

Interprovincial Program Guide

Sprinkler System Installer

2016

**CANADIAN
STANDARD
OF EXCELLENCE
FOR SKILLED TRADES**



red-seal.ca
sceau-rouge.ca



Employment and
Social Development Canada

Emploi et
Développement social Canada

Canada 

Sprinkler System Installer

2016

Trades and Apprenticeship Division

Division des métiers et de l'apprentissage

Labour Market Integration Directorate

Direction de l'intégration au marché du
travail

National Occupational Classification:

7252

Disponible en français sous le titre :

Mécanicien/mécanicienne en protection-
incendie

You can download this publication by going online: publiccentre.esdc.gc.ca This document is available on demand in multiple formats by contacting 1 800 O-Canada (1-800-622-6232), teletypewriter (TTY), 1-800-926-9105.

© Her Majesty the Queen in right of Canada, 2016

droitdauteur.copyright@HRSDC-RHDCC.gc.ca

PDF

Cat. No.: Em15-3/2-2016E-PDF

ISBN: 978-0-660-04704-1

You can download this publication and find more information on Red Seal trades by going online: <http://www.red-seal.ca>

Foreword

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Interprovincial Program Guide (IPG) as the national curriculum for the occupation of Sprinkler System Installer.

Jurisdictions have long recognized the benefit of pooling resources in the development and maintenance of apprenticeship training standards. A successful example of this is the Interprovincial Standards Red Seal Program itself. Essential to the establishment of standards is the development of suitable training systems and programs, which enable tradespeople to acquire certification based on these standards. While certification is the responsibility of Apprenticeship administrators throughout Canada, the development and delivery of technical training is the responsibility of jurisdictions.

In 1999, work to develop common training for apprenticeship programs within the Atlantic Provinces began. To date, 22 Curriculum Standards have been developed through the Atlantic Standards Partnership (ASP) project to assist programming staff and instructors in the design and delivery of technical training. Similarly, the CCDA embarked on a process for the development of national IPGs for the Boilermaker, Carpenter and Sprinkler System Installer trades. At its January 2005 strategic planning session, the CCDA identified developing common training standards as one of the key activities in moving towards a more cohesive apprenticeship system.

With the support of Employment and Social Development Canada (ESDC), several provinces and territories have partnered to build on the ASP and the CCDA processes to further develop IPGs to be used across the country. This partnership will create efficiencies in time and resources and promote consistency in training and apprentice mobility.

Acknowledgements

The CCDA and the IPG Committee wishes to acknowledge the contributions of the following industry and instructional representatives who participated in the development of this document in 2013.

Jamey Brown	New Brunswick
Trevor Busch	Manitoba
Michael Chriest	Saskatchewan
Todd Dempsey	Nova Scotia
Joe Howe	New Brunswick
Jamie McPherson	British Columbia
Kevin Sullivan	Newfoundland and Labrador
Jason Thompson	Ontario

In addition to the representatives above, various federal, provincial and territorial representatives contributed to the development of this document including the host province of New Brunswick.

In 2015, an update of this IPG was completed to ensure adequate coverage of the occupation as outlined in the 2014 National Occupational Analysis (NOA).

As this program guide will be amended periodically, comments or suggestions for improvement should be directed to:

Trades and Apprenticeship Division
Labour Market Integration Directorate
Employment and Social Development Canada
140 Promenade du Portage, Phase IV, 5th Floor
Gatineau, Quebec K1A 0J9
e-mail: redseal-sceaurouge@hrsdc-rhdcc.gc.ca

Table of Contents

Foreword	2
Acknowledgement	3
User Guide	5
IPG Glossary of Terms	7
Essential Skills Profiles	9
Profile Chart	10
Recommended Level Structure	12
2014 NOA Sub-Task to IPG Unit Comparison	13

PROGRAM CONTENT

Level 1	17
Level 2	47
Level 3	81

User Guide

According to the Canadian Apprenticeship Forum, the IPG is: "a list of validated technical training outcomes, based upon those sub-tasks identified as common core in the National Occupational Analysis (NOA), and validated by industry in the provinces and territories as incorporating the essential tasks, knowledge and skills associated with a given trade."

Learning outcomes contained in the IPG represent the minimum common core content for the development of jurisdictional training standards and outlines. IPGs are developed based on the NOAs and extensive industry consultation. The IPG is intended to assist program development staff in the design of jurisdictional plans of training. Each jurisdiction has the flexibility to add additional content.

The IPG was deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. It details units of training, unit outcomes and objectives. It does not impose a delivery model or teaching format.

Jurisdictions and/or training providers will select and develop delivery materials and techniques that accommodate a variety of learning styles and delivery patterns. The IPG does not dictate study materials, textbooks or learning activities to be used in delivery.

The IPG document includes a recommended levelling structure to facilitate mobility for apprentices moving from one jurisdiction to another. Because of difference in jurisdictional regulations and program durations, levels are offered as suggestions only.

Structure

The IPG is divided into units. The unit codes are used as a means of identification and are not intended to convey the order of delivery. Prerequisites have not been detailed. Each unit consists of *Learning Outcomes* and *Objectives and Content*. NOA references have been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the NOA.

The *Learning Outcomes* are the specific performances that must be evaluated. Wording of the learning outcomes, "Demonstrate knowledge of...", acknowledges the broad spectrum of ways in which knowledge can be shown. It is at the discretion of each jurisdiction to determine the manner in which learning outcomes are evaluated; theoretically, practically or a combination of both

User Guide *(continued)*

The *Objectives and Content* for the unit details the information to be covered in order to achieve the performances specified in the *Learning Outcomes*. These objectives can be either theoretical or practical in nature, based on the requirements identified through the industry consultation process. The learning activities used to cover the objectives are at the discretion of the jurisdiction; however, practically worded objective statements have been used where industry indicated a need for the apprentices to receive exposure to performing the task or skill outlined while attending technical training. For example, this exposure could be done through instructor demonstration or individual or group performance of the skill or task. This practical training will help to reinforce the theoretical component of the technical training.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided. The content listed within the IPG document is **not** intended to represent an inclusive list; rather, it is included to illustrate the intended direction for the objective. Content may be added or extended in jurisdictional training plans as required.

Jurisdictions are free to deliver the IPG units one at a time or concurrently, provided that all *Learning Outcomes* are met. The IPG does not indicate the amount of time to be spent on a particular unit, as the length of time required to deliver the *Learning Outcomes* successfully will depend upon the learning activities and teaching methods used.

IPG Glossary of Terms

These definitions are intended as a guide to how language is used in the IPGs.

APPLICATION	The use to which something is put and/or the circumstance in which you would use it.
CHARACTERISTIC	A feature that helps to identify, tell apart, or describe recognizably; a distinguishing mark or trait.
COMPONENT	A part that can be separated from or attached to a system; a segment or unit.
DEFINE	To state the meaning of (a word, phrase, etc.).
DESCRIBE	To give a verbal account of; tell about in detail.
EXPLAIN	To make plain or clear; illustrate; rationalize.
IDENTIFY	To point out or name objectives or types.
INTERPRET	To translate information from observation, charts, tables, graphs, and written material.
MAINTAIN	To keep in a condition of good repair or efficiency.
METHOD	A means or manner of doing something that has procedures attached to it.
OPERATE	How an object works; to control or direct the functioning of.
PROCEDURE	A prescribed series of steps taken to accomplish an end.
PURPOSE	The reason for which something exists or is done, made or used.

IPG Glossary of Terms *(continued)*

TEST

v. To subject to a procedure that ascertains effectiveness, value, proper function, or other quality.

n. A way of examining something to determine its characteristics or properties, or to determine whether or not it is working correctly.

TROUBLESHOOT

To follow a systematic procedure to identify and locate a problem or malfunction and its cause.

Essential Skills Profiles

Essential Skills are the skills needed for work, learning and life. They provide the foundation for learning all the other skills that enable people to evolve within their jobs and adapt to workplace change.

Over the past several years, the Government of Canada has conducted research examining the skills people use at work. From this research, Essential Skills Profiles have been developed for various occupations.

For more information regarding Essential Skills and to access Essential Skills Profiles for specific occupations, visit ESDC Essential Skills website at:

<http://www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml>

Profile Chart

COMMON OCCUPATIONAL SKILLS			
SSI-100 Safety	SSI-105 Tools and Equipment	SSI-110 Blueprint Reading and Sketching I	SSI-115 Access Equipment
SSI-120 Rigging, Hoisting and Lifting	SSI-125 Introduction to Trade Related Documents	SSI-130 Communication	SSI-200 Blueprint Reading and Sketching II
SSI-205 Electrical Principles	SSI-210 Basic Hydraulic Calculations	SSI-300 Blueprint Reading and Sketching III	SSI-305 Job Planning
SSI-355 Commissioning			
WATER SUPPLY INSTALLATION			
SSI-235 Pipe Design and Installation	SSI-240 Pipe and Tube Bending	SSI-275 Water Supply, Hydrants and Fire Department Connections	SSI-345 Fire Pumps and Controllers
PIPING INSTALLATION			
SSI-135 Hangers, Supports and Bracing	SSI-140 System Component Valves	SSI-145 Automatic Sprinkler Heads	SSI-150 Steel Pipe and Fittings
SSI-155 Plastic Pipe and Fittings	SSI-215 Standard Spray Sprinkler Heads	SSI-220 Extended Coverage Sprinkler Heads	SSI-225 Specialty Sprinkler Heads and Nozzles
SSI-230 Copper Pipe and Copper and Stainless Steel Tubing	SSI-245 Brazing, Soldering and Oxy-Acetylene Cutting		

Profile Chart *(continued)*

INSTALLATION AND LAYOUT OF FIRE PROTECTION SYSTEMS			
SSI-160 Wet Pipe Sprinkler Systems	SSI-165 Dry Pipe Sprinkler Systems	SSI-170 Antifreeze Sprinkler Systems	SSI-250 Standpipe and Hose Systems
SSI-255 Portable Fire Extinguishers	SSI-260 Outside Exposure Systems	SSI-265 Pre-action Systems	SSI-270 Deluge Systems
SSI-315 Dry and Wet Chemical Extinguishing Systems	SSI-320 Water Spray Fixed Systems	SSI-325 Water Mist Systems	SSI-330 Foam Systems
SSI-335 Carbon Dioxide Extinguishing Systems	SSI-340 Clean Agent Extinguishing Systems		
INSTALLATION OF DETECTION AND PROTECTION DEVICES AND SYSTEMS			
SSI-350 Detection and Signal- Initiating Devices			
SERVICE OF FIRE PROTECTION SYSTEMS			
SSI-310 Inspection, Testing and Maintenance			

Recommended Level Structure

LEVEL 1		
Unit Code	Title	Page
SSI-100	Safety	18
SSI-105	Tools and Equipment	20
SSI-110	Blueprint Reading and Sketching I	21
SSI-115	Access Equipment	23
SSI-120	Rigging, Hoisting and Lifting	24
SSI-125	Introduction to Trade Related Documents	27
SSI-130	Communication	29
SSI-135	Hangers, Supports and Bracing	30
SSI-140	System Component Valves	32
SSI-145	Automatic Sprinkler Heads	34
SSI-150	Steel Pipe and Fittings	36
SSI-155	Plastic Pipe and Fittings	39
SSI-160	Wet Pipe Sprinkler Systems	41
SSI-165	Dry Pipe Sprinkler Systems	43
SSI-170	Antifreeze Sprinkler Systems	45
LEVEL 2		
Unit Code	Title	Page
SSI-200	Blueprint Reading and Sketching II	48
SSI-205	Electrical Principles	50
SSI-210	Basic Hydraulic Calculations	52
SSI-215	Standard Spray Sprinkler Heads	54
SSI-220	Extended Coverage Sprinkler Heads	56
SSI-225	Specialty Sprinkler Heads and Nozzles	58
SSI-230	Copper Pipe and Copper and Stainless Steel Tubing	60
SSI-235	Pipe Design and Installation	62
SSI-240	Pipe and Tube Bending	64
SSI-245	Brazing, Soldering and Oxy-Acetylene Cutting	65
SSI-250	Standpipe and Hose systems	67
SSI-255	Portable Fire Extinguishers	69
SSI-260	Outside Exposure Systems	70
SSI-265	Pre-Action Systems	72
SSI-270	Deluge Systems	74
SSI-275	Water Supply, Hydrants and Fire Department Connections	76
LEVEL 3		
Unit Code	Title	Page
SSI-300	Blueprint Reading and Sketching III	82
SSI-305	Job Planning	83
SSI-310	Inspection, Testing and Maintenance	85
SSI-315	Dry and Wet Chemical Extinguishing Systems	88
SSI-320	Water Spray Fixed Systems	90
SSI-325	Water Mist Systems	92
SSI-330	Foam Systems	94
SSI-335	Carbon Dioxide Extinguishing Systems	97
SSI-340	Clean Agent Extinguishing Systems	100
SSI-345	Fire Pumps and Controllers	102
SSI-350	Detection and Signal Initiating Devices	104
SSI-355	Commissioning	106

2014 NOA Sub-task to IPG Unit Comparison

NOA Sub-task		IPG Unit	
Task 1 – Uses and maintains tools and equipment.			
1.01	Maintains hand tools.	SSI-105	Tools and Equipment
1.02	Maintains portable and stationary power tools.	SSI-105	Tools and Equipment
1.03	Maintains measuring and testing equipment.	SSI-105	Tools and Equipment
1.04	Uses access equipment.	SSI-115	Access Equipment
1.05	Uses rigging, hoisting and lifting equipment.	SSI-120	Rigging, Hoisting and Lifting
1.06	Uses personal protective equipment (PPE) and safety equipment.	SSI-100	Safety
Task 2 – Organizes work.			
2.01	Interprets codes, regulations and procedures.	SSI-125	Introduction to Trade Related Documents
2.02	Interprets blueprints and specifications.	SSI-110	Blueprint Reading and Sketching I
		SSI-200	Blueprint Reading and Sketching II
		SSI-300	Blueprint Reading and Sketching III
2.03	Uses documentation and reference material.	SSI-125	Introduction to Trade Related Documents
2.04	Communicates with others.	SSI-130	Communication
2.05	Plans daily job tasks and procedures.	SSI-305	Job Planning
2.06	Maintains safe work environment.	SSI-100	Safety
Task 3 – Performs common trade activities.			
3.01	Prepares work site.	SSI-100	Safety
		SSI-305	Job Planning
3.02	Handles materials and supplies.	SSI-100	Safety
		SSI-305	Job Planning
3.03	Installs supports and hangers.	SSI-135	Hangers, Supports and Bracing
3.04	Performs layout of systems.	SSI-160	Wet Pipe Sprinkler Systems
		SSI-165	Dry Pipe Sprinkler Systems
		SSI-170	Antifreeze Sprinkler Systems
		SSI-250	Standpipe and Hose Systems
		SSI-265	Pre-action Systems
		SSI-270	Deluge Systems
		SSI-325	Water Mist Extinguishing Systems
SSI-330	Foam Extinguishing Systems		
Task 4 – Commissions systems.			
4.01	Commissions water supply systems.	SSI-355	Commissioning
4.02	Commissions piping installation.		
4.03	Commissions detection, protection and control systems.		

NOA Sub-task		IPG Unit	
Task 5 – Installs underground water supplies.			
5.01	Supervises trenching and backfilling.	SSI-275	Water Supply, Hydrants and Fire Department Connections
5.02	Installs underground piping and components.		
5.03	Flushes underground system.		
Task 6 – Installs fire and booster pumps.			
6.01	Determines location of pumps, drivers, controllers and components.	SSI-275	Water Supply, Hydrants and Fire Department Connections
6.02	Installs pumps, controllers and components.		
Task 7 – Installs fire department connections.			
7.01	Determines location, size and type of fire department connection.	SSI-275	Water Supply, Hydrants and Fire Department Connections
7.02	Installs fire department piping and components.		
7.03	Tests fire department piping and components.		
Task 8 – Installs private water supply systems.			
8.01	Installs water tanks.	SSI-275	Water Supply, Hydrants and Fire Department Connections
8.02	Installs related equipment.		
Task 9 – Prepares piping and fittings for installation.			
9.01	Cuts pipe.	SSI-240	Pipe and Tube Bending
		SSI-245	Brazing, Soldering and Oxy-Acetylene Cutting
9.02	Bends pipe.	SSI-240	Pipe and Tube Bending
9.03	Threads pipe.	SSI-235	Pipe Design and Installation
9.04	Grooves pipe.	SSI-235	Pipe Design and Installation
9.05	Drills pipe.	SSI-230	Copper Pipe and Copper and Stainless Steel Tubing
		SSI-235	Pipe Design and Installation
9.06	Grinds pipe.	SSI-245	Brazing, Soldering and Oxy-Acetylene Cutting
9.07	Prepares fittings.	SSI-235	Pipe Design and Installation
Task 10 – Installs pipe and fittings.			
10.01	Installs steel pipe and fittings.	SSI-150	Steel Pipe and Fittings
		SSI-235	Pipe Design and Installation
10.02	Installs plastic pipe and fittings.	SSI-155	Plastic Pipe and Fittings
		SSI-235	Pipe Design and Installation
10.03	Installs copper pipe and fittings.	SSI-230	Copper Pipe and Copper and Stainless Steel Tubing
		SSI-235	Pipe Design and Installation
		SSI-245	Brazing, Soldering and Oxy-Acetylene Cutting
10.04	Paints and labels pipe.	SSI-235	Pipe Design and Installation

NOA Sub-task		IPG Unit	
Task 11 – Installs piping components.			
11.01	Identifies sprinkler heads.	SSI-145	Automatic Sprinkler Heads
		SSI-215	Standard Spray Sprinkler Heads
		SSI-220	Extended Coverage Sprinkler Heads
		SSI-225	Specialty Sprinkler Heads and Nozzles
11.02	Installs sprinkler heads and nozzles.	SSI-145	Automatic Sprinkler Heads
		SSI-215	Standard Spray Sprinkler Heads
		SSI-220	Extended Coverage Sprinkler Heads
		SSI-225	Specialty Sprinkler Heads and Nozzles
11.03	Installs sleeves.	SSI-235	Pipe Design and Installation
11.04	Installs sway/seismic bracing.	SSI-135	Hangers, Supports and Bracing
11.05	Installs auxiliary devices.	SSI-160	Wet Pipe Sprinkler Systems
		SSI-165	Dry Pipe Sprinkler Systems
11.06	Installs cross connection control assemblies.	SSI-140	System Component Valves
Task 12 – Installs water-based systems.			
12.01	Installs wet systems.	SSI-160	Wet Pipe Sprinkler Systems
12.02	Installs dry systems.	SSI-165	Dry Pipe Sprinkler Systems
12.03	Installs antifreeze systems.	SSI-170	Antifreeze Sprinkler Systems
12.04	Installs pre-action/deluge systems.	SSI-265	Pre-action Systems
		SSI-270	Deluge Systems
12.05	Installs foam systems.	SSI-330	Foam Extinguishing Systems
12.06	Installs standpipe systems.	SSI-250	Standpipe and Hose Systems
12.07	Installs water mist systems.	SSI-325	Water Mist Extinguishing Systems
Task 13 – Installs specialty fire suppression systems.			
13.01	Installs wet and dry chemical, clean agent and carbon dioxide systems.	SSI-315	Dry and Wet Chemical Extinguishing Systems
		SSI-335	Carbon Dioxide Extinguishing Systems
		SSI-340	Clean Agent Extinguishing Systems
13.02	Installs portable extinguishers.	SSI-255	Portable Fire Extinguishers
Task 14 – Installs detection devices.			
14.01	Installs wet and dry pilot lines.	SSI-350	Detection and Signal-Initiating Devices
14.02	Installs heat-actuated detectors (HADs).		
14.03	Installs spark detection systems.		
14.04	Installs air sampling systems.		
14.05	Installs electrical detection systems.		
Task 15 – Installs signal-initiating devices.			
15.01	Installs alarm-initiating devices.	SSI-350	Detection and Signal-Initiating Devices
15.02	Installs supervisory-initiating devices.		
Task 16 – Maintains and repairs fire protection systems.			
16.01	Troubleshoots fire protection systems.	SSI-310	Inspection, Testing and Maintenance
16.02	Repairs deficiencies.		
16.03	Performs scheduled maintenance.		

NOA Sub-task		IPG Unit	
Task 17 – Inspects and tests fire protection systems.			
17.01	Performs scheduled inspections.	SSI-310	Inspection, Testing and Maintenance
17.02	Performs scheduled tests.		
17.03	Inspects portable fire extinguishers.		

LEVEL 1

SSI-100 Safety

Learning Outcomes:

- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.
- Demonstrate knowledge of safety equipment, and their applications, maintenance and procedures for use.

2014 National Occupational Reference:

- 1.06 Uses personal protective equipment (PPE) and safety equipment.
- 2.06 Maintains safe work environment.
- 3.01 Prepares work site.
- 3.02 Handles materials and supplies.

Objectives and Content:

1. Define terminology associated with personal protective equipment (PPE), safety equipment and safe work practices.
2. Identify workplace hazards and describe safe work practices and equipment.
 - i) personal
 - confined space
 - working at heights
 - lifting and ergonomics
 - trenches
 - ii) workplace
 - hot work
 - lock-out/tag-out
 - high voltage
 - rotating equipment
 - barricades and flagging
 - radiation
 - extreme temperatures
 - noise
 - access equipment
 - ladders
 - scaffolding
 - swing stages

- man lifts
 - man baskets
- iii) environmental
 - hazardous materials
 - quality of air
 - system drainage and disposal requirements
- 3. Identify and interpret workplace safety and health regulations.
 - i) federal
 - Workplace Hazardous Material Information System (WHMIS)
 - Transportation of Dangerous Goods (TDG)
 - ii) provincial/territorial
 - Occupational Health and Safety (OH&S)
 - iii) municipal
- 4. Identify types of personal protective equipment (PPE) and describe their applications and procedures for use.
 - i) basic PPE
 - ii) specialized (site specific) PPE
 - iii) fall protection/travel restraints
- 5. Identify types of site safety equipment, and describe their applications and procedures for use.
 - i) fire extinguishers
 - ii) eye wash stations
 - iii) first aid kits
 - iv) spill kits
 - v) air monitoring devices
- 6. Describe the procedures used to inspect, maintain and store PPE and safety equipment according to manufacturers' specifications.

SSI-105 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of tools and equipment, their applications, maintenance and procedures for use.

2014 National Occupational Reference:

- 1.01 Maintains hand tools.
- 1.02 Maintains portable and stationary power tools.
- 1.03 Maintains measuring and testing equipment.

Objectives and Content:

1. Define terminology associated with tools and equipment.
2. Identify hazards and describe safe work practices pertaining to tools and equipment.
3. Identify types of hand tools, and describe their applications and procedures for use.
4. Identify types of portable and stationary power tools, and describe their applications and procedures for use.
5. Identify types of measuring and testing equipment, and describe their applications and procedures for use.
6. Identify types of powder-actuated tools, and describe their applications and training requirements.
7. Describe the procedures used to inspect, maintain and store tools and equipment.

SSI-110

Blueprint Reading and Sketching I

Learning Outcomes:

- Demonstrate knowledge of sprinkler system blueprints and sketches.
- Demonstrate knowledge of the procedures to read and interpret basic sprinkler system blueprints.
- Demonstrate knowledge of the procedures to draw and label orthographic and isometric drawings.

2014 National Occupational Reference:

2.02 Interprets blueprints and specifications.

Objectives and Content:

1. Define terminology associated with blueprint reading and sketching as they pertain to sprinkler systems.
2. Explain the fundamentals of orthographic and isometric projections.
3. Identify types of lines found on sprinkler system blueprints.
 - i) visible line
 - ii) hidden line
 - iii) central line
 - iv) dimension line
 - v) extension line
 - vi) section cutting line
 - vii) material section line
4. Identify symbols found on sprinkler system blueprints.
5. Identify types of views found on sprinkler system blueprints.
 - i) plan
 - ii) elevation
6. Describe the procedures used to interpret dimensions on blueprints.
 - i) floor plans
 - ii) elevations

- iii) sections
 - iv) details
7. Identify types of scales and describe their characteristics and applications.
 - i) metric scale rule (S.I.)
 - ii) architect scale rule (imperial)
 - iii) engineer scale rule
 - iv) typical scales
 8. Identify types of sketching and drawing equipment, and describe their applications and procedures for use.
 9. Describe the procedures used to interpret a site plan in both metric and imperial units.
 10. Describe the procedures used to draw and label three basic views of an object.
 11. Describe the procedures used to draw and label single line piping drawings using 90° elbows and tees.
 - i) orthographic
 - ii) isometric

SSI-115 Access Equipment

Learning Outcomes:

- Demonstrate knowledge of the selection, assembly and procedures for using access equipment.

2014 National Occupational Reference:

1.04 Uses access equipment.

Objectives and Content:

1. Define terminology associated with access equipment.
2. Identify hazards and describe safe work practices pertaining to the use of access equipment.
3. Interpret codes and regulations pertaining to the use of access equipment.
 - i) jurisdictional limitations
 - ii) certification requirements
4. Identify types of access equipment, and describe their applications and training requirements.
 - i) ladders
 - ii) scaffolding
 - iii) swing stages
 - iv) man lifts
 - v) man baskets
5. Describe the procedures used to inspect and maintain ladders and scaffolding.
6. Describe the procedures used to erect, level and dismantle scaffolding.
7. Describe the procedures used to store and secure access equipment.

SSI-120

Rigging, Hoisting and Lifting

Learning Outcomes:

- Demonstrate knowledge of rigging, hoisting and lifting equipment, their applications, limitations and procedures for use.
- Demonstrate knowledge of knots, their applications and procedures for tying.
- Demonstrate knowledge of hand signals used for hoisting and lifting.
- Demonstrate knowledge of the procedures used to plan and perform rigging, hoisting and lifting operations.
- Demonstrate knowledge of calculations required to perform rigging, hoisting and lifting operations.

2014 National Occupational Reference:

1.05 Uses rigging, hoisting and lifting equipment.

Objectives and Content:

1. Define terminology associated with rigging, hoisting and lifting.
2. Identify hazards and describe safe work practices pertaining to rigging, hoisting and lifting.
3. Interpret codes, standards and regulations pertaining to rigging, hoisting and lifting.
 - i) training requirements
 - ii) certification requirements
4. Identify types of rigging, hoisting and lifting equipment, and describe their applications, limitations and procedures for use.
5. Identify types of ropes and slings, and describe their characteristics, safe working loads and applications.
 - i) natural
 - ii) synthetic
 - iii) wire

6. Identify the factors to consider for selecting rigging equipment.
 - i) load characteristics
 - ii) environment
 - iii) safety factor
7. Describe the procedures used to perform calculations related to rigging.
 - i) weight of a load
 - ii) centre of gravity
 - iii) sling angle
8. Describe the considerations when rigging material or equipment for lifting.
 - i) load characteristics
 - ii) equipment and accessories
 - iii) environmental factors
 - iv) anchor points
 - v) sling angles
9. Identify types of knots and hitches used on ropes, and describe their applications and procedures to tie them.
10. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment according to manufacturers' specifications.
11. Explain sling angle when preparing for hoisting and lifting operations.
12. Describe the procedures used for attaching rigging equipment to the load.
13. Identify and interpret hand signals used for hoisting and lifting.
14. Describe the procedures used to communicate during hoisting, lifting and rigging operations.
 - i) hand signals
 - ii) electronic communications
 - iii) audible/visual
15. Describe the procedures used to ensure the work area is safe for lifting.
 - i) supervision of lift
 - ii) securing work area
 - iii) communication

16. Describe the procedures used to plan and perform a lift.
- i) determine weight of the load
 - ii) select equipment
 - iii) determine set-up of equipment
 - iv) determine communication methods
 - v) set up hoisting/lifting equipment
 - vi) rig material/equipment to be lifted
 - vii) attach tag line
 - viii) perform pre-lift checks
 - ix) lift and place load
 - x) perform post-lift inspection of the load
 - xi) disconnect the load

SSI-125 Introduction to Trade Related Documents

Learning Outcomes:

- Demonstrate knowledge of trade related documents and their applications.

2014 National Occupational Reference:

- 2.01 Interprets codes, regulations and procedures.
- 2.03 Uses documentation and reference material.

Objectives and Content:

1. Define terminology associated with trade related documentation.
2. Identify types of trade related documents and describe their applications.
 - i) manufacturers' specifications
 - ii) blueprints
 - drawings
 - addendums
 - specifications
 - iii) codes and standards
 - National Fire Protection Association (NFPA)
 - authority having jurisdiction (AHJ)
 - building codes
 - fire codes
 - iv) work orders
 - service
 - contract
 - time and material
 - v) permits
 - building
 - safety
 - vi) reference material
 - technical bulletins
 - manuals
 - Safety Data Sheets (SDS)
 - vii) safety logs
 - viii) time sheets
 - ix) reports

- service
 - hazard assessment
 - safety
 - workers' compensation
 - x) contractors' material and test certificates
 - aboveground
 - underground
 - xi) commissioning papers
3. Explain the liabilities and responsibilities associated with completing and/or signing trade-related documents.
4. Describe the procedures used to complete trade-related documents.

SSI-130 Communication

Learning Outcomes:

- Demonstrate knowledge of effective communication practices.
- Demonstrate knowledge of communication equipment and its applications.

2014 National Occupational Reference:

2.04 Communicates with others.

Objectives and Content:

1. Define terminology associated with effective communication practices.
2. Describe effective communication practices.
 - i) clients/general contractors
 - ii) building owner/representative
 - iii) co-workers
 - iv) related industry people
 - manufacturers
 - suppliers
 - consultants
 - engineers
 - other tradespeople
3. Explain the importance of effective communication practices.
 - i) respectful
 - ii) organized
4. Explain the importance of the coaching and mentoring relationship between journeyperson and apprentice.
5. Identify the types of communication methods and equipment, and describe their applications.
6. Describe the procedures used to communicate with other tradespeople.

SSI-135

Hangers, Supports and Bracing

Learning Outcomes:

- Demonstrate knowledge of the procedures to select, locate and install hangers, supports and bracing.
- Demonstrate knowledge of the procedures to install fasteners and inserts.

2014 National Occupational Reference:

3.03 Installs supports and hangers.

11.04 Installs sway/seismic bracing.

Objectives and Content:

1. Define terminology associated with hangers, supports and bracing.
2. Identify hazards and describe safe work practices pertaining to hangers, supports and bracing.
3. Interpret codes, standards and regulations pertaining to hangers, supports and bracing.
4. Interpret information pertaining to hangers, supports and bracing found on drawings and specifications.
5. Describe the procedures used to perform grade and hanger calculations.
 - i) grade on pipe
 - ii) grade from percentage
 - iii) progressive lengths of hanger rod
 - iv) number of hangers for given length and type of pipe
 - v) trapeze
6. Identify tools and equipment relating to hangers, supports and bracing, and describe their applications and procedures for use.
7. Identify types of hangers used in the installation of pipe, tube and tubing, and describe their characteristics and applications.

8. Identify hanger requirements for various systems.
9. Identify types and sizes of hanger rods, and describe their characteristics and applications.
10. Identify types of sway/seismic bracing and describe their purpose and applications.
11. Identify types of protective materials applied to hangers and describe their purpose and applications.
12. Identify types of fasteners and inserts, and describe their characteristics and applications.
13. Describe the procedures used to install hangers, supports and bracing.
14. Describe the procedures used to install fasteners and inserts.

SSI-140 System Component Valves

Learning Outcomes:

- Demonstrate knowledge of system component valves, their characteristics, purpose, applications and operation.
- Demonstrate knowledge of the procedures to install and maintain system component valves.

2014 National Occupational Reference:

11.06 Installs cross connection control assemblies.

Objectives and Content:

1. Define terminology associated with system component valves.
2. Identify hazards and describe safe work practices pertaining to system component valves.
3. Interpret codes, standards and regulations pertaining to system component valves.
4. Interpret information pertaining to system component valves found on drawings and specifications.
5. Identify tools and equipment pertaining to system component valves, and describe their applications and procedures for use.
6. Identify types of system component valves, and describe their characteristics, purpose and operation.
 - i) control
 - ii) test connection
 - iii) drain
 - iv) check
 - v) pressure relief
 - vi) pressure reducing
 - vii) hose

7. Identify the factors to consider for selecting and installing system component valves.
8. Describe the procedures used to install system component valves.
9. Identify common maintenance issues related to system component valves.
10. Describe the procedures used to maintain system component valves.

SSI-145 Automatic Sprinkler Heads

Learning Outcomes:

- Demonstrate knowledge of automatic sprinkler heads, their selection, installation and removal according to code and/or manufacturers' specifications.

2014 National Occupational Reference:

- 11.01 Identifies sprinkler heads.
- 11.02 Installs sprinkler heads and nozzles.

Objectives and Content:

1. Define terminology associated with automatic sprinkler heads.
2. Identify hazards and describe safe work practices pertaining to automatic sprinkler heads.
3. Interpret codes, standards and regulations pertaining to automatic sprinkler heads.
4. Interpret information pertaining to automatic sprinkler heads found on drawings, specifications and listings.
5. Identify tools and equipment relating to automatic sprinkler heads, and describe their applications and procedures for use.
6. Explain the history and theory behind sprinkler heads and systems.
7. Identify the materials used to manufacture automatic sprinkler heads and describe their characteristics and applications.
8. Identify categories of automatic sprinkler heads, and describe their characteristics and applications.
 - i) solder
 - ii) bulb
 - iii) open

9. Identify performance characteristics that apply to automatic sprinkler heads.
 - i) deflector design/spray patterns
 - ii) orifice size
 - iii) temperature rating
 - iv) temperature sensitivity
 - v) orientation
10. Identify the factors that affect maximum ceiling temperature.
11. Identify temperature ratings and colour coding.
 - i) fusible link
 - ii) frangible bulb
 - iii) decorative
12. Identify the the factors to consider for selecting automatic sprinkler heads.
13. Describe the procedures used to install and remove automatic sprinkler heads.
14. Describe the procedures used to protect, handle and care for automatic sprinkler heads prior to, and during, the installation and removal processes.
 - i) shipping
 - ii) unpacking/packing
 - iii) care and storage
 - iv) protective caps

SSI-150 Steel Pipe and Fittings

Learning Outcomes:

- Demonstrate knowledge of threaded steel pipe and fittings, and their associated joining techniques.
- Demonstrate knowledge of flanged steel pipe and fittings, and their associated joining techniques.
- Demonstrate knowledge of grooved steel pipe and fittings, and their associated joining techniques.
- Demonstrate knowledge of welded steel pipe and fittings, and their associated joining techniques.
- Demonstrate knowledge of the procedures to prepare steel pipe to be welded.
- Demonstrate knowledge of the procedures to thread and/or groove steel pipe.
- Demonstrate knowledge of the procedures to join steel pipe.

2014 National Occupational Reference:

10.01 Installs steel pipe and fittings.

Objectives and Content:

1. Define terminology associated with steel pipe and fittings.
2. Identify hazards and describe safe work practices pertaining to steel pipe and fittings.
3. Interpret codes, standards and regulations pertaining to steel pipe and fittings.
4. Interpret information pertaining to steel pipe and fittings found on drawings and specifications.
5. Identify tools and equipment used to prepare and thread steel pipe, and describe their applications and procedures for use.
 - i) hand tools
 - ii) nipple chucks
 - iii) thread cutting lubricants
 - iv) pipe cutters
 - v) reamers
 - vi) threaders

6. Identify tools and equipment used to prepare and groove steel pipe, and describe their applications and procedures for use.
 - i) hand tools
 - ii) pipe cutters
 - iii) reamers
 - iv) cut groovers
 - v) roll groovers
 - vi) diameter/depth tape
7. Identify tools and equipment used to prepare steel pipe for welding, and describe their applications and procedures for use.
8. Identify tools and equipment used to prepare and flange steel pipe, and describe their applications and procedures for use.
9. Identify tools and equipment used to drill steel pipe, and describe their applications and procedures for use.
10. Describe the procedures used to calculate piping offsets.
 - i) length of travel
 - ii) unequal spread
 - iii) equal spread
 - iv) rolling offset
11. Identify piping components and describe their purpose and relationships.
 - i) system risers
 - ii) risers
 - iii) feed mains
 - iv) cross mains
 - v) branch lines
 - vi) headers
 - vii) arm overs
 - viii) sprigs
12. Identify the the factors to consider for selecting steel pipe.
 - i) schedule numbers and grades
 - ii) pressure ratings
 - iii) pipe sizes and lengths
 - iv) end finishes
 - v) protective coatings and linings

- vi) codes
 - vii) manufacturers' specifications
 - viii) manufacturing techniques
13. Identify types of threaded pipe fittings, and describe their characteristics and applications.
- i) malleable
 - ii) cast iron
 - iii) steel
 - iv) galvanized
 - v) stainless
14. Identify types of flanges and their associated fittings and gaskets, and describe their characteristics and applications.
- i) materials
 - ii) flange markings
 - iii) gasket specifications
 - iv) manufacturers' specifications
15. Identify types of grooved and grip style pipe fittings and gaskets, and describe their characteristics and applications.
- i) materials and types
 - ii) markings
 - iii) pressure and temperature ratings
 - working pressures
 - iv) colour coding of gaskets
 - v) joining techniques
16. Describe the procedures used to join threaded pipe and install fittings on pipe.
17. Describe the procedures used to join grooved and grip style fittings to pipe.
18. Describe the procedures used to prepare steel pipe to be welded.

SSI-155 Plastic Pipe and Fittings

Learning Outcomes:

- Demonstrate knowledge of plastic pipe and fittings, and their associated joining techniques.

2014 National Occupational Reference:

10.02 Installs plastic pipe and fittings.

Objectives and Content:

1. Define terminology associated with plastic pipe and fittings.
2. Identify hazards and describe safe work practices pertaining to plastic pipe and fittings.
3. Interpret codes, standards and regulations pertaining to plastic pipe and fittings.
4. Interpret information pertaining to plastic pipe and fittings found on drawings and specifications.
5. Identify the factors to consider for selecting plastic pipe and fittings.
 - i) types
 - ii) pressure and temperature ratings
 - iii) sizes
 - iv) manufacturers' specifications
6. Identify tools and equipment relating to plastic pipe and fittings, and describe their applications and procedures for use.
7. Identify the types of fittings and solvents used with plastic pipe, and describe their applications.
8. Describe the procedures used to join plastic pipe using the solvent welding process.
 - i) safety requirements
 - ii) fabrication process and materials
 - iii) drilling and cleaning

- iv) assembly
- v) ventilation
- vi) cure times
- vii) testing
- viii) allowing for pipe expansion and contraction

9. Describe the procedures used to handle and store plastic pipe, fittings and solvents.

SSI-160

Wet Pipe Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of wet pipe sprinkler systems, and their operation and characteristics.
- Demonstrate knowledge of the procedures to install wet pipe systems and components according to code requirements.

2014 National Occupational Reference:

- 3.04 Performs layout of systems.
- 11.05 Installs auxiliary devices.
- 12.01 Installs wet systems.

Objectives and Content:

1. Define terminology associated with wet pipe sprinkler systems.
2. Identify hazards and describe safe work practices pertaining to wet pipe sprinkler systems.
3. Interpret codes, standards and regulations pertaining to wet pipe sprinkler systems.
4. Interpret information pertaining to wet pipe sprinkler systems found on drawings and specifications.
5. Identify tools and equipment relating to wet pipe sprinkler systems, and describe their applications and procedures for use.
6. Identify wet pipe sprinkler systems and describe their operating principles and characteristics.
7. Identify wet pipe sprinkler system components and describe their location, purpose and operation.
 - i) fire department connection
 - ii) test connections and drains
 - iii) alarm devices

- iv) control valves
 - v) alarm check valve or listed water flow alarm device
 - vi) relief valves
8. Identify alarm valves to be trimmed and describe their components and relevant design characteristics.
 9. Describe the procedures used to layout and install wet pipe sprinkler systems and components.
 10. Describe the procedures used to install alarm valve trim.
 - i) location of valves
 - ii) trim and accessories required
 - single systems
 - multiple systems
 11. Identify the factors to consider and requirements for installing auxiliary drains on wet pipe sprinkler systems.
 12. Describe the methods used to prevent false alarms.
 - i) excess pressure pumps
 - ii) retarding chamber
 - iii) flow switch retard
 - iv) external bypass
 13. Identify the requirements for acceptance testing of wet pipe systems and describe the associated procedures.
 14. Describe the procedures used to commission wet pipe systems.

SSI-165 Dry Pipe Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of dry pipe sprinkler systems, their operation and characteristics.
- Demonstrate knowledge of the procedures to install dry pipe sprinkler systems and their components according to code requirements.

2014 National Occupational Reference:

- 3.04 Performs layout of systems.
- 11.05 Installs auxiliary devices.
- 12.02 Installs dry systems.

Objectives and Content:

1. Define terminology associated with dry pipe sprinkler systems.
2. Identify hazards and describe safe work practices pertaining to dry pipe sprinkler systems.
3. Interpret codes, standards and regulations pertaining to dry pipe sprinkler systems.
4. Interpret information pertaining to dry pipe sprinkler systems found on drawings and specifications.
5. Identify tools and equipment relating to dry pipe sprinkler systems, and describe their applications and procedures for use.
6. Identify types of dry pipe sprinkler systems, and describe their operating principles and characteristics.
7. Identify dry pipe sprinkler system components, and describe their location, purpose and operation.
 - i) fire department connection
 - ii) test connections and drains
 - iii) alarm devices

- iv) control valves
 - v) dry pipe valves
 - vi) regulated air supply
 - vii) quick-opening devices
 - viii) anti-flooding devices
 - ix) auxiliary drains
 - x) drum drips
 - xi) high/low supervisory devices
 - xii) pressure gauges
8. Identify dry pipe valves to be trimmed, and describe their components and relevant design characteristics.
 9. Identify the factors to consider and requirements for installing auxiliary drains on dry pipe sprinkler systems.
 10. Describe the procedures used to layout and install dry pipe sprinkler systems and components.
 11. Describe the procedures used to install dry pipe valve trim.
 - i) location of valves
 - ii) trim and accessories required
 - single systems
 - multiple systems
 12. Identify the requirements for acceptance testing of dry pipe systems and describe the associated procedures.
 13. Describe the procedures used to commission dry pipe systems.

SSI-170

Antifreeze Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of antifreeze sprinkler systems, their operation and characteristics.
- Demonstrate knowledge of the procedures to install and maintain antifreeze sprinkler systems in accordance with code requirements and regulations.

2014 National Occupational Reference:

3.04 Performs layout of systems.

12.03 Installs antifreeze systems.

Objectives and Content:

1. Define terminology associated with antifreeze sprinkler systems.
2. Identify hazards and describe safe work practices pertaining to antifreeze sprinkler systems.
3. Interpret codes, standards and regulations pertaining to antifreeze sprinkler systems.
4. Interpret information pertaining to antifreeze sprinkler systems found on drawings and specifications.
5. Identify tools and equipment relating to antifreeze sprinkler systems, and describe their applications and procedures for use.
6. Identify the factors to consider for determining the need for freezing protection of sprinkler systems and controls.
 - i) location
 - ii) cost
 - iii) accessibility
7. Identify antifreeze sprinkler systems and their components, and describe their purpose and applications.

8. Identify types of antifreeze solutions, and describe their characteristics and applications.
 - i) used with potable water supply
 - ii) used with non-potable water supply
9. Identify the requirements and describe the procedures used to handle, store and dispose of antifreeze.
10. Identify installation requirements for antifreeze sprinkler systems.
 - i) antifreeze loop
 - ii) cross connection control
11. Identify valves required for antifreeze sprinkler systems.
 - i) type
 - ii) location
 - iii) test connections
12. Describe the procedures used to layout and install antifreeze sprinkler systems.
13. Describe the procedures used to test and maintain antifreeze sprinkler systems.
14. Identify the requirements for acceptance testing of antifreeze sprinkler systems, and describe the associated procedures.
15. Describe the procedures used to commission antifreeze sprinkler systems.

LEVEL 2

Learning Outcomes:

- Demonstrate knowledge of the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings.
- Demonstrate knowledge of the procedures to perform basic orthographic and isometric sketching.

2014 National Occupational Reference:

2.02 Interprets blueprints and specifications.

Objectives and Content:

1. Identify divisions of blueprints and describe their purpose.
 - i) architectural
 - ii) structural
 - iii) mechanical
 - iv) electrical
 - v) plot
 - vi) specifications and schedules
2. Identify views and drawings of a building and describe their purpose.
 - i) plans
 - floor
 - reflected ceiling
 - ii) elevations
 - iii) sections
 - iv) details
3. Interpret sprinkler systems information found on drawings.
 - i) grades and elevations
 - ii) dimensioning and scaling
 - iii) cutting plane lines
 - iv) extension lines
 - v) symbols and abbreviations
 - vi) single line pipe drawings

4. Describe the procedures used to interpret metric and imperial scaling.
5. Describe the procedures used to prepare orthographic and isometric sketches.
6. Describe the procedures used to prepare single line pipe drawings.
 - i) orthographic
 - 45° fittings
 - 90° fittings
 - ii) detail drawings (spool sheet) with north arrow indicators
 - orthographic North to isometric North
 - North orientation
 - cut sheets

SSI-205

Electrical Principles

Learning Outcomes:

- Demonstrate knowledge of the basic concepts of electricity.
- Demonstrate knowledge of electrical components and equipment.

*** The content of the electrical section in this course outline is not to suggest a Journey person Sprinkler System Installer should complete tasks normally performed by Journey person Electricians. The intent is to provide the Sprinkler System Installer with enough electrical knowledge so that safe decisions may be made when working on or around electrical equipment.*

Objectives and Content:

1. Define terminology associated with electricity.
2. Identify hazards and describe safe work practices pertaining to working on or around electrical equipment and sources.
3. Identify the types of electrical test meters, and describe their applications and procedures for use.
4. Identify electrical devices and describe their purpose.
 - i) circuit breakers
 - ii) disconnects
 - iii) overload heaters
 - iv) ground fault interrupters (GFI)
 - v) fuses
 - vi) contactors
 - vii) transformers
 - viii) solenoids
 - ix) motors
 - x) switches
 - xi) end of line resistors
5. Explain the basic principles of electricity.
6. Explain the principles of magnetism and electromagnetism.

7. Explain the types of electric current, phases and cycles.
8. Explain the mathematical relationship between amperes, volts, ohms and watts.
9. Describe series and parallel circuits.
10. Describe low voltage circuits.

SSI-210

Basic Hydraulic Calculations

Learning Outcomes:

- Demonstrate knowledge of the importance and purpose of hydraulic calculations and the factors involved.
- Demonstrate knowledge of hydraulic calculations as they pertain to code requirements and regulations.

Objectives and Content:

1. Define terminology associated with hydraulic calculations as they apply to the Sprinkler Systems Installer trade.
 - i) hydraulic calculation
 - ii) equivalent length
 - iii) friction loss
 - iv) static pressure
 - v) residual pressure
 - vi) hand hose allowance
 - vii) design densities
 - viii) design area
 - ix) system demand
2. Interpret codes and regulations pertaining to the layout for hydraulic calculated sprinkler systems.
3. Describe the flow of water.
 - i) laminar
 - ii) turbulent
 - iii) velocity
 - iv) friction
 - v) pressure
 - vi) pressure drop
 - vii) equivalent length
 - viii) flow rate
4. Explain the effects of volume, flow and pressure through a venturi.
5. Explain the effects of change of height on pressure.

6. Explain the effects of friction loss on pressure.
7. Explain the importance of water densities over a prescribed area.
8. List and describe the classification of occupancies.
9. Determine available water supply.
10. Identify system requirements regarding pipe sizes, branch lines and cross mains.
 - i) wet
 - ii) dry
 - iii) pre-action/deluge
11. Identify sprinkler heads that can be used with this system.
12. Identify the minimum operating pressure of the system.
13. Identify the type of piping to be used.
14. Describe the requirements for future additional heads.
15. Describe the procedures used to perform a flow test at municipal hydrants.
16. Describe the occupancy hazard design requirements for pipe schedule systems.

SSI-215 Standard Spray Sprinkler Heads

Learning Outcomes:

- Demonstrate knowledge of standard spray sprinkler head selection and installation according to code and manufacturers' specifications.

2014 National Occupational Reference:

- 11.01 Identifies sprinkler heads.
- 11.02 Installs sprinkler heads and nozzles.

Objectives and Content:

1. Define terminology associated with standard spray sprinkler heads.
2. Identify hazards and describe safe work practices pertaining to standard spray sprinkler heads.
3. Interpret codes, standards and regulations pertaining to standard spray sprinkler heads.
 - i) minimum and maximum distance between sprinklers
 - ii) minimum and maximum distance off wall
 - iii) minimum and maximum distance from ceiling
 - iv) maximum areas of protection
 - v) obstruction rules
 - vi) types of construction
 - vii) temperature ratings
4. Interpret information pertaining to standard spray sprinkler heads found on drawings, specifications and listings.
5. Identify types of standard spray sprinkler heads and describe their characteristics and applications.
 - i) pendant
 - ii) upright
 - iii) sidewall
6. Identify tools and equipment relating to standard spray sprinkler heads, and describe their applications and procedures for use.

7. Explain the importance of correct locations for standard spray sprinkler heads.
8. Identify location requirements of standard spray sprinkler heads.
 - i) bays
 - ii) beams
 - iii) girders
 - iv) joists
 - v) open bar joists
 - vi) open ceilings
 - vii) trusses
9. Identify required distances between standard spray sprinkler heads based on hazard class.
10. Identify standard spray sprinkler deflector orientation and location.
 - i) pitched roofs
 - ii) partitions
 - iii) peaks
 - iv) stairs and ramps
11. Identify clearances required between piled storage materials and standard spray sprinkler deflectors.
12. Identify code installation requirements for standard spray sprinkler heads for special situations.
13. Describe the procedures used to install standard spray sprinkler heads.

SSI-220

Extended Coverage Sprinkler Heads

Learning Outcomes:

- Demonstrate knowledge of extended coverage sprinkler head selection and installation according to code and manufacturers' specifications.

2014 National Occupational Reference:

11.01 Identifies sprinkler heads.

11.02 Installs sprinkler heads and nozzles.

Objectives and Content:

1. Define terminology associated with extended coverage sprinkler heads.
2. Identify hazards and describe safe work practices pertaining to extended coverage sprinkler heads.
3. Interpret codes, standards and regulations pertaining to extended coverage sprinkler heads.
 - i) minimum and maximum distance between sprinklers
 - ii) minimum and maximum distance off wall
 - iii) minimum and maximum distance from ceiling
 - iv) maximum areas of protection
 - v) obstruction rules
 - vi) types of construction
 - vii) temperature ratings
4. Interpret information pertaining to extended coverage sprinkler heads found on drawings, specifications and listings.
5. Identify types of extended coverage sprinkler heads, and describe their characteristics and applications.
 - i) pendant
 - ii) upright
 - iii) sidewall
6. Identify tools and equipment relating to extended coverage sprinkler heads, and describe their applications and procedures for use.

7. Explain the importance of correct locations for extended coverage sprinkler heads.
8. Identify location requirements of extended coverage sprinkler heads.
 - i) bays
 - ii) beams
 - iii) girders
 - iv) joists
 - v) open bar joists
 - vi) open ceilings
 - vii) trusses
9. Identify required distances between extended coverage sprinkler heads based on hazard class.
10. Identify extended coverage sprinkler deflector orientation and location.
 - i) pitched roofs
 - ii) partitions
 - iii) peaks
 - iv) stairs and ramps
11. Identify clearances required between piled storage materials and extended coverage sprinkler deflectors.
12. Identify code installation requirements for extended coverage sprinkler heads for special situations.
13. Describe the procedures used to install extended coverage sprinkler heads.

SSI-225

Specialty Sprinkler Heads and Nozzles

Learning Outcomes:

- Demonstrate knowledge of specialty sprinkler heads and nozzles, and their applications and installation requirements according to codes.

2014 National Occupational Reference:

11.01 Identifies sprinkler heads.

11.02 Installs sprinkler heads and nozzles.

Objectives and Content:

1. Define terminology associated with specialty sprinkler heads and nozzles.
2. Identify hazards and describe safe work practices pertaining to specialty sprinkler heads and nozzles.
3. Interpret codes, standards and regulations pertaining to specialty sprinkler heads and nozzles.
4. Interpret information pertaining to specialty sprinkler heads and nozzles found on drawings, specifications and listings.
5. Identify tools and equipment relating to specialty sprinkler heads and nozzles, and describe their applications and procedures for use.
6. Identify types of specialty sprinkler heads and nozzles, and describe their characteristics and applications.
 - i) residential
 - ii) institutional
 - iii) control mode specific application (CMSA)/large drop
 - iv) early suppression fast response (ESFR)
 - v) quick response early suppression (QRES)
 - vi) in-rack
 - vii) attic
 - viii) old-style/conventional
 - ix) open sprinkler
 - x) spray sprinkler

- xi) window
- xii) on/off
- xiii) dry
- xiv) corrosion resistant

7. Describe the procedures used to install specialty sprinkler heads and nozzles.

SSI-230

Copper Pipe, and Copper and Stainless Steel Tubing

Learning Outcomes:

- Demonstrate knowledge of copper pipe and copper and stainless steel tubing, and their associated fittings and joining techniques.

2014 National Occupational Reference:

9.05 Drills pipe.

10.03 Installs copper pipe and fittings.

Objectives and Content:

1. Define terminology associated with copper pipe and copper and stainless steel tubing.
2. Identify hazards and describe safe work practices associated with preparing, installing and soldering/brazing copper pipe and copper and stainless steel tubing.
 - i) fire prevention
 - ii) hot work procedures
3. Interpret codes, standards and regulations pertaining to copper pipe and copper and stainless steel tubing.
4. Interpret information pertaining to copper pipe and copper and stainless steel tubing found in drawings and specifications.
5. Identify the tools and equipment relating to copper pipe and copper and stainless steel tubing, and describe their applications and procedures for use.
6. Explain the effect of electrolysis on piping materials.
7. Identify techniques used to join copper pipe and/or copper and stainless steel tubing and describe their applications.
 - i) brazing
 - ii) soldering
 - iii) compression

- iv) flaring
 - v) grooving
8. Identify types of copper pipe and copper and stainless steel tubing, and describe their characteristics and applications.
 - i) types and colour codes
 - ii) pressure ratings
 - iii) sizes and lengths
 - iv) manufacturers' specifications
 - v) manufacturing techniques
 9. Identify the types of fittings used on copper pipe and copper and stainless steel tubing, and describe their characteristics and applications.
 10. Identify types of solders and brazing alloys, and describe their characteristics and applications.
 - i) pressure rating
 - ii) temperature rating
 11. Identify types of flux used in soldering or brazing, and describe their purpose, applications and effects.
 12. Identify equipment used to solder and braze joints, and describe their applications and procedures for use.
 13. Describe the procedures used to prepare and assemble flare and compression joints using hand tools.
 14. Describe the procedures used to cut tubing to required dimensions, and to prepare and join tubing.
 15. Describe the procedures used to assemble and tighten joints in accordance with regulations and specifications.
 16. Describe the procedures used to join copper pipe and copper and stainless steel tubing.

SSI-235

Piping Design and Installation

Learning Outcomes:

- Demonstrate knowledge of the procedures to design and install piping assemblies and their components according to code requirements.

2014 National Occupational Reference:

- 9.03 Threads pipe.
- 9.04 Grooves pipe.
- 9.05 Drills pipe.
- 9.07 Prepares fittings.
- 10.01 Installs steel pipe and fittings.
- 10.02 Installs plastic pipe and fittings.
- 10.03 Installs copper pipe and fittings.
- 10.04 Paints and labels pipe.
- 11.03 Installs sleeves.

Objectives and Content:

1. Define terminology associated with pipe design and installation.
2. Identify hazards and describe safe work procedures pertaining to pipe design and installation.
3. Interpret codes, standards and regulations pertaining to pipe design and installation for sprinkler systems.
 - i) pipe sleeves/coring
 - location
 - installation
 - leak prevention (smoke, fire, water)
 - ii) water supply requirements
 - iii) testing
4. Interpret information pertaining to pipe design and installation found on drawings and specifications.
5. Identify tools and equipment relating to pipe design and installation, and describe their applications and procedures for use.

6. Explain the effect of electrolysis on piping materials.
7. Explain friction loss as it applies to pipe schedules and hydraulically calculated systems.
8. Explain freezing protection of sprinkler controls and systems.
9. Identify the design considerations for piping assemblies.
 - i) pipe size
 - ii) hazard classifications
 - iii) drainage, grading and layout
 - iv) materials
 - v) system design
 - vi) flushing connections
10. Describe the procedures used to size and install piping sleeves.
11. Describe the procedures used to install piping assemblies.
12. Describe the procedures and materials used to prepare, paint and label pipe.

SSI-240 Pipe and Tube Bending

Learning Outcomes:

- Demonstrate knowledge of pipe and tube bending equipment and techniques.
- Demonstrate knowledge of the procedures to bend pipe and tube to specific code requirements.

2014 National Occupational Reference:

- 9.01 Cuts pipe.
- 9.02 Bends pipe.

Objectives and Content:

1. Define terminology associated with bending pipe and tube.
2. Identify hazards and describe safe work practices pertaining to bending pipe and tube.
3. Interpret codes, standards and regulations pertaining to bending pipe and tube.
4. Interpret information pertaining to bending pipe and tube found on drawings and specifications.
5. Identify tools and equipment relating to pipe and tube bending, and describe their applications and procedures for use.
6. Identify the factors to consider for selecting tube and pipe for bending.
 - i) grade
 - ii) size
 - iii) materials
7. Describe the procedures used to bend pipe and tube to required dimensions.

SSI-245

Brazing, Soldering and Oxy-Acetylene Cutting

Learning Outcomes:

- Demonstrate knowledge of the procedures to cut steel to specifications using oxy-acetylene equipment.
- Demonstrate knowledge of the procedures to braze and solder joints.

2014 National Occupational Reference:

- 9.01 Cuts pipe.
- 9.06 Grinds pipe.
- 10.03 Installs copper pipe and fittings.

Objectives and Content:

1. Define terminology associated with brazing, soldering and oxy-acetylene cutting.
2. Identify hazards and describe safe work practices pertaining to brazing, soldering and oxy-acetylene cutting.
 - i) personal
 - ii) shop/facility
 - iii) equipment
 - iv) ventilation
3. Interpret codes, standards and regulations pertaining to brazing, soldering and oxy-acetylene cutting.
4. Interpret information, pertaining to brazing, soldering and oxy-acetylene cutting, found on drawings and specifications.
5. Identify oxy-acetylene cutting equipment, its assembly and maintenance.
6. Identify materials and equipment used for brazing and soldering joints, and describe their applications.
 - i) materials
 - grade
 - size

- flux
 - fillers
 - ii) equipment
7. Describe the procedures used to set-up, adjust and shut-down oxy-acetylene equipment.
 8. Describe the procedures used to inspect and maintain oxy-acetylene equipment.
 9. Describe the procedures used to transport and store oxy-acetylene equipment.
 10. Describe the procedures used to cut material using oxy-acetylene equipment.
 11. Describe the procedures used to grind pipe.
 12. Describe the procedures used to braze joints.
 13. Describe the procedures used to solder joints.

SSI-250 Standpipe and Hose Systems

Learning Outcomes:

- Demonstrate knowledge of standpipe and hose systems and their installation in accordance with codes and regulations.

2014 National Occupational Reference:

- 3.04 Performs layout of systems.
12.06 Installs standpipe systems.

Objectives and Content:

1. Define terminology associated with standpipe and hose systems.
2. Identify hazards and describe safe work practices pertaining to standpipe and hose systems.
3. Interpret codes, standards and regulations pertaining to standpipe and hose systems.
4. Interpret code requirements pertaining to flushing connections in piping systems.
5. Interpret information pertaining standpipe and hose systems found on drawings and specifications.
6. Identify tools and equipment relating to standpipe and hose systems, and describe their applications and procedures for use.
7. Identify the classes of standpipe systems, and describe their characteristics and applications.
 - i) Class I
 - ii) Class II
 - iii) Class III

8. Identify types of standpipe systems, and describe their operating principles, characteristics and applications.
 - i) wet pipe
 - ii) dry pipe
 - iii) manual
 - iv) automatic
 - v) combined
9. Identify the factors to consider and the requirements to determine standpipe system design.
 - i) pipe sizing
 - ii) flow rate
 - iii) pressures
 - iv) hose valve location
 - v) hose thread connection (AHJ)
 - vi) gauge location
10. Identify types of hoses, hose valves and associated fittings, and describe their characteristics and applications.
11. Identify types of hose cabinets.
12. Identify types of hose spray nozzles and describe their applications.
13. Describe the procedures used to layout standpipe and hose systems.
14. Describe the procedures used to install hose cabinets and associated equipment.
15. Describe the procedures used to install hose spray nozzles.
16. Describe the procedures used to test and maintain standpipe systems.
17. Identify the requirements for acceptance testing of standpipe and hose systems and describe the associated procedures.
18. Describe the procedures used to commission standpipe and hose systems.

SSI-255 Portable Fire Extinguishers

Learning Outcomes:

- Demonstrate knowledge of portable fire extinguishers, their installation and requirements for testing.

2014 National Occupational Reference:

13.02 Installs portable extinguishers.

Objectives and Content:

1. Define terminology associated with portable fire extinguishers.
2. Identify hazards and describe safe work practices pertaining to portable fire extinguishers.
3. Interpret codes, standards and regulations pertaining to portable fire extinguishers.
4. Interpret information pertaining to portable fire extinguishers found on drawings and specifications.
5. Identify tools and equipment relating to portable fire extinguishers, and describe their applications and procedures for use.
6. Identify classes and types of portable fire extinguishers, and describe their characteristics, operation and applications.
7. Identify the installation requirements and procedures for portable fire extinguishers and cabinets when applicable.
8. Describe the procedures used to inspect, test and maintain portable fire extinguishers.
9. Describe the procedures used to operate portable fire extinguishers.

SSI-260

Outside Exposure Systems

Learning Outcomes:

- Demonstrate knowledge of outside exposure systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for outside exposure systems.

Objectives and Content:

1. Define terminology associated with outside exposure systems.
2. Identify hazards and describe safe work practices pertaining to outside exposure systems.
3. Interpret codes, standards and regulations pertaining to outside exposure systems.
4. Interpret information pertaining to outside exposure systems found on drawings and specifications.
5. Identify tools and equipment relating to outside exposure systems, and describe their applications and procedures for use.
6. Identify outside exposure systems, their operating principles and applications.
7. Identify the installation requirements for outside exposure systems.
 - i) water service requirements
 - ii) methods of actuation
 - iii) sprinkler heads/nozzles
 - iv) strainers and trim
8. Identify the requirements for drainage of the outside exposure system.
9. Describe the procedures used to install system controls required for outside exposure systems.

10. Describe the procedures used to install outside exposure systems and components.
11. Describe the procedures used to service and maintain outside exposure systems.
12. Identify the requirements for acceptance testing of outside exposure systems and describe the associated procedures.
13. Describe the procedures to commission outside exposure systems.

SSI-265 Pre-action Systems

Learning Outcomes:

- Demonstrate knowledge of pre-action systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for pre-action systems.

2014 National Occupational Reference:

- 3.04 Performs layout of systems.
12.04 Installs pre-action/deluge systems.

Objectives and Content:

1. Define terminology associated with pre-action systems.
2. Identify hazards and describe safe work practices pertaining to pre-action systems.
3. Interpret codes, standards and regulations pertaining to pre-action systems.
4. Interpret information pertaining to pre-action systems found on drawings and specifications.
5. Identify tools and equipment relating to pre-action systems, and describe their applications and procedures for use.
6. Identify types of pre-action systems and describe their operating principles and applications.
 - i) non-interlock
 - ii) single interlock
 - iii) double interlock
7. Identify types of alarms that a pre-action valve will operate.
8. Identify trim components used on pre-action valves and describe their design variations and applications.

9. Identify supplemental fire detection systems and describe their operating principles and applications.
 - i) electric
 - ii) pneumatic
 - iii) hydraulic
10. Identify the system controls required for pre-action systems.
11. Identify the installation requirements for pre-action systems and components.
 - i) materials
 - ii) hangers, supports and bracing
 - iii) system actuation
 - iv) system supervision
 - v) testing
 - vi) manufacturers' specifications
12. Identify the requirements for drainage of pre-action systems.
13. Describe the procedures used to layout and install pre-action systems.
14. Describe the procedures used to trim pre-action valves.
15. Describe the procedures used to install system controls required for pre-action systems.
16. Describe the procedures used to service and maintain pre-action systems.
17. Identify the requirements for acceptance testing pre-action systems and describe the associated procedures.
18. Describe the procedures used to commission pre-action systems.

SSI-270

Deluge Systems

Learning Outcomes:

- Demonstrate knowledge of deluge systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for deluge systems.

2014 National Occupational Reference:

3.04 Performs layout of systems.

12.04 Installs pre-action/deluge systems.

Objectives and Content:

1. Define terminology associated with deluge systems.
2. Identify hazards and describe safe work practices pertaining to deluge systems.
3. Interpret codes, standards and regulations pertaining to deluge systems.
4. Interpret information pertaining to deluge systems found on drawings and specifications.
5. Identify tools and equipment relating to deluge systems, and describe their applications and procedures for use.
6. Identify types of deluge systems and describe their operating principles and applications.
7. Identify trim components used on deluge valves, and describe their design variations and applications.
8. Identify types of alarms that a deluge valve will operate.
9. Identify supplemental fire detection systems, and describe their operating principles and applications.
10. Identify the system controls required for deluge systems.

11. Identify the installation requirements for deluge systems and components.
 - i) materials
 - ii) hangers, supports and bracing
 - iii) system actuation
 - iv) testing
 - v) manufacturers' specifications
12. Explain the requirements for drainage of deluge systems.
13. Describe the procedures used to layout and install deluge systems.
14. Describe the procedures used to install system controls required for deluge systems.
15. Describe the procedures used to trim deluge valves.
16. Describe the procedures used to service and maintain deluge systems.
17. Identify the requirements for acceptance testing of deluge systems and describe the associated procedures.
18. Describe the procedures used to commission deluge systems.

SSI-275 Water Supply, Hydrants and Fire Department Connections

Learning Outcomes:

- Demonstrate knowledge of water source connections.
- Demonstrate knowledge of fire department equipment and hydrants, and their installation procedures in accordance with codes and regulations.

2014 National Occupational Reference:

- 5.01 Supervises trenching and backfilling.
- 5.02 Installs underground piping and components.
- 5.03 Flushes underground system.
- 6.01 Determines location of pumps, drivers, controllers and components.
- 6.02 Installs pumps, controllers and components.
- 7.01 Determines location, size and type of fire department connection.
- 7.02 Installs fire department piping and components.
- 7.03 Tests fire department piping and components.
- 8.01 Installs water tanks.
- 8.02 Installs related equipment.

Objectives and Content:

1. Define terminology associated with water supply, hydrants and fire department connections.
2. Identify hazards and describe safe work practices pertaining to water supply, hydrants and fire department connections.
 - i) personal safety
 - ii) safety of infrastructure
 - iii) environmental requirements
3. Interpret codes, standards and regulations pertaining to water supply, hydrants and fire department connections.
4. Interpret information pertaining to water supply, hydrants and fire department connections, found on drawings and specifications.

5. Identify tools and equipment relating to water supply, hydrants and fire department connections, and describe their applications and procedures for use.
6. Identify types of water supplies used for sprinkler and hose systems, and describe their characteristics and applications.
 - i) municipal
 - ii) limited
 - tanks
 - reservoirs
 - iii) raw water
7. Identify types of pressure and gravity tanks, and describe their characteristics, principles of operation and applications.
 - i) locations
 - ii) tank sizes and pressure
8. Describe the procedures used to install, test, service and maintain pressure and gravity tanks.
 - i) installation
 - piping, valves, trim and accessories
 - electrical requirements
 - requirements for the discharge and drainage pipe
 - water supply requirements
 - ii) testing
 - iii) servicing
 - iv) maintenance
9. Explain the purpose and requirements for return bends on raw water sources.
10. Describe the procedures used to install underground water mains.
 - i) joining
 - ii) controlling thrust
 - iii) trenching and shoring
 - iv) bedding and backfilling
 - v) leakage testing
 - vi) chlorination/disinfection
 - vii) flushing
 - viii) completing documentation
11. Identify types of water supply connections and their associated components.

12. Describe the procedures used to connect water supplies to sprinkler systems inside the building.
13. Identify types of water connections and their associated components.
 - i) sprinkler valves
 - ii) cross connection control
14. Identify the requirements of cross connection control.
 - i) programs
 - ii) testers certification
 - iii) responsibilities
 - manufacturer
 - installer
 - tester
 - building owner
 - authority having jurisdiction (AHJ)
15. Explain the consequences of back flow and cross connection.
 - i) liability
 - ii) health hazards
16. Explain the effect that back flow prevention and cross connection control devices have on system design.
17. Identify types of cross connection controls, and describe their characteristics and operation.
18. Identify types of cross connection control programs.
19. Identify the methods used for protection of water supply in the sprinkler industry.
20. Describe the procedures used for testing protection devices.
21. Identify types of fire department connections, and describe their purpose and installation requirements.
 - i) requirements for check valves
 - ii) placement of fire department connections

- iii) requirements for drainage of fire department connections
 - iv) requirements for hose thread connections (AHJ)
22. Identify types of fire hydrants and associated equipment, and describe their characteristics.
- i) types
 - wall
 - yard
 - roof
 - ii) materials
 - iii) purpose and location
 - iv) sizes of hydrants and hose outlets
 - v) thread types/connections
23. Identify the installation requirements for hydrants and related equipment.
- i) spacing of hydrants
 - type
 - control valve
 - valve box
 - valve cover
 - ii) setting and support of hydrants
 - iii) thrust blocks
 - iv) drainage
 - v) frost protection
 - vi) physical damage protection
24. Describe the procedures used to maintain and repair hydrants and related equipment and components.
25. Identify types of hydrant houses and components, and describe their installation requirements.
26. Identify types of test equipment and describe their applications and procedures for use.
27. Describe flow test procedures used to determine water flow data for sprinkler systems.

LEVEL 3

SSI-300

Blueprint Reading and Sketching III

Learning Outcomes:

- Demonstrate knowledge of the procedures to complete and label basic drawings of typical sprinkler installations.
- Demonstrate knowledge of the procedures to develop a materials list from information contained in construction drawings.

2014 National Occupational Reference:

2.02 Interprets blueprints and specifications.

Objectives and Content:

1. Define terminology associated with developing materials list from construction drawings.
2. Describe the procedures used to create working plan and elevation view drawings of a typical sprinkler system installation.
 - i) establishing design criteria
 - ii) sprinkler head location
 - iii) distribution piping
 - iv) scaling and dimensioning
 - v) symbols and abbreviations
 - vi) riser detail
3. Describe the procedures used to modify drawings of a sprinkler system installation to create as-built drawings.
4. Describe the procedures used to compile a materials list from information found on drawings.
5. Identify the criteria used to estimate labour requirements.

SSI-305 Job Planning

Learning Outcomes:

- Demonstrate knowledge of the procedures to plan and organize jobs.
- Demonstrate knowledge of the procedures to produce material take-off lists.

2014 National Occupational Reference:

- 2.05 Plans daily job tasks and procedures.
- 3.01 Prepares work site.
- 3.02 Handles materials and supplies.

Objectives and Content:

1. Define terminology associated with job planning activities.
2. Identify sources of information relevant to job planning.
 - i) documentation
 - ii) drawings
 - iii) related professionals
 - iv) clients
3. Identify the factors to consider for determining job requirements.
 - i) personnel
 - ii) tools and equipment
 - iii) materials
 - iv) permits
4. Describe the procedures used to plan job tasks.
 - i) scheduling
 - ii) estimating
 - iii) coordinating site access
5. Describe the procedures used to receive and verify delivered materials.
6. Describe the procedures used to store, organize and maintain inventory.
7. Describe the procedures used to interpret and extract information from drawings.

8. Identify the purpose of submittals and shop drawings, and describe the procedures used to interpret them.
9. Identify the types of material take-off lists, and describe their applications and the procedures used to produce them.
 - i) material estimation
 - ii) material installation
10. Describe the procedures used to prepare work sites.
 - i) erecting barricades and flagging
 - ii) identifying hazards
 - iii) locating service points
 - iv) locating isolation points

SSI-310 Inspection, Testing and Maintenance

Learning Outcomes:

- Demonstrate knowledge of the inspection, testing and maintenance procedures and requirements for fire protection/suppression systems and their components.
- Demonstrate knowledge of the relationship between sprinkler systems and fire alarm panels.
- Demonstrate knowledge of the procedures to troubleshoot and correct system failures.

2014 National Occupational Reference:

- 6.01 Determines location of pumps, drivers, controllers and components.
- 6.02 Installs pumps, controllers and components.
- 17.01 Performs scheduled inspections.
- 17.02 Performs scheduled tests.
- 17.03 Inspects portable fire extinguishers.

Objectives and Content:

1. Define terminology associated with inspection, testing and maintenance of fire protection/suppression systems and their components.
2. Identify hazards and describe safe work practices pertaining to the inspection, testing, and maintenance of fire protection/suppression systems and their components.
3. Interpret codes, standards and regulations pertaining to the inspection, testing and maintenance of fire protection/suppression systems and their components.
4. Identify tools and equipment relating to inspection, testing and maintenance of fire protection/suppression systems, and describe their applications and procedures for use.
5. Explain the liabilities and responsibilities for the inspection, testing and maintenance of fire protection/suppression systems.
 - i) manufacturer
 - ii) installer
 - iii) authority having jurisdiction (AHJ)

- iv) building owner/representative
 - v) fire watch
6. Identify frequency of inspection, testing and maintenance of fire protection/suppression systems and components.
 7. Identify requirements for inspecting and testing systems that have been altered or repaired.
 8. Identify types of fire panels and signals, and describe their operation and purpose.
 - i) panels
 - alarm
 - release
 - annunciator
 - ii) signals
 - trouble
 - alarm
 - supervisory
 9. Identify the testing requirements for signaling devices.
 10. Describe the procedures used to shut down and reactivate sprinkler systems and associated alarms and supervisory devices.
 11. Describe the procedures used to inspect, test and maintain water-based fire protection/suppression systems and components.
 - i) wet pipe
 - ii) dry pipe
 - iii) antifreeze
 - iv) standpipe and hose valves
 - v) pre-action
 - vi) deluge
 - vii) combined dry pipe/pre-action
 12. Identify the requirements for inspecting, testing and maintenance of specialty fire protection systems and components.

13. Describe the procedures used to flush sprinkler systems.
 - i) hydraulic
 - ii) hydro-pneumatic
14. Describe the procedures used to inspect, test and maintain fire pumps and components.
15. Describe the procedures used to inspect, test and maintain hydrants and fire department connections.
16. Identify common causes of fire protection/suppression system failures.
17. Identify the classifications of needed corrections and repairs, and explain the associated requirements.
 - i) impairment
 - ii) critical deficiency
 - iii) non-critical deficiency
18. Describe the procedures used to troubleshoot water-based fire protection/suppression systems, and to perform the related repair procedures.
19. Identify the requirements for inspecting backflow preventers.

SSI-315

Dry and Wet Chemical Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of dry and wet chemical extinguishing systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for dry and wet chemical extinguishing systems.

2014 National Occupational Reference:

13.01 Installs wet and dry chemical, clean agent and carbon dioxide systems.

Objectives and Content:

1. Define terminology associated with dry and wet chemical extinguishing systems.
2. Identify hazards and describe safe work practices pertaining to dry and wet chemical extinguishing systems.
3. Interpret codes, standards and regulations pertaining to dry and wet chemical extinguishing systems.
4. Interpret information pertaining to dry and wet chemical extinguishing systems found on drawings and specifications.
5. Identify tools and equipment relating to dry and wet chemical extinguishing systems, and describe their applications and procedures for use.
6. Identify types of dry and wet chemical extinguishing agents and systems, and describe their characteristics and applications.
7. Describe the operating principles of dry and wet chemical extinguishing systems.
 - i) methods of dispensing dry and wet chemicals
 - hand hose line systems
 - fixed piping systems
 - ii) action of expellant gas
 - iii) extinguishing properties

8. Describe fixed pipe systems.
 - i) total flooding
 - ii) local application
9. Identify installation requirements of dry and wet chemical extinguishing systems.
 - i) materials
 - ii) supports and hangers
 - iii) system actuation
 - iv) testing
 - v) manufacturers' specifications/training
 - vi) handling and storage
10. Describe the procedures used to install dry and wet chemical extinguishing systems.
11. Identify the requirements for acceptance testing of dry and wet chemical extinguishing systems and describe the associated procedures.
12. Describe the procedures used to commission dry and wet chemical extinguishing systems.

SSI-320

Water Spray Fixed Systems

Learning Outcomes:

- Demonstrate knowledge of water spray fixed systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for water spray fixed systems.

Objectives and Content:

1. Define terminology associated with water spray fixed systems.
2. Identify hazards and describe safe work practices pertaining to water spray fixed systems.
3. Interpret codes, standards and regulations pertaining to water spray fixed systems.
4. Interpret information pertaining to water spray fixed systems found on drawings and specifications.
5. Identify tools and equipment relating to water fixed spray systems, and describe their applications and procedures for use.
6. Identify types of water spray fixed systems and describe their operating principles and applications.
 - i) water supply required
 - ii) design of system
 - water spray nozzles
 - nozzle orientation and placement
 - iii) exposure protection
7. Identify the factors to consider for selecting components for water spray fixed systems.
8. Identify installation requirements of water spray fixed systems.
 - i) materials
 - ii) supports and hangers
 - iii) system actuation

- iv) testing
 - v) manufacturers' specifications/training
 - vi) handling and storage
9. Describe the procedures used to layout and install water spray fixed systems and components.
 - i) preparing materials
 - ii) installing supports
 - iii) installing system actuation
 - iv) performing tests and makes adjustments
 10. Describe the system controls for the water spray fixed system and their installation requirements.
 11. Explain the requirements for drainage of the system.
 12. Describe the procedures used to service and maintain water spray fixed systems.
 13. Identify the requirements for acceptance testing of water spray fixed systems and describe the associated procedures.
 14. Describe the procedures used to commission water spray fixed systems.

SSI-325 Water Mist Systems

Learning Outcomes:

- Demonstrate knowledge of water mist systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for water mist systems.

2014 National Occupational Reference:

- 3.04 Performs layout of systems.
12.07 Installs water mist systems.

Objectives and Content:

1. Define terminology associated with water mist systems.
2. Identify hazards and describe safe work practices pertaining to water mist systems.
3. Interpret codes, standards and regulations pertaining to water mist systems.
4. Interpret information pertaining to water mist systems found on drawings and specifications.
5. Identify tools and equipment relating to water mist systems, and describe their applications and procedures for use.
6. Identify types of water mist systems and describe their operating principles and applications.
 - i) water supply required
 - ii) design of system
 - iii) characteristics of water spray nozzles
 - iv) exposure protection
7. Identify the factors to consider for selecting components for water mist systems.

8. Identify installation requirements of water mist systems.
 - i) materials
 - ii) supports and hangers
 - iii) system actuation
 - iv) testing
 - v) manufacturers' specifications/training
 - vi) handling and storage
9. Describe the procedures used to layout and install water mist systems and components.
 - i) preparing materials
 - ii) installing supports
 - iii) installing system actuation
 - iv) performing tests and makes adjustments
10. Identify system controls for water mist systems and their installation requirements.
11. Explain the requirements for drainage of the system.
12. Describe the procedures used to service and maintain water mist systems.
13. Identify the requirements for acceptance testing of water mist systems and describe the associated procedures.
14. Describe the procedures used to commission water mist systems.

SSI-330 Foam Systems

Learning Outcomes:

- Demonstrate knowledge of foam systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for foam systems.

2014 National Occupational Reference:

- 3.04 Performs layout of systems.
12.05 Installs foam systems.

Objectives and Content:

1. Define terminology associated with foam systems.
2. Identify hazards and describe safe work practices pertaining to foam systems.
 - i) environmental considerations
 - containment
 - disposal
3. Interpret codes, standards and regulations pertaining to foam systems.
4. Interpret information pertaining to foam systems found on drawings and specifications.
5. Identify tools and equipment relating to foam systems, and describe their applications and procedures for use.
6. Identify foam systems and describe their operating principles and applications.
 - i) water supply required
 - ii) design of system
 - iii) characteristics and selection of discharge methods
 - iv) exposure protection
7. Describe the installation requirements of foam systems.
 - i) materials
 - ii) supports

- iii) system actuation
 - iv) testing
 - v) manufacturers' specifications/training
 - vi) handling and storage
8. Identify system controls for foam systems and describe their installation requirements.
 9. Identify types of concentrate used in foam systems and describe their characteristics and applications.
 10. Describe the procedures used to layout and install foam systems and components.
 - i) foam concentrate storage tank and trim
 - ii) reserve tank and trim
 - iii) foam concentrate pump
 - iv) check valves, strainers and orifice plates
 - v) valves
 - wet
 - dry
 - pre-action/deluge
 - vi) piping materials
 - system
 - concentrate
 - vii) cross connection control devices
 - viii) discharge methods
 11. Describe the procedures used to fill foam concentrate tanks.
 12. Explain the requirements for drainage of the system.
 13. Explain the operation of a balanced pressure proportioning system.
 14. Explain the operation of a pressure proportioning tank with and without diaphragm.
 15. Describe the procedures used to test and maintain foam systems.

16. Identify the requirements for acceptance testing of foam systems and describe the associated procedures.
17. Describe the procedures used to commission foam systems.

Learning Outcomes:

- Demonstrate knowledge of carbon dioxide extinguishing systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for carbon dioxide extinguishing systems.

2014 National Occupational Reference:

13.01 Installs wet and dry chemical, clean agent and carbon dioxide systems.

Objectives and Content:

1. Define terminology associated with carbon dioxide extinguishing systems.
2. Identify hazards and describe safe work practices pertaining to carbon dioxide extinguishing systems.
3. Interpret codes, standards and regulations pertaining to carbon dioxide extinguishing systems.
4. Interpret information pertaining to carbon dioxide extinguishing systems found on drawings and specifications.
5. Identify tools and equipment relating to carbon dioxide extinguishing systems, and describe their applications and procedures for use.
6. Explain the properties of carbon dioxide.
7. Identify carbon dioxide systems and describe their operating principles and applications.
 - i) design of system
 - ii) exposure protection
 - iii) methods of system operation
 - local application
 - total flooding
 - hand directed operation

8. Identify carbon dioxide system components and describe their purpose and operation.
 - i) alarms and indicators
 - ii) life safety provisions
 - iii) discharge nozzles
 - iv) piping and fittings
 - v) supports
 - vi) tanks and manifolds
 - vii) release mechanisms
 - viii) detection devices
9. Identify types of carbon dioxide extinguishing systems and describe their characteristics and applications.
 - i) low pressure
 - ii) high pressure
10. Describe the procedures used to calculate the quantity of carbon dioxide extinguishing agent required for a system as per manufacturers' specifications.
11. Identify the installation requirements for carbon dioxide extinguishing systems and components.
 - i) materials
 - ii) supports
 - iii) system actuation
 - iv) system supervision
 - v) testing
 - vi) manufacturers' specifications/training
 - vii) handling and storage
12. Describe the procedures used to install carbon dioxide extinguishing systems and components.
13. Describe the procedures used to service, maintain and remove carbon dioxide extinguishing systems as per manufacturers' specifications.

14. Identify the requirements for acceptance testing of carbon dioxide extinguishing systems and describe the associated procedures according to manufacturers' specifications.
15. Describe the procedures used to commission carbon dioxide extinguishing systems as per manufacturers' specifications.

SSI-340

Clean Agent Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of clean agent extinguishing systems, their applications and operating principles.
- Demonstrate knowledge of installation requirements and associated test procedures for clean agent extinguishing systems.

2014 National Occupational Reference:

13.01 Installs wet and dry chemical, clean agent and carbon dioxide systems.

Objectives and Content:

1. Define terminology associated with clean agent extinguishing systems.
2. Identify hazards and describe safe work practices pertaining to clean agent extinguishing systems.
3. Interpret codes, standards and regulations pertaining to clean agent extinguishing systems.
4. Interpret information pertaining to clean agent extinguishing systems found on drawings and specifications.
5. Identify tools and equipment relating to clean agent extinguishing systems, and describe their applications and procedures for use.
6. Identify clean agent extinguishing systems and describe their operating principles and applications.
 - i) design of system
 - ii) exposure protection
 - iii) methods of system operation
 - local application
 - total flooding
 - hand directed operation

7. Identify clean agent extinguishing system components and describe their purpose and operation.
 - i) alarms and indicators
 - ii) life safety provisions
 - iii) discharge nozzles
 - iv) piping and fittings
 - v) supports
 - vi) tanks and manifolds
 - vii) release mechanisms
 - viii) detection devices
 - ix) pressure relief venting
8. Identify types of clean agent extinguishing systems and describe their characteristics and applications.
9. Describe the procedures used to install and test clean agent extinguishing systems according to manufacturers' specifications.
10. Describe the procedures used to service, maintain and remove clean agent extinguishing systems according to manufacturers' specifications.
11. Identify the factors to consider and limitations pertaining to halon systems.
12. Identify the requirements for acceptance testing of clean agent extinguishing systems and describe the associated procedures.
13. Describe the procedures used to commission clean agent extinguishing systems according to manufacturers' specifications.

SSI-345 Fire Pumps and Controllers

Learning Outcomes:

- Demonstrate knowledge of fire pumps and controllers, and their operation and selection.
- Demonstrate knowledge of the installation, maintenance and associated testing requirements for fire pumps and controllers.

Objectives and Content:

1. Define terminology associated with fire pumps and controllers.
2. Identify hazards and describe safe work practices pertaining to fire pumps and controllers.
3. Interpret codes, standards and regulations pertaining to fire pumps and controllers.
4. Interpret information pertaining to fire pumps and controllers, found on drawings and specifications.
5. Identify tools and equipment relating to fire pumps and controllers, and describe their applications and procedures for use.
6. Explain head pressure as it relates to pumps.
7. Explain the effects of potential problems with fire pumps and describe their solutions.
 - i) cavitation
 - ii) air pockets
 - iii) rotation
 - iv) drivers
 - v) rpm
 - vi) pressure relief valves
8. Identify types of fire pumps and describe their principles of operation and applications.

9. Identify fire pump assembly components and accessories, and describe their purpose and operation.
10. Explain the requirements for installation of strainers and trash screens on raw water sources.
11. Identify the factors to consider for selecting fire pump assemblies.
 - i) types of drivers
 - ii) pump and pipe sizing
 - iii) capacity of pumps
 - iv) pressure ratings
 - v) pump performance
 - vi) fire pump curve (manufacturers')
 - vii) start mechanisms
12. Identify the installation requirements for fire and jockey pumps.
13. Describe the principles of operation of controllers.
14. Describe the procedures used to install, test and maintain fire pumps and their components.
15. Identify the installation requirements for fuel supply and exhausts of diesel drivers for fire pumps.
16. Describe the procedures used to install, inspect and test controllers.
17. Identify the requirements for acceptance testing on fire pumps and their components and describe the associated procedures.
18. Describe the procedures used to commission fire pumps and controllers.

SSI-350

Detection and Signal-Initiating Devices

Learning Outcomes:

- Demonstrate knowledge of the procedures to install, test and maintain detection devices.
- Demonstrate knowledge of the procedures to install, test and maintain signal-initiating devices.

2014 National Occupational Reference:

- 14.01 Installs wet and dry pilot lines.
- 14.02 Installs heat-actuated detectors (HADs).
- 14.03 Installs spark detection systems.
- 14.04 Installs air sampling systems
- 14.05 Installs electrical detection systems.
- 15.01 Installs alarm-initiating devices.
- 15.02 Installs supervisory-initiating devices.

Objectives and Content:

1. Define terminology associated with detection and signal-initiating devices.
2. Identify hazards and describe safe work practices pertaining to detection and signal-initiating devices.
3. Interpret codes, standards and regulations pertaining to detection and signal-initiating devices.
4. Interpret information pertaining to detection and signal-initiating devices, found on drawings and specifications.
5. Identify tools and equipment relating to detection and signal-initiating devices, and describe their applications and procedures for use.
6. Identify types of detection devices and describe their characteristics, parameters and applications.
 - i) wet and dry pilot lines
 - ii) heat-actuated detectors (HADs)
 - iii) spark detection

- iv) air sampling and distribution piping
 - v) electrical detection
 - vi) photo cells
7. Identify types of signal-initiating devices and describe their characteristics, parameters and applications.
- i) alarm-initiating
 - ii) supervisory-initiating
8. Describe the procedures used to install, test and maintain detection devices according to manufacturers' specifications.
9. Describe the procedures used to install, test and maintain signal-initiating devices according to manufacturers' specifications.

SSI-355 Commissioning

Learning Outcomes:

- Demonstrate knowledge of the procedures to commission water supply systems.
- Demonstrate knowledge of the procedures to commission piping installation.
- Demonstrate knowledge of the procedures to commission detection, protection and control systems.

2014 National Occupational Reference:

- 4.01 Commissions water supply systems.
- 4.02 Commissions piping installation.
- 4.03 Commissions detection, protection and control systems.

Objectives and Content:

1. Define terminology associated with commissioning of systems and installations.
2. Identify hazards and describe safe work practices pertaining to the commissioning of water supply systems, piping installations, and detection, protection and control systems.
3. Interpret codes, standards and regulations pertaining to the commissioning of water supply systems, piping installations, and detection, protection and control systems.
4. Interpret information pertaining to the commissioning of water supply systems, piping installations, and detection, protection and control systems, found on drawings and specifications.
5. Identify tests to be performed on water supply systems.
 - i) hydrostatic
 - ii) chlorination
 - iii) flushing
 - iv) acceptance test of fire pump
 - v) component operation
 - cross connection control assemblies
 - water tanks
 - reservoirs

6. Identify tests and checks to be performed on piping installations.
 - i) hydrostatic
 - ii) pneumatic
 - iii) seal of penetrations
 - iv) placement of hangers, brackets, supports and restraints
 - v) grade and elevation
 - vi) flushing and swabbing
 - vii) labelling
 - viii) blank testing gaskets
 - ix) escutcheons
7. Identify tests and checks to be performed on detection, protection and control systems.
 - i) hydrostatic
 - ii) pneumatic
 - iii) location, operation and performance of components
 - valves
 - compressors
 - quick opening devices
 - detection devices
 - signal initiating devices
8. Describe the procedures used to commission water supply systems.
9. Describe the procedures used to commission piping installations.
10. Describe the procedures used to commission detection, protection and control systems.