

CERTA

Certified Roofing Torch Applicator Program



Torch-applied Roof System Safety Instructors Guide



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Torch-applied Roof System Safety

Instructors Guide

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PROGRAM POLICIES AND PROCEDURES

Program Introduction

Using This Instructors Guide

The Certified Roofing Torch Applicator (CERTA) Program Instructors Guide is divided into nine parts. Each part provides specific instructions on how to prepare for and facilitate a successful CERTA training session. These instructions represent minimum activities and time allotments for conducting a full CERTA training class. You are encouraged to modify the instructions provided, create your own ideas for training activities and spend more time on certain topics as trainees' needs require. The main goal is to ensure the learning objectives in each section are achieved by each trainee.

The first page of each scheduled classroom training event provides a Section Introduction that includes the section's learning objectives; timing breakdowns for each learning activity in the section; and a description of the materials and conventions required to facilitate the learning activities in the section.

You will find a Facilitation Guide in each section that provides detailed speaking notes, clear instructions for facilitating each learning activity and study questions designed to guide participants' learning. You may choose to develop your own questions based on your field experiences.

Program Description

In 1986, the Midwest Roofing Contractors Association (MRCA), in conjunction with the Asphalt Roofing Manufacturers Association and the United Union of Roofers, Waterproofers and Allied Workers, developed a curriculum for training roofing workers in the safe application of torch-applied roof systems. This program was named the Certified Roofing Torch Applicator Program, or CERTA.

In 2003, the insurance industry approached NRCA to address concerns about increasing incidents and losses occurring during torching activities by roofing contractors. NRCA recognizes torching activities are and will continue to be a major part of the roofing industry, and roofing workers traditionally have been trained on torch use through on-the-job techniques. This training method typically has not adequately addressed safety concerns, and the need became apparent for focused safety training in torching activities. NRCA has adopted and revised the CERTA program to meet this industry need.

This updated CERTA program provides the latest safety practices and new industry requirements for torching activities. Only authorized trainers such as you may teach these requirements using the new CERTA program. The new program includes classroom instruction, a student manual, a video and hands-on training. There is no comparable safety training program available in the roofing industry.

Safety is the cornerstone of success for any roof system installation. The CERTA program is designed to provide safety training for roofing professionals at all levels. This certification program comprises standards and safety practices that companies can use to implement and expand their safety programs.

The CERTA program addresses the concerns of roofing contractors, the insurance industry, fire and code authorities, roofing material manufacturers, equipment manufacturers and fuel suppliers. Upon successful completion of a training program, participants will be certified roofing torch applicators. CERTA identification cards will be issued to you to distribute to each participant who becomes certified, and a list of certified applicators' names will be maintained in an NRCA database. This certification is valid for three years, or it may be rescinded at any time if a certified worker is observed performing unsafe work practices or behaviors.

Program Success

The number of serious roofing torch-related fire incidents has decreased significantly since 2004 when the new CERTA program was implemented in the roofing industry. The following data regarding losses paid for fire damage caused by improper use of a roofing torch was shared by one major U.S. insurance underwriter that offers general liability coverage to roofing contractors.

Loss Year	Number of Claims	Loss Amount
2002	46	\$13,784,800
2003	23	\$7,822,500
2004	20	\$3,901,000
2005	13	\$3,717,500
2006	14	\$1,583,500
2007	10	\$287,800

The CERTA program has made a significant impact on the safe use of roofing torches throughout the roofing industry.

Key Learning Objectives

Upon completing CERTA training, participants will be able to:

- List personal protective equipment (PPE) requirements for torching activities
- Describe basic first-aid procedures associated with torching activities
- Explain proper steps and procedures for handling propane gas cylinders
- Identify components of a torch assembly
- Demonstrate safe assembly, lighting and use of torch equipment
- Identify the key elements of a comprehensive pre-job inspection
- Recognize hazardous areas
- Prescribe hazard controls when torching near hazardous areas
- Demonstrate safe torching techniques near hazardous areas
- Explain post-job fire watch and other duties

In addition to accomplishing these objectives, this program provides information and reference resources that complement various topics addressed in the training. This information can be applied to all roofing work and used to enhance a company’s safety program.

Trainer Resources

Authorized Trainer Database

The CERTA program administrator maintains a secure database of all current and past authorized CERTA trainers. It is the responsibility of all authorized trainers to update the CERTA program administrator with any changes to their contact information, including phone and fax number(s), e-mail address(es) or mailing address(es).

Occasionally, the CERTA program administrator needs to contact authorized trainers to provide them with program updates and revisions. You are required to confirm receipt of these program updates and revisions to maintain your authorized status. Training session registration numbers will not be issued to a trainer if he or she fails to confirm receipt of the most recent program updates and revisions.

Web Site

The CERTA program administrator created a Web site devoted to authorized CERTA trainers. The Web site allows you to download all program materials, including student manuals, the instructors guide, trainer administrative tools and other resources that can assist in your training efforts. The only documents not available on the Web site are the student final exam and answer key. The student final exam and answer key will be distributed only to authorized trainers when they register a training session with the CERTA program administrator. The Web site is www.nrca.net/rp/education/nrca/certaclasses.aspx.

Training Session Requirements

Training Session Size

The maximum number of participants for a single eight-hour CERTA session facilitated by one instructor is 20. One authorized instructor cannot safely observe more than 20 participants during a hands-on training session. A session size may be increased provided additional authorized instructors assist with the hands-on training section of the program. The ratio of instructors to participants for the hands-on section must remain 1:20.

Time

Conducting a CERTA training session requires a minimum of five hours of classroom instruction plus a minimum of three hours of hands-on instructional activities for a full class of 20 trainees. Smaller class sizes may reduce these minimum allotted times. Detailed schedules for allotted minimum times can be found in each section of this instructors guide.

Training Session Registration

You will need to register each training session in advance. The registration form provided on page 7 lists the session information you must provide. You may photocopy the form or print it from the trainer resource Web site. There are several ways to submit a completed registration form to NRCA:

- Fax it to (847) 299-1183.
- Mail it to CERTA Program Administration, 10255 W. Higgins Road, Suite 600, Rosemont, IL 60018-5607.
- Call NRCA at (800) 323-9545.
- E-mail it to certaadmin@nrca.net.

The CERTA program administrator will confirm receipt of your training session and issue a unique training session number within one business day. You will receive a confirmation e-mail containing the session number and additional supporting session documents. You may conduct the training session at any time within seven business days after receiving your confirmation e-mail and session number. Do not proceed with a training class until you have received a valid session number from the CERTA program administrator. Training sessions conducted without first being registered will not be recognized.

Training Session Quality Control

The success of any training program depends on the quality of instruction. CERTA training can significantly affect roofing worker safety and reduce property damage. As an authorized CERTA trainer, your job is to provide effective instruction that affects torching behaviors of roofing workers.

You received this instructors guide during your CERTA train-the-trainer session. This guide is designed to establish consistent, high-quality CERTA program instruction. Following the guide will help ensure your training efforts successfully meet the program objectives.

Comprehensive program delivery requires a full eight hours to ensure all industry safety practices are addressed. Condensing this program to fewer than eight hours can jeopardize fire and life safety and is not recommended.

You are expected to make every effort to maintain high-quality instruction as an authorized CERTA instructor. By accepting your role as an authorized instructor, you agree to allow the CERTA program administrator or insurance company representatives to randomly select and attend your training sessions for quality-control auditing purposes only.

Additionally, you agree to grant the CERTA program administrator permission to provide your contact information to any individuals, groups or organizations interested in receiving certification training. The CERTA program administrator will not provide this information to any person or organization for any other purpose. The CERTA program administrator is not obligated to promote any authorized trainer. These procedures will help ensure overall CERTA program quality.

Training Compliance

If at any time during your term as an authorized CERTA trainer you fail to comply with the policies and procedures set forth in

this instructors guide or behave inappropriately in your role as a trainer, The CERTA program administrator may take the following actions:

- Revoke your authorized status
- Revoke the certified status of all individuals you have trained

You, individuals you have certified and their employers will immediately be notified of these actions.

Certification Procedures

There are a few tasks you will need to complete after each training session to ensure your trainees get certified. These tasks include completing a session roster and submitting it to the CERTA program administrator within five business days and completing the trainer’s section of the payment form and submitting it to each trainee’s employer within three business days. Roofing workers will not be certified until completed rosters are received and payments made.

Certification Requirements

Participating in a CERTA training session does not guarantee participants become certified roofing torch applicators. There are two program requirements that must be satisfied before you can approve a participant for certification. Participants must:

1. Pass a final exam with a score of 70 percent or higher
2. Pass a performance evaluation conducted by peers during the hands-on session of the program

You may deny certifying a participant for actions you believe to be detrimental to or in conflict with any program objective. Examples would be:

- Unruly or disruptive behavior during the training session
- Causing injury to oneself or another participant, whether intentional or not; such an incident represents inadequate general safety training and a subsequent risk to the work force

Certification and Recertification Fees

Table 1 shows the fee structure for roofing contractor employees who successfully complete a CERTA training program.

Table 1: CERTA Program Fee Structure		
Category	Certification	Recertification
Employee of an NRCA member contractor at time of certification	\$120	\$80
Employee of an NRCA nonmember contractor at time of certification	\$160	\$120

The CERTA certification and recertification fees are the responsibility of each trainee’s current employer, roofing contractor or employee representative. After completing a training session, an authorized trainer is responsible for submitting a completed training roster to the CERTA program administrator within five business days and submitting an invoice/credit card payment form to each trainee’s employer within three business days. Only one payment form is necessary for multiple trainees from the same employer. *Employers must remit payment directly to NRCA.* Authorized trainers may charge and collect a separate fee for providing training services but may not collect payment from employers for attendees’ certification fees.

Training Session Roster Report

A session roster provides the CERTA program administrator the database information necessary to administrate the CERTA certification program. You are required to submit this information within five business days to ensure participants’ certification.

- Training session registration number
- Each participant’s personal information, including:
 - First and last name and middle initial

- Home mailing address
- Home telephone number
- Personal e-mail address, if available
- Employer’s name at time of training (company name)
- Employer’s address
- Employer’s telephone number
- Final exam grade
- Hands-on performance grade (pass/fail)

Complete a training session roster using the electronic Excel template, which you can download from the trainer resource Web site. Do not alter information field headings. Once you have entered all session information, save the file using a new file name. The original template file will not be lost. For example, if your session registration number is 04052601, your saved Excel file will be named 04052601.xls (see Figure 1).



Figure 1: 04052601.xls

Submit the completed session roster as an attached file by e-mail, or copy the roster to a CD and mail it to:

NRCA
 CERTA Program Administration
 10255 W. Higgins Road, Suite 600
 Rosemont, IL 60018-5607
 (800) 323-9545
 Fax: (847) 299-1183
 E-mail: certaadmin@nrca.net

You also may print the completed roster and then fax or mail it to the address above. **Training session rosters not containing a session registration number will not be accepted.** A credit card payment form is available on the CERTA trainer resource Web site to print and send to employers.

CERTA Identification Cards

Successful participants will receive personalized CERTA ID cards. CERTA ID cards will be mailed to you to distribute to participants. Completing the data input from your training session rosters and mailing participants’ documents may require two to four weeks. Submitting training session rosters as electronic files attached to an e-mail will speed up this process.

Participants do not need to wait for their documents to be certified. However, participants are only certified after:

- Successful completion of all training program requirements (see page 3 for program certification requirements)
- NRCA has received the session roster
- NRCA has received full payment of fees

Recertification

A written notice will be mailed to all certified torch applicators a minimum of six months prior to their certification expiration date providing detailed information, requirements and procedures to recertify. Additional notices will be mailed three months and one month prior to expiration. Each notice will be mailed to the address provided at the time of certification. The CERTA program administrator will not attempt to contact applicators whose notifications are returned as undeliverable. It is the sole responsibility of all certified torch applicators to directly inform the CERTA program administrator of changes to their contact information.

Reauthorization

Your status as an authorized trainer also is valid for three years. Certain reauthorization conditions and additional training and testing will be required at the end of each three-year period to maintain status as an authorized trainer. A written notice will be

mailed to you a minimum of six months prior to the expiration date providing detailed information, requirements and procedure instructions to become reauthorized. Additional notices will be mailed three months prior and one month prior to the expiration date. Each notice will be mailed to the address provided at the time of authorization. The CERTA program administrator will not attempt to contact trainers whose notifications are returned as undeliverable. It is your responsibility to directly inform the CERTA program administrator of changes to your contact information.

Copyright Permission

Authorized CERTA trainers are granted permission to copy any part of the CERTA program materials, including the student manuals, instructors guide, teaching aids and administrative documents, for the sole purpose of performing their duties as authorized CERTA trainers. Commercial copy service companies often require written permission from the copyright holder to produce copies. A permission form signed by a CERTA Program Administration representative can be downloaded from the CERTA trainer resource Web site. You will need to print and complete this form prior to presenting program materials to be copied. CERTA program materials may not be transmitted electronically, changed, altered, modified, revised or amended in any way.

CERTA TRAINING SESSION REGISTRATION FORM															
(Check one) <input type="checkbox"/> This is a Certification training session <input type="checkbox"/> This is a Recertification training session															
Date of request (today's date):															
Anticipated training session date: (Training must be held within seven days after receipt of a session number from the CERTA program administrator)	This training session will take place on: _____ or will take place between (Month/Day/Year) _____ and _____ (Month/Day/Year) (Month/Day/Year)														
Authorized trainer(s):	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">Trainer name(s):</th> <th style="width: 40%;">Trainer ID number(s):</th> </tr> </thead> <tbody> <tr> <td style="padding: 2px;">1.</td> <td style="padding: 2px;"></td> </tr> <tr> <td style="padding: 2px;">2.</td> <td style="padding: 2px;"></td> </tr> <tr> <td colspan="2" style="padding: 2px;">Trainer e-mail address:</td> </tr> </tbody> </table>	Trainer name(s):	Trainer ID number(s):	1.		2.		Trainer e-mail address:							
Trainer name(s):	Trainer ID number(s):														
1.															
2.															
Trainer e-mail address:															
Company (ies) for which training is being provided:	1. 2.														
Training session facility information:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td colspan="2" style="padding: 2px;">Location name:</td></tr> <tr><td colspan="2" style="padding: 2px;">Address:</td></tr> <tr><td colspan="2" style="padding: 2px;">City:</td></tr> <tr> <td style="width: 60%; padding: 2px;">State:</td> <td style="padding: 2px;">ZIP code:</td> </tr> <tr><td colspan="2" style="padding: 2px;">Telephone:</td></tr> <tr><td colspan="2" style="padding: 2px;">Fax:</td></tr> <tr><td colspan="2" style="padding: 2px;">Contact person:</td></tr> </table>	Location name:		Address:		City:		State:	ZIP code:	Telephone:		Fax:		Contact person:	
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Address:															
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State:	ZIP code:														
Telephone:															
Fax:															
Contact person:															
Anticipated number of participants:															
Session schedule:	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%; padding: 2px;">Start time: ____:____ (a.m./p.m.)</td> <td style="padding: 2px;">End time: ____:____ (a.m./p.m.)</td> </tr> </table>	Start time: ____:____ (a.m./p.m.)	End time: ____:____ (a.m./p.m.)												
Start time: ____:____ (a.m./p.m.)	End time: ____:____ (a.m./p.m.)														
Additional session information:															

E-mail or fax this completed CERTA Training Session Registration Form to:
 certaadmin@nrca.net or (847) 299-1183

Certified Torch Applicator (CERTA) Training Session Roster Report

Training Session ID# _____ Training Session Date _____

FIRST_NAME	LAST_NAME	HOME_ADDRESS_1	CITY	STATE	ZIP	HOME_PHONE	ALT_PHONE	E-MAIL	EXAM_GRADE	PERFORMANCE_GRADE	COMPANY_NAME	COMPANY ADDRESS	CITY	STATE	ZIP

Sample of Training Session Roster Report

CLASSROOM REQUIREMENTS AND TRAINING PROCEDURES

Classroom Setup

The classroom setup for conducting CERTA torch applicator training sessions is straightforward. Each participant requires a comfortable chair and a writing surface. Washroom facilities should be readily accessible to minimize downtime. You will need a flip chart, a dry-erase board or a chalkboard, as well as markers that draw lines large enough for all participants to see clearly. A television monitor should be large enough for every participant to clearly see details in the training video and slightly elevated for good viewing by all. The room should be well-lit, relatively quiet, free of distractions and maintained at a comfortable temperature. Basic adult-learning research suggests that participants’ ability to learn is decreased when they are physically uncomfortable. You are encouraged to enhance the classroom setting with topical posters, sample equipment or other learning aids that support the program content.

Classroom Training Materials

The following list of materials and equipment is the minimum required to conduct a comprehensive CERTA training session.

Required Classroom Training Materials
CERTA program instructors guide
Student manual photocopy for each attendee (20 maximum)
TV monitor (minimum 19 inches)
DVD player
Flip chart, dry-erase board or chalkboard with appropriate markers
Propane roofing “detail” torch (105k Btu or less) assembly, including: <ul style="list-style-type: none"> - Assembled torch - Hose and connectors - Pressure regulator - POL connector - Propane tank (10- or 20-pound size)
Roofing materials sample kit, including two small pieces of each of the following: <ul style="list-style-type: none"> - Wood fiberboard roof insulation - Polyisocyanurate insulation - DensDeck® gypsum board - Wood fiber cant strip - SBS polymer-modified bitumen membrane - APP polymer-modified bitumen membrane - Heavy glass base sheet - Type IV glass ply sheet - Self-adhering, smooth-surfaced polymer-modified bitumen base sheet
Optional Classroom Training Materials
1-inch three-ring binder for each student’s manual
Name ID tent card for each attendee (20 maximum)

Classroom Schedule

This schedule provides a guideline for facilitating the classroom portion of the CERTA training program. It does not include time for completing the hands-on training requirements. A schedule for the hands-on portion of this CERTA training is provided in the Hands-on Training Requirements, Policies and Procedures section of this instructors guide. Taking breaks is encouraged but not shown in these schedules. The frequency and duration of breaks depend on many variables; therefore, break schedules are left to your discretion.

Event	Event Name	Time Allotted
1	Program Introduction	35 minutes
2	Section 1: General Requirements	30 minutes
3	Section 2: Pre-job Planning and Preparation	30 minutes
4	Section 3: Propane Tool and Equipment Safety	45 minutes
5	Section 4: Application Safety	90 minutes
6	Section 5: Post-job Requirements and Duties	30 minutes
7	Final Exam and Review	40 minutes
	Total Classroom Schedule	300 minutes (five hours)

Program Facilitation

Preparation

Obtaining desired results from training requires communicating the program content in a clear and organized way that participants can understand. Good facilitation happens only if you spend enough time preparing. Preparation time is perhaps the single most important component of your job as a trainer. Preparation time includes practicing your presentation. Study the course materials. Review all parts of this instructors guide. Practice discussing the topics in front of friends or family, and ask them to provide feedback on your style. Good facilitation skills are acquired through practice over time. They do not happen naturally for most individuals. The more time you spend preparing, the more comfortable you will be speaking in front of a class and the more effective you will be as an instructor.

This instructors guide will familiarize you with a number of different training methods and approaches designed to help you facilitate this course and maintain consistency in the delivered content. The following pages provide some background and helpful hints for applying these methods.

The hands-on section of this program also requires full preparation. Photocopies of exams should be made ahead of time. Mock-ups should be constructed and base plies installed. Roofing membranes should be pre-cut and placed next to each workstation. You want the participants' time spent using a roofing torch, not developing cutting and fastening skills.

Adult Learning

Helping adults acquire new skills and knowledge can be exhilarating and challenging. It takes patience, flexibility, creativity and a strong conviction that what you are doing matters. The mission of training is to change performance capability, not just to transmit information.

Read the table below and select from each pair of statements to see which one best fits you.

I learn best when ...

Column A	Column B
<input type="checkbox"/> Someone who knows something I don't explains and describes it to me.	<input type="checkbox"/> I engage in discussion with someone who knows something I don't.
<input type="checkbox"/> I attend lectures in which an instructor presents information to me.	<input type="checkbox"/> I attend lectures in which an instructor engages me in a two-way interaction.
<input type="checkbox"/> I am told how to do something and then try to apply the information at a later date.	<input type="checkbox"/> I have the chance to practice new skills and get feedback on my performance right away.

Table adapted from H.D. Stolovitch and E.J. Keeps

Almost without exception, people answer from column B. That is because truly effective training is learner-centered and performance-based. Adult-learning research suggests for real skill improvement to take place, training needs to involve participants in practical, hands-on exercises that are realistic and provide a challenge. It doesn't hurt if it's fun, too! Here is a summary of some things we know about adult learners.

Results:

Adults see learning as a means to an end. They want to know, "What's in it for me?"

Real-life Applications:

Adults want courses that focus on real-life problems and tasks rather than academic material. A strong "how-to" focus is desired.

Action:

Adults are accustomed to being active. They should be given the opportunity for active participation in a setting that is safe, welcoming and comfortable.

Experience:

Adults bring considerable experience with them. They should regularly be given the opportunity to contribute. They dislike long lectures and one-way communication.

Self-esteem:

Adults have something to lose. They have a strong need to maintain their self-esteem. In other words, their egos are on the line. It is important they don't feel embarrassed or put down.

Social Interaction:

Adults learn by interacting with others. This collaboration has two basic aspects: students working together with their peers to solve a problem and teachers acting as guides to help them solve problems and construct knowledge.

This instructors guide responds to adult learners' need to participate actively in gaining skills rather than learning in a static atmosphere where knowledge is imparted strictly in lecture form by an expert.

Your Role as a Facilitator

As an instructional facilitator, your attitude and everything you say and do should be focused on helping the participants learn. Your goal is to provide an environment where interactions between you and the students will stimulate them to acquire the skills, knowledge and attitudes that make up the objectives of this course.

You can do this by entering into a partnership with participants in the learning experience and helping them feel comfortable with learning—to feel challenged, feel inspired and become more competent. Here are some of the ways you can establish an environment conducive to learning:

- Share with participants the session goals and how you can work together to achieve them.
- Let people know you welcome questions and you want an interactive session.
- Demonstrate an open and nonjudgmental attitude.
- Although you are a subject-matter expert, don't create the impression you know it all.

Methodologies

Small-group Work: This is important for a participatory workshop and is a key training method. It builds camaraderie among participants and enables them to develop a shared understanding of new material. It also gives participants who are reluctant to speak in a large group an opportunity to ask questions and voice their opinions.

Groups usually should be limited to no more than six participants each. The groups can be formed by various means, but it is important that participants of various skill and knowledge levels be combined. Changing the members of groups throughout the day will enhance participation and interaction.

- **Process:** Tell participants the purpose of the group work and how much time they have to complete it. Ask them to appoint a note taker for the group, if necessary. Circulate among the groups to ensure everyone understands the activity and has an opportunity to ask questions.

Give time signals at a number of points, with a minimum of halfway, 10-minute and three-minute signals before reconvening the large group.

Interactive Lectures: Think about the lectures you have heard. A talented speaker may have maintained your interest, but *how much of the information do you remember?* This is the disadvantage of using lecture as a method for training. However, there is a place for lectures in a training workshop.

- Lectures provide a contrast to other instructional methods.
- They are the most efficient way to present content material, and if followed by exercises that retrench the information, they can be extremely effective.
- They allow participants to ask questions and share their experiences with others.
- **Process:** You can make your lectures more interesting by:
 - Personalizing content by sharing your experiences
 - Repeating core messages in different ways
 - Encouraging questions
 - Asking for participants' experiences to bear out a point

Pairs: Participants are invited to pair off to discuss a specific topic. This allows one-on-one communication that helps with group cohesion.

- **Process:** Large-group discussions after working in pairs can wreak havoc with time control. If you are short on time, invite only one or two pairs to share what they have developed during the exercise.

Games: Instructional games provide an appealing learning environment for participants to strive to reach a goal. They are usually a highly motivating approach that requires learners to demonstrate mastery of specific content. This training program uses games that are played in teams and individually.

- **Process:** Each game used in this session has a prescribed set of rules. Be as clear as possible in explaining these rules before the game begins, but realize that no matter how clear you try to be, there is often some ambiguity that arises while the game is being played.

Think ahead of time about the types of difficulties you might encounter as you facilitate a game and how you will handle them. Examples of this are complaints, lack of fair play or determining whether a response is a correct answer.

Each group will respond differently to games. If some participants are acting competitive in a way that is having a negative effect on the group, you can take scoring out of the activity entirely.

You may want to use small items such as candy bars as prizes for the winners. This is left to your discretion. However, if people are overly competitive, it may be better not to award prizes for winners. Remind participants that the objective of the game is learning—and the best way to learn is by cooperating with others.

Timing

One of the most essential elements of a smooth-running workshop—and often one of the most difficult—is an almost fanatical adherence to time guidelines. The trick is to balance the need and desire for participants to contribute through questions, comments and anecdotes and the necessity to move on so that all the content can be covered effectively. The time guidelines provided need not be firmly adhered to; however, they are intended to help your time management and ensure all learning objectives are met.

Here are some pointers for time management:

- Always start on time. This includes when you are reconvening after a break or lunch. Even if only a few people are present, begin! People will learn quickly that they need to return from breaks promptly.
- Check regularly to ensure you are on schedule.
- Keep your own talking time to a minimum.
- Deal with digressions firmly but diplomatically. One of your primary responsibilities is to keep the group focused on the topic.
- Don't ask, "Are there any questions?" if you are behind schedule.

- Stick to the time limits for learning activities.
- During exercises, circulate to help with blockages and spur the groups on.
- Have a separate flip chart with the heading PARKING LOT written on it. Whenever someone raises a question that is off topic or you don't have time to address, list it on the flip chart. Then, if time permits, address these matters at the end of the course. This may just mean giving the person the name of a resource to look up later.
- State directly when you are behind schedule. This decreases the number of questions asked and the number of digressions.

Further Reading on Adult Learning:

The Adult Learner: A Neglected Species. Malcolm Knowles.

Making Instruction Work. R.F. Mager.

The Skilled Facilitator. Roger Schwarz.

Winning Through Participation: Meeting the Challenge of Corporate Change With the Technology of Participation. Laura J. Spencer.

Telling Ain't Training. H.D. Stolovitch & E.J. Keeps

Language and Literacy Issues

Literacy issues often arise when training roofing workers. This is simply a fact that, as a facilitator, you need to be aware of. A program's objectives may be difficult to achieve if participants are not able to read or write well or if they cannot understand the materials for any reason. Participants may be too embarrassed in front of their peers to reveal they are struggling to understand the materials. Try to recognize trainees who are not comfortable and work with them privately to make sure they learn the key concepts of this program. It is better to privately discuss an issue with them during a break than to raise the issue in front of other participants. Assess as best you can a trainee's level of understanding. You may need to recommend that certain trainees take home their student manuals to study and then participate in a later session. Never ignore a problem and certify a trainee who cannot successfully fulfill all program requirements.

Final Exam Procedures

The final exam not only provides an evaluation of how well participants retain information, but it also provides an evaluation of how well a facilitator communicated the information. Effective trainers know successful training is measured by the actual outcomes of their efforts. Successful participants leave training with new knowledge and skills they can apply in life. Therefore, it is important participants succeed in completing a final written exam that establishes whether the program objectives were met.

Most participants can complete the final exam in a written format at the end of the scheduled classroom session. However, some participants may have obstacles impairing their abilities to take a written exam. These obstacles could be a learning disability, comprehension or reading problems, or a language difficulty. The best way you can help these participants is to discuss these kinds of issues during the program introduction. First, let participants know they need to successfully complete a final written exam to become certified. Then, let them know you are aware these kinds of obstacles exist; you want participants to succeed; and you are willing to discuss with anyone ways to help them complete an exam. Tell them to approach you during a break or lunch to discuss an issue. Assure them you will keep their confidence and are willing to schedule an oral version of the exam for them at a different time. Do not let participants fail because they cannot read well. They may comprehend the content well because you conducted an effective training session, but they may be unable to complete the certification through a written exam.

Conducting a Written Final Exam

The CERTA final exam consists of 25 multiple-choice questions. Have participants clear their writing areas. Explain they are to read each question and circle what they think is the best answer even if it seems more than one answer may be correct. Also explain that cheating during the exam will result in an automatic failure. Distribute the exams, and let participants work. Do not allow discussion during an exam. Have students hand their completed exams directly to you when they are finished. Tell students if they finish early, it would be a good time to leave the room, if possible, and take a break.

Conducting an Oral Final Exam

It is recommended you schedule oral exams no later than three days after completing a classroom training session. Have participants clear their writing areas. Write on a flip chart or chalkboard an example of the four multiple-choice answers, explaining that the top answer is A, second is B, third is C and bottom is D. Point out each letter symbol so they clearly see the sequence they need to recognize on their exams. Then, explain that you will be reading each question, followed by reading each answer. You will state the letter as you read each answer. Tell participants to circle what they think is the best answer to the question. Participants may ask you to repeat the answers, but you should deny requests to clarify an answer or a question. Simply read the questions and answers as they are written.

Grading Exams

Written Final Exam

You should print and photocopy the exam as part of your preparation before each session. The written exam should be kept in a secure, out-of-sight place until you administer it.

There are 25 questions on the final exam. Each exam question is worth four points. Check each incorrect answer, total the number of incorrect answers checked, multiply that number by four and then deduct this number from 100. On the bottom of the last page of each exam, write the number of incorrect answers and the score. Then, report each participant's final exam score on the session roster sheet.

Hands-on Performance Evaluations

Participants can fail the hands-on evaluation for this course. They are being evaluated by their peers on how well they perform the prescribed torching operation following the listed criteria on the evaluation form. There are 60 items on the evaluation form. The hands-on performance evaluation is scored on a pass/fail basis. Authorized trainers will need to report a participant's score as either "P" for pass or "F" for fail. Criteria for scoring are found in the hands-on section of this instructors guide on page 38, part C-13.

Retesting

A trainee will not be certified if he or she fails either the final exam or hands-on performance evaluation. To become certified, he or she will need to participate in another registered training session conducted by you or another authorized trainer. The trainee only needs to participate in the portion of the CERTA training he or she previously failed and not necessarily the entire class. In this case, a trainer will need to designate in advance that an individual is participating only in the hands-on or classroom portion of the session. This is done by writing a participant's name in the comment section of the Training Session Registration Form found on page 7, and then alongside the name, write either "exam re-test" or "hands-on retest."

PROGRAM INTRODUCTION

SECTION INTRODUCTION

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

1. Describe the workshop objectives
2. Explain the importance of CERTA training
3. Identify safety practices for torching behavior

TIMING This unit is divided into three parts:

- A. Welcome (10 minutes)
- B. Icebreaker (10 minutes)
- C. CERTA Introduction (15 minutes)

Total Unit Time: 35 minutes

MATERIALS

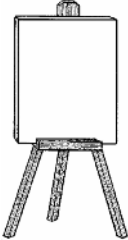




Flip chart and markers



Student manuals

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A Welcome (10 minutes) <i>Before starting the session, write the workshop objectives on flip-chart paper and post them in the front of the classroom.</i>		
		<p>Welcome participants to the seminar, and emphasize the importance of their active participation in the training.</p> <p>Introduce yourself and provide your credentials and related industry experience.</p> <p>Provide the following administrative details:</p> <ul style="list-style-type: none"> • Review the overall workshop objectives listed on the flip chart. • Provide a site description including locations of restrooms and refreshments. • Explain the daily start and stop times. • Explain your break schedule and policies, including lunch breaks. • Describe the lunch arrangements. • Instruct all class members to turn off their pagers and cell phones or put them on vibrate mode. • Explain to participants that to become certified, they must pass a final written exam and a torching performance test during the hands-on section of the program. <p>Explain that to get the most out of the training session, students should:</p> <ul style="list-style-type: none"> • 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 a break or during lunch to arrange an oral exam at a later date if they think they may have difficulties completing a written exam
B Icebreaker (10 minutes)		
		<p>Direct the class to turn to page 5 (Spanish page 5) of their student manuals and find the exercise titled “My Favorite T-shirt.”</p> <p>Ask for a volunteer to read the instructions to the class. Assign someone if no one volunteers.</p> <p>Direct one person to start the exercise, and continue until all students have participated.</p>

Sec.	Notes and Materials	Directions and Discussion
C	CERTA Introduction (15 minutes)	
		<p>Introduce the CERTA program by explaining successful trainees will be certified as Certified Roofing Torch Applicators.</p> <p>Explain this certification might be necessary for contractors to be insured because the insurance industry has suffered large losses from fires started by roofing torches.</p> <p>Most injuries and property damage could have been avoided with proper safety precautions.</p> <p>Several insurance companies, building owners and some municipalities require roofing companies that perform torch work to have their roofing workers certified through this training program.</p> <p>Explain the following about their certification:</p> <ul style="list-style-type: none"> • An identification card will be issued to each participant. • The card will be valid for three years. • The card can be revoked at any time if a certified worker is observed performing unsafe work practices. • Additional training and testing will be required at the end of the three-year period to maintain certification. <p>Review with students each topic and bullet point from the list of safety practices found on page 2 (Spanish page 2) of their student manuals. Use your copy of this list on page 18.</p> <p>Call on individual students to read one at a time, progressing through the entire list. Tell them it is OK if they don't understand what some of the terms mean; every item on the list will be thoroughly addressed during the program.</p> <p>Do not take time now to discuss or explain details about these safety practices.</p>

CERTA Safety Practices for Roofing Torch Use

1. CHECKLIST

- 1.1 Complete the daily checklist for all torching jobs.

2. PRE-JOB PLANNING

- 2.1 Identify and protect plywood, oriented strand board (OSB), wood plank, wood fiberboard and other combustible building components as follows:
 - 2.1.1 The job foreman or supervisor shall review daily with the building owner conditions that could present hazards during torching and address them.
 - 2.1.2 Address possible fire traps and hidden hazards; see No. 3, Torching Safety, Items 3.1 through 3.5.
- 2.2 Have a minimum of two 4A60BC fire extinguishers available within 10 feet of torch operations.
- 2.3 Train all personnel on the roof on how to use a fire extinguisher.
- 2.4 Inspect penetrations, such as exhaust vents, inside and outside. Lint, grease or other substances, if present, shall be cleaned prior to torching work.
- 2.5 Have a cell phone available or other means of communicating with 911 or another emergency responder.
- 2.6 Comply with state and local ordinances where applicable.
- 2.7 Field-of-the-roof installation
 - 2.7.1 Over *combustible*¹ roof decks:
 - 2.7.1.1 A thermal barrier shall be incorporated into the roof system design using torch-applied polymer-modified bitumen sheet products. Acceptable thermal barriers include one of the following:
 - Minimum ¾-inch-thick perlite board insulation
 - Minimum ¾-inch-thick fiberglass board insulation
 - Minimum ½-inch-thick gypsum roof board
 - 2.7.1.2 When a thermal barrier is installed, comply with the manufacturer's recommendations and the recommendations contained in The NRCA Roofing Manual.
 - 2.7.2 Over *noncombustible*² roof decks:
 - 2.7.2.1 Comply with the manufacturer's recommendations and the recommendations contained in The NRCA Roofing Manual.
- 2.8 Flashing installation: Polymer-modified bitumen flashings shall be installed using one of the following flashing system application methods:
 - 2.8.1 Torch-and-flop indirect torching
 - 2.8.2 Cold-applied adhesives
 - 2.8.3 Mop-applied with hot bitumen
 - 2.8.4 Direct torching using a single-burner, low-output (105k Btu or less) "detail" torch over *combustible*¹ or *noncombustible*² substrates as follows:
 - 2.8.4.1 Over *combustible*¹ substrates, an air-impermeable backer layer with sealed laps installed over the flashing substrate shall be incorporated into the flashing assembly prior to the application of the torch-applied polymer-modified bitumen sheet finish surface. Acceptable adhered backer layers include one of the following:
 - A layer of fiberglass ply sheet, fiberglass base sheet or polymer-modified bitumen base sheet mechanically fastened to the substrate and an additional layer of a minimum of one layer fiberglass ply sheet or polymer-modified bitumen base sheet adhered to the underlying layer in solid moppings of hot asphalt

- Minimum of one layer of self-adhering, smooth-surfaced polymer-modified bitumen sheet
- 2.8.4.2 Over *noncombustible*² substrates, an adhered backer layer with sealed laps installed over the flashing substrate shall be made part of the membrane flashing assembly prior to the application of the torch-applied polymer-modified bitumen sheet finish surface. Acceptable adhered backer plies include one of the following:
- Minimum of one layer of fiberglass ply sheet, fiberglass base sheet or polymer-modified bitumen base sheet adhered in solid moppings of hot asphalt
 - Minimum of one layer of self-adhering, smooth-surfaced polymer-modified bitumen sheet
- Note: If the membrane flashing substrate cannot be specifically identified as *noncombustible*,² direct torching with a detail torch is permitted if 2.8.4.1 is used.

3. TORCHING SAFETY

- 3.1 Only CERTA certified torch applicators shall operate torches when an open flame will contact any part of a roof.
- 3.1.1 Using an open flame for roof drying or de-icing over *combustible*¹ roof surfaces shall not be permitted.
- 3.1.2 The use of an open flame torch solely to heat bitumen equipment valves (i.e., hot luggers, felt layers or kettles) or bitumen pipe assemblies is acceptable and may be performed by a noncertified applicator as long as an open flame does not contact *combustible*¹ roofing materials.
- 3.2 Protect materials that may burn when in contact with an open flame. Never torch directly to any *combustible*¹ material.
- 3.3 Never torch directly in an area where you cannot see the path of the open flame (including—but not limited to—flashings, corners, curbs, voids, expansion joints and small roof penetrations). Use alternative application methods, such as torch-and-flop indirect torching, cold-applied adhesives or mop-applied with hot bitumen, in these areas.
- 3.4 A lit torch shall only be placed on the roof surface using a functional torch stand.
- 3.5 A lit torch shall never be left unattended.

4. END-OF-DAY FIRE WATCH

- 4.1 A minimum two-hour fire watch, as described in the new CERTA training program, shall be conducted by a properly trained and dedicated individual; it shall include checking the roof's underside for smoldering (whenever possible), as well as the top side.

¹ *combustible*, i.e., plywood, OSB, wood plank or wood fiberboard

² *noncombustible*, i.e., concrete, masonry, concrete block or gypsum

Section
1

GENERAL REQUIREMENTS

SECTION INTRODUCTION

OBJECTIVES Upon completion of this section, participants will be able to:

1. List personal protective equipment (PPE) requirements for torching activities
2. Describe basic first-aid procedures associated with torching activities
3. Describe the PASS system for using a fire extinguisher

TIMING This section is divided into two parts:

- A. Video and discussion (20 minutes)
- B. Tick-tack-toe Review Exercise (10 minutes)

Total Unit Time: 30 minutes

MATERIALS






Video clip from CERTA training video
(Video introduction plus Part 1 running time is 4 minutes 50 seconds.)



Student manuals

FACILITATION GUIDE

A	Video and Discussion (20 minutes)	
	 	<p>Show the Introduction and Part 1 of the DVD (running time including introduction is 4 minutes 50 seconds).</p> <p>Ask the students what PPE should be used for torch work.</p> <p>Expected answers:</p> <ul style="list-style-type: none"> • Long-sleeved shirt, buttoned at neck and cuffs • Long pants without cuffs • Ankle-high boots • Hard hat (if overhead hazard) • Leather gloves with snug cuffs • Goggles or face shield <p>Direct the students to turn to Photo 3 on page 7 (Spanish page 7) of their student manuals to see a picture of another type of recommended PPE—gauntlets.</p> <p>Ask the students what they <u>should not</u> do to a burn victim.</p>

		<p>Expected answers:</p> <ul style="list-style-type: none"> • Try to remove bitumen or clothing that is stuck to a burn. • Apply lotions, antiseptics or salves. <p>Ask the students what they should do to aid a burn victim.</p> <p>Expected answers:</p> <ul style="list-style-type: none"> • Call an ambulance. • Submerge the burn area in cool water. • Move the person out of the sun, if possible. <p>Direct the students to turn to page 14 (Spanish page 14) of their student manuals and review the classes of fires and types of fire extinguishers used for each (shown on student manual page 15 [Spanish page 15]).</p> <p>Tell the students the No. 1 rule if there is a fire is: ALWAYS CALL THE FIRE DEPARTMENT.</p> <p>Also, be certain you are not endangering yourself by attempting to put out a fire.</p> <p>Direct the students to turn to page 12 (Spanish page 12) of their student manuals and review the PASS system for using a fire extinguisher.</p> <p>Direct the students to turn to pages 10 and 11 (Spanish page 11) of their student manuals and review the fire extinguisher guidelines together as a class.</p> <p>Explain contact with propane may cause frostbite or freeze burns in exposed tissues.</p> <p>Direct the students to turn to page 9 (Spanish page 9) of their student manuals and have them look over the first-aid recommendations for freeze burn.</p> <p>Ask the class how these recommendations differ from those for normal burns.</p> <p>Expected answers:</p> <ul style="list-style-type: none"> • The victim should be put in a warm area. • Immerse the burn area in neutral-temperature water. • Give the victim warm liquids to drink.
<p>B Tick-tack-toe Review Exercise (10 minutes)</p>		
		<p>Refer the class to page 17 (Spanish page 17) of their student manuals to find the handout titled “Fire Safety Tick-tack-toe.”</p> <p>Ask the class to work in pairs and take five minutes to play the tick-tack-toe game.</p> <p>Explain they should flip a coin to see who starts the game and then play the game in the usual manner—except they may only place an X or O in a space if they can answer the question and the other person agrees the answer is correct.</p> <p>Stress they should be good sports while they play.</p> <p>Review the answers with the class when time is up by asking for volunteers to provide each answer. Be sure to allow opportunity for discussion and clarification, if necessary. Your answer sheet is on the next page.</p>

FIRE SAFETY TICK-TACK-TOE

ANSWER SHEET

Fill in the blank:

A minimum of _____
4A60BC fire
extinguishers should be
readily available within
10 feet of all
torching activities.

ANSWER

Two

What does the plastic
seal band through the
release pin of a fire
extinguisher ensure?

ANSWER

*The plastic seal ensures
the fire extinguisher has
not been discharged.*

Name one thing you
should do
and
one thing you
should not do
when tending to a
regular burn victim.

ANSWER

*See the list on **pages 8 and 9**
of the student manual.*

Name two things that
should be done for
victims of propane
freeze burn.

ANSWER

*See the list on **page 9** of
the student manual.*

What words does the
term PASS stand for?

ANSWERS

*Pull
Aim
Squeeze
Sweep*

Name two materials that—
if they were on fire—
would be classified as
Class A fires.

ANSWERS

*Wood
Paper
Plastic
Rags*

Name three types of PPE
that should be used while
doing torch work.

ANSWERS

*Long-sleeved shirt
Cuffless pants
Leather gloves
Gauntlets
Goggles
Face shield
Ankle-high boots
Hard hat (if overhead hazard)*

What classification of
fire extinguisher should
be within 10 feet of
torch work?

ANSWER

4A60BC

What should be done with
a fire extinguisher that
has been discharged?

ANSWER

*Remove it from the job site,
and have it serviced by an
approved service provider.*

Section 2 PRE-JOB PLANNING AND PREPARATION

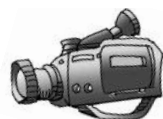
SECTION INTRODUCTION

- OBJECTIVES** Upon completion of this section, participants will be able to:
1. Identify the key elements of a comprehensive pre-job inspection
 2. Prescribe hazard controls when torching near hazardous areas

- TIMING** This section is divided into two parts:
- A. Video and discussion (15 minutes)
 - B. Job-site hazards and controls review exercise (15 minutes)

Total Unit Time: 30 minutes

MATERIALS



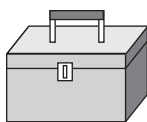
Video clip from CERTA training video (running time 7 minutes 16 seconds)



Flip chart and markers




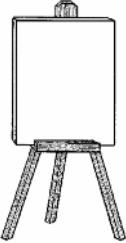


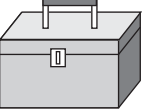
Student manuals



Samples of:

- 3/4-inch-thick perlite, 3/4-inch-thick fiberglass and 1/2-inch-thick gypsum roof board insulation materials
- Fiberglass base sheets
- Fiberglass ply sheets
- Self-adhering polymer-modified bitumen base sheet

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A Video and Discussion (15 minutes)		
		<p>Show Part 2 of the video (running time 7 minutes 16 seconds).</p>
	 	<p>Remind the class the video said daily inspections should be performed by a foreman or supervisor before work begins.</p> <p>Ask the class to name some of the hazards the inspector should be looking for, and record the answers on the flip chart.</p> <p>Expected answers:</p> <ul style="list-style-type: none"> • Confirm workers have proper PPE. • Make sure the crew knows the local fire codes and follows the rules. • Make note of flammable materials near work areas. • Make sure necessary fall protection is in place. • Other examples from video <p>Direct the students to turn to the Appendix of their student manuals and find the Daily Inspection Checklist.</p> <p>Point out the fact the Daily Inspection Checklist includes sections for in-progress inspections and post-job inspections and tasks, as well as pre-job inspections.</p> <p>Direct the students to turn to the section titled Identifying Hazards and Preventive Measures on page 18 (Spanish page 18) of their student manuals.</p> <p>Point out the fact the checklist names hazards and their possible controls, and explain in more detail the items on the checklist.</p> <p>Point out the organization of the list of hazards and controls in the student manual. For example, the list has general headings, such as General Working Conditions, and subheadings, such as Housekeeping and Fall Protection.</p>
B Job-site Hazards and Controls Review (15 minutes)		
	  <p><i>Refer to the Job-site Hazards and Controls Matching Answer Sheet on the next page to review the exercise.</i></p>	<p>Ask participants to work in pairs to conduct the review exercise, and tell them they will have five minutes to complete the exercise.</p> <p>Explain they should refer to the lists of hazards and preventive measures for <u>pre-job inspections</u> found on pages 18-22 (Spanish pages 18-23) of their student manuals to find a “control” that matches the listed hazard, and then they should mark the corresponding letter on the line.</p> <p>Point out that the category of hazard (heading or subheading) is shown in italics above the description of the hazard on the handout.</p> <p>Review the sheet when time is up by asking students to volunteer to give the answer for each question. While reviewing each question, have the students turn to the related page in their student manuals that shows each hazard/control and briefly discuss each situation.</p> <p>Pass out samples of thermal barrier insulation materials, fiberglass base sheets, self-adhering polymer-modified bitumen base sheet and fiberglass ply sheets when you review these topics in the matching exercise.</p>

JOB-SITE HAZARDS AND CONTROLS MATCHING EXERCISE ANSWER SHEET

HAZARDS

CONTROLS

<p><i>General Working Conditions</i></p> <p><u> C </u> Loose materials can blow into torch flames.</p>	<p>A. Closest telephone access should be identified and communicated to all crew members.</p>
<p><i>Weather Conditions</i></p> <p><u> F </u> Wind conditions may cause open flames from torching equipment to extend beyond normal visibility.</p>	<p>B. If above-deck thermal insulation is NOT present over the roof deck, incorporate a thermal barrier into the roof system. Note: A base ply alone does not qualify as a thermal barrier. (See Safety Practices on page 2 [Spanish page 2] of the student manual [page 18 in this instructors guide].)</p>
<p><i>Weather Conditions</i></p> <p><u> D </u> Bright sunlight limits open-flame visibility.</p>	<p>C. Remove all trash and debris from the workplace.</p>
<p><i>Specific Job-site Hazards</i></p> <p><u> G </u> Combustible flashing substrates are present.</p>	<p>D. Increase the distance of open flames to hazardous areas when flames cannot readily be seen.</p>
<p><i>Specific Job-site Hazards</i></p> <p><u> H </u> Rooftop penetrations are present.</p>	<p>E. Consult the building owner to identify and gain access to concealed attics and crawl spaces to fulfill regular daily inspections.</p>
<p><i>Specific Job-site Hazards</i></p> <p><u> B </u> A combustible roof deck is present.</p>	<p>F. Cease torching operations if spread of flames cannot be controlled.</p>
<p><i>Specific Job-site Hazards</i></p> <p><u> E </u> Concealed attics or crawl spaces are present immediately below a combustible deck.</p>	<p>G. If combustible flashing substrates are present, including cant strips, a two-layer backer should be incorporated into the flashing detail design and installation.</p>
<p><i>Emergency Communications</i></p> <p><u> A </u> It may be difficult to contact the local fire or emergency services department in the event of a fire.</p>	<p>H. Direct open flames should not contact any rooftop penetration.</p>

Section
3

PROPANE TOOL AND EQUIPMENT SAFETY

SECTION INTRODUCTION

OBJECTIVES

Upon completion of this section, participants will be able to:

1. Name the components of a roofing torch assembly
2. Explain the proper steps and procedures for handling propane gas cylinders

TIMING

This section is divided into three parts:

- A. Video and discussion (15 minutes)
- B. Demonstration of roofing torch assembly (15 minutes)
- C. Propane cylinder discussion (15 minutes)

Total Unit Time: 45 minutes

MATERIALS



Video clip from CERTA training video
(running time 3 minutes 23 seconds)



Roofing torch assembly







Student manuals



Flip chart and markers

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A Video and Discussion (15 minutes)		
		<p>Show Part 3 of the video (running time 3 minutes 23 seconds).</p> <p>Ask the participants what they think is the most important information presented in Part 3 of the video.</p> <p>If individuals have not stated <u>why</u> they think certain information is important, ask them to provide their reasons.</p>
B Demonstration of Roofing Torch Assembly (15 minutes)		
		<p>Show the class the roofing torch assembly.</p> <p>Point out the components of the torch and assembly that are shown in Figure 1 on page 24 (Spanish page 25) of the student manuals and ask the class to name the parts.</p> <p>Direct the students to turn to Photo 2 (picture of a propane cylinder) on page 26 (Spanish page 27) of their student manuals.</p> <p>Point out and ask the class to name components shown in Photo 2.</p>
C Propane Cylinder Discussion (15 minutes)		
		<p>Stress the extreme potential danger of propane and the importance of safety.</p> <p>Remind the class that the video stressed the importance of matching the torch with the correct pressure regulator. Mismatching regulators and torches may create fire and explosion hazards.</p> <p>Remind the class that the video discussed two types of propane tanks that are used for roofing work:</p> <ul style="list-style-type: none"> • Vapor withdrawal • Liquid withdrawal <p>Ask the class which type is usually used for roofing torch work.</p> <p>Expected answer: Vapor withdrawal</p> <p>Direct the class to turn to Figure 4 and Figure 5 on pages 27 and 28 (Spanish pages 28 and 29) of their student manuals.</p> <p>Ask the class to state the key characteristics and differences between the two types of cylinders.</p> <p>Expected answers:</p> <p><u>Vapor withdrawal:</u></p> <ul style="list-style-type: none"> • Vapor collects above liquid. • This vapor is drawn off and burned off at the torch head. • Vapor tanks have a female valve fitting for hose connection.

Sec.	Notes and Materials	Directions and Discussion
		<p><u>Liquid withdrawal:</u></p> <ul style="list-style-type: none"> • A dip tube draws liquid propane from the bottom of the tank. • The liquid is carried to the torch head, where it is vaporized and burned. • Tanks manufactured after 1988 have a male valve. <p>Explain that the type of torch used with a liquid system differs from a torch used with a vapor system.</p> <p>Note: Some torches designed for liquid-withdrawal systems may be used with vapor-withdrawal systems. However, you cannot use vapor-withdrawal torches with a liquid system. Doing so will create a continuous uncontrolled fireball of burning liquid propane!</p> <p>Ask the class to describe the method shown in the video for testing for leaks between hoses and connections.</p> <p>Expected answer:</p> <ul style="list-style-type: none"> • Apply soapy water around connections. • If bubbles appear, tag the hose and remove it from service. <p>Write the following heading on a piece of flip chart paper: <u>Moving and Hoisting Cylinders.</u></p> <p>Ask students to state safety rules for moving and hoisting propane cylinders. If they are having trouble, direct them to pages 28 and 29 (Spanish pages 29 and 30) of their student manuals.</p> <p>Expected answers:</p> <ul style="list-style-type: none"> • Fasten cylinders in an upright position on a dolly or cart. • When moving a small cylinder without a cart, grip it by the protective collar. • Two people should move a large cylinder—one person grips the foot ring, and one grips the protective collar. • Never lay the tank on its side and roll it. • If hoisting a cylinder more than 30 inches, securely fasten it in an upright position in a hoisting cage. <p>Ask the students to state safety rules for storing propane cylinders. If they are having trouble, direct them to page 29 (Spanish page 30) of their student manuals.</p> <p>Expected answers: See the bulleted list on page 29 (Spanish page 30) of the student manual.</p>

Section

4

APPLICATION SAFETY

SECTION INTRODUCTION

OBJECTIVES Upon completion of this section, participants will be able to:

1. Recognize hazardous areas
2. Describe safe torching techniques to use near hazardous areas

TIMING This section is divided into three parts:

- A. Video and discussion (35 minutes)
- B. Demonstration of assembling a roofing torch assembly (10 minutes)
- C. Hazards recognition exercise (45 minutes)

Total Unit Time: 90 minutes

MATERIALS



Video clip from CERTA Training Video
(running time 7 minutes 24 seconds)



Student manuals









Roofing torch assembly



Soapy water and applicator

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A Video and Discussion (35 minutes)		
	  <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><i>Note: If you observe that people are not checking off the steps in their student manual, you can call out each step as it is being shown in the video.</i></p> </div>	<p>Tell students the torch-and-flop application method is the most effective work practice they can use. It is done to keep the open flame away from combustible areas.</p> <p>Direct the students to turn to page 35 (Spanish page 37) of their student manuals (instructions for torch and flop for field applications).</p> <p>Briefly review the steps for torch-and-flop application, beginning with the section titled Starting Field Membranes at Roof Edges or Walls. As you are reviewing the steps, be sure to ask if everyone understands the steps.</p> <p>Continue this process with the section Ending Field Membranes at Roof Edges or Walls and the section Around Penetrations.</p> <p>Continue this process with the section on torch and flop for flashing applications: At Walls, Penetrations and Perimeter Edges.</p> <p>Direct the students to turn back to page 35 (Spanish page 37) of their student manuals (instructions for torch and flop for field applications).</p> <p>Explain you will be showing a video clip that will demonstrate all the steps that were just discussed.</p> <p>Tell the students to put a check mark in their student manuals by the steps as they see each step being demonstrated in the video.</p> <p>Stress the importance of students understanding these skills because they will be required to practice and demonstrate them in the hands-on portion of their training.</p> <p>Show Part 4 of the video (running time 7 minutes 24 seconds).</p> <p>Ask students if they have any questions about the techniques they just saw demonstrated.</p>
B Demonstration of Assembling a Roofing Torch Assembly (10 minutes)		
	   <p><i>Refer to the answer sheet on the next page to review the roofing torch assembly exercise.</i></p>	<p>Direct students to turn to page 46 (Spanish page 47) of their student manuals and find the page titled Assembling a Roofing Torch Assembly.</p> <p>Explain the page lists the steps for assembling a torch—but the steps are not in order. You will demonstrate each step as the class tells you, in order, which step you should take.</p> <p>Direct the students to fill in the correct step number on their handouts.</p> <p>Proceed with the assembly following the directions of the class as long as the directions are in the correct order.</p> <p>Direct the students to turn to page 32 (Spanish page 33) of their student manuals and refer to the section titled Lighting a Hand-held Torch.</p> <p>Tell them they will be required to follow these steps during the hands-on portion of the training.</p> <p>Ask for a volunteer to read Step 1, and continue this process for each step, clarifying the information, as necessary.</p>

C	Hazard Recognition Exercise (45 minutes)	
		<p>Divide the class into groups of four or five.</p> <p>Direct the students to turn to page 38 (Spanish page 39) of their student manuals.</p> <p>Explain the instructions for the exercise, and do Hazard No. 1 together as a class.</p> <p>Tell students they will have 30 minutes to complete the exercise.</p> <p>When 30 minutes have passed (or when most of the groups are finished with the exercise—whichever comes first), ask one of the groups to provide answers for Hazard No. 2.</p> <p>Ask the rest of the students whether they agree, and give additional feedback and correction as necessary.</p> <p>Continue this process until each hazard has been discussed.</p>

ASSEMBLING A ROOFING TORCH ASSEMBLY ANSWER SHEET

Step Number	Action
6	Open the propane cylinder valve fully while the regulator adjustment valve is still closed. Slowly open the regulator adjustment valve just enough to blow out any foreign matter. Close both valves.
4	Attach the regulator to the cylinder valve. Tighten the connection.
1	Inspect all equipment for damage.
8	Conduct a leak test.
3	Tightly close the cylinder valve handle and regulator adjustment valve using its knob or screw.
7	Assemble a roofing torch following its manufacturer’s instructions. Attach the other hose end to the roofing torch.
5	Attach the hose end connector to the regulator. Tighten the hose fitting snugly to the regulator outlet.
2	Inspect the cylinder valve for dirt or foreign substances. Clean it out with a clean rag or soft brush if necessary. Use compressed air to blow out any foreign material that may have accumulated during storage.

Section
5

POST-JOB REQUIREMENTS AND DUTIES

SECTION INTRODUCTION

OBJECTIVES Upon completion of this section, participants will be able to:

1. Explain the post-job fire watch and other duties

TIMING This section is divided into two parts:

- A. Fire-watch and post-job basics exercise (10 minutes)
- B. Video and discussion (20 minutes)

Total Unit Time: 30 minutes

MATERIALS



Video clip from CERTA training video
(running time 1 minute 27 seconds)




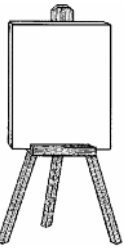


Student manuals



Flip chart and markers

FACILITATION GUIDE

Sec.	Notes and Materials	Directions and Discussion
A	Fire-watch and Post-job Basics Exercise (10 minutes)	
	 <p><i>Refer to the Ten Fire-watch and Post-job Basics Answer Sheet on the next page to review the exercise.</i></p>	<p>Direct students to turn to page 50 (Spanish page 51) of their student manuals and find the handout titled Ten Fire-watch and Post-job Basics.</p> <p>Tell the class that these 10 items are some of the most basic post-job duties and you will discuss post-job tasks in greater detail after reviewing this sheet and watching a video clip.</p> <p>Work through the handout together as a class, amplifying the statements for clarification as necessary.</p>
B	Video and Discussion (20 minutes)	
	  	<p>Show Part 5 of the video (running time 1 minute 27 seconds).</p> <p>Direct students to turn to page 48 (Spanish page 49) of their student manuals.</p> <p>Review this table with the class, focusing on WHAT the evidence of fire is and HOW it is found.</p> <p>Ask the class to name the fire-watch and post-job duties, and record their answers on the flip chart.</p>

TEN FIRE-WATCH AND POST-JOB BASICS

ANSWER SHEET

NOTE TO INSTRUCTOR: The CAPITALIZED words represent the pictures in the student handout. The **boldface/underlined** words represent the fill-in-the-blank words in the student handout.

In some cases, student answers may be slightly different from those indicated below. Answers can be considered correct if they have essentially the same meaning as the words shown below.

1. Most serious roof FIRES caused by torches happen **after** the crew has gone home.
2. Combustible materials can ignite during the day and not be noticed because they are SMOLDERING **under** the roof system.
3. The person who conducts a fire WATCH must be competent and have authority to take **action**.
4. The designated PERSON performs fire-watch duty throughout each **workday**.
5. In addition, a **two**-hour fire watch begins as soon as the last TORCH on the roof is extinguished. The fire watch may take longer, depending on conditions.
6. A competent person performing fire-watch duty must know where a building's FIRE ALARM is and know how to **operate** it.
7. He or she must also have authority by the BUILDING owner to **trigger** the alarm.
8. Interior inspections require easy access for viewing the underside of the roof deck or inspecting concealed attic areas. **After-hours** access for interior inspections is a KEY fire-watch requirement.
9. Post-job tasks include CHECKING that all cylinder **valves** are turned off.
10. Remove cylinders from the roof for overnight storage if you can. If not, gather all cylinders near the center of the roof away from **combustible** materials, penetrations, walls and roof edges. Secure cylinders upright in a group using steel wire, heavy CHAIN or a binder strap.

HANDS-ON TRAINING REQUIREMENTS, POLICIES AND PROCEDURES

SECTION INTRODUCTION

OBJECTIVES Upon completion of this hands-on unit, you will:

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

TIMING This section is divided into four parts:

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

Total Unit Time: 180 minutes (3 hours)
See detailed table for time schedule.

MATERIALS



Scheduled materials and equipment checklists



Torching equipment (from checklist), circular saw, hammer, carpenter’s square, screw gun

Event	Hands-on Exercises Schedule	
8	Hands-on Instruction: Instructor Demonstrates Torch Lighting	5 minutes
	8-1: Lighting Procedures	2 minutes
	8-2: Shutting Down Torch	3 minutes
9	Hands-on Instruction: Instructor Demonstrates Applying Self-adhering Base Ply	5 minutes
10	Hands-on Instruction: Instructor Demonstrates Flashing Torch and Flop	10 minutes
11	Hands-on Instruction: Instructor Demonstrates Flashing Direct Torching	10 minutes
12	Hands-on Instruction: Instructor Demonstrates Field Torch-and-flop Applications	20 minutes
	12-1: Starting Rolls at Roof Edges or Walls	5 minutes
	12-2: Interior Roof Drain	6 minutes
	12-3: Penetration	5 minutes
	12-4: Finishing Rolls at Roof Edges or Walls	4 minutes
13	Hands-on Instruction: Participant Torch Exercise Rotation and Evaluation	120 minutes
	13-1, Station 1 and 2: Flashing Torch and Flop	60 minutes each team
	13-2, Station 3 and 4: Field Applications Torch and Flop	60 minutes each team
14	Program Wrap-up	10 minutes
	Total	180 minutes (3 hours)





FACILITATION GUIDE



A	Hands-on Workstation Setup (Prepare before conducting training session.)	
	<div style="border: 2px solid black; padding: 10px; width: fit-content; margin: 0 auto;"> <p>Materials and Equipment Lists</p> </div> <div style="display: flex; justify-content: center; gap: 10px; margin-top: 10px;"> <div style="width: 20px; height: 15px; background-color: #ccc; border: 1px solid #000;"></div> <div style="width: 20px; height: 15px; background-color: #ccc; border: 1px solid #000;"></div> <div style="width: 20px; height: 15px; background-color: #ccc; border: 1px solid #000;"></div> <div style="width: 20px; height: 15px; background-color: #ccc; border: 1px solid #000;"></div> </div>	<p>Identify the training location, and be sure it will meet all the safety requirements (e.g., ventilation, fire protection).</p> <p>Gather all materials, tools and equipment together for the training session. Use the tables provided on pages 41 and 42 of this section.</p> <p>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.</p> <p>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 42 to 45 of this section.</p>

		<p>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. Refer to pages 42 to 45 of this instructors guide for details.</p> <p>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.</p> <p>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.</p> <p>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.</p>
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B Instructor Conducts Hands-on Exercise Demonstrations
Total 50 minutes

Have students take turns reading aloud to you the step-by-step instructions found in their evaluation checklist on pages 59 and 60 (Spanish pages 60 and 61) of the student manual during your demonstration.

8		<p><i>Event 8 (5 minutes)</i></p> <p>8-1, 2 minutes: Demonstrate proper torch-lighting procedures.</p> <p>8-2, 3 minutes: Demonstrate proper torch shut-down procedures.</p>
9		<p><i>Event 9 (5 minutes) (stations 1 or 2)</i></p> <p>Demonstrate proper application of self-adhering base ply with a focus on ensuring sealed laps, using the flashing box mock-up.</p>
10		<p><i>Event 10 (10 minutes) (stations 1 or 2)</i></p> <p>Demonstrate flashing torch-and-flop application using the flashing box mock-up.</p>
11		<p><i>Event 11 (10 minutes) (stations 1 or 2)</i></p> <p>Demonstrate proper flashing direct torching application using the flashing box mock-up and a detail application-size (105k Btu or less) torch.</p>

<p>12</p>		<p><i>Event 12 (20 minutes) (stations 3 or 4)</i></p> <p>12-1: Demonstrate proper starting of field membrane rolls at roof edges or walls.</p> <p>12-2:</p> <ul style="list-style-type: none"> 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. <p>12-3: Demonstrate the proper torch-and-flop method for installing field sheet over the drain penetration.</p> <p>12-4: Demonstrate the proper torch-and-flop method for ending field membranes at roof edges or walls.</p>
<p>C Supervise and Evaluate Participants’ Performance of Hands-on Exercises Total 130 minutes (2 hours, 10 minutes)</p>		
<p>13</p>	 <div data-bbox="305 1157 496 1404" style="border: 1px solid black; padding: 5px; text-align: center; margin-top: 20px;"> <p>Hands-on Exercise Evaluation Forms</p> </div>	<p>Count off participants into groups 1 through 4. The result will be four groups of five people for a 20-person session.</p> <p>Tell participants to turn to pages 59 and 60 (Spanish pages 60 and 61) of the Appendix of their student manuals and remove the Hands-on Performance Evaluation Form. Tell participants to fill in their names at the top of the form as the torch operator.</p> <p>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 the prescribed torching operation following the listed criteria on the evaluation form. There are 60 individual items on the evaluation form.</p> <p>Explain Reasons for Failure.</p> <p>Reasons for automatic failure include:</p> <ul style="list-style-type: none"> • Smoking within 50 feet of a propane cylinder • Scoring a 1 on any one of the seven “never touches the _____ with a flame” items • Injuring himself or herself or another participant, whether intentional or not • Engaging in unruly behavior or misconduct as determined by the authorized instructor <p>A participant also fails this hands-on evaluation if he or she receives 18 or more 1 scores on the total evaluation.</p> <p>Position each group 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.</p>

<p>13-1</p>		<p>Explain to the groups that they have 60 minutes to complete each group exercise.</p> <p>Rotate participants from task to task at their workstation until each group member has performed all tasks related to the torching exercise.</p> <p>Advise students to evaluate one another in a positive and constructive manner, providing feedback to the torch operator <i>based on the criteria set forth in the step-by-step instructions they reviewed on pages 32 through 37 (Spanish pages 33 to 39) of their student manuals</i>. Remind them they should not be injecting personal opinions about ways they were taught or shortcuts they may know nor should they suggest their experience is a “better” way to do a task. Reinforce the feedback needs to be objective, constructive and positive in tone.</p> <p>Monitor each group’s evaluation feedback to ensure positive, constructive comments are being given. You may also add your own feedback.</p> <p>Explain to evaluators they need to agree on a performance grade for the torch operator, again keeping it objective, and have evaluators write the operator’s grade in the space provided on his or her evaluation form. If an operator performs poorly, discuss with the group and assist the operator as time allows. The objective here is to teach operators safe torching habits.</p> <p>Keep a close eye on all exercises, and maintain order. Do not allow horseplay or other inappropriate behavior.</p> <div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Station 1 and 2: Flashing exercise on one side of a flashing box— 60 minutes simultaneous with event 13-2</p> </div> <p>Participant 1—may choose to either install a self-adhered base ply with sealed laps and direct torch a flashing using only a detail torch or may choose to perform 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.</p> <p>Participant 2—performs fire-watch duty while others are torching. He or she is to perform no other duties during the fire watch. This person has the authority to stop an exercise if he or she observes a fire risk.</p> <p>Participants 3, 4 and 5—observe that participant 1 is performing the torching sequence properly following the step-by-step instructions provided on the evaluation form. This includes never allowing a flame to touch a flashing box.</p> <p>At the end of the first 60-minute exercise, groups exchange places with workstations 3 and 4 to begin the second round of simultaneous exercises.</p>
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<p>13-2</p>		<div style="border: 1px solid black; padding: 10px; text-align: center;"> <p>Stations 3 and 4: Field Mock-up Exercise for starting and ending rolls and installing around penetrations using flat field mock-ups—60-minute exercise simultaneous with 13-1</p> </div> <p>Participant 1—performs each of the torch-and-flop field application tasks following the step-by-step instructions provided on the evaluation forms. These tasks include:</p> <ul style="list-style-type: none"> • 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 • Properly lighting and shutting down a torch assembly <p>Participant 2—same fire-watch duty as described in 13-1.</p> <p>Participants 3, 4 and 5—conduct evaluations as described in 13-1.</p>
<p>D</p>	<p>Program Wrap-up (10 minutes)</p>	
<p>14</p>	<div style="border: 2px solid black; padding: 10px; text-align: center; background-color: #f0f0f0;"> <p>Program Evaluation Forms</p> </div>	<p>Instruct participants to fill out the program evaluation form on pages 61 and 62 (Spanish pages 62 and 63) in the Appendix of their student manuals. Encourage participants to fill out these forms and mail them to NRCA.</p> <p>Confirm you have all the personal information you will need to complete your roster sheet.</p> <p>Inform participants you will distribute their certification 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 cards to you for distribution.</p> <p>Thank everyone for participating.</p>

Equipment and Materials Requirements

Hands-on Training Mock-up Construction Materials

√	Quantity	Unit	Description
			Mock-up Construction
	192	Square feet	½-inch high-density wood fiberboard roof insulation
	3	Sheets	4-foot-by-8-foot-by-½-inch CDX plywood
	15	Each	2x4 dimensional lumber by 45-inch length
	6	Each	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	1½-inch general-purpose screws
	100	Each	16 penny nails
	50	Each	1½-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 polymer-modified base sheet
	9	Rolls	APP polymer-modified bitumen membrane—smooth or granulated
	8	Each	Wood fiber cant strips—3-foot lengths (optional)
	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

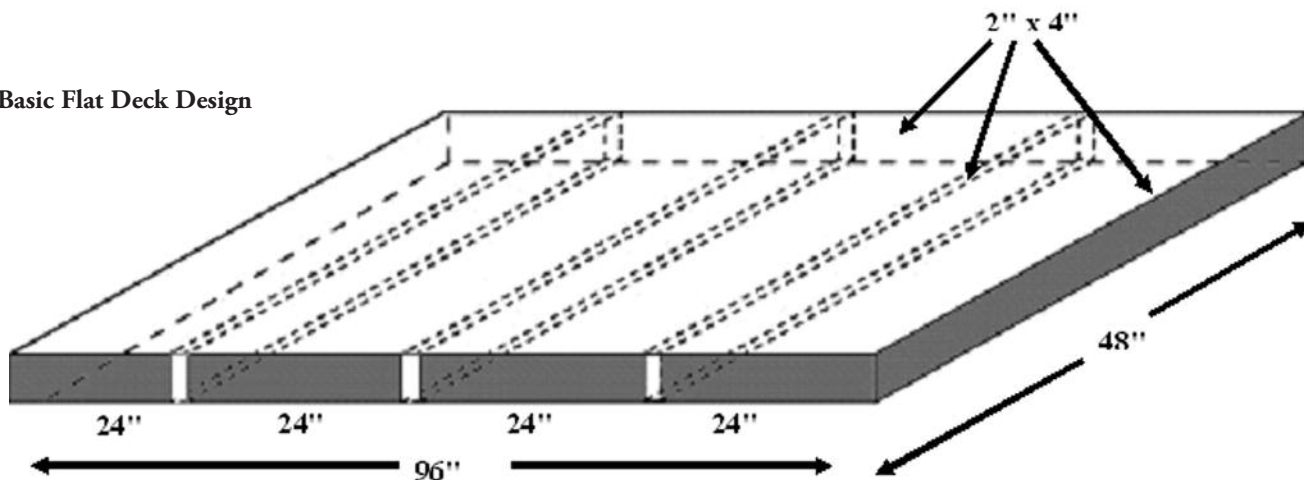
√	Quantity	Unit	Description
	4	Each	20-pound vapor liquid petroleum (LP) gas cylinders
	4	Each	Pressure regulators
	4	Each	Pressure gauges
	4	Each	25-foot UL-listed hoses
	4	Sets	Swivel-type connectors for torch assemblies

√	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-97 goggles (eye protection)
	5	Pair	Leather-palmed heavy work gloves (hand protection)

Mock-up Design, Construction and Setup

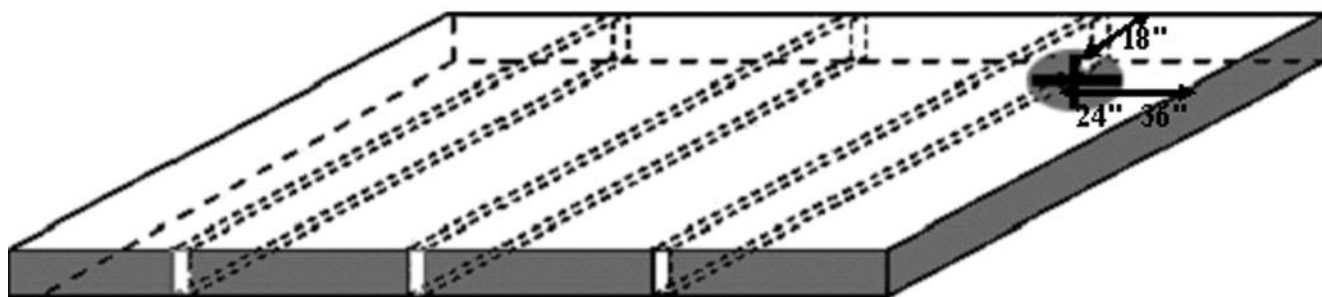
The drawings below represent mock-ups you will need to construct before conducting the hands-on training portion of this program.

Basic Flat Deck Design



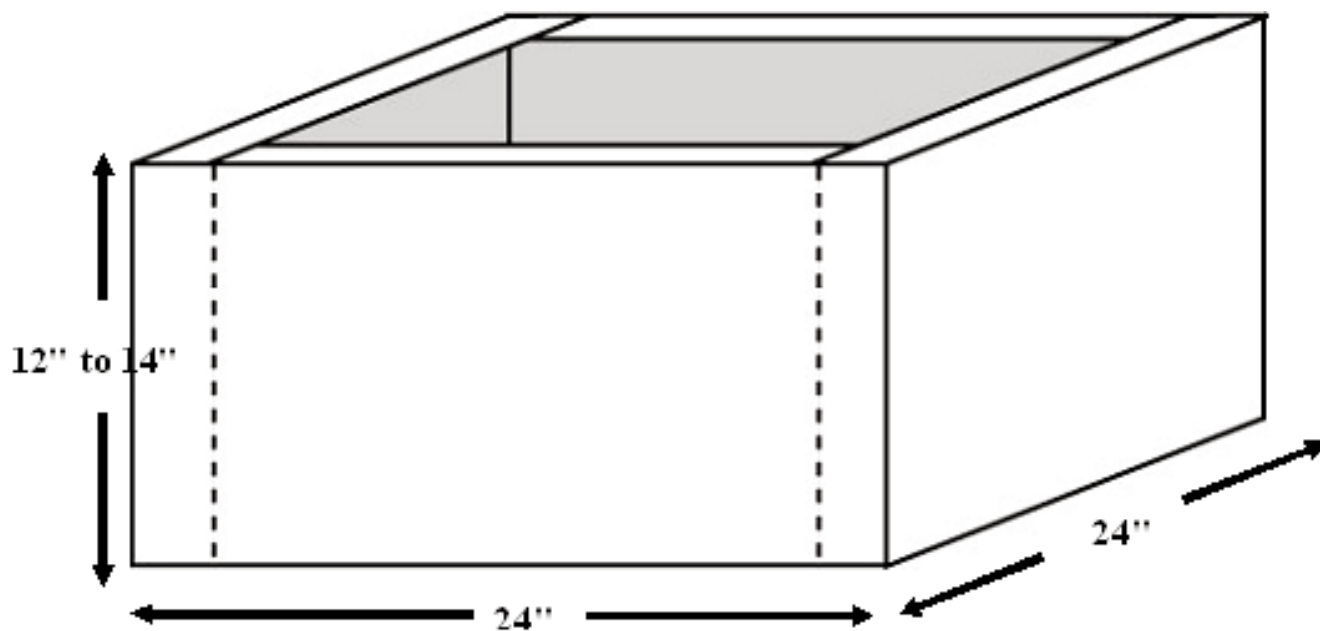
Construct basic flat deck using 2x4 dimensional lumber secured with 16d nails as shown here. Install one layer ½-inch minimum CDX plywood to deck over the 2x4 frame, secured 8 inches on center with 1¼-inch general-purpose screws. Install two layers of ½-inch high-density wood fiberboard roof insulation secured with 1½-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



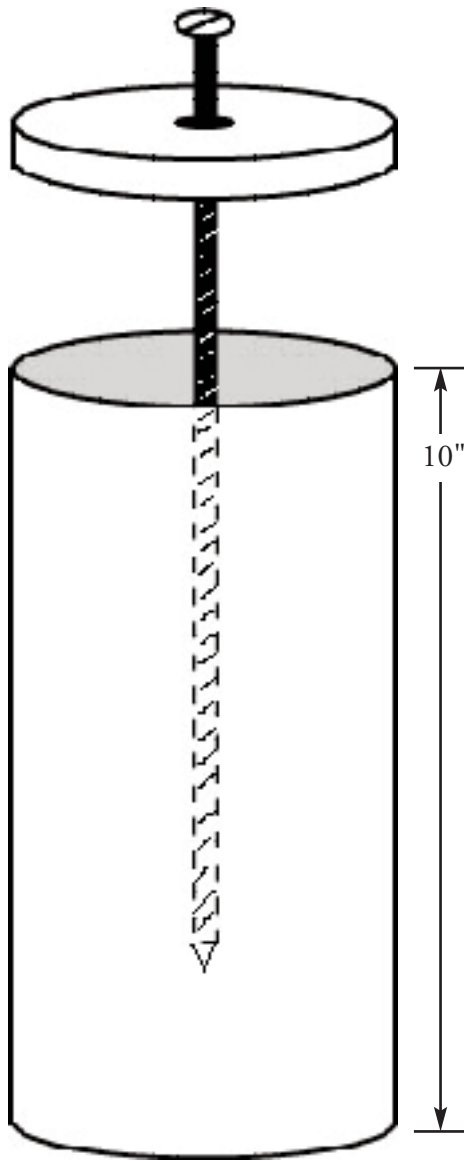
Cut a hole 18 inches from one side and 18 to 24 inches from one end in two of the three basic flat deck mock-ups. Use a 9-inch metal pie tin, a large coffee can or an inverted galvanized steel tall cone flashing cut to height to simulate a roof drain opening. Secure the simulated roof drain in the hole.

Basic Flashing Box Mock-up



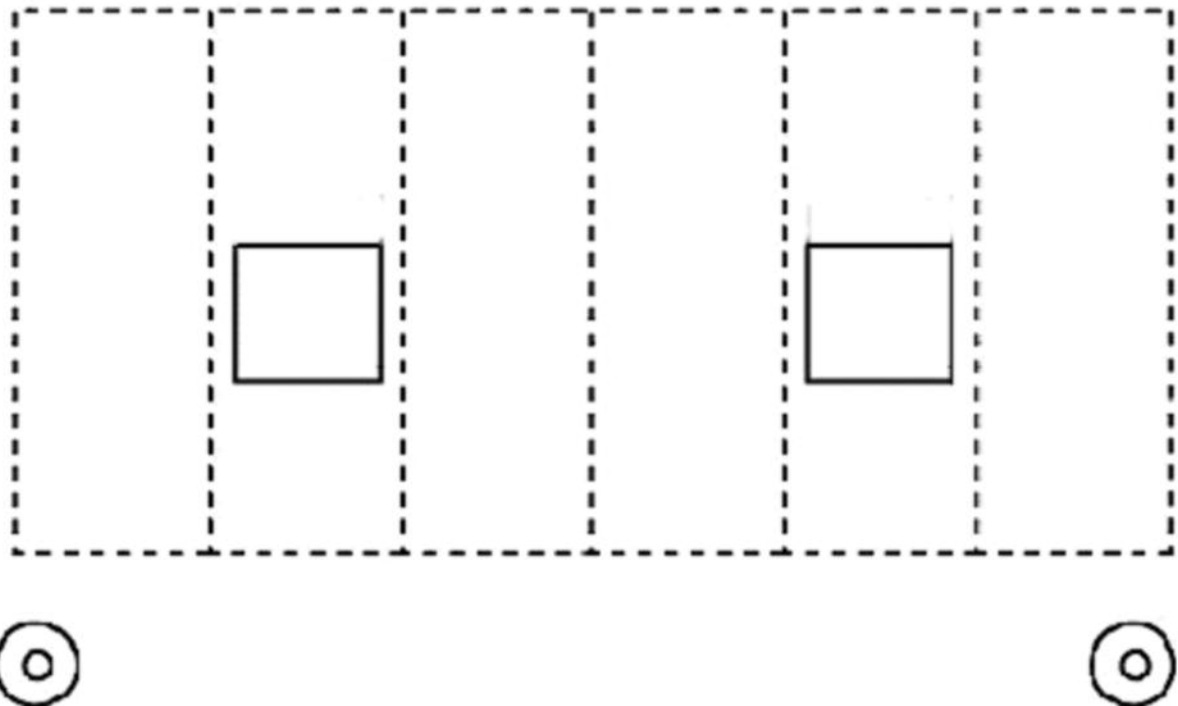
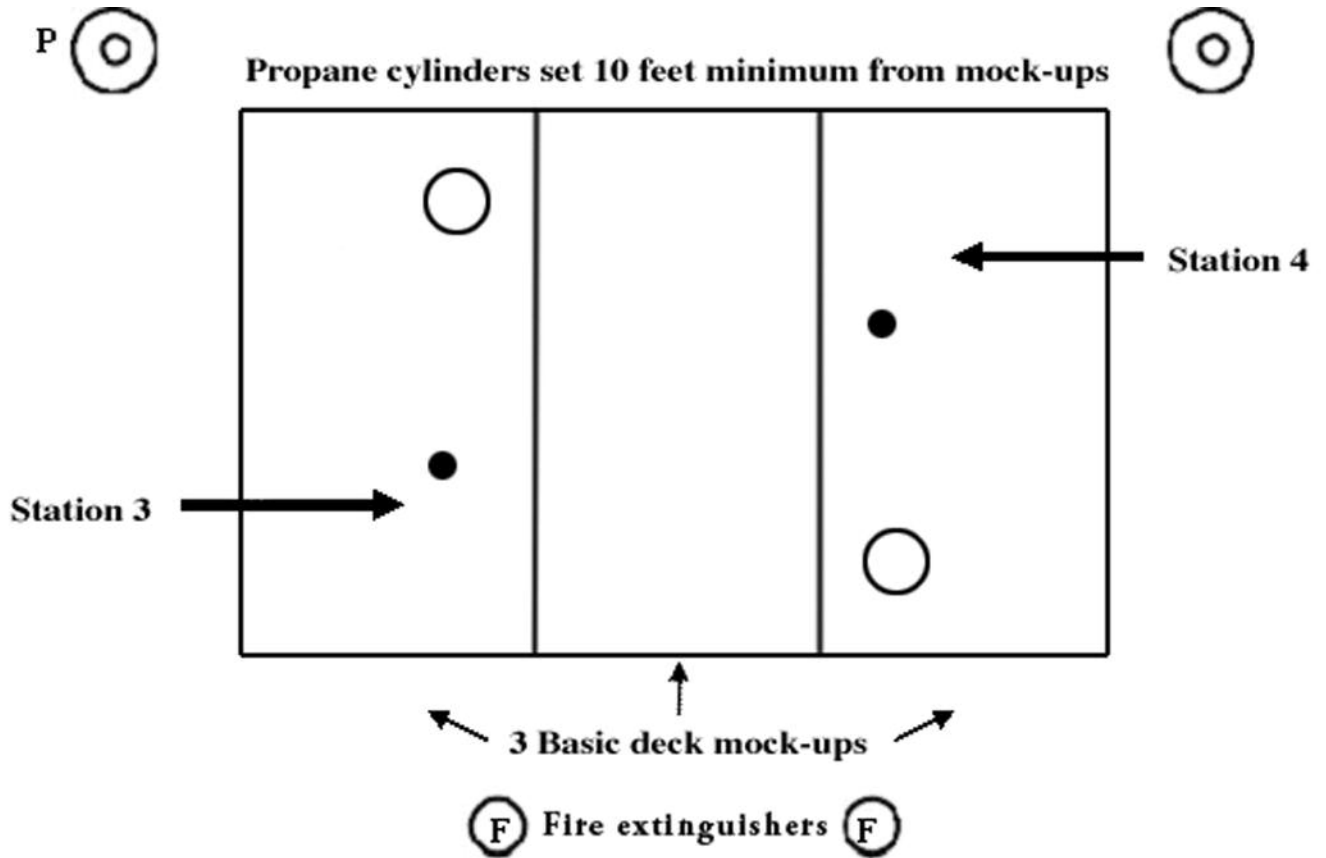
Construct basic flashing box mock-up using four pieces of 2- by 12- or 14-inch dimensional lumber nailed together using 16d nails. Add new cant strips for each training session.

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 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.