Module Overview

This module identifies sprinkler fitter career opportunities and looks at typical work environments. It examines trade-specific safety hazards and workplace safety. It covers the correct use of common tools.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify specific codes and standards that apply to the fire sprinkler industry.
2. Define the typical work environment of a sprinkler fitter.
3. Identify career opportunities in the fire sprinkler industry.
4. Describe the personal responsibilities of sprinkler fitters.
5. Recognize safety hazards that you may come across as a sprinkler fitter.
6. Describe procedures to best handle and store trade materials.
7. Recognize drawings typically seen by sprinkler fitters in the field.
8. Identify basic tools, materials, and fire sprinkler systems used in the sprinkler fitter trade.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Correctly use pipe wrenches to remove and install fittings.
2. Show the proper use and care of pliers.
3. Demonstrate using a torpedo level to check horizontal and vertical piping.
4. Cut different types of piping material with a hacksaw.

Materials and Equipment

- Multimedia projector and screen
- Sprinkler Fitting Level One PowerPoint® Presentation Slides (ISBN 978-0-13-272924-6)
- Computer
- Whiteboard/chalkboard
- Markers/chalk
- Pencils and scratch paper
- Appropriate personal protective equipment
- Job announcements for sprinkler fitters from local newspapers (want ads)
- NCCER Apprentice Training Recognition Forms
- NFPA 13, The Standard for the Installation of Sprinkler Systems
- Installation drawings
- Copies of local building codes
- Copies of several standards
- NFPA 13D
- NFPA 13R
- NFPA 20
- NFPA 22
- NFPA 24
- NFPA 25
- OSHA Safety and Health Standards for the Construction Industry
- Copy of an employee manual
- Pipe wrenches
- Offset pipe wrench
- Chain wrench
- Strap wrench
- Sprinkler head wrench
- Torque wrench
- Pliers
- Torpedo levels
- Hacksaws
- Pipe and fittings
- Different types of piping
- Module Examinations*
- Performance Profile Sheet*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 5 hours are suggested to cover Orientation to the Trade. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tbody>
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<td>A. Introduction</td>
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<td>B. Fire Sprinkler Systems</td>
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<td>C. Codes and Standards</td>
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<td>D. Sprinkler Fitter Careers</td>
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<td>E. Employee Responsibility and Human Relations</td>
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<td>F. Safety</td>
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<tr>
<td><strong>Session II. Tools; Review and Testing</strong></td>
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<tr>
<td>A. Tools of the Trade</td>
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<tr>
<td>B. Laboratory</td>
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</tr>
<tr>
<td>Have trainees practice using pipe wrenches, pliers, torpedo levels, and hacksaws. This laboratory corresponds to Performance Tasks 1 through 4.</td>
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<tr>
<td>C. Your Training Program</td>
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<td>D. Review</td>
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<tr>
<td>E. Module Examination</td>
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<tr>
<td>1. Trainees must score 70% or higher to receive recognition from NCCER.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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<tr>
<td>F. Performance Testing</td>
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</tr>
<tr>
<td>1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.</td>
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<tr>
<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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</table>
Module Overview

This module covers some of the basic components of a sprinkler system, including sprinklers, underground and aboveground pipe, valves, alarms, hangers, bracing and restraints. It provides an overview of the major types of sprinkler systems and the code requirements for the installation of these systems.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Sprinkler Fitting Level One, Module 18101-13.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Define the term Listed and explain how the term relates to sprinkler systems.
2. Explain the purpose of a Listing agency.
3. Describe the characteristics of common sprinklers.
4. State the important characteristics of aboveground pipe, including wall thickness and joining methods.
5. Define C-factor and list the advantages of a higher C-factor.
6. Describe the types of pipe hangers and sway bracing.
7. Identify the characteristics of control valves, check valves, water flow alarms, and fire department connections.

Performance Tasks

This is a knowledge-based module. There are no Performance Tasks.

Materials and Equipment

Multimedia projector and screen
Sprinkler Fitting Level One PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
NFPA 13, The Standard for the Installation of Sprinkler Systems
Upright, pendent, sidewall, and conventional sprinklers

Several sizes of steel pipe
Samples of copper tubing and CPVC pipe
Various fittings
Steel pipe used in underground applications
Several types of hangers
Various types of valves
Water flow alarm
Fire department connections
Quick Quiz*
Module Examinations**

* Located at the back of this module.
** Single-module AIG purchases include the printed exam. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly.
**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.


**Teaching Time For This Module**

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 7½ hours are suggested to cover *Introduction to Components and Systems*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

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<thead>
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<td>B. Listing Agencies</td>
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<td>C. Sprinkler Systems</td>
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<tr>
<td><strong>Session II. Pipe, Fittings, and Hangers</strong></td>
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<td>A. Aboveground Pipe and Tube</td>
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<td>B. Underground Pipe</td>
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<td>C. Hangers, Bracing, and Restraint-of-System Piping</td>
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<tr>
<td><strong>Session III. Valves, Review, and Testing</strong></td>
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<td>A. Valves</td>
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<td>B. Water Flow Alarms</td>
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<tr>
<td>C. Fire Department Connections</td>
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<tr>
<td>D. Review</td>
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</table>
| E. Module Examination | 1. Trainees must score 70% or higher to receive recognition from NCCER.  
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor. |
Module Overview

This module describes the materials used in steel piping systems and the tools used to cut and thread steel pipe. It explains how to determine pipe lengths between fittings (takeouts). It describes methods to cut, thread, and groove pipe. It covers threaded, plain-end, and flanged fittings and discusses grooved pipe fittings and installation techniques.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Sprinkler Fitting Level One, Modules 18101-13 and 18102-13.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Follow basic safety precautions for preparing and installing steel pipe.
2. Identify types of steel pipe and fittings.
3. Recognize tools for cutting and threading steel pipe.
4. Calculate takeouts.
5. Set up equipment, including power threading machines.
6. Measure, cut, ream, and thread steel pipe.
7. Assemble threaded, grooved, and plain-end pipe.
8. Check for correctness of pipe-end preparation.
9. Read a fitting.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Cut pipe using steel pipe cutters.
2. Ream pipe.
3. Thread pipe using a manual pipe threader.
4. Set up a power threading machine.
5. Assemble threaded and grooved piping.
6. Read a fitting.
7. Apply pipe thread compound to the end of steel pipe.
8. Make up several types of fittings.
9. Identify appropriate gaskets for fittings.
10. Calculate pipe length between fittings.

Materials and Equipment

Multimedia projector and screen
Sprinkler Fitting Level One
  PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper,
Appropriate personal protective equipment
Various sizes and types of steel pipe
ASTM A53
Steel pipe cutters
Hinged cutters
Manual pipe threader and dies
Assorted elbows
Couplings
Unions
Bushings
Caps and plugs
Mechanical tees
Nipples
Plain end fittings
Coupling with grippers
Groovers

continued
Hole cutting tools  
Grooved couplings  
Flanged fittings  
Flanges  
Gaskets  
Gasket lubricant  
Examples of various pipe threads  
Thread and ring gauges  
Fitting manufacturer’s makeup chart  
Fitting manufacturer’s takeout chart  
Pipe drawings  
Power threading machine  
Cutting oil  
Pipe stand  
Vises  
Reamers  
Pipe cleaning tool  
¾-inch to ⅝-inch sets of open-end wrenches  
Adjustable wrenches  
Channel-lock pliers  
Drift pins  
Framing squares  
Measuring tape  
Soapstones  
Torque wrenches  
Liquid Teflon®  
Teflon® tape  
Pipe dope  
Module Examinations*  
Performance Profile Sheets*  

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 22½ hours are suggested to cover Steel Pipe. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
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<tbody>
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<td><strong>Session I. Threaded Piping Systems</strong></td>
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<td>A. Introduction</td>
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<tr>
<td>B. Materials Used in Threaded Piping Systems</td>
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<tr>
<td>C. Cutting Tools</td>
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<tr>
<td>D. Laboratory</td>
<td>Have trainees practice cutting and reaming steel pipe. This laboratory corresponds to Performance Tasks 1 and 2.</td>
</tr>
<tr>
<td><strong>Sessions II and III. Threads</strong></td>
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<tr>
<td>A. Threads</td>
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<tr>
<td>B. Manual Pipe Threader</td>
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<tr>
<td>C. Laboratory</td>
<td>Have trainees practice threading pipe with a manual pipe threader. This laboratory corresponds to Performance Task 3.</td>
</tr>
<tr>
<td>D. Power Threading Machine</td>
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<tr>
<td>E. Laboratory</td>
<td>Have trainees practice setting up a power threading machine. This laboratory corresponds to Performance Task 4.</td>
</tr>
<tr>
<td><strong>Sessions IV and V. Assembly Techniques</strong></td>
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<tr>
<td>A. Pipe Joint Compound</td>
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<tr>
<td>B. Laboratory</td>
<td>Have trainees practice applying pipe joint compound. This laboratory corresponds to Performance Task 7.</td>
</tr>
<tr>
<td>C. Laboratory</td>
<td>Have trainees practice assembling threaded piping. This laboratory corresponds to Performance Task 5.</td>
</tr>
<tr>
<td>D. Selecting Threaded Fittings</td>
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<tr>
<td>E. Laboratory</td>
<td>Have trainees practice reading a fitting. This laboratory corresponds to Performance Task 6.</td>
</tr>
<tr>
<td>F. Making Up Pipe and Fittings</td>
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<tr>
<td>G. Laboratory</td>
<td>Have trainees practice making up the pipe and fitting. This laboratory corresponds to Performance Task 8.</td>
</tr>
</tbody>
</table>
Sessions VI and VII. Specialty Pipe
A. Plain Ends
B. Grooved Pipe
C. Laboratory
   Have trainees practice assembling grooved pipe. This laboratory corresponds to Performance Task 5.
D. Flanged Pipe
E. Laboratory
   Have trainees practice identifying appropriate gaskets for fittings. This laboratory corresponds to Performance Task 9.

Session VIII. Determining Pipe Length
A. Determining Pipe Length Between Fittings
B. Laboratory
   Have trainees practice determining pipe length between fittings. This laboratory corresponds to Performance Task 10.

Session IX. Review and Testing
A. Module Review
B. Module Examination
   1. Trainees must score 70% or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module describes the handling and storage of CPVC pipe and outlines methods and tools for cutting, chamfering, and cleaning CPVC pipe, including calculating takeouts. It identifies CPVC safety concerns. Joining techniques are described, particularly the solvent-cement (one-step) method. The rules for using plastic pipe hangers are also explained.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Sprinkler Fitting Level One, Modules 18101-13 through 18103-13.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Follow basic safety precautions for preparing and installing CPVC pipe.
2. Recognize chemical compatibility issues when joining CPVC pipe to other materials.
3. Identify approved types of CPVC pipe and fittings.
4. Recognize tools for cutting and chamfering CPVC pipe.
5. Calculate takeouts.
6. Set up equipment.
7. Cut, chamfer, and clean CPVC pipe.
8. Properly prepare pipe ends.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Calculate takeouts for CPVC pipe.
2. Connect CPVC pipe to other materials.
3. Prepare work area.
4. Prepare and join CPVC pipe and fittings.
5. Cut, chamfer, and cement CPVC pipe.
6. Cure CPVC.

Materials and Equipment

Multimedia projector and screen
Sprinkler Fitting Level One PowerPoint® Presentation Slides (ISBN 978-0-13-272924-6)
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Manufacturer’s literature on CPVC
Samples of CPVC pipe
Various CPVC fittings
Sample restraints
Depth gauge/cold ring
Manufacturer’s installation instructions
Solvent-cement and applicator
Directions for using solvent-cement
MSDS for solvent-cement
Thread sealant
Primer
Rags
CPVC pipe cutting tools:
CPVC pipe saw
Tubing cutters
Chop saw
Rachet shears
Anvil cutter

continued
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures. This module requires trainees to work with chemicals. Ensure all trainees are briefed on HazCom and chemical safety procedures including first aid, ventilation, and personal protective equipment.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time For This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover CPVC Pipe and Fittings. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
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<tr>
<td><strong>Session I. CPVC Piping Systems and Fittings</strong></td>
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<td>A. Introduction</td>
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<tr>
<td>B. CPVC Pipe</td>
<td>____________</td>
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<tr>
<td>C. CPVC Fittings</td>
<td>____________</td>
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<tr>
<td>D. Calculating Takeouts</td>
<td>____________</td>
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<tr>
<td>E. Laboratory</td>
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</tbody>
</table>

Have trainees practice calculating takeouts for CPVC pipe. This laboratory corresponds to Performance Task 1.
Session II. Preparing CPVC Pipe
A. Preparing the Work Area
   B. Laboratory
      Have trainees practice preparing the work area. This laboratory corresponds to Performance Task 3.
C. Cutting CPVC
D. Chamfering and Cleaning CPVC
E. Cementing CPVC
F. Laboratory
   Have trainees practice cutting, chamfering, and cementing CPVC pipe. This laboratory corresponds to Performance Task 5.

Session III. Assembly Techniques
A. Joining CPVC Pipe
   B. Laboratory
      Have trainees practice preparing and joining CPVC pipe and fittings. This laboratory corresponds to Performance Task 4.
C. Curing CPVC
   D. Laboratory
      Have trainees practice curing CPVC pipe. This laboratory corresponds to Performance Task 6.
E. Connecting CPVC Pipe to Other Materials
   F. Laboratory
      Have trainees practice joining CPVC pipe and fittings. This laboratory corresponds to Performance Task 2.

Session IV. Hangers; Review and Testing
A. Rules for Using Hangers on CPVC
   B. Module Review
   C. Module Examination
      1. Trainees must score 70% or higher to receive recognition from NCCER.
      2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
D. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
Module Overview

This module describes copper tubing and fittings along with cutting and bending tools. It explains how to measure, cut, ream, clean and solder copper tube. The brazing process is described as are brazing metals, fluxes, and brazing equipment. Support bracing and grooved couplings are also discussed.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Sprinkler Fitting Level One, Modules 18101-13 through 18104-13.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Follow basic safety precautions for preparing and installing copper tube.
2. Identify approved types of copper tube and fittings.
3. Identify and describe cast bronze fittings.
4. Identify wrought fittings.
5. Identify and select dielectric fittings.
7. Calculate takeouts.
8. Set up equipment.
9. Cut, chamfer, and clean copper tube.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Identify wrought fittings.
2. Identify and describe cast bronze fittings.
3. Identify and select dielectric fittings.
4. Perform soldering of copper tubing joints.
5. Perform brazing of copper tubing joints.

Materials And Equipment

Multimedia projector and screen
Sprinkler Fitting Level One
PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
Various sizes and types of copper tube
Wrought fittings
Cast bronze fittings
Dielectric fittings
Fitting manufacturer’s takeout chart
Various types of tube cutters
Portable band saws, chop saws, or hacksaws
Reaming tool
Deburring tool
Tube-bending equipment
Various tools used to bend copper tube
Grooved couplings
Mechanical fasteners
T-drill
Drill
Tube end notcher
ASTM B828
Cleaning materials (sandpaper, files)
Fitting brush
Soldering torch
Wire solder

continued
Flux brush and solder paste  Friction lighters
Tape measure  Filler rods
Level  Flux and flux brush
Cleaning rags  Sample hangers
Manufacturer's makeup chart  Sample restraints
Oxyacetylene brazing equipment (compressed gas, regulators, hoses, torch, torch tips)  Module Examinations*

* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

**Safety Considerations**

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures. This module requires trainees to work with torches. Ensure all trainees are briefed on fire safety procedures including fire extinguishers, fire watches, and personal protective equipment.

**Additional Resources**

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover Copper Tube Systems. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

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<td>B. Copper Tubing</td>
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<tr>
<td>C. Wrought Fittings</td>
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<tr>
<td>D. Cast Bronze Fittings</td>
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<tr>
<td>E. Dielectric Fittings</td>
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<tr>
<td>F. Laboratory</td>
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<tr>
<td>Have trainees practice identifying wrought, cast bronze, and dielectric fittings. This laboratory corresponds to Performance Tasks 1 through 3.</td>
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<tr>
<td>G. Takeouts</td>
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<tr>
<td><strong>Session II. Preparing and Soldering Copper Tubing</strong></td>
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<tr>
<td>A. Cutting Copper Tube</td>
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<td>B. Bending Copper Tube</td>
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<td>C. Preparing Tubing and Fittings for Soldering</td>
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<td>D. Soldering</td>
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<tr>
<td>E. Laboratory</td>
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<tr>
<td>Have trainees practice soldering copper tubing joints. This laboratory corresponds to Performance Task 4.</td>
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<tr>
<td><strong>Session III. Brazing</strong></td>
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<tr>
<td>A. Brazing Metals and Fluxes</td>
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<td>B. Preparing Tubing and Fittings for Brazing</td>
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<td>C. Equipment Setup</td>
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<td>D. Brazing Techniques</td>
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<td>E. Laboratory</td>
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<tr>
<td>Trainees practice brazing copper tubing joints. This laboratory corresponds to Performance Task 5.</td>
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<tr>
<td><strong>Session IV. Support; Review and Testing</strong></td>
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<tr>
<td>A. Support for Copper Tubing</td>
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<td>B. Grooved Couplings For Copper Tube</td>
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<tr>
<td>C. Module Review</td>
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<td>D. Module Examination</td>
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<tr>
<td>1. Trainees must score 70% or higher to receive recognition from NCCER.</td>
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<td>2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.</td>
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<td>E. Performance Testing</td>
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Module Overview

This module identifies the types and properties of soil. It discusses guidelines for working in or near a trench, including methods for digging trenches and making them safe. It describes underground pipe installation for various types of pipe, including bedding, backfilling, thrust blocks, and restraints. It explains in-building risers, hydrants, yard valves, and hydrant hoses. It covers testing, inspection, flushing, chlorinating, and underground test certificates.

Prerequisites

Prior to training with this module, it is recommended that the trainee shall have successfully completed Core Curriculum and Sprinkler Fitting Level One, Modules 18101-13 through 18105-13.

Objectives

Upon completion of this module, the trainee will be able to do the following:

1. Identify types and properties of soil.
2. Identify trenching safety requirements.
3. Explain sloping requirements for different types of soil.
4. Explain how to dig trenches.
5. Describe excavation support (shoring) systems.
6. Describe types of bedding material.
7. Identify and describe types of underground pipe.
8. Describe thrust blocks and restraints.
9. Identify and describe hydrants, yard valves, hydrant hoses, and associated equipment.
10. Explain testing, inspection, and chlorinating of underground pipe.
11. Fill out an underground test certificate.

Performance Tasks

Under the supervision of the instructor, the trainee should be able to do the following:

1. Use the bar and block method and lever pullers to fit pipe.
2. Cut different types of pipe.
3. Use service and saddle clamps.
4. Set the target on a post indicator valve.
5. Use spanners and hydrant wrenches to open and close a hydrant.
6. Fill out an underground test certificate.

Materials and Equipment

Multimedia projector and screen
Sprinkler Fitting Level One
PowerPoint® Presentation Slides
Computer
Whiteboard/chalkboard
Markers/chalk
Pencils and scratch paper
Appropriate personal protective equipment
One-Call information cards or brochures
Samples of local soils

Boxes
Scale
Digging tool
Manufacturer’s literature on backhoes and wheel trenchers
Samples of underground pipe and fittings
Various valves used with underground pipe
Fittings-underground
Plastic (PVC) pipe and fittings
Slip joint
Mechanical joint

continued
Safety Considerations

Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. This module requires trainees to work with hand and power tools. Ensure that they are briefed on shop safety procedures.

Additional Resources

This module presents thorough resources for task training. The following resource material is suggested for further study.


Teaching Time for This Module

An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 17½ hours are suggested to cover Underground Pipe. You will need to adjust the time required for hands-on activity and testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

<table>
<thead>
<tr>
<th>Topic</th>
<th>Planned Time</th>
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<tr>
<td><strong>Sessions I and II. Introduction; Trenching</strong></td>
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</table>
Sessions III and IV. Underground Pipe Installations
A. Bedding and Backfilling
B. Underground Pipe Installations
C. Laboratory
   Have trainees practice fitting pipe. This laboratory corresponds to Performance Task 1.
D. Laboratory
   Have trainees practice cutting pipe. This laboratory corresponds to Performance Task 2.
E. Laboratory
   Have trainees practice using clamps. This laboratory corresponds to Performance Task 3.
F. Thrust Blocks and Restraints

Sessions V and VI. Risers, Valves, and Hydrants; Testing
A. In-Building Riser
B. Backflow Preventers
C. Hydrants
D. Laboratory
   Have trainees practice opening and closing a hydrant. This laboratory corresponds to Performance Task 5.
E. Yard Valves and Related Appurtenances
F. Laboratory
   Have trainees practice working with post-indicator valves. This laboratory corresponds to Performance Task 4.
G. Testing and Inspections
H. Laboratory
   Have trainees practice filling out Underground Test Certificates. This laboratory corresponds to Performance Task 6.

Session VII. Review and Testing
A. Module Review
B. Module Examination
   1. Trainees must score 70% or higher to receive recognition from NCCER.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.
C. Performance Testing
   1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.
   2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.