



Hazardous Materials, Operations, and Processes

Course Plan

Course Details

Certification:	Fire Inspector 2
CTS Guide:	Fire Inspector 2 Certification Training Standards Guide (2014)
Description:	This course provides students with a basic knowledge of hazardous materials, operations, and processes related to the roles and responsibilities of a Fire Inspector 2 including hazardous conditions, flammable and combustible liquids and gases, and hazardous materials.
Designed For:	The certified Fire Inspector 1 advancing to the Fire Inspector 2 classification
Prerequisites:	Fire Inspector 2A: Fire Prevention Administration
Standard:	Complete all activities and formative tests. Complete all summative tests with a minimum score of 80%.
Hours:	Lecture: 26:30 Activities: 2:30 Testing: 03:00
Hours (Total):	32:00
Maximum Class Size:	30
Instructor Level:	Primary Instructor
Instructor/Student Ratio:	1:30
Restrictions:	None
SFT Designation:	CFSTES

Required Resources

Instructor Resources

To teach this course, instructors need:

- California Building Code
(International Code Council, current edition)
- California Code of Regulations (CCR) Title 19
(Office of Administrative Law, <https://oal.ca.gov/>)
- California Fire Code
(International Code Council, current edition)

Reference manual options:

- *Fire Inspection and Code Enforcement Instructor Resource Kit*
(IFSTA, 8th edition)

Or the combination of the following:

- *Fire Inspector: Principles and Practice*
(International Association of Fire Chiefs, Revised Enhanced 1st edition, Jones & Bartlett Learning, ISBN: 9781284137743)
- *Fire Inspector: Principles and Practice Instructor's ToolKit* CD-ROM
(International Association of Fire Chiefs, Cdr edition, Jones & Bartlett Learning, ISBN: 9781284095654)

Online Instructor Resources

The following instructor resources are available online at

<https://osfm.fire.ca.gov/divisions/state-fire-training/cfstes-professional-certification/>:

- Course plan
- Website

Student Resources

To participate in this course, students need:

- California Fire Code
(International Code Council, current edition)

Fire Inspector 2D

Reference manual options:

- *Fire Inspection and Code Enforcement*
(IFSTA, 8th edition, ISBN: 9780879396053)

Or

- *Fire Inspector: Principles and Practice*
(International Association of Fire Chiefs, Revised Enhanced 1st edition, ISBN:
9780763798574)

Unit 1: Introduction

Topic 1-1: Orientation and Administration

Terminal Learning Objective

At the end of this topic, a student will be able to identify facility and classroom requirements and identify course objectives, events, requirements, assignments, activities, resources, evaluation methods, and participation requirements in the course syllabus.

Enabling Learning Objectives

1. Identify facility requirements
 - Restroom locations
 - Food locations
 - Smoking locations
 - Emergency procedures
2. Identify classroom requirements
 - Start and end times
 - Breaks
 - Electronic device policies
 - Special needs and accommodations
 - Other requirements as applicable
3. Review course syllabus
 - Course objectives
 - Calendar of events
 - Course requirements
 - Student evaluation process
 - Assignments
 - Activities
 - Required student resources
 - Class participation requirements

Discussion Questions

1. What is a formative test? What is a summative test?

Activities

1. To be determined by the instructor.

Topic 1-2: Fire Marshal Certification Process

Terminal Learning Objective

At the end of this topic, a student will be able to identify different levels in the Fire Marshal certification track, the courses and requirements for Fire Inspector 2 certification, and be able to describe the capstone task book and testing process.

Enabling Learning Objectives

1. Identify the different levels of certification in the Fire Inspector certification track
 - Fire Inspector 1

Fire Inspector 2D

- Fire Inspector 2
- 2. Identify the other Fire Prevention certification tracks
 - Plans Examiner
 - Fire Marshal
- 3. Identify the courses required for Fire Inspector 2
 - Fire Inspector 2A: Fire Prevention Administration
 - Fire Inspector 2B: Fire and Life Safety Requirements
 - Fire Inspector 2C: Fire and Life Safety Systems and Equipment Inspections
 - Fire Inspector 2D: Hazardous Materials, Operations, and Processes
- 4. Identify any other requirements for Fire Inspector 2
- 5. Describe the capstone task book process
 - Complete all prerequisites and course work
 - Submit application and fees to request capstone task book
 - Must be employed by a California Fire Agency as a Fire Inspector
 - Complete all job performance requirements included in the task book
 - Must have identified evaluator verify individual task completion via signature
 - Must have Fire Chief or authorized representative verify task book completion via signature
- 6. Describe the capstone testing process
 - Complete coursework
 - Schedule online capstone test
 - Schedule skills evaluation test

Discussion Questions

1. How many levels are there in the Fire Marshal certification track? What are they?

Activities

1. To be determined by the instructor.

Unit 2: Hazardous Conditions

Topic 2-1: Evaluating Hazardous Conditions Involving Equipment, Processes, and Operations

Terminal Learning Objective

At the end of this topic, a student, given field observations and documentation, will be able to evaluate hazardous conditions involving equipment, processes, and operations to verify installation in accordance with applicable codes and standards and identify, document, and report deficiencies in accordance with jurisdictional policies.

Enabling Learning Objectives

1. Identify applicable codes and standards associated with equipment, processes, and operations
 - Welding
 - Flammable finishes

- Dipping and coating
 - Quenching
 - Dry cleaning
 - Dust hazards
 - Asphalt and tar kettles
 - Semiconductor/electronic manufacturing
 - Motion picture and television production
 - Aviation facilities
 - Fruit ripening
 - Fumigation
 - Woodworking
 - Waste handling
 - Industrial ovens
2. Describe accepted fire protection practices
 3. Identify ignition sources related to hazardous conditions, equipment, and processes
 4. Describe safe housekeeping practices
 5. Identify additional reference materials related to protection of hazardous processes and code enforcement
 6. Observe hazardous conditions created by installation of equipment, processes and operations
 7. Recognize problems with equipment, processes, and operations involving hazardous conditions
 8. Interpret codes and communicate deficiencies in accordance with the policies of the AHJ

Discussion Questions

1. Where would you find the code requirements for spraying operations?
2. When does the fire code not regulate a dry cleaning establishment?

Activities

1. To be determined by the instructor.

Instructor Notes

1. The Fire Inspector 2 is expected to have knowledge of processes and operations that include milling operations and the manufacture, storage, and use of hazardous chemicals and explosives.

CTS Guide Reference: CTS 3-6

Topic 2-2: Evaluating Alternative Protection Measures for Equipment, Operations, and Processes

Terminal Learning Objective

At the end of this topic, a student, given deficiencies noted during a field inspection of a facility and proposed alternative methods, will be able to evaluate alternative protection measures for equipment, operations, and processes to verify that the level of protection they provide complies with the intent of applicable codes and standards.

Enabling Learning Objectives

1. Identify applicable codes and standards adopted by the jurisdiction
2. Describe hazards of the process or operation
3. Discuss fire protection systems requirements
4. Identify inherent hazards associated with equipment, operations, and processes
5. Identify necessary safety precautions
6. Describe how to evaluate alternative protection measures for equipment, operations, or processes to ensure the proposed protection level is equivalent to or greater than the intent of applicable codes and standards
7. Observe and recognize problems with alternative protection measures for equipment, operations, and processes
8. Verify compliance of alternative protection measures for equipment, operations, and processes in order to resolve deficiencies

Discussion Questions

1. What kind of alternative protection measures can you use for hazardous processes?

Activities

1. To be determined by the instructor.

CTS Guide Reference: CTS 3-16

Topic 2-3: Evaluating Fire Protection Plans and Practices

Terminal Learning Objective

At the end of this topic, a student, given a field report describing a facility housing a complex process or operation, will be able to evaluate fire protection plans and practices to determine the fire growth potential for all areas and verify that the protection level is appropriate for the hazard in accordance with applicable codes and standards and jurisdictional policies.

Enabling Learning Objectives

1. Identify the fire growth potential associated with complex processes or operations
 - Heat content of the materials involved
 - Exposed surface area
 - Material height and array
 - Continuity of combustible materials within a space
 - Ceiling height, ventilation or openness of the space
 - Detection and protection equipment
2. Identify the fire protection levels for various complex processes or operations
3. Analyze various scenarios to determine appropriate fire protection level
4. Describe evacuation procedures
5. Recognize problems with fire protection plans and practices
6. Evaluate hazards and verify appropriate protection level in accordance with applicable codes and standards and jurisdictional policies

Discussion Questions

1. What process would you use to evaluate a fire protection plan for a complex process?

Activities

1. Given a field report describing a facility housing a complex process or operation, have students analyze various scenarios to determine the appropriate fire protection level.

Instructor Notes

1. Use the list from topic 2-1 for equipment, processes, and operations involving hazardous conditions.

CTS Guide Reference: CTS 3-17

Unit 3: Flammable and Combustible Liquids and Gases

Topic 3-1: Verifying Code Compliance for Storage, Handling, and Use of Flammable and Combustible Liquids and Gases

Terminal Learning Objective

At the end of this topic, a student, given field observations and inspection guidelines from the authority having jurisdiction, will be able to verify code compliance for storage, handling, and use of flammable and combustible liquids and gases to identify, document, and report deficiencies in accordance with applicable codes and standards and jurisdictional policies.

Enabling Learning Objectives

1. Describe the properties and hazards of flammable and combustible liquids and gases
2. Discuss material safety data sheets
3. Describe safe handling practices for flammable and combustible liquids and gases
4. Identify applicable codes and standards
 - CFC, chapter 34
5. Describe fire protection systems and equipment approved for the material
6. Describe fire behavior as it relates to flammable and combustible liquids and gases
7. Identify safety procedures
8. Identify storage compatibility requirements
9. Describe how to determine maximum allowable quantities (MAQ) of flammable and combustible liquids and gases
10. Describe control areas
11. Describe how to evaluate control areas as they relate to the storage of flammable and combustible liquids and gases
12. Describe general requirements for quantities not exceeding maximum allowable quantities per control area
13. Identify typical fire hazards associated with processes or operations utilizing flammable and combustible liquids
14. Observe and recognize problems with storage, handling, and use of flammable and combustible liquids and gases
15. Interpret codes in order to make decisions related to the compliant storage, handling, and use of flammable and combustible liquids and gases

16. Communicate deficiencies in accordance with applicable codes and standards and jurisdictional policies

Discussion Questions

1. What happens if maximum allowable quantities are exceeded?
2. What kind of fire-rated wall defines control areas?
3. What is the purpose of a control area?
4. What type of fire protection system is required for flammable liquids and gases?

Activities

1. Given MSDS sheets and appropriate tables, have students determine MAQs for different types of flammable liquids and gases.

CTS Guide Reference: CTS 3-8

Topic 3-2: Evaluating Compliance Alternatives for the Storage, Handling, and Use of Flammable or Combustible Liquids and Gases

Terminal Learning Objective

At the end of this topic, a student, given field inspection reports and proposed compliance alternatives, will be able to evaluate compliance alternatives for the storage, handling, and use of flammable or combustible liquids and gases so that their storage, handling, and use comply with the intent of applicable codes and standards and jurisdictional policies.

Enabling Learning Objectives

1. Identify other agencies that have requirements and jurisdiction related to flammable and combustible liquids and gases
2. Describe how to evaluate compliance alternatives for the storage, handling, and use of flammable or combustible liquids and gases to ensure compliance with the intent of applicable codes and standards and jurisdictional policies
3. Read plans, reports and material safety data sheets as required to evaluate compliance alternatives for the storage, handling, and use of flammable or combustible liquids and gases

Discussion Questions

1. What are some other agencies that may have jurisdiction related to flammable and combustible liquids and gases?
2. What are some proposed compliance alternatives that you may be required to evaluate?

Activities

1. To be determined by the instructor.

CTS Guide Reference: CTS 3-20

Unit 4: Hazardous Materials

Topic 4-1: Verifying Code Compliance for the Storage, Handling, and Use of Hazardous Materials

Terminal Learning Objective

At the end of this topic, a student, given field observations, will be able to evaluate code compliance for the storage, handling, and use of hazardous materials to identify, document, and report deficiencies in accordance with applicable codes and standards and jurisdictional policies.

Enabling Learning Objectives

1. Describe the properties and hazards associated with hazardous materials
2. Describe safe handling, use, and dispensing practices for hazardous materials
3. Identify applicable codes and standards
 - Hazardous materials - CFC, chapter 27
 - Compressed gases - CFC, chapter 30
 - Corrosive materials - CFC, chapter 31
 - Cryogenic fluids - CFC, chapter 32
 - Flammable solids - CFC, chapter 36
 - Highly toxic and toxic materials - CFC, chapter 37
 - Liquefied petroleum gases - CFC, chapter 38
 - Organic peroxides - CFC, chapter 39
 - Oxidizers - CFC, chapter 40
 - Unstable materials - CFC, chapter 43
 - Water-reactive solids and liquids - CFC, chapter 44
 - Radioactive materials - Nuclear Regulatory Commission
4. Describe fire protection systems and equipment approved for the material
5. Describe fire behavior as it relates to hazardous materials
6. Identify safety procedures
7. Describe chemical reactions
8. Identify storage compatibility requirements
9. Describe how to determine maximum allowable quantities (MAQ)
10. Describe control areas
11. Describe how to evaluate control areas as they relate to hazardous materials storage
12. Describe general requirements for quantities not exceeding maximum allowable quantities per control area
13. Identify fire hazards associated with processes or operations utilizing hazardous materials
14. Describe the requirements for, and contents of, a Hazardous Materials Management Plan
15. Observe and recognize problems with storage, handling, and use of hazardous materials

16. Interpret codes in order to make decisions related to the compliant storage, handling, and use of hazardous materials
17. Communicate deficiencies in accordance with applicable codes and standards and jurisdictional policies

Discussion Questions

1. In what occupancy type might hazardous materials be found?
2. What hazard identification signs does indoor storage require?
3. Why are special requirements applied to group M and group S occupancies?
4. What is considered a portable tank?
5. What is the proper distance for a fire station to locate an above-ground protected diesel storage tank?

Activities

1. Given a multi-story floor plan and an inventory of hazardous materials, have students list the maximum allowable quantity for each material assuming those materials are stored on the 6th floor.

CTS Guide Reference: CTS 3-9

Topic 4-2: Evaluating Compliance Alternatives for the Storage, Handling, and Use of Hazardous Materials

Terminal Learning Objective

At the end of this topic, a student, given field inspection reports and proposed compliance alternatives, will be able to evaluate compliance alternatives for the storage, handling, and use of hazardous materials to verify that their level of safety complies with the intent of applicable codes and standards and jurisdictional policies.

Enabling Learning Objectives

1. Identify other agencies that have requirements and jurisdiction related to hazardous materials
2. Observe and recognize problems with compliance alternatives for the storage, handling, and use of hazardous materials
3. Describe how to evaluate compliance alternatives for the storage, handling, and use of hazardous materials to ensure compliance with the intent of applicable codes and standards and jurisdictional policies
4. Read plans, reports and material safety data sheets as required to evaluate compliance alternatives for the storage, handling, and use of hazardous materials

Discussion Questions

1. What are some other agencies that may have jurisdiction related to hazardous materials?
2. What are some proposed compliance alternatives that you may be required to evaluate?

Activities

1. To be determined by the instructor.

CTS Guide Reference: CTS 3-19

Time Table

Segment	Lecture Time	Activity Time	Total Unit Time
Unit 1: Introduction			
Topic 1-1: Orientation and Administration			
Lecture	00:30		
Activity 1-1: To be determined by instructor		00:00	
Topic 1-2: Fire Marshal Certification Process			
Lecture	00:30		
Activity 1-2: To be determined by instructor		00:00	
Unit 1 Totals	1:00	00:00	1:00
Unit 2: Hazardous Conditions			
Topic 2-1: Evaluating Hazardous Conditions Involving Equipment, Operations, and Processes			
Lecture	4:30		
Activity 2-1: To be determined by instructor		00:00	
Topic 2-2: Evaluating Alternative Protection Measures for Equipment, Operations, and Processes			
Lecture	2:00		
Activity 2-2: To be determined by instructor		00:00	
Topic 2-3: Evaluating Fire Protection Plans and Practices			
Lecture	1:00		
Activity 2-3: See suggested activity		00:30	
Unit 2 Totals	7:30	00:30	8:00
Unit 3: Flammable and Combustible Liquids and Gases			
Topic 3-1: Verifying Code Compliance for Storage, Handling, and Use of Flammable and Combustible Liquids and Gases			
Lecture	6:00		
Activity 3-1: See suggested activity		1:00	

Fire Inspector 2D

Segment	Lecture Time	Activity Time	Total Unit Time
Topic 3-2: Evaluating Compliance Alternatives for the Storage, Handling, and Use of Flammable or Combustible Liquids and Gases			
Lecture	3:00		
Activity 3-2: To be determined by instructor		00:00	
Unit 3 Totals	9:00	1:00	10:00
Unit 4: Hazardous Materials			
Topic 4-1: Verifying Code Compliance for the Storage, Handling, and Use of Hazardous Materials			
Lecture	6:00		
Activity 4-1: See suggested activity		1:00	
Topic 4-2: Evaluating Compliance Alternatives for the Storage, Handling, and Use of Hazardous Materials			
Lecture	3:00		
Activity 3-2: [Activity Title]		00:00	
Unit 4 Totals	9:00	1:00	10:00
Lecture, Activity, and Unit Totals:	26:30	2:30	29:00

Course Totals

Segment Type	Time
Total Lecture Time (LT)	26:30
Total Activity Time (AT)	2:30
Total Testing Time (TT)	3:00
Total Course Time	32:00