

NFSA Seminar Information

Seminar Title: Layout Technician Training Course

Seminar Description: This two-week course is to take a person with basic knowledge of math, physical science and drafting skills and teach them to be productive basic sprinkler layout and detailing technicians. All of the skills necessary for NICET Level II Certification will be covered by the course.

Duration: 10 days

Number of Modules: 71

Total Instructional Contact Minutes: 3600 minutes (6 CEU, 60 CPD)

Learning Objectives

Day 1 At the end of this day the participant will be able to:

1. Discuss the History of Sprinklers,
2. Describe the Principles of combustion,
3. Identify the Rules Governing Installation, Plan Preparation and Formatting,
4. Describe How Sprinklers Work,
5. Discuss Contracts and Specifications and the Layout Process,
6. Identify the Components and Operation of Wet Pipe and Dry-Pipe Sprinkler systems,
7. Apply Basic Math

Day 2 At the end of this day the participant will be able to:

1. Apply Units of Measure,
2. Identify the Components and Operation of Preaction and Deluge Systems, Public Mains as Water Supplies, Underground Piping, Backflow Prevention,
3. Discuss Types of Construction and Structures,
4. Identify Hazard Classifications

Day 3 At the end of this day the participant will be able to:

1. Differentiate Types of Sprinklers, Spray Sprinkler Spacing and Location (upright, pendent and sidewall),
2. Apply Sprinkler Obstruction Rules for Standard Spray Sprinklers, Extended Coverage Sprinklers, Obstructions to Extended Coverage Sprinklers

Day 4 At the end of this day the participant will be able to:

1. Describe and discuss the rules governing System Configurations, Aboveground Pipe and Fittings, Hangers and Support, Seismic Considerations

Day 5 At the end of this day the participant will be able to:

1. Select Materials for the Job,
2. Discuss the principles of Hydraulic Calculations,
3. Review of First Week

Day 6 At the end of this day the participant will be able to:

1. Apply Hydraulic Calculation to Examples,
2. Describe the requirements for Alarm and Supervision Requirements,
3. Discuss and apply the requirements for Fire Pumps
4. Discuss and apply the requirements for Standpipe System Layout

Day 7 At the end of this day the participant will be able to:

1. Apply Standpipe System Hydraulics,
2. Layout and calculate a Wet Pipe Sprinkler System

Day 8 At the end of this day the participant will be able to:

1. Discuss and apply the requirements for Tanks,
2. Layout and Calculate a Dry-Pipe System

Day 9 At the end of this day the participant will be able to:

1. Identify and apply the requirements for Residential Sprinkler Systems in NFPA 13, 13D and 13R

Day 10 At the end of this day the participant will be able to:

1. Conduct a Plan Review,
2. Describe System Acceptance Testing,
3. Describe and discuss Stock Listing,

Layout Technician Training Course 2012

Subject/Activity	Time (minutes)	Format
Day 1		
1 – Introduction: Seminar and CPFST (include the role of the technician) NFSA and allied organizations (NFPA, NICET, etc.) Students and Instructors (include “fun” fact for contest after lunch)	10 20 20	PPT - 01
<i>BREAK</i>	<i>10</i>	
2 – History of Fire Sprinklers	20	PPT – 02
3 – Principles of Combustion: Combustion Lesson Fuels and extinguishment options Fire Power video	20 20 20	PPT – 03 (tetrahedron in folder) FirePower.mpg
<i>BREAK</i>	<i>10</i>	
4 – Exercise: Covers history and combustion topics	20	DOC - 04
5 – Rules Governing Installation: Code, standards, and their heirarchy NFPA standards process and NFPA 13 organization Exercise: Covers rules governing installation	20 20 20	PPT – 05 DOC – 05
<i>LUNCH</i>	<i>60</i>	
6 – Day 1 Contest: Remembering Classmate Fun Facts	10	
7 – Plan Preparation and Formatting Exercise: Covers views, symbols, and uses	30 20	PPT – 07 DOC – 07♣
8 – Parts of a Sprinkler/How Do They Work?	15	PPT – 08
9 – Layout Process	15	PPT – 09
<i>BREAK</i>	<i>10</i>	
10 – Contracts and Specifications	15	PPT – 10
11 – Common Components (water supplies, valves, FDCs, etc.)	60	PPT – 11
12 – Homework #1: Covers symbols, components, and math	5	DOC – 12♣
<i>BREAK</i>	<i>10</i>	
13 – Math: (optional) Notations, exponents and basic algebra Exercise: Covers notations, exponents and basic algebra Geometry and trigonometry Exercise: Covers geometry and trigonometry	20 25 20 25	PPT – 13 DOC – 13-1♣ DOC – 13-2♣
Total time	570	

8a start, 11:50a lunch, 3:50p math, 5:30p close

Subject/Activity	Time (minutes)	Format
Day 2		
14 – Units of Measure (English and metric, includes flow and pressure)	15	PPT – 14
15 – Wet Pipe Systems and Components <i>**This is an overview, keep detail to a minimum**</i>	15	PPT – 15
16 – Dry Pipe Systems and Components <i>**This is an overview, keep detail to a minimum**</i>	25	PPT – 16
17 – Exercise: Covers wet and dry systems and their components	20	DOC – 17
18 – Preaction and Deluge Systems and Components	15	PPT – 18
<i>BREAK</i>	<i>10</i>	
19 – Public Mains as Water Supplies: What’s available? Evaluating and Adjusting Flow Test Results Exercise: Covers working with flow test data	20 20 25	PPT – 19 Flow Test.wmv Flow Test_045.wmv DOC – 19♣
<i>BREAK</i>	<i>10</i>	
20 – Underground Pipe: Selection, protection and restraint Acceptance testing Exercise: Covers underground pipe including thrust blocks	15 10 20	PPT – 20 DOC – 20
<i>LUNCH</i>	<i>60</i>	
21 – Day 2 Contest: Fire sprinkler roundup (word search)	10	PDF – 21 (folder-copies)
Review Homework #1	30	DOC – 12♣
22 – Backflow: Types of backflow devices Determining type of backflow device needed Installation and orientation issues Exercise: Covers backflow devices, friction loss and testing	40 10	PPT – 21 PPT – 21
<i>BREAK</i>	<i>10</i>	
23 – Types of Construction: Materials and terminology Building codes and types of construction Obstructed and unobstructed construction (NFPA 13) Exercise: Covers types of construction and calculating obstructed construction	60 15	PPT – 23 DOC – 23♣
24 – Hazard Classification Exercise: Covers identifying hazards	15 15	PPT – 24 DOC – 24
25 – Homework #2: Covers underground, flow tests, backflow, and types of construction	5	DOC – 25♣
Total time	490	

8a start, 11:40a lunch, 4:10p close

Subject/Activity	Time (minutes)	Format
Day 3		
26 – Commodity Classification	25	PPT – 26 carton.mpg
Exercise: Covers identifying commodities	15	DOC – 26
27 – Sprinkler Selection	20	PPT – 27
<i>BREAK</i>	10	
28 – Upright and Pendent Spray Sprinkler Spacing: Distances between sprinklers, distances from walls, and maximum coverage areas	30	PPT – 28
Exercise: Covers distances and area of coverage	30	DOC – 28-1 ♣
Small room rule	10	
Exercise: Covers using the small room rule	10	DOC – 28-2 ♣
Distances from ceilings, ceiling pockets, and elevation changes	35	
Exercise: Covers distances from the ceiling	40	DOC – 28-3 ♣
<i>LUNCH</i>	60	
29 – Day 3 Contest: Sprinkler BINGO	10	PDF – 29 (folder-copies)
Review Homework #2	20	DOC – 25
30 – Sprinklers and Heat Sources	15	PPT – 30
Exercise: Covers distances needed from heated objects	15	DOC – 30 ♣
31 – Beam Rule	10	PPT – 31
Exercise: Covers applying the beam rule	15	DOC – 31 ♣
32 – Three Times (3X) Rule and Miscellaneous Obstruction Rules	15	PPT – 32
Exercise: Covers applying the three times rule and others	10	DOC - 32 ♣
<i>BREAK</i>	10	
33 – Sidewall Standard Spray Sprinklers		PPT – 33
Spacing of sidewall sprinklers	10	
Obstructions to sidewall sprinklers	5	
Exercise: Covers sidewall sprinklers locations	10	DOC – 33 ♣
34 – Extended Coverage Sprinklers (includes obstructions)	15	PPT – 34
Exercise: Covers extended coverage sprinkler locations	20	DOC – 34 ♣
35 – Homework #3: Covers spacing of standard spray upright/pendent sprinklers, sidewall sprinklers and extended coverage sprinklers	5	DOC – 35 ♣
Total time	470	

8a start, 11:45a lunch, 3:50p close

Subject/Activity	Time (minutes)	Format
Day 4		
36 – System Configurations	15	PPT – 36
37 – Pipe and Fittings Exercise: Covers piping materials for sprinkler systems	45 15	PPT – 37
<i>BREAK</i>	10	
38 – Hangers Components and listing requirements Hanging branch lines and armovers Hanging mains and supporting risers Trapeze hangers Exercise: Covers locating and calculating hangers	60 20	PPT – 38 DOC – 38
<i>BREAK</i>	10	
39 – Seismic Protection Seismic requirements from the building codes Exercise: Covers determining the seismic design category (SDC) and force factors Flexibility and clearance requirements Exercise: Covers where flexibility and clearance need to be applied	20 10 20 15	PPT – 39 building shaking.mpg DOC – 39-1 DOC – 39-2
<i>LUNCH</i>	60	
40 – Day 4 Contest: Acronym Game	10	DOC – 40
Review Homework #3	30	DOC – 35
41 – Seismic Sway Braces Sway bracing materials and tentative spacing Exercise: Covers allowed materials and tentative brace spacing Calculating sway brace loads and determining sway brace component capacities	20 15 25	PPT – 41 DOC – 41-1♣
<i>BREAK</i>	10	
41 – Seismic Sway Braces (<i>continued</i>) Exercise: Covers sway brace loads Seismic restraint requirements Exercise: Covers seismic restraint Retrofit requirements for seismic	25 5 10 5	PPT – 41 DOC – 41-2♣ DOC – 41-3
42 – Exercise: Covers seismic protection cumulatively	30	DOC – 42♣
43 – Homework #4: Covers hangers and seismic protection	5	DOC – 43♣
Total time	490	

8a start, 12p lunch, 4:10p close

Subject/Activity	Time (minutes)	Format
Day 5		
44 – Choosing Materials for the Job	20	PPT – 44
45 – Job Coordination	10	PPT – 45
46 – Hydraulic Principles		PPT – 46
Types of pressure including elevation pressure	35	
Flow continuity and friction loss calculations		
Exercise: Covers pressures, flow, and friction loss	20	DOC – 46-1
Flow and pressure from an orifice	10	
Exercise: Covers calculating flow and pressure from openings	20	DOC – 46-2
<i>BREAK</i>	10	
47 – Introduction to Hydraulic Calculations	40	PPT – 47
Determining flow from sprinklers using density/area curves		
Determining flow from sprinklers for other sprinklers		
Determining the remote area		
Exercise: Covers using the density/area curves and flows from sprinkler listings	30	DOC – 47
<i>BREAK</i>	10	
48 – Room Design Method and Other Calculation Methods	15	PPT – 48
Exercise: Covers using the room design method	15	DOC – 48♣
<i>LUNCH</i>	60	
49 – Day 5 Contest: Sprinkler System Jeopardy (rules in DOC-49)	10	PPT – 49 DOC – 49
Review Homework #4	40	DOC – 43
<i>BREAK</i>	10	
50 – Remote Areas and Flow Paths		PPT – 50
Determining the design area	40	
Creating calculation flow paths		
Exercise: Covers remote areas and flow paths	15	DOC – 50-1♣
Determining branch line k-factors	15	
Exercise: Covers calculating k-factors	15	DOC – 50-2♣
51 – Review of Week 1	10	PPT – 51
52 – Homework #5: Covers hydraulics and a sample test	5	DOC – 52♣
Total time	455	

8a start, 11:55a lunch, 3:35p close

Subject/Activity	Time (minutes)	Format
Day 6		
53 – First Hydraulic Calculation Example Determine design area and flow paths Calculate first branch line and effective k-factor Calculate remainder of the system	120	PPT – 53
<i>BREAK</i>	10	
54 – Fire Alarms and Supervision NFPA 13 and NFPA 72 alarm requirements and initiating devices Alarm versus supervisory signals Exercise: Covers alarms and types of signals	30 10	PPT – 54 DOC – 54
<i>BREAK</i>	10	
55 – Fire Pumps Introduction to pumps, pressures, and laminar flow Centrifugal fire pumps and components Exercise: Covers determining net pressure and discharge pressure as well as identify fire pump components Suction piping and the pump room/house Discharge piping and test arrangements <i>**Slide #51 in PPT – 55 has the key in the notes section**</i> Exercise: Covers pump room materials, suction piping and discharge piping	30 10 40 15	PPT – 55 DOC – 55-1 DOC – 55-2
<i>LUNCH</i>	60	
56 – Day 6 Contest: Name and State Game	10	DOC - 56
Review Homework #5	30	DOC – 52
57 – Fire Pump Sizing Exercise: Covers sizing fire pumps	30 20	PPT – 57 DOC – 57
<i>BREAK</i>	10	
58 – Introduction to Standpipe Systems Classes and types of systems Location of hose connections Exercise: Covers identifying standpipe components and locating outlets	40 15	PPT – 58 DOC – 58♣
59 – Homework #6: Covers fire pumps and standpipe systems	5	DOC – 59♣ PDF – 59
Total time	495	

8a start, 12:35p lunch, 4:15p close

Subject/Activity	Time (minutes)	Format
Day 7		
60 – Standpipe Systems Interconnection, pipe sizes, minimum/maximum pressures, and hydraulic calculation of standpipes Exercise: Covers calculating standpipes	10	PPT – 60
Components and appurtenances as well as zones	15	PDF – 59♣ (from HW6)
Exercise: Covers zones and maximum pressures	15	DOC – 60-2♣
61 – Changes to the Work	15	PPT – 61
<i>BREAK</i>	10	
62 – Wet Pipe System Layout		DOC – 62 (instructor's sheet in overheads folder)
I. Specifications and introduction	10	
II. Define the hazard	5	
III. Analyze the structure	10	
IV. Water supply	15	
V. Select the system type	5	
VI. Select the type of sprinkler	5	
<i>BREAK</i>	10	
62 – Wet Pipe System Layout (continued)		DOC – 62 (instructor's sheet in overheads folder)
VII. Sprinkler spacing	30	
VIII. Piping	15	
IX. Hangers	5	
X. Seismic considerations	5	
XI. System connections	10	
XII. Hydraulics	45	
XIII. Homework summary	5	
<i>LUNCH</i>	60	
63 – Day 7 Contest: Hangman (use whiteboard or easel)	10	DOC – 63
Review Homework #6	20	DOC – 59♣
64 – Stocklisting	40	PPT – 64
65 – Homework #7: Covers wet system plan and calculation	5	Grading: DOC – 65 Overhd – 62♣
Total time	390	

8a start, 12:15p lunch, 2:30p close

Subject/Activity	Time (minutes)	Format
Day 8		
66 – Scheduling	10	PPT – 66
67 – Tanks Atmospheric tanks, elevated tanks, and pressure tanks Connections to tanks and heating requirements Exercise: Covers sizing and pressure	40 15	PPT – 67 DOC – 67
<i>BREAK</i>	<i>10</i>	
68 – Dry Pipe System Layout I. Specifications and introduction II. Define the hazard III. Analyze the structure IV. Water supply V. Select the system type VI. Select the type of sprinkler	10 5 15 40 5 10	DOC – 68 (instructor's sheet in overheads folder, PPT – 68 in folder: dry sys estimate)
<i>BREAK</i>	<i>10</i>	
68 – Dry Pipe System Layout (continued) VII. Sprinkler spacing VIII. Piping	35 40	DOC – 68 (instructor's sheet in overheads folder)
<i>LUNCH</i>	<i>60</i>	
69 – Day 8 Contest: Scrabble	10	
Review Homework #7	20	DOC – 65
68 – Dry Pipe System Layout (continued) IX. Hangers X. Seismic considerations XI. System connections XII. Hydraulics XIII. Homework summary	5 0 5 45 5	DOC – 68 (instructor's sheet in overheads folder)
<i>BREAK</i>	<i>10</i>	
70 – Plan Submittal	10	PPT – 70
71 – Homework #8: Covers dry system plan and calculation	5	Grading: DOC – 71 Overhd – 68♣
Total time	420	

8a start, 12:05p lunch, 3p close

Subject/Activity	Time (minutes)	Format
Day 9		
72 – Residential Sprinkler Systems Introduction, components and UL 1626 Exercise: Covers general residential sprinkler use	60 15	PPT – 72 RES Spray Pattern.mpg SSP-spray pattern.mpg DOC – 72-1
<i>BREAK</i>	10	
72 – Residential Sprinkler Systems (continued) Guidelines under NFPA 13 Exercise: Covers examples with NFPA 13 systems Guidelines under NFPA 13D Exercise: Covers applying NFPA 13D	20 25 20 15	PPT – 72 DOC – 72-2♣ DOC – 72-3♣
<i>BREAK</i>	10	
72 – Residential Sprinkler Systems (continued) Guidelines under NFPA 13R Exercise: Covers applying NFPA 13R Summary	20 15 5	PPT – 72 DOC – 72-4♣
73 – Layout NFPA 13D system in house	30	PDF – 73♣
<i>LUNCH</i>	60	
74 – Day 9 Contest: Match Game (pieces can be found in a folder)	10	DOC – 74
Review Homework #8	60	DOC – 71♣
<i>BREAK</i>	10	
73 – Layout NFPA 13D system - calculations	60	PDF – 73♣
75 – Homework #9: Covers layout and calculation of NFPA 13R system	5	PDF – 75♣ (spec sheet)
Total time	450	

8a start, 12:05p lunch, 3:30p close

Subject/Activity	Time (minutes)	Format
Day 10		
76 – Plan Review Exercise: Review homework as a class for “plan review” **Use check list**	15 60	PPT – 76 DOC – 76
<i>BREAK</i>	10	
77 – Acceptance Testing Exercise: Covers acceptance testing	30 15	PPT – 77 DOC – 77
78 – Existing Building Surveys	15	PPT – 78
79 – Layout Technician Training Course Review	10	PPT – 79
80 – Program Evaluations	15	
81 – Certificate Distribution	10	
Total time	180	

8a start, 11a close