



# SPRINKLER FITTING

## Competencies / Objectives

### Level One

#### MODULE 18101-07 - ORIENTATION TO THE TRADE

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.

#### MODULE 18102-07 - INTRODUCTION TO COMPONENTS AND SYSTEMS

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 sprinkler heads.
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.

#### MODULE 18103-07 - STEEL PIPE

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.

## **MODULE 18104-07 - CPVC PIPE AND FITTINGS**

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 cement CPVC pipe.
8. Properly prepare pipe ends.
9. Join and cure CPVC pipe.

## **MODULE 18105-07 - COPPER TUBE SYSTEMS**

1. Follow basic safety precautions for preparing and installing copper tube pipe.
2. Identify approved types of copper tube pipe and fittings.
3. Identify and describe cast bronze fittings.
4. Identify wrought fittings.
5. Identify and select dielectric fittings.
6. Solder and braze copper tubing joints.
7. Calculate takeouts.
8. Set up equipment.
9. Cut, chamfer, and clean copper tube pipe.
10. Properly prepare pipe ends.

## **MODULE 18106-07 - UNDERGROUND PIPE**

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.

## Level Two

### MODULE 18201-07 - HANGERS, SUPPORTS, RESTRAINTS, AND GUIDES

1. Identify and describe strength requirements of pipe hangers, supports, restraints, and guides.
2. Identify and describe spacing requirements of pipe hangers, supports, restraints, and guides.
3. Identify and describe types of pipe hangers, supports, restraints, and guides.
4. Install pipe hangers, supports, restraints, guides, and anchors.
5. Identify and explain types of earthquake bracing.
6. Install earthquake bracing.
7. Describe and explain sleeving and firestopping.
8. Cut a hanger rod to a specified length.

### MODULE 18202-07 - GENERAL PURPOSE VALVES

1. Identify the basic types of valves.
2. Demonstrate the ability to service different types of valves.
3. Define the general purpose of a backflow preventer.
4. Install outside stem and yoke (OS&Y) valves.
5. Install a tamper switch.
6. Install butterfly grooved valves.
7. Disassemble, service, and reassemble a check valve.

### MODULE 18203-07 – GENERAL TRADE MATH

1. Use basic math principles to solve problems.
2. Convert fundamental measurement quantities from the English system to the metric system, and from metric to English.
3. Recognize the effects of temperature on sprinkler systems.
4. Use temperature scales to solve sprinkler rating problems.
5. Calculate 45-degree offsets and tank volume.
6. Center sprinkler heads using the target, square offset, and geometric methods.
7. Solve sprinkler systems problems relating to changes in elevation, sprinkler, discharge, and hanger sizing.

### MODULE 18204-07 - SHOP DRAWINGS

1. Identify common structural symbols on a shop drawing.
2. Identify cut lengths and sizes of pipe on an installation drawing.
3. Identify the materials to perform an installation from drawings.
4. Identify standard sprinkler system symbols.
5. Interpret a legend and calculate the number of sprinklers to be used in an installation.
6. Identify the orifice size of a sprinkler from drawings.
7. Identify the temperature rating of a sprinkler from a drawing.
8. Calculate the square footage and the number of sprinklers required for a given area.
9. Identify and match the NFPA standard to the title.

## **MODULE 18205-07 - STANDARD SPRAY FIRE SPRINKLERS**

1. Identify unobstructed and obstructed construction on a drawing and explain why these construction types are obstructed or unobstructed.
2. Calculate maximum coverage area of standard sprinklers for various occupancies.
3. Calculate spacing using the small room rule.
4. Determine sprinkler temperatures by examining different sprinklers.
5. Calculate the maximum spacing of sidewall sprinklers using the protection area rule.
6. Referencing a sprinkler identification number (SIN), identify the manufacturer and sprinkler type.

## **MODULE 18206-07 - WET FIRE SPRINKLER SYSTEMS**

1. Describe riser check, alarm check valves, and trim.
2. Trim an alarm check valve and replace the faceplate gasket.
3. Identify and describe flow switches, tamper switches, and pressure switches.
4. Install a tamper switch and a flow switch and set the retard device on the flow switch.
5. Identify and explain fire department connections and hose stations.
6. Explain inspector's test connections and auxiliary drains.
7. Explain hydrostatic testing and test pumps.
8. Perform a hydrostatic test using a pump.
9. Describe antifreeze systems.
10. Calculate the specific gravity of an antifreeze solution.
11. Complete a contractor's material and test certificate.

## **MODULE 18207-07 - DRY-PIPE SYSTEMS**

1. Identify and explain dry-pipe systems and why and where dry-pipe systems are used.
2. Identify dry-pipe valves and trim.
3. Install pressure gauges on an alarm valve.
4. Identify and explain air supplies.
5. Identify and explain accelerators and exhausters.
6. Perform an installation of an accelerator.
7. Explain why an exhauster is a quick-opening device (QOD) and identify possible locations where an exhauster could be installed in a dry-pipe system.
8. Explain pitching sprinkler piping and auxiliary drains in dry-pipe systems.
9. Calculate pitch for dry-pipe systems.
10. Identify and explain fire department connections with respect to dry-pipe systems.
11. Install, set, and adjust an air maintenance device.
12. Reset and troubleshoot a dry-pipe system.
13. Remove face plate.

# Level Three

## MODULE 18301-07 - DELUGE/PREACTION SYSTEMS

1. Identify and explain differences between deluge and preaction systems.
2. Identify the critical components of a deluge system and a preaction system.
3. Explain where preaction systems and deluge systems are generally installed.
4. Trip and reset a deluge valve.
5. Identify the three types of discharge nozzles used with a deluge system.
6. Identify and explain various methods of activating electrical release and electrical supervision.
7. Demonstrate the procedures to place a Firecycle<sup>®</sup> system in service.
8. Identify and explain non-, single-, and double-interlocked preaction systems.
9. Explain the main precautions that must be observed when placing non-, single-, and double-interlocked systems into service and describe activation.
10. Perform a hydrostatic test.

## MODULE 18302-07 - STANDPIPES

1. Identify the different types and classifications of standpipes.
2. Explain the requirements for standpipes for buildings under construction.
3. Explain the basic requirements for sizing standpipes hydraulically and by schedule.
4. Describe a hose rack assembly and how it works.
5. Describe roof manifolds.
6. Identify and explain fire department connections.
7. Identify types of hose valves and adapters.
8. Demonstrate flow test procedures used to validate minimum pressure and flow capability.
9. Identify, test, and adjust a pressure-reducing valve (PRV).
10. Demonstrate LINK-SEAL<sup>®</sup> installation procedures.

## MODULE 18303-07 - WATER SUPPLIES

1. Recognize federal, state, and jurisdictional requirements for supply and disposal of fire sprinkler system water.
2. Identify different water supplies for automatic sprinkler systems.
3. Explain the three qualities that are critical to the water supply for fire sprinkler systems.
4. Identify types of water storage and explain their usage.
5. Describe different water main configurations.
6. Perform flow test procedures.
7. Plot residual and static pressure on a graph.
8. Read a flow test results sheet and determine the number of outlets flowed, hydrant outlet size, and static and residual pressure.
9. Fill out a flow test summary sheet.
10. Identify and describe backflow preventers and methods of installation.
11. Identify and describe meters used in fire sprinkler systems.

## **MODULE 18304-07 - FIRE PUMPS**

1. Explain the basic components and types that make up a fire pump system.
2. Identify the NFPA standard that covers the installation of fire pumps.
3. Explain the minimum residual pressure in pounds per square inch (psi) that can be used when pumping from a municipal water supply.
4. Convert pressure ratings from psi to feet of head and vice versa.
5. Explain how to set and align a pump.
6. Discuss the different types of and requirements for fire pump controllers.
7. Discuss monitoring requirements for fire pumps.
8. Describe acceptance testing of fire pumps.
9. Perform a mechanical check of a fire pump system.
10. Measure the flow of a system.
11. Identify potential causes for a malfunctioning fire pump.

## **MODULE 18305-07 - APPLICATION-SPECIFIC SPRINKLERS AND NOZZLES**

1. Identify, describe, and explain application-specific sprinklers.
2. Explain areas of coverage, positioning, and obstruction requirements.
3. Select correct types of sprinklers based on occupancy and obstruction requirements.
4. Select proper escutcheon for recess sprinklers.
5. Identify and explain nozzles.
6. Describe different types of nozzles.
7. Size and install dry sprinklers.
8. Size and install an attic sprinkler.

# Level Four

## MODULE 18401-08 - SYSTEM LAYOUT

1. Explain system design, pipe sizing, and hydraulic calculations.
2. Identify and describe the four different system configurations.
3. Explain the differences between pipe schedule design and hydraulic design.
4. Identify and describe extra hazard, ordinary hazard, light hazard, and residential occupancies.
5. Identify and explain flow characteristics.
6. Explain pressure loss considerations.
7. Calculate branch line hydraulics.
8. Perform steps to calculate a branch line.
9. Calculate main piping hydraulics.
10. Explain how pipe schedule relates to hazard classifications.

## MODULE 18402-08 - INSPECTION, TESTING, AND MAINTENANCE

1. Describe the reasons for unsatisfactory sprinkler system performance.
2. Explain initial system testing and inspections for aboveground, underground, and overhead pipe.
3. Describe the flushing process for underground piping/mains.
4. Describe the importance of periodic inspections of sprinkler systems.
5. Explain the report of inspection and how it must relate to the chapters included in NFPA 25.
6. Explain the difference between warranty repair and owner repair.
7. Explain the general preparations for system repair.
8. Describe the specific repair considerations for deluge and preaction systems.
9. Describe the general preparation procedures for inspection, maintenance, and repair of special systems.
10. Explain the required procedures to test all types of valves.
11. Perform a main drain test.
12. Complete inspection and testing of water-based and wet standpipe systems and complete the required documentation.

## **MODULE 18403-08 - SPECIAL EXTINGUISHING SYSTEMS**

1. Describe the three methods of heat transfer.
2. Explain the basic principles of exposure protection.
3. Identify what piping and fitting materials can be used and where they must be located in an exposure system.
4. Explain where water spray systems are typically used.
5. Explain the general concepts of using foam as opposed to water as an extinguishing agent.
6. Describe the different classes of foam concentrates and foam sprinkler system configurations.
7. Explain how to measure density using a refractometer.
8. Identify the five basic automatic fire detection methods that can be used for electric release.
9. Describe the dangers when working with a carbon dioxide system.
10. Describe the different classes of fire extinguishers and what the rating designations mean.

## **MODULE 18404-08 - INTRODUCTORY SKILLS FOR THE FOREMAN**

1. Explain the foreman's responsibilities to the project coordinating staff or project owner.
2. Explain the job safety responsibilities.
3. Describe job cleanliness and material organization.
4. Explain responsibilities for project close-out.
5. Describe project layout and coordination.
6. Identify and describe the scope of project and the scope letter.
7. Describe job specifications and project drawings.
8. Record changes on a shop drawing for as-builts.
9. Complete daily, weekly time, and progress reports.
10. Identify and explain materials documentation.

## **MODULE 18405-08 - PROCEDURES AND DOCUMENTATION**

1. Recognize the consequences of improper system installation.
2. Identify the five Cs of project documentation.
3. Recognize unsafe acts and conditions on a work site.
4. Identify the hazards associated with specific tasks.
5. Discuss the procedures for responding to an accident.
6. Describe the procedures for emergency response to water damage.
7. Explain how to handle a water damage claim.