



Certified Roofing Torch Applicator Program



Torch-applied Roof System Safety Recertification Teaching Notes



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Certified Roofing Torch Applicator Program
Torch-applied Roof System Safety

Recertification Teaching Notes

PROGRAM INTRODUCTION

SECTION INTRODUCTION

OBJECTIVES

Upon completion of this introductory unit, participants will be able to:

1. Describe the workshop objectives
2. Describe the purposes of the CERTA program

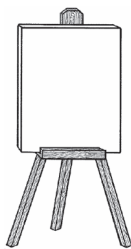
TIMING

This unit is divided into three parts:

- A. Welcome (5 minutes)
- B. Icebreaker (10 minutes)
- C. CERTA Trivia: Hit or Myth? (15 minutes)

Total Unit Time: 30 minutes

MATERIALS



Flip chart and markers



Student manuals



Loose coins



Small prize or candy for icebreaker winner (optional)

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A	Welcome (5 minutes) <i>Before starting the session, write the workshop objectives on flip-chart paper and post them in the front of the classroom.</i>	
		Welcome participants to the class, and emphasize the importance of their active participation during the training. Introduce yourself, and provide your credentials and related industry experience. Provide the following administrative details: • Review the overall workshop objectives listed on the flip chart. • Describe locations of restrooms and refreshments. • Explain the program start and stop times. • Explain your break schedule and classroom policies. • Request all class members turn off their pagers and cell phones or put them on vibrate mode. • Explain to all participants that to become recertified, they must pass a final written exam and a torching performance test during the hands-on portion of the program. Explain that for a worthwhile and enjoyable learning experience to occur, students should: • Ask a question when they have one • Feel free to share an experience that relates to a topic that is being taught • Request an example if a point is not clear • Approach you during lunch or a break to arrange an oral exam for a later time if they think they may have difficulties completing a final written exam
B	Icebreaker (10 minutes) <i>Refer to Roofers Society of Truth and Lies to lead this icebreaker.</i>	
		Direct the class to turn to page 3 (Spanish page 3) of the student manual to find the section titled Icebreaker: Roofers' Society of Truth and Lies. Review instructions with the class, and facilitate the icebreaker. Instructions for this exercise are found on page 3 in this instructors guide.
C	CERTA Trivia: Hit or Myth Review Exercise (15 minutes)	
		Instruct students to turn to page 4 (Spanish page 4) of the student manual to find the exercise titled CERTA Trivia: Hit or Myth? Explain students have five minutes to review the five statements and answer the five questions. Tell students to stop writing after five minutes. Call on individual students to read one statement at a time, asking them to share their answers. Challenge students to further explain their responses. Progress through the entire list until all five have been reviewed.

Icebreaker Facilitation Instructions: Roofers' Society of Truth and Lies

Each person takes a turn guessing if another person's story about using a roofing torch is the truth or a lie. If both players are correct, both advance. If both are incorrect, both advance. If only one player is correct and one is wrong, the incorrect person is out of the competition.

Facilitation instructions:

1. First, tell players they each will need a coin. If someone does not have one, lend one for this icebreaker.
2. Tell players to pair up with an initial partner, preferably someone they do not know well. One partner flips a coin and does not reveal the coin toss result to his or her partner.
3. Tell players if their coin reveals "heads," they tell the truth; if "tails," they make up a story, or lie.
4. Tell players they need to swap stories with their partner about an experience they had using a roofing torch. The first partner does not reveal if the story was true or a lie until both partners have told their stories. Each partner must then guess whether the other partner's story was true.
5. Tell players that if both partners guess correctly, they move on and each finds another partner. If both partners guess incorrectly, they also move on and each finds another partner. However, if one partner guesses correctly and one incorrectly, the person who guessed incorrectly is out.
6. Tell players to repeat steps one through three until only one person remains and is declared the winner.
7. Give the winner a prize, if desired.

Icebreaker activity provided courtesy of:
High-Energy, High-Impact, Business Training Solutions
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9015 Katie Court
Port Tobacco, MD 20677
www.businesstrainingworks.com



Example Answers to CERTA Trivia: Hit or Myth?

Statement 1: When I follow the safety practices for installing torch-applied roof systems, the quality of my workmanship suffers.

☐ True ☒ False

Why or why not?

High-quality workmanship can be attained when following the safety practices. If you are not used to installing torch-applied roof systems using these procedures, you may need to practice these skills to achieve quality workmanship, thus requiring more time at first to do installations. These skills also require more forethought during installation to avoid direct application of an open flame toward hazardous areas.

Statement 2: When I install torch-applied roof systems, I am more aware of potential fire hazards than I was before completing my CERTA training.

☒ True ☐ False

Why or why not?

CERTA training provides an increased awareness of common hazardous areas and how fires start when using a roofing torch. And the training provides methods for using a roofing torch that help reduce the risk of fires.

Statement 3: I don't have to worry about fire hazards when using a roofing torch to dry an area of a roof.

☐ True ☒ False

Why or why not?

Any time an open flame is directed toward a roof surface, a hazard is created. An open flame can react to blowing wind or negative building pressures and be sucked into openings and vents or other hazardous areas without being noticed, thus starting a fire.

Statement 4: Using the torch-and-flop method at flashing details and for installing field plies at edges and walls is an effective way to reduce risks of fire.

☒ True ☐ False

Why or why not?

The best way to reduce the risk of starting a fire is to never direct a flame at edges, walls or flashing details.

Statement 5: I am a better roofing worker because of what I have learned in the new CERTA program.

☒ True ☐ False

Why or why not?

Participants have an increased awareness of and can better recognize the hazardous areas where fires start when using a roofing torch. But more important, they learn what to do to avoid starting a fire when they recognize a hazard.

**Section
1**

SAFETY PRACTICES FOR TORCH-APPLIED ROOF SYSTEM APPLICATION

SECTION INTRODUCTION

OBJECTIVES

Upon completing this section, participants will be able to:

1. Explain the purpose of each published safety practice
2. Identify the safety practice that best applies to given situations

TIMING

This section is divided into two parts:

- A. Review of published safety practices (15 minutes)
- B. Safety practices review exercise (15 minutes)

Total Unit Time: 30 minutes

MATERIALS

Student manuals

FACILITATION GUIDE

A Review of Published Safety Practices (15 minutes)



Tell students to turn to **page 5 (Spanish page 5)** of their student manuals.

Direct one student to read the first safety practice.

Ask the student to explain why the safety practice is important and how it helps reduce the risk of fire.

Continue having students read the remaining safety practices, one per student, until all safety practices have been read and discussed.

Expected student explanations and comments for each safety practice:

- 1.1. Completing a daily checklist helps identify possible hazards before starting work each day. Hazards can change from one day to the next, so completing the list at the start of every day is important.
 - 2.1.1. Reviewing possible hazards daily with the building owner provides an opportunity to identify combustible building components only the building owner may be aware of. It also provides an opportunity to let a building owner know what to do to eliminate a present hazard that a roofing contractor should not be responsible to correct.
 - 2.1.2. When combustible building components are identified, the checklist provides an opportunity to document the hazards and prescribe which best practice will help minimize or eliminate the hazards.
- 2.2. Having two 4A60BC fire extinguishers close at hand allows for an immediate response to extinguish a detected fire before it has a chance to increase in intensity. Two fire extinguishers will extinguish twice as much as a single fire extinguisher, and with two on hand, one can serve as a backup should the other extinguisher fail.
- 2.3. Knowing how to use a fire extinguisher is the best way to ensure its effectiveness. It is best for everyone to know because it could be anyone on the roof who first notices a fire.
- 2.4. Inspecting before using a torch in these areas helps prevent igniting combustible substances by providing an opportunity for someone to remove them.
- 2.5. If a fire occurs, stressful situations ensue that make it difficult to find a telephone and identify the number to call in case of an emergency.
- 2.6. Some state or local building codes and ordinances may require obtaining a burn permit; may not allow the storage of propane cylinders on a roof overnight; or may not allow propane cylinders on a roof under any circumstances. There may be other hazards on adjacent properties a roofing worker may not be aware of, so it is important to comply with these codes and ordinances.
- 2.7. Combustible substrates could mean a type of wood deck or a combustible type of roof insulation such as polyisocyanurate. Torchign over these materials should never occur directly, even with a base sheet in place, without a thermal barrier to help reduce the risk of setting the combustible material on fire.
- 2.8. Combustible flashing components will always require some form of protection, or encapsulation, that prevents an open flame from coming in contact.
 - 2.8.1. Using the torch-and-flop method for installing flashings is an effective method because it significantly reduces the risk of exposing combustible components to direct contact with an open flame.
 - 2.8.4. Limited direct torching of flashing systems only is allowed using a single-burner, low-output (105k Btu or less) "detail" torch and providing a backer ply with sealed laps is first installed.
- 3.1. Insurance companies and building owners, as well as some local building code agencies, may require the CERTA certification to use a roofing torch for any purpose.
- 3.2. Eliminating direct torching to any combustible material is an effective method because it reduces the chance of exposing combustible components to direct contact with an open flame.
- 3.3. Some roofing jobs have areas of the roof that hide certain hazards—for example, openings under door thresholds or under metal siding, where an open flame could be drawn under and start a fire.
- 3.4. Too often, roofing torches show up on job sites without a stand. Everyone wants to get a job done, but using a torch without a stand can damage a roof and potentially start a fire.
- 3.5. Walking away from a lit torch is like walking away from a bomb with a lit fuse thinking you will get back in time to extinguish it before it explodes. Too many things can happen to an unattended lit torch: It can flop over on its own and start the roof membrane on fire; the flame can blow out, allowing raw gas to pour onto the work area

A	Review of Published Safety Practices (continued)
and create an explosion hazard; another person may not see the open flame and walk directly into it, causing severe burns. Never leave a lit torch unattended. 4.1. A competent person—that is, someone trained on the specific hazards and skills needed to conduct a fire watch—must always stay on the roof for a minimum of two hours after the last torch is shut off, regardless of the time of day or night. Many smoldering fires can take this long before they burst into flame or even longer if it is windy or the roof is constructed of old materials.	

B	Safety Practices Review Exercise (15 minutes)
	Tell students to turn to page 7 (Spanish page 7) of their student manuals. Direct one student to read the first statement and then choose the safety practice listed that best matches the statement. Tell all students to write the correct answer in the line next to each statement. Continue having students read the remaining statements, one per student, until all statements have been read and answered. Discuss each student's response to the extent time allows. The correct answers are provided on the next page.

Safety Practices Review Answer Key

- A. 2.7.1. I am installing a new roof using a roofing torch. The deck is made of plywood. I know I need to install a thermal barrier first.
- B. 3.3 I need to torch a small piece of flashing under a door threshold, but I cannot see what is under the door or siding. I should not use a torch. Instead, I will install the flashing using the proper cold-applied adhesive.
- C. 2.1.1 Before we started working today, our foreman talked with the building owner. It is a good thing he did because the owner's warehouse guys stored some flammable solvent on a shelf against a wall right under where we were planning to torch today. That could have been a disaster!
- D. 2.4 We pulled an old exhaust fan off a curb so the new flashing material would fit under its flange. When we pulled off the fan, we found three old bird nests under the hood. They could have caught fire had we not found them.
- E. 2.6 Our superintendent stopped by the torching job this morning and posted a city burn permit on the door leading out to the roof.
- F. 2.3 A small fire started smoldering under an eave where a gutter ran into a chimney. It was easy to put out the fire with a fire extinguisher. There was no damage, and we only had to clean off the white powder. I'm glad we knew how to use a fire extinguisher and we avoided a big fire!
- G. 3.4 The stand was broken off the torch my foreman gave me to use. I fixed the stand before relighting the torch.
- H. 3.1 My boss is able to get good insurance to do torching work, and I can get more work because I got certified in the CERTA program.
- I. 1.1 Before we started working today, our foreman walked over the section of the roof he was planning to do and filled out some important paperwork. I know it is important to go over this checklist every day because conditions can change from one day to the next.
- J. 2.8.4.1 I am installing flashings on a parapet wall. There is a wood nailer in the brick near the old wood deck. I know I need to cover this flashing area first with an approved backer ply.
- K. 3.5 My foreman told me to go down to the truck and bring up a box of tin-capped nails so we can nail the flashings. I will do this to my torch before I go down to the truck.
- L. 2.5 My foreman told the crew he programmed the telephone number of the local fire department into his cell phone in case there is an emergency.
- M. 3.2 I have to torch materials over a concrete wall. There is a louvered vent coming out of the wall where I have to work. I will cover the entire vent using a fire blanket to make sure no flames get into the opening.
- N. 2.1.2 I found an old unused wood curb hidden under a metal counterflashing in an area where everything else was metal. I will address this hazard by removing the old wood curb before using a torch.
- O. 4.1 My company put me through special training to help identify hidden fires that sometimes smolder under a roof. I call these areas "hot spots." I stay on a roof at least two hours after we shut off the last torch. I watch for hot spots, smoke or other clues a fire might be smoldering.
- P. 2.2 I am working with a crew of six to install torch-applied flashings near the northwest corner of a roof. When we are working close together, we need two fire extinguishers present. But when I work alone on another area of the roof, I need two fire extinguishers just for my torch.
- Q. 2.8.4.2 I am installing torch-applied flashings around an air-conditioner curb. The curb is metal. I installed a backer ply (either hot-mopped or self-adhered) with sealed laps. I now can carefully install the flashing strips onto the curb using a small detail torch and the direct-torching method.

Section 2 HAZARD IDENTIFICATION

SECTION INTRODUCTION

OBJECTIVES

Upon completing this unit, participants will be able to:

1. Identify common fire hazards encountered during roofing applications
2. Prescribe application methods that reduce fire risk when torching near hazardous areas

TIMING

This unit consists of three sections:

- A. Student Hazard Identification Exercise (10 minutes)
- B. Class Review of Hazard Identification Exercise (20 minutes)
- C. Set Up Participants for Hands-on Exercise (6 minutes)

Total Unit Time: 36 minutes

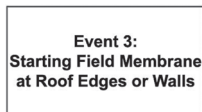
MATERIALS



Student manuals

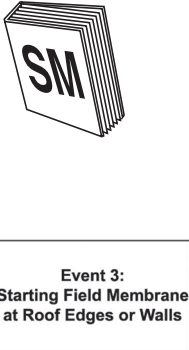


Clock with second hand, or stopwatch



One event card for each participant

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A	Student Hazard Identification Exercise (10 minutes)	
		Direct the students to turn to page 8 (Spanish page 8) of their student manuals. Explain that there are 20 pictures. Students are to look at each picture; identify what they think is the fire hazard being represented; and write a brief description of the hazard on the lines next to each picture. Direct students also to write what they think they should do to reduce the fire hazard. Ask a student to review and read the first example picture and answer given on page 8 (Spanish page 8). Confirm their understanding of the exercise by asking if anyone has a question about the instructions. Tell students they have 10 minutes to complete the exercise and you will time the exercise. Do not mention that you will be conducting a review of their answers. Time the exercise. Call out STOP when the 10 minutes has elapsed.
B	Class Review of Hazard Identification Exercise (20 minutes)	
		Tell a student to read his or her answer to picture No. 2. Ask the student to explain why the course of action described in his or her answer could reduce the fire hazard. Use good questioning skills when conducting this type of review. Continue around the room, having the rest of the students read the remaining answers, one per student, until all pictures and descriptions have been read and discussed.
C	Set Up Participants for Hands-on Exercise	
		Photocopy, cut out and stack the event cards (one for each participant) into a deck. Event cards are found on page 23 of this instructors guide. Shuffle the cards to create a random order of events. Tell participants they each will be required to complete four hands-on exercises, including: 1. Lighting a torch (Event 1) 2. Flashing torch and flop (Event 2) 3. An event card assignment 4. Shutting off the torch (Event 8) Direct participants to pages 21 and 22 (Spanish pages 21 and 22) in the appendix of their student manuals and have them remove the Hands-on Performance Evaluation Form. Tell participants to write their name as the torch operator and the training date at the top of the evaluation form. Instruct students to each draw one card from the deck. This provides each student with an event assignment. One or two students may receive an Event Wild Card. Allow these students to choose the event they wish to perform, only allowing them to choose between events three through seven.

		Tell students to write their event number at the top of the evaluation form. Count off students and break them into four teams numbered 1 through 4. For a 20-person session, the result will be four teams of five people. Remind students to remember their team number.
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HANDS-ON TRAINING REQUIREMENTS, POLICIES AND PROCEDURES

SECTION INTRODUCTION

The hands-on section of this CERTA recertification program is essentially the same as the original CERTA applicator program. The only significant difference is that students will be required to perform only four torch-and-flop exercises, randomly chosen, whereas they were required to perform eight exercises in the original program.

OBJECTIVES Upon completing this unit, instructors will be able to:

1. Set up mock-up stations, materials and equipment for hands-on exercises
2. Conduct hands-on exercise demonstrations
3. Supervise and evaluate participants' performance of hands-on exercises
4. Conduct an overall program wrap-up review

TIMING This unit is divided into four sections:

- A. Hands-on workstation setup
- B. Instructor demonstrations
- C. Participant exercises
- D. Program wrap-up

Total Unit Time: 120 minutes (2 hours)

MATERIALS



Scheduled materials and equipment checklists



Torching equipment (from checklist), circular saw, hammer, carpenters square, screw gun

Hands-on Exercises Schedule

Event		
8	Hands-on Instruction: Instructor Demonstrations of Torch Lighting	4 minutes
	8-1: Lighting Procedures	2 minutes
	8-2: Shutting Down Torch	2 minutes
9	Hands-on Instruction: Instructor Demonstration of Applying Self-adhering Base Ply	5 minutes
10	Hands-on Instruction: Instructor Demonstration of Flashing Torch and Flop	10 minutes
11	Hands-on Instruction: Instructor Demonstration of Field Torch-and-flop Applications	20 minutes
	11-1: Starting Rolls at Roof Edges or Walls	5 minutes
	11-2: Interior Roof Drain	6 minutes
	11-3: Penetration	5 minutes
	11-4: Finishing Rolls at Roof Edges or Walls	4 minutes
12	Hands-on Instruction: Participant Torch Exercise Rotation and Evaluation	76 minutes
	12-1, Station 1 and 2: Flashing Torch and Flop	38 minutes
	12-2, Station 3 and 4: Field Applications Torch and Flop	38 minutes
13	Program Wrap-up	5 minutes
	Total Hands-on Exercises Scheduled Time	120 minutes (2 hours)

FACILITATION GUIDE

A	Hands-on Workstation Setup	
	(Prepare before conducting training session.)	
	Materials and Equipment Lists 	Identify the training location, and be sure it will meet all the safety requirements (e.g., ventilation, fire protection). Gather all materials, tools and equipment together for the training session. Use the table provided at the end of this section. Decide on mock-up locations, taking into consideration all safety requirements. Weather permitting, always try to conduct hands-on exercises outdoors, but have a backup location identified in case the weather does not cooperate. Build mock-ups. You will provide four fully equipped mock-up stations for students to perform hands-on training exercises. Refer to mock-up drawings on pages 19 to 22 of this section. Basic roof deck mock-ups are constructed using 2x4 dimensional lumber, ½-inch plywood and high-density wood fiberboard roof insulation. Flashing boxes are constructed of 2- by 12-inch or 2- by 14-inch dimensional lumber.

	Materials and Equipment Lists	Roll out heavy fiberglass base sheets to protect concrete floors. Extend the sheets a minimum of 3 feet beyond each side of where the roof deck and flashing box mock-ups will be set after the sheets are laid. Place propane cylinders a minimum of 10 feet from each workstation. Place two 4A60BC fire extinguishers centrally located near the mock-up stations. Prepare all torching equipment. Assemble torch assemblies, and test them for leaks. Or, if you decide to extend the shop time, you may have participants do the assembling and leak testing under your supervision. Distribute all roofing materials at each workstation. Pre-cut enough base plies and flashing strips before a session. There will only be time for participants to do this as part of their exercise if you extend the time. Cutting flashing membranes is not a skill this program addresses.
B Conduct Hands-on Exercise Demonstrations Total 40 minutes Have students read aloud the step-by-step instructions to you during your demonstration. The instructions can be found in the evaluation checklist on pages 21 and 22 (Spanish pages 21 and 22) of the student manual.		
8		<u>Event 8 (4 minutes)</u> 8-1: 2 minutes: Demonstrate proper torch-lighting procedures. 8-2: 2 minutes: Demonstrate proper torch shutdown procedures.
9		<u>Event 9 (5 minutes) (stations 1 or 2)</u> Demonstrate proper application of self-adhering base ply with a focus on ensuring sealed laps, using the flashing box mock-up.
10		<u>Event 10 (10 minutes) (stations 1 or 2)</u> Demonstrate flashing torch-and-flop application using the flashing box mock-up.
11		<u>Event 11 (20 minutes) (stations 3 or 4)</u> 11-1: Demonstrate proper starting of field membrane rolls at roof edges or walls. 11-2: a. Demonstrate the proper torch-and-flop method for going around a pipe penetration. b. Demonstrate the proper torch-and-flop method for installing a target flashing sheet around an interior drain. 11-3: Demonstrate the proper torch-and-flop method for installing field sheet over the drain penetration. 11-4: Demonstrate the proper torch-and-flop method for ending field membranes at roof edges or walls.

C	Supervise and Evaluate Participants' Performance of Hands-on Exercises Total 75 minutes (1 hours, 15 minutes)	
12	 Hands-on Exercise Evaluation Forms	Explain to participants they can fail the hands-on part of this course. They are being evaluated by their peers on how well they perform their torching events following the listed criteria on the evaluation form. Although there are 66 individual listed items, <i>each participant only needs to complete the items listed for the following events:</i> 1. Lighting a torch (Event 1—nine items) 2. Flashing torch and flop (Event 2—seven items) 3. An event card assignment (number of items varies) 4. Shutting off the torch (Event 8—five items) Explain Reasons for Failure. Reasons for automatic failure include: 1. Smoking within 50 feet of a propane cylinder 2. Scoring a 1 on any one of the seven “never touches the _____ with a flame” items 3. Injuring himself or herself or another participant, whether intentional or not 4. Engaging in unruly behavior or misconduct as determined by the authorized instructor A participant also fails this hands-on evaluation if he or she scores a 1 on 12 or more items. Position each team at one of the four workstations. Field mock-ups will use field-sized torch assemblies, and flashing box mock-ups will use detail-sized torch assemblies. Explain that each team has 38 minutes to complete the events at the workstation. That means for a team of five, each participant has about seven and one-half minutes to perform his or her events for that workstation. Rotate participants at their workstation until all team members have finished their events. Tell students to evaluate one another in a positive and constructive manner, providing feedback to the torch operator. Remind them they should not inject personal opinions about ways they were taught or shortcuts they may know nor should they suggest that their experience is a better way to do a task. Remind each team that feedback needs to be objective, constructive and positive in tone. Monitor each group's evaluation feedback to ensure positive, constructive feedback is being given. You may also add your own feedback.

		Explain to the evaluators they need to agree on a performance grade for the torch operator for each item and circle the appropriate number for each item listed. If an operator performs poorly, discuss with the other team members how to assist the operator as time allows. The objective here is to teach operators safe torching habits. Keep a close eye on all exercises, and maintain order. Do not allow horseplay or other inappropriate behavior.
12-1		Station 1 and 2: Flashing torch-and-flop exercise with flashing boxes— 38 minutes simultaneous with event 12-2 Participant 1—performs the flashing torch-and-flop application by following the step-by-step instructions on the evaluation form. This will include properly lighting and shutting down a torch assembly. Participant 2—performs fire-watch duty while others are torching. Performs no other duties during the fire watch. This person has the authority to stop an exercise if a fire risk is observed. Participants 3, 4 and 5—observe that participant 1 is performing the torching sequence properly following the step-by-step instructions on the evaluation form. This includes never allowing a flame to touch a flashing box. At the end of the first 38-minute exercise, groups exchange places with workstations 3 and 4 to begin the second round of simultaneous exercises.
12-2		Stations 3 and 4: Field mock-up exercise for starting and ending rolls and installing around penetrations using flat field mock-ups— 38-minute exercise simultaneous with 12-1 Participant 1—performs only the torch-and-flop field application tasks listed on the event card, following the step-by-step instructions provided on the evaluation forms. These tasks include: • Starting rolls at a roof edge or wall • Installing a target sheet over the roof drain area • Installing the field membrane over the roof drain area • Installing the field membrane around a pipe penetration • Ending the roll at a roof edge Participant 2—performs same fire-watch duty as described in 12-1. Participants 3, 4 and 5—conduct evaluations as described in 12-1.

D	Program Wrap-up (5 minutes)	
13		Instruct participants to fill out the program evaluation form found on pages 23 and 24 (Spanish pages 23 and 24) in the appendix of their student manuals. Encourage participants to fill out these forms and email them to CERTAadmin@nrca.net or mail them to NRCA. Confirm you have all the personal information you will need to complete your roster sheet. Inform participants you will distribute their recertification cards as soon as you receive them. Remember the tasks you need to do: Grade their exams, tabulate their torching performance evaluation forms, submit the session roster, and wait two to four weeks for NRCA to process and mail the recertification cards to you. Thank everyone for participating.

Equipment and Materials Requirements

Hands-on Training Mock-up Construction Materials

√	Quantity	Unit	Description
			Mock-up Construction
	192	Square feet	¼-inch fiberglass mat-faced gypsum core panel
	3	Sheets	4-foot-by-8-foot-by-½-inch CDX plywood
	15	Each	2x3 or 2x4 dimensional lumber by 45-inch length
	6	Each	2x3 or 2x4 dimensional lumber by 8-foot length
	2	Each	2- by 12- or 14-inch construction-grade dimensional lumber by 12-foot length
	150	Each	1¼-inch general purpose screws
	100	Each	16 penny nails
	50	Each	¾-inch tin-capped roofing nails
	2	Each	9-inch metal pie tins, large coffee cans or galvanized tall cone flashing
	2	Each	4-inch-diameter steel pipe by 10- or 12-inch length
	2	Each	½-inch plywood circles cut to 4-inch O.D. pipe size
	2	Each	12-inch wood screws

Hands-on Training Roofing Materials

			Roofing Materials: 20 participants
	1	Roll	Heavy fiberglass base sheet (#75-type)
	1	Roll	Self-adhering smooth-surfaced polymer-modified base sheet
	3-4	Rolls	APP polymer-modified bitumen membrane—smooth or granulated
	8	Each	Wood-fiber cant strips—3-foot lengths
	1	Box	Arrow T-50 staples for staple gun (or equivalent)
	10	Each	Hooked blades for roofing knives
	1	Bottle	Liquid soap (for leak-detecting solution)

Hands-on Training Roofing Equipment

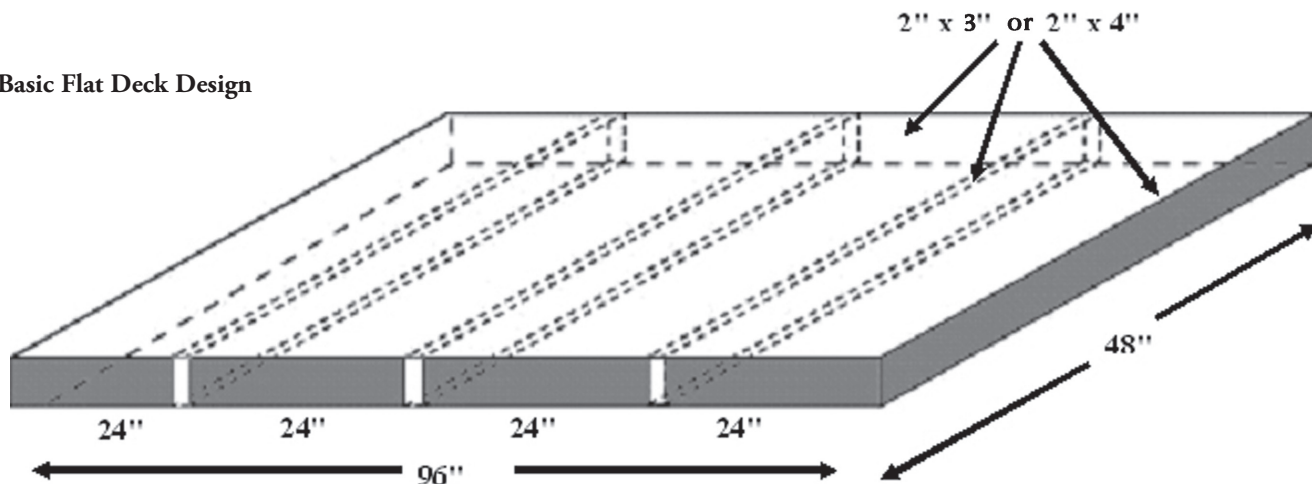
√	Quantity	Unit	Description
	4	Each	20-pound vapor LP gas cylinders
	4	Each	Pressure regulators
	4	Each	Pressure gauges
	4	Each	25-foot UL-listed hoses
	4	Sets	Swivel-type connectors for torch assemblies

√	Quantity	Unit	Description
	2	Each	Propane roofing torches—detail application size not to exceed 105K Btu
	2	Each	Propane roofing torches—field application size
	4	Each	Spark-type igniters
	2	Each	Adjustable wrench
	1	Each	Flat-blade screwdriver (for changing knife blades)
	4	Each	Utility-type roofing knives
	1	Each	Arrow T-50 staple gun (or equivalent)
	4	Each	Large round-nosed trowels
	2	Each	4A60BC fire extinguishers, fully charged, with updated inspection tags and intact plastic seals
	1	Each	Comprehensive first-aid kit
	1	Each	Clean plastic 5-gallon pail (for water)
	1	Each	Small plastic squirt bottle
	5	Each	ANSI Z-87 goggles (eye protection)
	5	Pair	Leather-palmed heavy work gloves (hand protection)

Mock-up Design, Construction and Setup

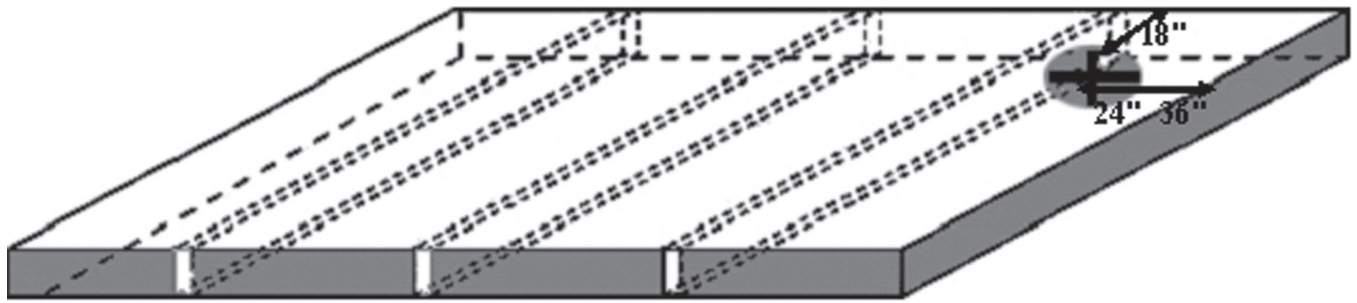
These drawings represent mock-ups you will need to construct before conducting the hands-on training for this program. These mock-up designs are the same used for the original CERTA applicator training program.

Basic Flat Deck Design



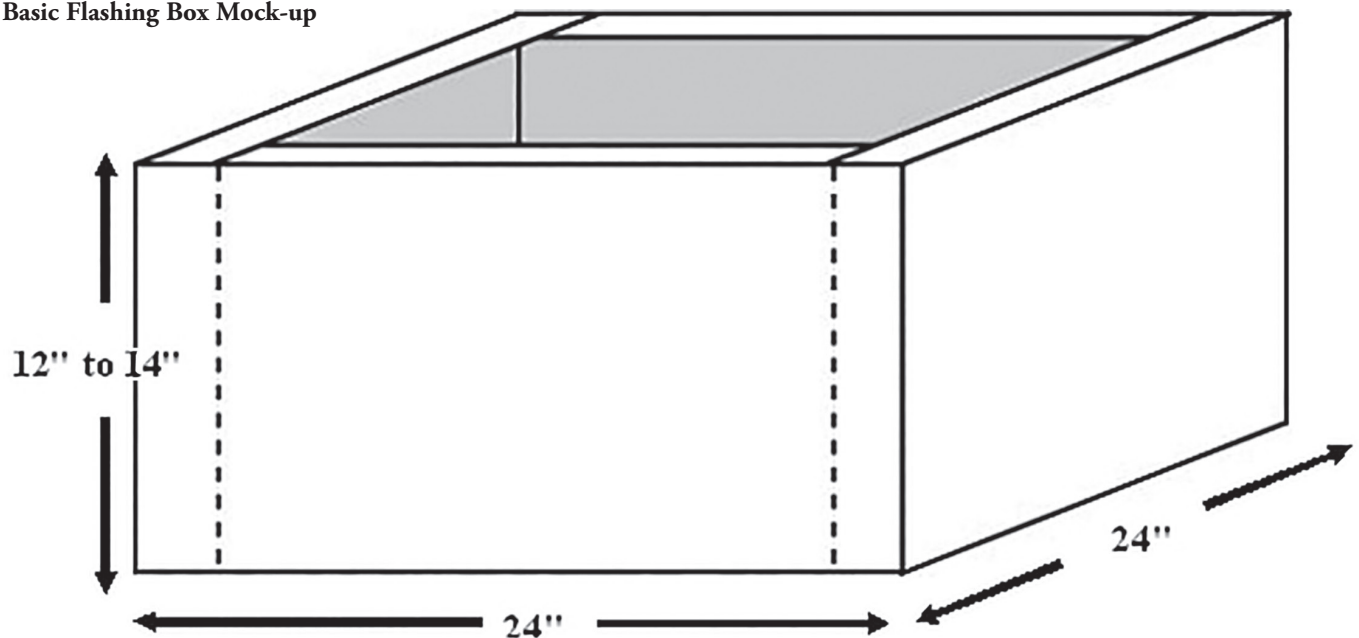
Construct basic flat deck using 2x3 or 2x4 dimensional lumber secured with 16d nails as shown here. Install one layer ½-inch minimum CDX plywood to deck over the frame, secured 8 inches on center with 1¼-inch general purpose screws. Install two layers of ¾-inch fiberglass mat-faced gypsum core panel roof insulation secured with ¾-inch tin-capped nails over the plywood. You will need to construct three basic flat deck mock-ups to conduct the hands-on training exercise.

Simulated Roof Drain



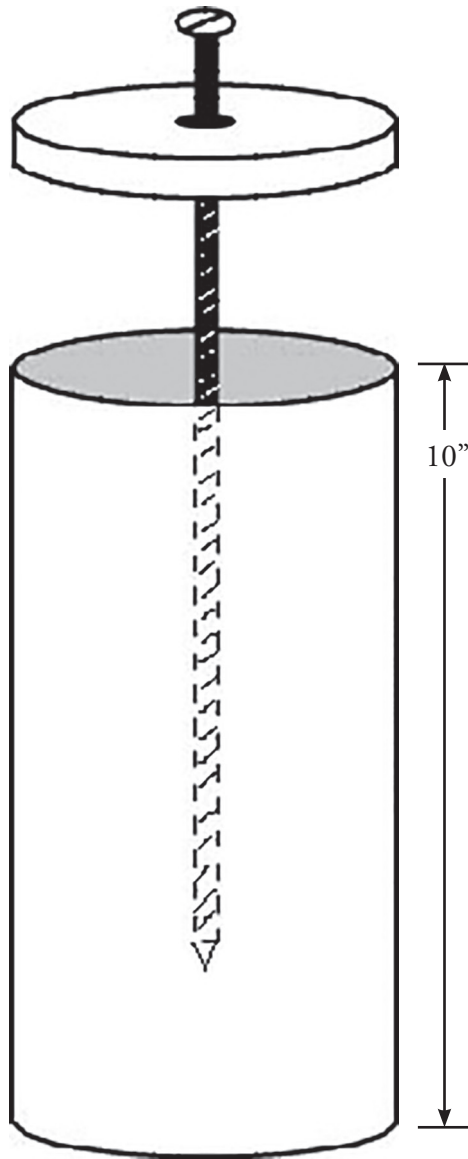
Cut a hole 18 inches from one side and 18 to 24 inches from one end in two of the three basic flat deck mock-ups. Use a 9-inch metal pie tin, a large coffee can or an inverted galvanized steel tall cone flashing cut to height to simulate a roof drain opening. Secure the simulated roof drain in the hole.

Basic Flashing Box Mock-up



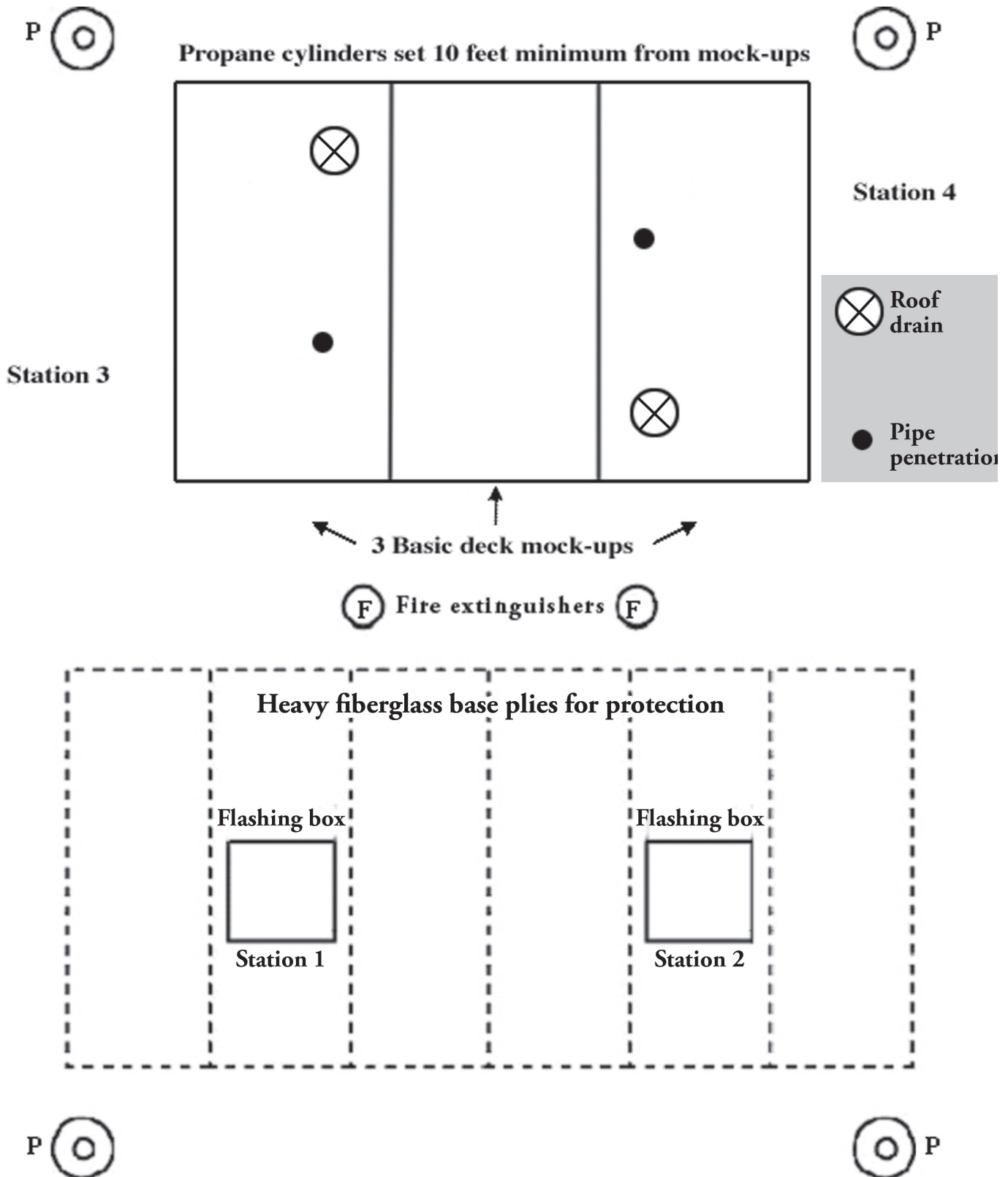
Construct basic flashing box mock-up using four pieces of 2- by 12- or 14-inch dimensional lumber nailed together using 16d nails. Add new cant strips for each training session.

Basic Pipe Penetration Mock-up



Construct basic pipe penetration mock-up using a minimum 10-inch length of 3- or 4-inch pipe, a circular plywood disk cut to the size of the outer pipe diameter and a screw 2 inches longer than the pipe length. Drill a hole near the center of the plywood disk to accept the screw. Secure the basic pipe penetration mock-up at the opposite end of the basic deck mock-up approximately 18 inches from one side and 24 inches from the end. The basic pipe mock-up can easily be removed for storage.

Mock-up Station Layout Plan



Lay the three basic deck mock-ups side by side with the two drain openings at opposite ends. Cover over entire basic deck mock-up layout using heavy fiberglass base ply sheet stapled into place. Lay fiberglass base ply ground protection for Stations 1 and 2 flashing box areas. Set flashing boxes approximately 8 to 10 feet apart. Install cant strips around flashing boxes. Cover flashing boxes and cant strip using heavy fiberglass base ply sheets stapled securely in place. Set two 4A60BC fire extinguishers between the workstations. Set a 20-pound propane tank a minimum of 10 feet away from each workstation.

EVENT 3: Starting field membranes at roof edges or walls	EVENT 4: Installing target sheet at drain
EVENT 5: Installing field membrane over drain	EVENT 6: Installing field membrane around pipe penetration
EVENT 7: Ending field membranes at roof edges and walls	Event Wild Card EVENT ____: You get to choose!

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