



# Special Hazards Systems

## Level IV Certification Content Outline

### Standard Model Program with Computer-Based Testing

*The candidate for NICET certification as a Level IV Special Hazards Systems technician should have the knowledge and experience to:*

Design systems involving unique applications of agents/devices, and/or explosion prevention; troubleshoot complex systems; and manage multiple project teams; interpret and negotiate contracts.

**Note:** For each exam, the skills and knowledge listed under each task are suggestive of those involved in that task, but are not intended to constitute an exhaustive listing.

#### 4.1 Inspection, Testing, and Maintenance Tasks

*No tasks at this level.*

#### 4.2 Repair and Recharge Tasks

*No tasks at this level.*

#### 4.3 Installation Tasks

*No tasks at this level.*

#### 4.4 System Design and Configuration Tasks

*(Approximately 42-48% of the exam)*

##### 4.4.1 Communicate with NFPA committee regarding standards.

**Knowledge:**

Structure of NFPA standards  
Terminology used in standards and codes  
NFPA revision process  
NFPA revision publications.  
Role of the NFPA standards council  
Procedures for requesting a formal interpretation

**Skills:**

Interpret standards' language and identify ambiguities.  
Identify elements of plans, specifications, and AHJ statements that could be subject to competing interpretations of a standard.  
Track status of request for formal interpretation.  
Propose changes to a standard.

##### 4.4.2 Design a complex foam system.

**Knowledge:**

High-expansion and medium-expansion foam and their applications  
Foam concentrate proportioning methods  
Foam concentrate storage and delivery equipment  
Foam recovery and containment methods

**Skills:**

Apply requirements of total flooding and local applications according to NFPA 11 6.12 and 6.13.  
Determine the required foam and water supply volume.  
Select a foam proportioning method to comply with NFPA 11 and 16.  
Size a foam pump.  
Use manufacturer specifications to determine discharge device placement based on flow coverage patterns.  
Hydraulically balance multiple systems in simultaneous flow.

##### 4.4.3 Implement protection of dust control system and/or equipment.

**Knowledge:**

Dust control devices and their characteristics  
Combustible dust deflagration index (Kst) testing requirements  
Risks associated with dust control equipment placement

**Skills:**

Apply electrical equipment classifications to system design according to NFPA 70 Chapter 5.  
Select a protection technique as required by NFPA 654 and in accordance with NFPA 68 or 69.  
Apply protection methods based on equipment locations. Confirm that vent location is acceptable according to NFPA 68.  
Communicate with system manufacturers to select, size, and lay out explosion control/isolation system components.

##### 4.4.4 Design a low-pressure CO<sub>2</sub> system.

**Knowledge:**

CO<sub>2</sub> protection schemes and their requirements  
Restrictions for normally-occupied enclosures  
Carbon-dioxide-related hazards to personnel  
Low-pressure CO<sub>2</sub> system characteristics  
Floor-loading requirements  
CO<sub>2</sub> Refrigeration equipment and its requirements  
Discharge components and their functions.  
Venting requirements for purging CO<sub>2</sub> from protected areas and areas where the agent is likely to settle

(Task 4.4.4 continued on next page)



(Task 4.4.4 continued)

**Skills:**

- Apply NFPA 12 protection requirements to CO<sub>2</sub> applications.
- Implement NFPA 12 safety requirements in total-flood CO<sub>2</sub> applications.
- Oversee full-discharge test and acceptance test for AHJ.
- Evaluate hazards and determine the required area/volume of CO<sub>2</sub> application.
- Determine the duration of discharge based on agent supply, discharge rate, and piping.
- Evaluate potential of CO<sub>2</sub> migration outside of the protected hazard area and its impact on occupants.

**4.4.5 Coordinate and implement the application of explosion prevention systems (other than dust control equipment).****Knowledge:**

- Components of explosion prevention systems and their functions
- Materials which are susceptible to explosive combustion
- Types of explosion suppression systems and their functions
- Principles of explosion

**Skills:**

- Identify explosive hazards and evaluate their potential for explosion.
- Identify agents that can prevent explosion of a hazard.
- Communicate with manufacturer of explosion prevention system to select, size, and lay out the components of an explosion prevention system.

**4.4.6 Develop installation specifications taking into account manufacturer's instructions and any site-specific requirements.****Knowledge:**

- Formatting of standard industry specifications

**Skills:**

- Interpret field survey to determine site-specific protection requirements.
- Communicate with owner to determine fire protection objectives and goals.
- Apply NFPA standards, insurance requirements, and local building codes to the project.
- Create clear and organized written reports.

**4.5 Work Management Tasks**

*(Approximately 40-46% of the exam)*

**4.5.1 Accommodate LEED (Leadership in Energy & Environmental Design) requirements.****Knowledge:**

- Role of the Green Building Council

**Skills:**

- Interpret LEED rating system
- Determine the owner's/end user's objectives related to LEED certification.
- Recognize LEED requirements and procedures for the project.
- Select an agent and other components that are LEED-compliant with the project's objectives.
- Document compliance with LEED requirements.

**4.5.2 Present performance-based design alternatives to engineers/AHJs.****Knowledge:**

- Intent and applicability of NFPA 11, 12, 12A, 13, 16, 17, 69, 72, 90A, 101, 170, 750, 2001, 2010
- Significant New Alternatives Program (SNAP) list
- Lowest observable adverse level (LOAL)/No observable adverse level (NOAL)
- Written and verbal communication skills

**Skills:**

- Comply with performance-based design requirements in NFPA standards.
- Recognize applications that are outside the scope of standards' prescriptive methods.
- Present technical information clearly, accurately, and professionally to technical or non-technical audiences, either individually or in groups.
- Determine the interests and concerns of individuals in various roles related to a special hazards systems project.
- Prove the advantages of a performance-based special hazards system design over building-code mandated systems.

**4.5.3 Educate AHJs and insurance authorities about special hazards work.****Knowledge:**

- Written and verbal communication skills
- Roles of NFPA, FSSA, NAFED, SFPE, AFFA and their local chapters
- Intent and applicability of NFPA 11, 12, 12A, 13, 16, 17, 69, 72, 90A, 101, 170, 750, 2001, 2010
- Methods of presentation delivery
- The role of insurance companies in establishing criteria for suppression systems

**Skills:**

- Educate groups of AHJs about Special Hazards standards, system types, technology, and new products.
- Present technical information clearly, accurately, and professionally to technical or non-technical audiences, either individually or in groups.
- Prepare and deliver informational presentations.
- Coordinate meeting arrangements.

**4.5.4 Conduct cost and benefits research to determine the feasibility of using new agents and other products.****Knowledge:**

Sources of information about new products  
Factors that affect the lifetime cost of various agents and devices  
EPA and other regulatory agencies' effect on chemical suppression lifetimes  
Training costs involved with using new products  
Start-up costs involved with using a new product

**Skills:**

Research the characteristics of a new agent or device.  
Analyze the benefits, detriments, and risks of an agent's characteristics in various applications.  
Analyze the immediate and lifetime costs of the product, and how it might affect the overall costs of system installation and maintenance.  
Analyze the fiscal budget and sales projections.

**4.5.5 Negotiate and review project contracts.****Knowledge:**

Project contract structure and terminology as defined in the industry publications.  
Types of expenses encountered in completing a project.

**Skills:**

Communicate clearly with owner's representative and other contractors.  
Identify and evaluate the client's objectives, needs, concerns, constraints, and resources.  
Develop an estimate of the cost of the project.  
Interpret various types of potential or actual insurance requirements and costs.  
Interpret indemnification requirements.  
Interpret payment progress requirements.  
Interpret tax requirements.  
Interpret contract termination requirements.  
Interpret change order requirements.  
Interpret value engineering options.  
Interpret consequences of penalty clauses for missed deadlines.  
Interpret project's special requirements.

**4.5.6 Develop a project budget.****Knowledge:**

Basic accounting procedures  
Time management principles  
Cost factors related to a special hazards system project  
Sources of cost estimating information

**Skills:**

Calculate estimated profit.  
Communicate clearly and accurately, both verbally and in writing.  
Obtain expense- and revenue- related information from project contract documents, plans, and specifications.  
Identify time constraints that can affect budget.  
List and estimate expense items for a project.  
Estimate material cost escalation.  
Estimate manpower requirements for all phases including submittal and closeout.  
Estimate manpower cost escalation.  
Estimate costs involved in project submittal.  
Estimate costs involved in project closeout.  
Identify special equipment that will be needed for a project site.

**4.5.7 Monitor project cost-control.****Knowledge:**

Basic accounting procedures  
Project budget components  
Cost factors

**Skills:**

Communicate clearly and accurately, both verbally and in writing.  
Manage labor requirements.  
Identify and monitor invoicing and payment deadlines.  
Monitor and manage payments for equipment deliveries.  
Manage account collections and subcontractor payments.  
Process and track RFIs, RFPs, construction bulletins, change orders, and progress billing.  
Monitor cashflow schedule.  
Prepare and maintain schedule of values.  
Manage project retainage.

**4.6 Safety Tasks**

*(Approximately 4-11% of the exam)*

**4.6.1 Manage compliance with OSHA and insurance carrier (Bureau of Workers' Compensation) safety requirements.****Knowledge:**

OSHA training course recommendations  
29 CFR Part 1910.132 -138  
OSHA accident investigation procedures 29 CFR 1904  
Purpose and significance of experience modification rates (EMR) and total recordable incident ratio (TRIR)  
CFR 29 1904: Recording and Reporting Occupational Injuries and Illness

**Skills:**

Document personnel safety training, and track expiration dates.  
Investigate accidents and document consequences or disciplinary actions.  
Post OSHA Form 300A (Summary of work-related injuries) to document and report worksite injuries.  
Maintain records of injuries.