18101

Occupational Overview: The Sprinkler Industry

Sprinkler Fitting

Overview

This module describes the basic types of sprinkler systems, the tools used to install them, and the codes and standards that apply to these systems. It also covers the apprenticeship requirements for sprinkler fitters, employer and employee responsibilities, and career paths in the sprinkler industry.

Learning Objective 1

Successful completion of this module prepares trainees to:

Identify the various types of sprinkler systems and the tools used to install them.

a. Recognize the various types of sprinkler systems.
b. Identify the tools used to install sprinkler systems.

Learning Objective 2

Successful completion of this module prepares trainees to:

Identify the codes and standards applicable to sprinkler systems.

a. List the various codes applicable to sprinkler systems.
b. Identify the NFPA standards applicable to sprinkler systems.

Learning Objective 3

Successful completion of this module prepares trainees to:

Understand the apprenticeship training process for sprinkler fitters.

a. List Department of Labor (DOL) requirements for apprenticeship.
b. Describe various career paths and opportunities in the sprinkler industry.
c. Understand the responsibilities of the employer and employee.

d. Describe employer and employee safety obligations.

Performance Tasks

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

Recommended Teaching Time: 5 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 18101
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

18102

Introduction to Components and Systems

Sprinkler Fitting

Overview

This module provides an overview of the four main types of sprinkler systems. It also describes testing laboratories and Listing requirements. In addition, it covers sprinkler characteristics, including thermal response, spray pattern and coverage area, orientation, K-factor ratings, and temperature ratings. It also describes various types of piping, valves, and pumps.

Learning Objective 1

Successful completion of this module prepares trainees to:

Identify the operation of the four main types of sprinkler systems.

a. Trace the sequence of operation through a wet pipe sprinkler system.
b. Trace the sequence of operation through a dry pipe sprinkler system.
c. Trace the sequence of operation through a preaction sprinkler system.
d. Trace the sequence of operation through a deluge sprinkler system.

Learning Objective 2

Successful completion of this module prepares trainees to:

Identify the nationally recognized testing laboratories that are used to evaluate sprinkler system components.

a. Define the terms related to sprinkler codes and standards.
b. Identify the Listing agencies that test and certify sprinkler system components.

Learning Objective 3

Successful completion of this module prepares trainees to:

Identify common sprinklers and their operating characteristics.

a. Identify sprinkler orientations and spray patterns.

b. Identify various sprinkler characteristics.

Learning Objective 4

Successful completion of this module prepares trainees to:

Identify different types of piping, valves, and fire pumps.

a. Describe the installation requirements for various piping systems.
b. Identify sprinkler system valves and waterflow switches.
c. Describe the purpose of fire pumps.

Performance Tasks

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

Recommended Teaching Time: 10 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 18102
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

18103

Steel Pipe and Fittings

Sprinkler Fitting

Overview

This module describes the steel pipe used in sprinkler systems, including pipe types, schedules, and sizes. It also covers common methods of end preparation, including cutting, reaming, grooving, and threading pipe. Various types of grooved, threaded, flanged, and plain-end fittings are described, along with the installation methods and applications of each type.

Learning Objective 1

Successful completion of this module prepares trainees to:

Size and select steel pipe.

a. Identify pipe sizes.
b. Identify schedules and wall thicknesses.
c. List pipe manufacturing processes.
d. Identify ASTM International piping standards.

Learning Objective 2

Successful completion of this module prepares trainees to:

Prepare pipe for fittings.

a. Recognize the tools used when cutting and reaming pipe.
b. Cut and ream pipe.

Learning Objective 3

Successful completion of this module prepares trainees to:

Groove pipe and install grooved fittings.

a. Identify types of grooved connections.

b. Recognize the tools used when grooving pipe.
c. Identify and install grooved fittings.

Learning Objective 4

Successful completion of this module prepares trainees to:
Thread pipe and install threaded fittings.

a. Identify types of threads.
b. Recognize the tools used when threading pipe.
c. Thread pipe.
d. Identify and install threaded fittings.

Learning Objective 5

Successful completion of this module prepares trainees to:
Select and install flanged fittings.

a. Identify flanged fittings and their applications.
b. Install flanged pipe fittings.

Learning Objective 6

Successful completion of this module prepares trainees to:
Identify the applications of plain-end pipe fittings.

a. Identify plain-end fittings with grippers and their applications.
b. Identify press-fit fittings and their applications.

Performance Tasks

1. Identify the correct pipe size and schedule for a given application.
2. Cut and ream pipe.
3. Groove pipe and install grooved fittings.
4. Thread pipe and install threaded fittings.
5. Install flanged fittings using the proper bolt tightening sequence.

Recommended Teaching Time: 20 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 18103
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- A table of steel pipe dimensions and schedules
- Paper
- Writing utensil
- Performance Profile sheets

Performance Task 2

- Lengths of steel pipe
- A pipe vise
- Pipe cutters
- Hand reamer
- Thread cutting oil
- A shop towel
- Appropriate PPE
- Performance Profile sheets

Performance Task 3

- Lengths of pipe
- Grooved fittings
- Lubricant, as needed
- Wrench
- Cut groover and/or roll groover
- Appropriate PPE

- Performance Profile sheets

Performance Task 4

- Power threading machine and/or manual pipe threader
- Selection of die heads
- Lengths of pipe
- Thread cutting oil
- Shop cloth
- Floor pipe stand or support (optional depending on pipe length)
- Assorted threaded fittings
- Pipe wrench
- Appropriate PPE
- Performance Profile sheets

Performance Task 5

- Gaskets
- Drift pin
- Bolts and nuts
- Assorted flanges
- Torque wrench
- Lubrication, as needed
- Appropriate PPE
- Performance Profile sheets

18104

CPVC Pipe and Fittings

Sprinkler Fitting

Overview

This module covers the special type of chlorinated polyvinyl chloride (CPVC) pipe and fittings used in sprinkler systems. It also describes the procedures for cutting, beveling, cleaning, and joining CPVC pipe and fittings, and provides an overview of how to test the installed sprinkler system.

Learning Objective 1

Successful completion of this module prepares trainees to:

Size and select chlorinated polyvinyl chloride (CPVC) pipe.

a. Identify CPVC pipe characteristics.
b. Identify the Listed applications of CPVC pipe.
c. Describe the storage and handling requirements for CPVC pipe.
d. Describe the protection requirements for CPVC pipe in concealed and exposed installations.

Learning Objective 2

Successful completion of this module prepares trainees to:

Cut and join CPVC pipe.

a. Describe how to cut, deburr, bevel, and clean CPVC pipe.
b. Describe the procedure for solvent-cementing CPVC pipe and fittings.

Learning Objective 3

Successful completion of this module prepares trainees to:

Install and test CPVC sprinkler systems.

a. Identify support spacing requirements for CPVC pipe.
b. Describe how to install sprinklers and test the system.

c. Identify installation requirements for special applications.

Performance Tasks

1. Cut, deburr, bevel, and clean CPVC pipe.
2. Join CPVC pipe and fittings.
3. Install CPVC pipe using the correct support spacing.
4. Complete a manufacturer training course for CPVC.

Recommended Teaching Time: 12.5 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 18104
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Tasks 1, 2, and 3

- Ratchet cutters, tubing cutters, fine-tooth pipe saws, or power saws
- Sections of CPVC pipe
- Reamer or deburring tool
- Outside beveling tool or inside-outside reamer
- Clean, dry shop cloths
- Solvent-cement
- Solvent-cement dauber
- Assorted fittings
- Assorted pipe hangers, supports, and associated fasteners
- Drill for installing hangers and supports
- Appropriate PPE

- Performance Profile sheets

Performance Task 4

- A manufacturer training course for CPVC
- Materials required by course
- Performance Profile sheets

18105

Copper Tubing and Fittings

Sprinkler Fitting

Overview

This module describes the installation of copper tubing and fittings, including support spacing requirements. It explains how to measure, cut, ream, clean, and solder copper tubing. The brazing process is described, as are brazing metals, fluxes, and heating equipment. It also covers mechanical connections.

Learning Objective 1

Successful completion of this module prepares trainees to:

Size and select copper tubing and fittings.

a. Identify copper tubing types and sizes.
b. Identify the fittings used with copper tubing.
c. Explain how to cut and bend copper tubing.
d. Identify support spacing requirements for copper tubing.

Learning Objective 2

Successful completion of this module prepares trainees to:

Describe the process for soldering copper tubing.

a. Identify the characteristics of solder metal and fluxes.
b. List the steps in the soldering process.

Learning Objective 3

Successful completion of this module prepares trainees to:

Describe the process for brazing copper tubing.

a. Identify the safety precautions associated with brazing.

b. Identify the characteristics of brazing metal and fluxes.
c. List the steps in the brazing process.

Learning Objective 4

Successful completion of this module prepares trainees to:
Identify mechanical connection methods for copper tubing.

a. Explain how to install a grooved fitting.
b. Describe how to make a press-fit connection.

Performance Tasks

1. Identify various fittings used with copper tubing.
2. Cut, ream, clean, and bend copper tubing in preparation for joining.
3. Make a soldered joint.
4. Join copper using mechanical connectors.

Recommended Teaching Time: 10 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 18105
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- An assortment of fittings used with copper tubing, each labeled with a letter or number for reference
- Blank paper
- Writing utensil

- Performance Profile sheets

Performance Tasks 2, 3, and 4

- Hand-cutting tools
- Lengths of copper tubing
- Fittings
- Power saw, as required
- A reaming tool, if not present on the tube cutter
- Tube-bending springs and/or tube-bending equipment
- Abrasive cloth, abrasive pads, and a properly sized fitting brush
- Measuring tape
- Flux
- Flux brush
- Heat blocks or heat shields
- Heating equipment, such as a torch
- Solder metal
- Grooved fittings/couplings and/or compression fittings
- Battery-powered compression tool or other manufacturer-approved tools for joining copper tubing with mechanical connectors
- Appropriate PPE
- Performance Profile sheets

18106

Underground Pipe

Sprinkler Fitting

Overview

This module describes the installation of underground piping systems. It covers ductile iron and PVC piping and components, including risers, backflow preventer assemblies, hydrants, and restraints. It also covers trench safety requirements, backfilling, and testing requirements.

Learning Objective 1

Successful completion of this module prepares trainees to:

Describe underground piping systems and their components.

a. Identify the types of piping used in underground fire service.
b. Identify risers, backflow preventer assemblies, hydrants, and associated equipment.

Learning Objective 2

Successful completion of this module prepares trainees to:

Identify trench safety requirements.

a. Describe how trenches are prepared and protected.
b. Identify safety guidelines for working in or near trenches.

Learning Objective 3

Successful completion of this module prepares trainees to:

Describe the installation of underground piping systems.

a. Explain how bedding is placed.
b. Describe the methods for cutting and joining underground pipe.
c. Explain how to install thrust blocks and restraints.
d. Identify methods of corrosion protection for pipe and fittings.

e. Explain how to install tracer wire.
f. Describe how a trench is backfilled.
g. Identify the testing, inspection, and flushing requirements for underground piping systems.

Performance Task

1. Complete a Contractor's Material and Test Certificate for Underground Piping.

Recommended Teaching Time: 12.5 hours

Classroom Equipment and Materials

- Whiteboard and markers
- Pencils and paper
- PowerPoint® Presentations for Module 18106
- A variety of standard marker sizes
- Poster board
- Flip chart
- LCD projector and screen
- Computer with internet access
- Module Review answer key
- Module Examinations

Performance Task 1

- Copies of Contractor's Material and Test Certificate for Underground Piping, enough for one per trainee
- Sample shop drawings, enough for one per trainee
- Writing utensils
- Performance Profile sheets