages of smoke ejectors.
3. Discuss the advantages and disadvantages of positive pressure blowers.

#### Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 645-646

J&B Fundamentals 2<sup>nd</sup> edition, pages 415-419

IFSTA Essentials 5th edition, pages 574-578

### **HYDRAULIC VENTILATION**

1. Describe the techniques of hydraulic ventilation.

2. Discuss the advantages and disadvantages of hydraulic ventilation.
3. Point out the fact that hydraulic ventilation can remove 2 to 4 times more smoke than a smoke ejector in the negative pressure mode.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 646-647

J&B Fundamentals 2<sup>nd</sup> edition, pages 418-419

IFSTA Essentials 5th edition, page 578

## **APPLICATION**

Using a smoke generator and an available structure, assign the class the task of ventilating the smoke charged structure with a smoke ejector in the negative pressure mode. Then repeat the procedure with the smoke ejector in the positive pressure mode. Perform the procedure with a Positive Pressure Ventilation fan and if possible try the procedure with hydraulic ventilation. Time how long it takes to evacuate all smoke from the structure using each method. Discuss the results with the class.

## **SUMMARY**

Review the considerations for ventilation.

Review the tools that may be required for ventilation operations.

Summarize the advantages and disadvantages of the various methods for ventilating.

# **LESSON THREE**

# **FIREFIGHTER I**

## **Ventilation**

**DOMAIN:** PSYCHOMOTOR

**LEVEL OF LEARNING:** APPLICATION

### **MATERIALS**

Overhead projector or laptop computer and multimedia projector; projection screen; appropriate ventilation tools for this particular department; a house or mock-up for practical skills, preferably with windows; IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2<sup>nd</sup> Edition or Delmar Firefighter's Handbook 3<sup>rd</sup> Edition.

### **NFPA 1001 JPRs, 2008 edition**

- 5.3.11 Perform horizontal ventilation on a structure
- 5.3.12 Perform vertical ventilation on a structure

### **Junior Member Statement:**

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

## **TERMINAL OBJECTIVE**

The Firefighter I candidate when given the appropriate resources shall correctly demonstrate making ventilation openings in a window, flat roof, and a pitched roof.

## **ENABLING OBJECTIVES**

1. The Firefighter I candidate shall correctly demonstrate sounding a roof with an axe and pike pole, and correctly noting the location of the support members.
2. The Firefighter I candidate shall successfully demonstrate opening windows with and without the use of tools.
3. The Firefighter I candidate, using both hand tools and power tools, shall successfully open a hole in a flat roof and a pitched roof.

# **LESSON THREE**

# **FIREFIGHTER I**

## **Ventilation**

### **MOTIVATION**

The determining factor in being safe and successful while ventilating a structure is dependent upon understanding how to establish the opening. It is extremely important, especially while performing vertical ventilation, that firefighters understand how to correctly and safely operate ventilation tools. It is equally important that firefighters realize how critical it is to know the structural stability of the roof they are walking on. Since it is crucial to ventilate directly over the fire, it becomes a major safety concern for those firefighters working on a part of the roof that may already be compromised.

### **PRESENTATION**

#### **ENABLING OBJECTIVE 1**

The Firefighter I candidate shall correctly demonstrate sounding a roof with an axe and a pike pole, and correctly noting the location of support members.

1. Review safety considerations for mounting and traversing a roof, which may be under fire conditions.
2. Demonstrate sounding the roof with both an axe and a pike pole.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 655-657  
J&B Fundamentals 2<sup>nd</sup> edition, pages 420-421  
IFSTA Essentials 5th edition, pages 558-560

### **APPLICATION**

Working in pairs, have each candidate practice sounding a roof. Have their partner assist by telling them when they have located a support member. Performing this skill is

difficult so allow sufficient time for your candidates to practice. Under the supervision of an instructor have each candidate demonstrate sounding a roof? Have them explain as they go along what they are feeling and looking for. When the candidate finishes, discuss their strong points and weak points.

**NOTE: The cognitive portion of this lesson was covered in a previous lesson plan. The purpose of this class is to allow the candidates to practice and perform the lessons taught. If sufficient time has passed between the classroom portion and this practical, a review is recommended.**

**Where it is not practical or possible for all candidates to break a window glass or cut a hole, simulation of the process is acceptable. However, it is strongly suggested that all attempts be made to secure an acquired structure that will allow candidates to perform each enabling objective.**

## **PRESENTATION**

### **ENABLING OBJECTIVE #2**

The Firefighter I candidate shall successfully demonstrate opening windows with and without the use of tools.

1. Restate the principal; “try before you pry.”
2. Illustrate how to check for excess heat.
3. Review the different tools, which may be used.
4. Remind candidates of the difficulty and expense of breaching double pane and thermoplastic windows.
5. Explain and/or demonstrate opening windows with and without tools.

#### Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 647-653  
J&B Fundamentals 2<sup>nd</sup> edition, pages 412-415  
IFSTA Essentials 5th edition, pages 440-444

## **APPLICATION**

Have each candidate demonstrate opening a door without hand tools and with hand tools. Supervise, observe, comment and critique.

## **PRESENTATION**

### **ENABLING OBJECTIVE #3**

The Firefighter I candidate, using both hand and power tools, shall successfully open a hole in a flat roof and a pitched roof.

1. Describe and discuss the safety considerations in performing vertical ventilation.
2. Emphasize the importance of proper positioning while cutting and not to cut any structural supports.
3. Point out to candidates that one big hole is better than several small ones and the ceiling of the room being ventilated must be penetrated as well.
4. Explain and demonstrate the use of each tool you expect them to use.

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 655-664

J&B Fundamentals 2<sup>nd</sup> edition, pages 419-433

IFSTA Essentials 5<sup>th</sup> Edition, pp. 558-560, 562

**NOTE: Where possible, allow the candidates to practice on a mock-up prior to working on an acquired structure. This will allow the instructor a chance to work individually with each candidate and a chance for them to develop confidence prior to working on a roof while being evaluated.**

## **APPLICATION**

Have each candidate cut a hole using a hand tool and a power tool. Be sure they work in pairs under the direct supervision of an instructor.

Under the supervision of an instructor, assign each candidate either a hand tool or a power tool, and instruct them to cut a particular size hole. Critique each candidate upon completion.

## **SUMMARY**

Review the ways to sound a roof.

Restate each of the methods for opening windows.

Provide a summary of the methods for cutting roofs with hand and power tools.

# **LESSON FOUR**

# **FIREFIGHTER I**

## **Ventilation**

**DOMAIN:** PSYCHOMOTOR

**LEVEL OF LEARNING:** APPLICATION

### **MATERIALS**

Overhead projector or laptop computer and multimedia projector; projection screen; appropriate ventilation tools for this particular department; a house or mock-up for practical skills, preferably with windows; IFSTA Essentials 5th edition or Jones and Bartlett Fundamentals of Fire Fighter Skills 2<sup>nd</sup> Edition or Delmar Firefighter's Handbook 3<sup>rd</sup> Edition.

### **NFPA 1001 JPR, 2008 edition**

5.3.12 Perform vertical ventilation on a structure

#### **Junior Member Statement:**

Junior Member training activities should be supervised by qualified instructors to assure that the cognitive and psychomotor skills are completed in a safe and non-evasive manner. While it is critical that instructors be constantly aware of the capabilities of all students both mentally and physically to complete certain tasks safely and successfully, the instructor should take every opportunity to discuss with departmental leaders and students the maturity and job awareness each participant has for the hazards associated with fire and rescue training.

## **TERMINAL OBJECTIVE**

The Firefighter I candidate, when given at least four different types of roofs, shall identify characteristics, procedures, and precautions to be taken while performing roof ventilation.

## **ENABLING OBJECTIVES**

1. The Firefighter I candidate shall correctly list in writing the reasons why the following factors are used to determine roof integrity:
  - a) Construction.
  - b) Visual observation.
  - c) Elapsed time of fire.
  
2. The Firefighter I candidate when given examples of at least four different types of roofs shall correctly list in writing the characteristics and necessary precautions to be taken when ventilating.

# LESSON FOUR

# FIREFIGHTER I

## Ventilation

### MOTIVATION

When considering vertical ventilation it is important that firefighters understand the type of roof they are presented with. Understanding the construction type, construction features, and using acquired knowledge about how fire burns, will dramatically improve the decision making process. Without this basic information the firefighter is gambling with the lives of personnel on the roof as well as the occupants and firefighters within the structure. Vertical ventilation can radically improve the structure's internal environment; however, it still remains one of the most hazardous tasks a firefighter may have to perform.

### PRESENTATION

#### ENABLING OBJECTIVE #1

The firefighter I candidate shall correctly list in writing the reasons why the following factors are used to determine roof integrity:

- a) Construction.
  - b) Visual observation.
  - c) Elapsed time of fire.
- 
1. Discuss the difference between "conventional" construction and "lightweight" construction.
  2. Point out how a conventional or older roof is built vs. Modern lightweight roofs.
  3. Describe truss construction and review its strengths and weaknesses.
  4. Explain the relationship of fire exposure time to the effect it has on truss construction.

5. Discuss the different types of occupancies and the type roofs they are subject to have such as residential, commercial, and industrial.
6. Discuss "reading" the roof.
  - a) Is fire showing through the roof?
  - b) Is the roof sagging?
  - c) What is the type of roof?
  - d) Are the ventilators showing smoke and / or fire?

Reference:

Delmar Handbook 3<sup>rd</sup> edition, pages 402-409

J&B Fundamentals 2<sup>nd</sup> edition, pages 422-425

IFSTA Essentials 5th edition, pages 146-150, 156-159, 556-558, 562-567

## **APPLICATION**

Ask overhead questions of the preceding information. As answers are given, write them on the board. It may be necessary to ask leading questions of some classes depending upon their experience.

## **PRESENTATION**

### **ENABLING OBJECTIVE #2**

The Firefighter I candidate when given examples of at least four different types of roofs shall list the characteristics and necessary precautions to take when ventilating.

1. Discuss the three basic roof types, their typical roof coverings and explain how they impact on roof styles.
  - a) Wood shingles & shakes.
  - b) Composition roofing/shingles.
  - c) Tar and gravel.
  - d) Urethane / isocyanate foam.
  - e) Single ply / synthetic membrane.
  - f) Tile / slate. (Has more weight per square foot than any other style of roof).
  - g) Light weight metal / fiberglass.
  - h) Steel clad.
2. Describe and discuss strengths and weaknesses of a flat roof.

3. Illustrate the strengths and weaknesses of a pitched or gable roof.
4. Describe and discuss strengths and weaknesses of a hip roof.
5. Point out the strengths and weaknesses of an arched roof.
6. Describe and discuss strengths and weaknesses of a mansard or bridge truss roof.
7. Illustrate the strengths and weaknesses of a lightweight concrete roof.
8. Describe and discuss strengths and weaknesses of a corrugated roof.

Reference:

J&B Fundamentals 2<sup>nd</sup> edition, pages 422-424, 433-434  
IFSTA Essentials 5th edition, pages 560-567

### **APPLICATION**

Divide class into four equal groups. Assign each group two of the different types of roofs. Have them select a spokesperson to list on a chalkboard or flip chart the characteristics and precautions for the roof styles. Solicit comments after each group. Allow 30 minutes for group discussion and presentation.

### **SUMMARY**

Review the factors used to determine roof integrity.

Summarize the characteristics and precautions to be used on different types of roofs.