

Introduction to the Plumbing Profession

Annotated Instructor's Guide

Module 02101-12

Module Overview

This module introduces trainees to the plumbing profession. Trainees will become familiar with the tasks and responsibilities of professionals in the construction industry.

Objectives

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

1. Describe the history of the plumbing profession.
2. Identify the responsibilities of a person working in the plumbing industry.
3. State the personal characteristics of a professional.
4. Identify the stages of progress within the plumbing profession and its positive impact on society.
5. Identify how green technology is incorporated into plumbing.

Performance Tasks

This is a knowledge-based module; there are no performance tasks.

Materials and Equipment

Computer	Latest edition of the <i>International Plumbing Code</i> (IPC)
<i>Plumbing Level One</i> PowerPoint® Presentation Slides (ISBN 978-0-13-292164-0)	Latest edition of the <i>Uniform Plumbing Code</i> (UPC)
Markers/chalk	Latest edition of the <i>National Standard Plumbing Code</i> (NSPC)
Pencils and paper	Module Examinations*
Whiteboard/chalkboard	
Appropriate personal protective equipment	
Copies of your local code	

*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.

Additional Resources

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

The National Standard Plumbing Code, current edition. Falls Church, VA: PHCC.

Plumbing a House, 1994. Peter A. Hemp. Newtown, CT: Taunton Press.

Teaching Time for This Module_____

An outline for use in developing your lesson plan follows. 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 *Introduction to the Plumbing Profession*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	Planned Time
Session I. The Plumbing Profession, Part One	
A. Brief History of Plumbing	_____
B. The Plumbing Profession	_____
Session II. The Plumbing Profession, Part Two; Review and Examination	
A. Keys to Professional Success	_____
B. Career Opportunities in Plumbing	_____
C. Review	_____
D. 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 reviews the common causes of plumbing-related accidents and injuries. Trainees will learn how to identify hazardous situations and unsafe conditions as well as how to handle and respond to these situations and conditions.

Objectives

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

1. Describe the common unsafe acts and unsafe conditions that cause accidents.
2. Describe how to handle unsafe acts and unsafe conditions.
3. Explain how the cost of accidents and illnesses affects everyone on site.
4. Demonstrate the use and care of appropriate personal protective equipment.
5. Identify job-site hazardous work specific to plumbers.
6. Explain how to work safely in and around a trench.
7. Explain how to work safely in and around confined spaces.
8. Demonstrate the proper use of ladders.
9. Demonstrate how to maintain power tools safely.
10. Describe and demonstrate the lockout/tagout process.
11. Identify the benefits of a job safety analysis.

Performance Tasks

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

1. Inspect the following personal protective equipment:
 - Gloves
 - Body harness
 - Hard hat
 - Safety glasses
 - Safety shoes
 - Hearing protection
2. Put on the following personal protective equipment:
 - Hard hat
 - Body harness
 - Eye protection
 - Gloves
 - Hearing protection
 - Safety shoes
3. Demonstrate proper use of ladders.
4. Inspect power tools (corded and cordless) to ensure they are safe to use.
5. Inspect hand tools to ensure they are safe to use.
6. Demonstrate/simulate the proper methods of lockout/tagout for energy sources.

Materials and Equipment

Computer
Plumbing Level One PowerPoint® Presentation
Slides (ISBN 978-0-13-292164-0)
Markers/chalk
Pencils and paper
Whiteboard/chalkboard
Appropriate personal protective equipment
Copies of your local code
Copies of your company's safety program
Examples of personal protective equipment:
Gloves
Hard hat
Eye protection
Hearing protection
Safety shoes
Respiratory protection
Fall protection (body harness)
Rubber gloves to conduct an air test
Respirators
Ladders
29 CFR 1904, 1910, 1926, and 1929
Lockout/tagout kit

Materials to clean a respirator
Several sample MSDSs, including:
PVC adhesive MSDS
Concrete dust MSDS
Sample safety plan
Sample safety signs
Hand and power tools:
Bladed
Impact
Power
Electrically powered
Liquid fuel
Demolition saw
Skill saw
Reciprocating saw
Power drill
Gas detection meter
Sample of intrinsically safe/explosion-proof equipment
Sample emergency action plans
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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use. Remind trainees that any tool can be dangerous if used carelessly, and that power tools are only to be used under proper supervision.

Additional Resources

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

Environmental Protection Agency website: www.epa.gov
Interactive Plumbing Network website: www.plumbnet.com
National Safety Council website: www.nsc.org
OSHA website: www.osha.gov

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 22½ hours are suggested to cover *Plumbing Safety*. 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.

Topic	Planned Time
Session I. Causes and Costs of Accidents	
A. Unsafe Acts	_____
B. Unsafe Conditions	_____
C. Costs and Impacts	_____
Session II. Personal Protective Equipment, Part One	
A. Hard Hats	_____
B. Safety Glasses, Goggles, and Face Shields	_____
C. Gloves and Shoes	_____
D. Hearing Protection	_____
Session III. Personal Protective Equipment, Part Two	
A. Fall Protection	_____
B. Respiratory Protection	_____
C. Proper Clothing and Grooming	_____
D. PT/Laboratory	_____
Have trainees inspect and put on personal protective equipment.	
This laboratory corresponds to Performance Tasks 1 and 2.	
Session IV. Hazard Communication	
A. Right to Know	_____
B. Labels	_____
C. Material Safety Data Sheets	_____
D. Responding to Emergencies	_____
Session V. Work Zones	
A. Signs and Signals	_____
B. Barricades and Barriers	_____
C. Walking and Working Surfaces	_____
D. PT/Laboratory	_____
Have trainees demonstrate the proper use of a ladder. This laboratory corresponds to Performance Task 3.	
E. Motorized Vehicles	_____
Session VI. Hand and Power Tools	
A. Hand Tools	_____
B. Corded and Cordless Tools	_____
C. Electrically Powered Tools	_____
D. PT/Laboratory	_____
Have trainees practice inspecting hand and power tools to ensure they are safe to use. This laboratory corresponds to Performance Tasks 4 and 5.	
E. Liquid-Fuel Tools	_____

Session VII. Trenching and Lockout/Tagout

A. Trenching

- 1. Trenching Hazards
- 2. Guidelines for Working in and around a Trench
- 3. Indications of an Unstable Trench
- 4. Trench Failure and Safety

B. Lockout/Tagout

- 1. Procedures
- 2. Safeguards
- 3. PT/Laboratory

Have trainees practice the proper method of performing a lockout/tagout procedure. This laboratory corresponds to Performance Task 6.

Session VIII. Confined Spaces

- A. Classification
- B. Entry Permits
- C. Hazards
- D. Safeguards

Session IX. Underground Safety and Emergency Response

- A. Underground Safety
- B. Emergency Response
- C. Review
- D. 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.

E. 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 reviews the basic plumbing tools used to measure, lay out, cut, drill, bore, and ream. Trainees will learn how to safely use, properly care for, and maintain plumbing tools.

Objectives

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

1. Identify the basic hand and power tools used in the plumbing trade.
2. Demonstrate the proper use of plumbing tools.
3. Demonstrate the ability to select the proper tool(s) for tasks.
4. Demonstrate proper maintenance and storage for hand and power tools.
5. Describe the safety requirements for using power and hand tools common to the plumbing trade.

Performance Tasks

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

1. Identify plumbing tools.
2. Properly use plumbing tools.
3. Demonstrate proper maintenance and storage of hand and power tools.

Materials and Equipment

Computer	Metal stud punch
<i>Plumbing Level One</i> PowerPoint® Presentation	Chisel with mushroomed head
Slides (ISBN 978-0-13-292164-0)	Variety of smooth-edged cutting tools
Markers/chalk	Keel crayon
Pencils and paper	Soapstone
Whiteboard/chalkboard	Variety of drills, including:
Appropriate personal protective equipment	Portable electric
Copies of your local code	Offset
Plumber's toolbox (refer to the list in the appendix)	Cordless
Sections of iron pipe	Cordless multitool
Damaged and unsafe tools	Drill bits
Measuring and layout tools	Die tool sets
Variety of squares, including:	Soldering tools
Speed	Variety of wrenches, including:
Combination	Pipe
Framing	Pipe tongs
Levels and precision measuring tools	Strap
Torpedo level	Spud
Plumb bob	Open-end
Chalkline	Adjustable
Tooth-edged cutting tools, including:	Basin
Hacksaws	Monkey
Reciprocating saws	Torque
Portable band saws	Pliers
Abrasive saws	Maul
Saw blades: 18, 14, and 32 teeth per inch	Wood-splitting wedge
Wood and cold chisels	Sections of wood
	Hollow-shank screwdriver
	Bits

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*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 trainees are equipped with appropriate personal protective equipment and that they are properly instructed on its use. Remind trainees that any tool can be dangerous if used carelessly, and that power tools are only to be used under proper supervision. Before beginning hands-on training with any new tool, review the relevant proper handling and use procedures.

Additional Resources

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

Contractor Books, website, www.contractorbooks.com

Core Curriculum, Latest Edition. NCCER. Upper Saddle River, NJ: Prentice Hall.

Sheet Metal Level Three, Latest Edition. NCCER. Upper Saddle River, NJ: Prentice Hall.

Council Tools, website, www.counciltool.com.

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 *Tools of the Plumbing 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.

Topic	Planned Time
Session I. Plumbing Tools, Part One	
A. Care and Use of Tools	_____
B. Safety	_____
C. Measuring and Layout Tools	_____
D. Leveling Tools	_____
E. Tooth-Edged Cutting Tools	_____
Session II. Plumbing Tools, Part Two	
A. Smooth-Edged Cutting Tools	_____
B. Drilling and Boring Tools	_____
C. Electric Pipe-Threading Machine	_____
D. Soldering Tools	_____
Session III. Plumbing Tools, Part Three	
A. Extension Cords	_____
B. Tools for Assembly and Holding	_____
C. Hammers	_____
D. Screwdrivers	_____

Session IV. Plumbing Tools, Part Four; Review and Testing

A. Vises

B. Calculator

C. Review

D. 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.

E. 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 introduces some of the basic math used by plumbers in the field. Trainees will learn how to use basic math to calculate pipe length.

Objectives

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

1. Add, subtract, multiply, and divide whole numbers.
2. Add, subtract, multiply, and divide fractions.
3. Add, subtract, multiply, and divide decimals.
4. Convert decimals to percentages and percentages to decimals.
5. Convert fractions to decimals and decimals to fractions.
6. Explain what the metric system is and how it is important in the plumbing trade.
7. Square various numbers and take square roots of numbers, with and without a calculator.
8. Identify the parts of a fitting and use common pipe-measuring techniques.
9. Use fitting dimension tables to determine fitting allowances and thread makeup.
10. Calculate end-to-end measurements using fitting allowances and thread makeup.
11. Identify the functions of a construction calculator.

Performance Tasks

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

1. Measure pipe using the following methods:
 - End-to-end
 - End-to-center
 - Center-to-center
 - End-to-face
 - Face-to-face
 - Face-to-throat
2. Determine end-to-end dimensions by figuring fitting allowances and thread makeup.

Materials and Equipment

Computer
Plumbing Level One
PowerPoint® Presentation Slides
(ISBN 978-0-13-292164-0)

Markers/chalk

Pencils and paper

Whiteboard/chalkboard

Appropriate personal protective equipment

Copies of your local code

Piece of wood

Handsaw

Calculators

Sections of pipe

Measuring tools

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.

Additional Resources

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

Plumber's and Pipefitter's Calculations Manual. R. Dodge Woodson. McGraw-Hill Professional.

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 12½ hours are suggested to cover *Introduction to Plumbing Math*. 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.

Topic	Planned Time
Session I. Basic Math Review, Part I	
A. Whole Numbers	_____
B. Fractions	_____
Session II. Basic Math Review, Part II	
A. Decimals	_____
B. Conversion Processes	_____
Session III. Basic Math Review, Part III	
A. Metric System	_____
B. Squares and Square Roots	_____
Session IV. Measuring Pipe	
A. Parts of a Fitting	_____
B. Makeup and Fitting Allowance	_____
C. Manufacturer Tables	_____
D. Calculating Pipe Length	_____
Session V. Review and Testing	
A. 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 introduces the types of construction drawings typically used in the plumbing trade, explains the relationship among these drawings, and discusses applicable code requirements. Trainees will learn how to read, interpret, and sketch construction drawings, as well as how to draw lines to scale.

Objectives

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

1. Identify various plumbing drawings and describe how the different views are used.
2. Identify the basic symbols used in schematic drawings of pipe assemblies.
3. Explain the types of drawings in a complete set of drawings and how they relate to each other.
4. Interpret plumbing-related information from a set of drawings.
5. Sketch an orthographic and isometric drawing.
6. Use an architect's scale to draw lines to scale and to measure lines drawn to scale.
7. Describe how code requirements apply to certain drawings.

Performance Task

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

1. Sketch an orthographic and isometric drawing.

Materials and Equipment

Computer	Sample specifications and their corresponding drawings
<i>Plumbing Level One</i> PowerPoint® Presentation Slides (ISBN 978-0-13-292164-0)	A variety of scales, including:
Markers/chalk	Architect's scale
Pencils and paper	$\frac{1}{4}$ scale
Whiteboard/chalkboard	Engineer's scale
Copies of your local code	Metric scale
Complete set of construction drawings	Module Examinations*
Drafting paper to sketch isometric drawings	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.

Additional Resources

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

Core Curriculum, Latest Edition. NCCER. Upper Saddle River, NJ: Prentice Hall.

Blueprint Reading Basics, 2001. Warren Hammer. New York: Industrial Press.

Technical Drawing, 14th Edition 2011. Frederick E. Giesecke *et al.* Upper Saddle River, NJ: Prentice Hall/Pearson Education.

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 *Introduction to Plumbing Drawings*. 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.

Topic	Planned Time
Sessions I-II. Reading Plumbing Drawings	
A. Title Block	
B. Scale	
C. Dimensioning	
D. Symbols	
E. Notes	
F. Specifications	
G. Plumbing Codes	
Sessions III-IV. Components of Construction Drawings	
A. Plot	
B. Foundation	
C. Floor	
D. Elevation	
E. Details	
F. Electrical	
G. HVAC	
H. Plumbing	
I. Coordination	
Sessions V-VI. Types of Drawings	
A. Sketches	
B. Pictorial	
C. Schematic	
D. Orthographic	
E. Approved Submittal	
F. Fixture	
G. Exploded	
H. Cutaway	

Session VII. Review and Testing

A. 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 introduces the various types of materials, schedules, and applications of plastic piping. Trainees will learn how to determine the appropriate types of fittings, valves, hangers, and supports needed for plastic piping. Trainees will learn to properly measure, cut, and join plastic piping.

Objectives

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

1. Identify the various types of plastic pipe.
2. Identify the material properties, storage, and handling requirements of plastic pipe.
3. Identify the types of fittings and valves used with plastic pipe.
4. Identify the techniques used in hanging and supporting plastic pipe.
5. Properly measure, cut, and join plastic pipe.
6. Identify the hazards and safety precautions associated with plastic pipe.

Performance Tasks

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

1. Select correct types of materials for plastic piping systems.
2. Identify types of fittings and valves and their uses.
3. Select the appropriate personal protective equipment for working with plastic piping.
4. Properly measure, cut, and join plastic piping.
5. Select the correct support and spacing for the application.

Materials and Equipment

Computer
Plumbing Level One PowerPoint® Presentation
Slides (ISBN 978-0-13-292164-0)
Appropriate personal protective equipment
Copies of your local code
Flexible pipe
Pipe labels
Sections of plastic pipe, including:
 ABS (acrylonitrile-butadiene-styrene)
 PVC (polyvinyl chloride)
 CPVC (chlorinated polyvinyl chloride)
 PE (polyethylene)
 PEX (cross-linked polyethylene)
 PB (polybutylene)
Sample material safety data sheets (MSDS) for plastic pipe
Tools for measuring
Tools for cutting pipe
Deburring tools
Miter box
Plastic saw for cutting PVC pipe
CPVC or PVC cement or all-purpose cement conforming to ASTM F-493 standards

PVC bell-and-spigot pipe
Lubricant
Tools used to join PEX tubing, including:
 Insert and crimp-ring system
 Tubing cutter
 Hand-crimping tool
 Go-no-go gauge
Cutter designed for plastic tubing
PEX ring
Expander tool
Mechanical joints and clamps
Compression collars
Tools for the butt-fusion method, including:
 Temperature indicator stick
 Heating tool
 Fusion timer
 Socket face
 Cold ring
Manufacturers Standardization Society's MSS40
 hanger standard
National Fire Protection Association (NFPA) 13
Copies of the Quick Quiz*
Module Examinations**
Performance Profile Sheets**

*Located at the back of this instructor's guide.

**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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use. Emphasize safety precautions specific to pipe-cutting operations. Stress the importance of following manufacturers’ recommendations when cutting or sawing pipe or when using any flame, heat, or power tools. Remind trainees of the environmental and physical hazards related to working with ignition sources and hazardous substances such as primer and cement.

Additional Resources _____

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

Pipefitting Level Two, Latest Edition. NCCER. Upper Saddle River, NJ: Prentice Hall.
Plumbing: Design and Installation, Second Edition, 2002. L. V. Ripka. Homewood, IL: American Technical Publishers.

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 12½ hours are suggested to cover *Plastic 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.

Topic	Planned Time
Session I. Introduction to Plastic Pipe	
A. Advantages and Disadvantages	_____
B. Properties	_____
C. Sizing	_____
D. Labeling	_____
E. Manufacturers	_____
Sessions II-III. Plastic Pipe and Fittings	
A. Types of Plastic Pipe	_____
B. PT/Laboratory	
Have trainees practice identifying types of plastic pipes. This laboratory corresponds to Performance Task 1.	
C. Material Storage and Handling	_____
D. Water Supply Fittings	_____
E. DWV Fittings	_____
F. PT/Laboratory	_____
Have trainees practice identifying fittings and valves and their uses. This laboratory corresponds to Performance Task 2.	

Session IV. Measuring, Cutting, and Joining

- A. Measuring
- B. Cutting
- C. Joining
- D. PT/Laboratory

Have trainees practice measuring, cutting, and joining plastic piping.
Trainees must select appropriate personal protective equipment.
This laboratory corresponds to Performance Tasks 3 and 4.

Session V. Pipe Supports and Pressure Testing; Review and Testing

- A. Hangers
- B. Fasteners
- C. Review
- D. 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.

- E. 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 discusses the materials, schedules, and properties of copper tube, fittings, and valves. Trainees will learn how to measure, ream, cut, join, and groove copper tube, as well as how to hang and support copper tube.

Objectives

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

1. Identify the various types of copper tube.
2. Identify the material properties, storage, and handling requirements of copper tube.
3. Identify the types of fittings and valves used with copper tube.
4. Identify the techniques used in hanging and supporting copper tube.
5. Properly measure, cut, and join copper tube.
6. Identify the hazards and safety precautions associated with copper tube.

Performance Tasks

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

1. Select correct types of materials for copper tube systems.
2. Identify types of fittings and valves and their uses.
3. Select the appropriate personal protective equipment for working with copper tube.
4. Correctly measure, cut, ream, and join copper tube.
5. Select the correct support and spacing for the application.

Materials and Equipment

Computer	Handheld tube cutter
<i>Plumbing Level One</i> PowerPoint® Presentation	Internal tube cutter
Slides (ISBN 978-0-13-292164-0)	Sizing tool
Markers/chalk	Tools to form sweat joints, compression joints, and flare joints
Pencils and paper	Variety of soldering tools, including an acetylene torch
Whiteboard/chalkboard	Tools to roll groove and cut groove copper tube
Appropriate personal protective equipment	Tube attachments for wood-frame construction
Copies of your local code	<i>National Fire Protection Association (NFPA)</i>
Access to a fire extinguisher	<i>Chapter 13</i>
Sections of copper tube	<i>Manufacturers Standardization Society MSS40</i>
Tee-pulling tool	hanger standards
Fittings and valves, including:	Pressure gauge
Water supply fittings	Test plug
Water supply valves	Module Examinations*
DWV fittings	Performance Profile Sheets*
Alternative fittings	
Tools for measuring copper tube	
Copper cutter	

*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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use. Emphasize safety precautions specific to tube-cutting operations. Stress the importance of following manufacturers’ recommendations when cutting or sawing tube or when using any flame, heat, or power tools. Remind trainees of the environmental and physical hazards related to soldering work.

Additional Resources _____

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

The Copper Tube Handbook, 2006. New York: Copper Development Association.
Pipefitter’s Handbook, Third Edition, 1967. Forrest R. Lindsey. New York: Industrial Press, Inc.
“Throw Away Your Torches,” Julius Ballanco, P.E. *Plumbing and Mechanical*, 2000.

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 12½ hours are suggested to cover *Copper Tube 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.

Topic	Planned Time
Session I. Introduction to Copper Tube	
A. Types	_____
B. Sizing	_____
C. Labeling	_____
D. Applications	_____
E. Material Storage and Handling	_____
F. PT/Laboratory	_____
Have trainees select correct types of materials for copper tube systems. This laboratory corresponds to Performance Task 1.	
Session II. Fittings and Valves	
A. Water Supply Fittings	_____
B. Water Supply Valves	_____
C. DWV Fittings	_____
D. Alternative Fittings	_____
E. PT/Laboratory	_____
Have trainees identify types of fittings and valves and their uses. This laboratory corresponds to Performance Task 2.	

Sessions III-IV. Measuring, Cutting, Bending, Joining, and Grooving

A. Measuring

B. Cutting

C. Bending

D. Joining

E. Grooving

F. PT/Laboratory

Have the trainees select the appropriate personal protective equipment for working with copper tube and have them correctly measure, cut, ream, and join copper tube. This laboratory corresponds to Performance Tasks 3 and 4.

Session V. Installing, Insulating, and Pressure Testing; Review and Testing

A. Types of Tube Hangers and Supports

B. PT/Laboratory

Have trainees select the correct support and spacing for a given application. This laboratory corresponds to Performance Task 5.

C. Insulating Tubes

D. Pressure Testing

E. Review

F. 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.

G. 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 discusses proper and improper applications of cast-iron piping. Trainees will learn how to identify materials, schedules, and fittings used with cast-iron piping, as well as how to properly measure, cut, join, and support cast-iron piping.

Objectives

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

1. Identify the various types of cast-iron pipe.
2. Identify the material properties, storage, and handling requirements of cast-iron pipe.
3. Identify the types of fittings and valves used with cast-iron pipe.
4. Identify the techniques used in hanging and supporting cast-iron pipe.
5. Properly measure, cut, and join cast-iron pipe.
6. Identify the hazards and safety precautions associated with cast-iron pipe.

Performance Tasks

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

1. Select correct types of materials for cast-iron piping systems.
2. Identify types of fittings and their uses.
3. Select the appropriate personal protective equipment for cast-iron piping.
4. Correctly measure, cut, and join cast-iron pipe.
5. Select the correct hanger or support and spacing for the application.

Materials and Equipment

Computer
Plumbing Level One PowerPoint® Presentation
Slides (ISBN 978-0-13-292164-0)
Markers/chalk
Pencils and paper
Whiteboard/chalkboard
Appropriate personal protective equipment
Cast-Iron Soil Pipe Institute (CISPI) handbook
Latest edition of the *International Building Code*
Screws, lag screws, or large nails for wooden structures
Folding rule
Tape measure
Sections of hub-and-spigot pipe (single and double-hub) in a variety of sizes
Sections of no-hub pipe in a variety of sizes
A variety of fittings with manufacturer labels
A variety of bends, including:
Long bends
Sweeps
Heel inlets
Closet bends

Closet flanges
A variety of branches, including:
Wyes
Double wyes
Sanitary tees
Double sanitary tees
Sanitary crosses
Increasers
Traps
Soil pipe cutter
Neoprene gasket
Chain puller, lead hammer, or pushing bar
Rubber lubricant
Couplings
Torque wrench
Sway braces
Beam clamps or C-clamps for metal structures
Expansion anchors or threaded masonry fasteners
Rotary hammer drill
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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use. Emphasize safety precautions specific to pipe-cutting operations. Stress the importance of following manufacturers’ recommendations when cutting or sawing pipe or when using any flame, heat, or power tools. Remind trainees of the hazards and safety precautions specific to working with molten lead.

Additional Resources _____

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

Cast Iron Soil Pipe and Fittings Handbook, November 2011. Cast Iron Soil Pipe Institute website, www.cispi.org.
Plumbing: Design and Installation, Third Edition. L. V. Ripka. Homewood, IL: American Technical Publishers.

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 12½ hours are suggested to cover *Cast-Iron 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.

Topic	Planned Time
Session I. Types of Cast-Iron Pipe	
A. Sizes	_____
B. Labeling	_____
C. Storage and Handling	_____
D. PT/Laboratory	_____
Have trainees select correct types of materials for cast-iron piping systems. This activity corresponds to Performance Task 1.	
Session II. Fittings	
A. Bends	_____
B. Branches	_____
C. Increasers	_____
D. Traps	_____
E. PT/Laboratory	_____
Have trainees identify types of fittings and their uses. This activity corresponds to Performance Task 2.	
Session III. Measuring, Cutting, and Joining	
A. Measuring and Cutting Hub-and-Spigot Pipe	_____
B. Measuring and Cutting No-Hub Pipe	_____
C. Joining Hub-and-Spigot Pipe	_____
D. Joining No-Hub Pipe	_____
E. PT/Laboratory	_____
Have trainees select the appropriate personal protective equipment for cast-iron piping and correctly measure, cut, and join cast-iron pipe. This activity corresponds to Performance Tasks 3 and 4.	

Session IV. Hangers and Supports

- A. Types of Hangers and Supports
- B. Supporting Horizontal Pipe Runs
- C. Supporting Vertical Pipe Runs

Session V. Installation and Testing; Review and Testing

- A. Installation
- B. PT/Laboratory
Have trainees select the correct hanger or support and spacing for a given application. This activity corresponds to Performance Task 5.
- C. Testing Installations
- D. Review
- 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.
- F. 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 discusses the types of steel pipe and fittings used in plumbing applications. Trainees will learn about common fittings and valves; measuring, cutting, and joining steel pipe; and the hangers and supports used with steel pipe.

Objectives

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

1. Identify the types of steel pipe.
2. Identify the material properties, storage, and handling requirements of steel pipe.
3. Identify the types of fittings and valves used with steel pipe.
4. Identify the techniques used in hanging and supporting steel pipe.
5. Properly measure, cut, and join steel pipe.
6. Identify the hazards and safety precautions associated with steel pipe.

Performance Tasks

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

1. Identify the common types of materials, schedules, sizes, and labels used for steel piping.
2. Identify the common fittings and valves used with steel piping.
3. Properly measure, cut, and join steel piping.
4. Identify the hazards and safety precautions associated with steel piping.
5. Identify the various techniques used in hanging and supporting steel piping.

Materials and Equipment

Computer

Plumbing Level One

PowerPoint Presentation Slides
(ISBN 978-0-13-292164-0)

Markers/chalk

Blank acetate sheets

Transparency pens

Pencils and scratch paper

Overhead projector and screen

Whiteboard/chalkboard

Appropriate personal protective equipment

Copies of your local code

Sections of ASTM-approved pipe

Steel pipe in different sizes

Steel pipe fittings

Steel pipe cutter

Ground joint union

A variety of couplings and fittings

Globe, gate, ball, and stop-and-waste valves

Threaded pipe

Threading die and stock

Cutting oil

Tape measure

Marking tool

Two pipe wrenches of appropriate size

Hand and power threaders

Straight, offset, and compound-leverage pipe wrenches

Hand die and stock

Pipe joint compound and sealant tape

NFPA Chapter 13

MSS40 hanger standards

Pipe attachments, including supports, channels, and clamps

Connectors

Structural attachments

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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use. Emphasize safety precautions specific to pipe-cutting operations. Stress the importance of following manufacturers’ recommendations when cutting or sawing pipe or when using any power tools.

Additional Resources _____

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

National Fuel Gas Code, Latest Edition. Theodore C. Lemoff. Quincy, MA: National Fire Protection Association.

Overview of the International Fuel Gas Code: Based on the 2000 International Fuel Gas Code, 2000. Country Club Hills, IL: Building Officials & Code Administrators International, Inc.

Plumbing Installation and Design, Second Edition, 1987. L. V. Ripka. Homewood, IL: American Technical Publishers.

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 12½ hours are suggested to cover *Steel 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 trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
Session I. Introduction to Steel Pipe	
A. Domestic and Imported Steel	_____
B. Threads	_____
C. Steel Pipe Sizing	_____
D. Labeling	_____
E. Material Storage and Handling	_____
F. PT/Laboratory	_____
Have trainees identify the common types of materials, schedules, sizes, and labels used for steel piping. This laboratory corresponds to Performance Task 1.	
Session II. Fittings and Valves	
A. Fittings for Threaded Pipe	_____
B. Valves for Threaded Pipe	_____
C. Fittings and Valves for Grooved Pipe	_____
D. PT Laboratory	_____
Have trainees identify the common fittings and valves used with steel piping. This laboratory corresponds to Performance Task 2.	
Session III. Measuring and Cutting Steel Pipe	
A. Working with Threaded Pipe	_____
B. Measuring	_____
C. Cutting	_____
D. Reaming	_____

Session IV. Threading and Joining Steel Pipe

- A. Threading
- B. Joining Threaded Pipe
- C. Grooving Pipe
- D. Joining Grooved Pipe
- E. PT/Laboratory

Have trainees properly measure, cut, and join steel piping. Have them identify the hazards and safety precautions associated with steel piping. This laboratory corresponds to Performance Tasks 3 and 4.

Session V. Hangers, Supports, and CSST; Review and Testing

- A. Pipe Attachments
- B. Connectors
- C. Structural Attachments
- D. Installation
- E. Corrugated Stainless Steel Tubing Sizes and Labels
- F. Corrugated Stainless Steel Tubing Regulators and Valves
- G. Types of Corrugated Stainless Steel Tubing Installations
- H. PT/Laboratory

Have trainees identify the various techniques used in hanging and supporting steel piping. This laboratory corresponds to Performance Task 5.

- I. Review
- J. Module Examination
 - 1. Trainees must score 70 percent 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.
- K. 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 discusses the materials commonly used to make fixtures, the most common types of fixtures, and the types of faucets available. Trainees will learn how each type of fixture and faucet operates, as well as how to choose the proper fixtures and faucets for a variety of installations.

Objectives

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

1. Identify the basic types of materials used in the manufacture of plumbing fixtures.
2. Identify common types of sinks, lavatories, and faucets.
3. Identify common types of bathtubs and showers.
4. Identify common types of toilets, urinals, and bidets.
5. Identify and describe common types of drinking fountains and water coolers.
6. Identify common types of appliances connected by a plumber.

Performance Task

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

1. Identify the most commonly installed fixtures and appliances.

Materials and Equipment

Computer
Plumbing Level One PowerPoint® Presentation
Slides (ISBN 978-0-13-292164-0)
Whiteboard/chalkboard
Markers/chalk
Pencils and paper
Appropriate personal protective equipment
Copies of your local code
A variety of porcelain, cast iron, sheet steel, stainless steel, and plastic fixtures
A variety of photos of fixtures
Faucet for wheelchair-accessible lavatory
Electric eye
A variety of flushing devices
Directional tee with an internal baffle

Tools for fixture and faucet installation, including:

Basin wrench
Spud wrench
Seat wrench
Crescent wrench
Basket strainer wrench
Shower valve socket wrench
Smooth-jawed crescent wrench
Screwdrivers
Americans with Disabilities Act of 1990 (ADA) Standards for Accessible Design
Module Examinations*
Performance Profile Sheets*
Copies of Quick Quiz**

* 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.

** Located at the back of this instructor's guide.

Safety Considerations

Ensure that trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use.

Additional Resources _____

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

ICC/ANSI 117A.1-1998. New York: American National Standards Institute.

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 Plumbing Fixtures*. 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.

Topic	Planned Time
Session I. Fixtures and Faucets, Part One	
A. Introduction to Fixtures and Faucets	_____
B. Materials Used to Make Fixtures	_____
C. Sinks and Lavatories	_____
D. Bathtubs	_____
E. Shower Stalls	_____
F. Water Closets	_____
Session II. Fixtures and Faucets, Part Two	
A. Urinals	_____
B. Bidets	_____
C. Food Waste Disposers	_____
D. Domestic Dishwashers	_____
E. Laundry Trays	_____
Session III. Fixtures and Faucets, Part Three; Review and Testing	
A. Service Sinks and Mop Basins	_____
B. Floor Drains and Floor Sinks	_____
C. Drinking Fountains and Water Coolers	_____
D. Faucets	_____
E. PT/Laboratory	_____
Have each trainee identify the most commonly installed fixtures and appliances. This laboratory corresponds to Performance Task 1.	
F. Review	_____
G. 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.	
H. 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 Craft Training Report Form 200, and submit the results to the Training Program Sponsor.	

Introduction to Drain, Waste, and Vent (DWV) Systems

Annotated Instructor's Guide

Module 02111-12

Module Overview

This module explains the factors that influence DWV system design and how different types of drains, fittings, vents, and pipe are used to move waste out of a building. Trainees will learn installation requirements that prevent malfunctions in the system.

Objectives

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

1. Explain how waste moves from a fixture through the drain system to the environment.
2. Identify the major components of a drainage system and describe their functions.
3. Identify the different types of traps and their components, explain the importance of traps, and identify the ways that traps can lose their seals.
4. Identify significant code and health issues, violations, and consequences related to DWV systems.

Performance Task

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

1. Sketch an isometric drawing of a simple DWV system and label its components.

Materials and Equipment

Computer
Plumbing Level One PowerPoint® Presentation
Slides (ISBN 978-0-13-292164-0)
Markers/chalk
Pencils and paper
Whiteboard/chalkboard
Appropriate personal protective equipment
Copies of your local code
DWV system design drawings
P-traps
Copies of *Figure 8* with the callouts covered
Drainage fittings made from a variety of materials

DWV fittings, including:
Bends
Adapters
Cleanouts
Tees
Wyes
Increases
Offsets
Torpedo level
Plans for a municipal waste treatment plant
Plans for a private waste disposal system
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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use. Stress the specific hazards of working with DWV systems, such as exposure to toxic gases, and explain the related necessary safety precautions.

Additional Resources

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

Plumbing Systems: Analysis, Design and Construction, 1996. Tim Wentz. Upper Saddle River, NJ: Prentice Hall.

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 *Introduction to Drain, Waste, and Vent (DWV) 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.

Topic	Planned Time
Session I. DWV Systems, Fixtures, Drains, and Traps	
A. DWV Systems	_____
B. Fixture Drains	_____
C. Types of Traps	_____
D. Parts of Traps	_____
Session II. Installation Requirements	
A. Trap Installation Requirements	_____
B. Why a Trap Loses Its Seal	_____
Session III. Vents, Drains, and Fittings	
A. Vents	_____
B. Sizing Drains and Vents	_____
C. Fittings and Their Applications	_____
Session IV. DWV System Design; Review and Testing	
A. Grade	_____
B. Building Drain	_____
C. Building Sewer	_____
D. Sewer Main	_____
E. Waste Treatment	_____
F. Code and Health Issues	_____
G. PT/Laboratory	_____
Have trainees sketch an isometric drawing of a simple DWV system and label its components. This laboratory corresponds to Performance Task 1.	
H. Review	_____
I. 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.	
J. 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.	

Introduction to Water Distribution Systems

Annotated Instructor's Guide

Module 02112-12

Module Overview

This module discusses the processes in which water is distributed. Trainees will learn to identify the components and functions of a water distribution system, as well as explain the relationships among the components.

Objectives

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

1. Describe the process by which water is distributed in municipal, residential, and private water systems.
2. Identify the major components of a water distribution system, and describe the function of each component.
3. Explain the relationships between components of a water distribution system.

Performance Task

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

1. Sketch an isometric drawing of a simple water distribution system and label its components.

Materials and Equipment

Computer
Plumbing Level One PowerPoint® Presentation
Slides (ISBN 978-0-13-292164-0)
Markers/chalk
Pencils and paper
Whiteboard/chalkboard
Appropriate personal protective equipment
Copies of your local code
Copies of *Figure 4* with the callouts covered
Sample water distribution piping diagram
Attachments, including:
Stems
Discs
Seat rings
Disc holders or guides
Wedges
Bushings

A variety of valves, including:
Gate valves
Globe valves
Angle valves
Ball valves
Check valves
Pressure regulator valves
Supply stop valves
Temperature and pressure relief valves
Drafting paper
Drawings of the hypothetical DVW systems completed by trainees for the module, "Introduction to DWV Systems"
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 trainees are equipped with appropriate personal protective equipment, and that they are properly instructed on its use.

Additional Resources

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

Advanced Home Plumbing, 1997. Black & Decker Home Improvement Library. Minnetonka, MN: Cowles Creative Publishing, Inc.

International Plumbing Code, Latest Edition. Falls Church, VA: International Code Council.

National Standard Plumbing Code, Latest Edition. Falls Church, VA: Plumbing-Heating-Cooling Contractors–National Association.

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 *Introduction to Water Distribution 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.

Topic	Planned Time
Session I. Introduction	
A. Sources of Water	_____
B. Water Treatment	_____
Session II. Supply and Distribution	
A. Materials	_____
B. Service Line from a Private Water Supply	_____
C. Service Line from a Public Water Main	_____
Session III. Cross-Connection	
A. Cross-Connection	_____
B. Backflow Preventers	_____
C. Valves	_____
D. Types of Valves	_____
Session IV. Building Distribution; Review and Testing	
A. Locating Components	_____
B. Sizing the Main Supply Lines	_____
C. Fixtures and Faucets	_____
D. PT/Laboratory	_____
Have trainees sketch an isometric drawing of a sample water distribution system and label its components. This laboratory corresponds to Performance Task 1.	
E. Review	_____
F. 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.	
F. 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.	