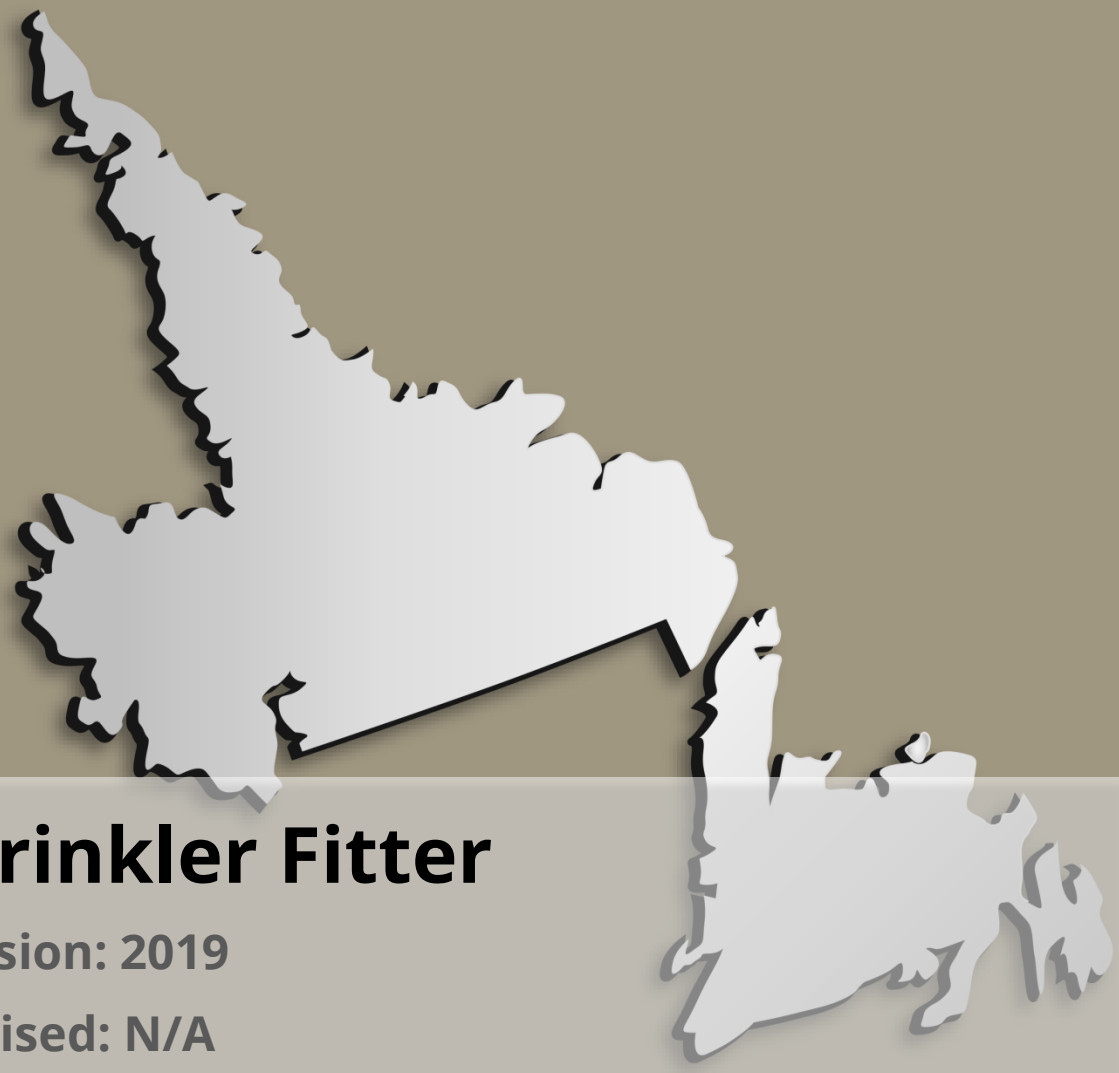
Curriculum Standard

Atlantic Apprenticeship

Atlantic Workforce Partnership



Sprinkler Fitter

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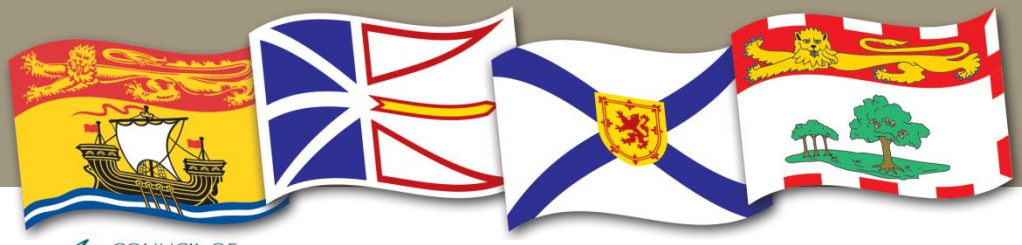

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Employment and Social Development Canada
Emploi et Développement social Canada

Atlantic Apprenticeship Curriculum Standard

Sprinkler Fitter

Preface

This Atlantic Apprenticeship Curriculum Standard is intended to assist instructional staff in the design and delivery of technical, in-class training in support of the Sprinkler Fitter program.

This document contains all the technical training elements required to complete the Sprinkler Fitter apprenticeship program and has been developed based on the 2017 Red Seal Occupational Standard (RSOS). The RSOS can be found on the Red Seal website (www.red-seal.ca).

Implementation of this AACS for Apprenticeship training is outlined in the following table.

Level	Implementation Effective
Level 1	2019/2020
Level 2	2020/2021
Level 3	2021/2022

** *The above implementation schedule was current at time of printing. Please* ***confirm*** *with Apprenticeship Staff prior to commencing training.*

Granting of credit or permission to challenge level examinations for pre-employment or pre-apprenticeship training for the Sprinkler Fitter trade will be based on the content outlined in this standard. Training providers must contact their provincial apprenticeship authority for more information on the process and requirements for determining eligibility for credit towards an apprenticeship program. Programs which have been deemed acceptable by the jurisdictional apprenticeship authority will be identified in transfer credit matrix developed through the Atlantic Apprenticeship Harmonization Project.

Acknowledgements

The development of the Atlantic Apprenticeship Curriculum Standard (AACS) is an initiative of the Atlantic Apprenticeship Council's Atlantic Apprenticeship Harmonization Project (AAHP) through the Atlantic Workforce Partnership and Employment and Social Development Canada.

The Atlantic Apprenticeship Council wishes to acknowledge the contributions of the following industry and instructional representatives on the Atlantic Trade Advisory Committee (ATAC) who participated in the development of this document in June, 2018.

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User Guide

Atlantic Apprenticeship Curriculum Standards (AACS) are developed based on Red Seal Occupational Standards (RSOS), National Occupational Analyses (NOA), Interprovincial Program Guides (IPG), if available, and extensive industry consultation. This document represents the minimum content to be delivered as part of the harmonized Atlantic program for the Sprinkler Fitter trade.

The AACS's are deliberately constructed for ease of use and flexibility of structure in order to adapt to all delivery requirements. They detail units of training, unit outcomes and objectives. They do 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 AACS does not dictate study materials, textbooks or learning activities to be used in delivery.

The document includes a Level Structure to facilitate mobility for apprentices moving from one jurisdiction to another.

Structure

The content of the AACS is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery. It is at the discretion of the training provider to deliver the content in the required logical sequence of delivery within the level. Jurisdictions are free to deliver units one at a time or concurrently within a level, provided all outcomes are met.

The Learning Outcomes describe what the apprentice should know or be able to do at the end of training. Wording of the Learning Outcomes, "Demonstrate knowledge of…" acknowledges the broad spectrum of ways in which knowledge can be assessed (i.e. practical projects, multiple choice testing, presentations, etc.) by instructional staff within the training.

Summative evaluation will be through a multiple-choice Level Examination administered through the jurisdictional Apprenticeship Authority.

User Guide *(continued)*

The 2017 Red Seal Occupational Standard References (RSOS) to AACS Comparison chart outlines the relation between each RSOS sub-task and the AACS units. RSOS References have also been detailed in each unit to highlight the direct link between the unit and relevant sub-tasks in the RSOS.

In the Level Structure section, the document identifies suggested hours in order to provide an indication of the time it should take to cover the material in the unit and is provided as a guide only. Adjustments to the suggested hours for each unit may be required to account for rate of apprentice learning, statutory holidays, storm days, registration and examinations. These suggested hours detailed for each unit will represent both theory and practical training (if relevant) and for consistency will be based on a standard of 30 hours per week of training. The true length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used.

There are two types of objectives found in the AACS document: theoretical and practical.

The theoretical objectives represent the material that is to be covered during the technical training in order to convey the required knowledge to the apprentice.

The practical objectives represent the tasks or skills that have been deemed by the Atlantic Trade Advisory Committee as critical for the apprentices to receive exposure to while attending technical training. For example, exposure could be done through instructor demonstration or individual or group performance of the skill or task. Training providers are encouraged to use practical demonstration and opportunities for hands-on learning whenever possible. Practical objectives are not intended to replace the on-the-job training component of the apprentice's program or to mirror or replace the logbook skills that are to be taught and evaluated in the workplace.

Detailed content for each objective has not been developed. Where detail is required for clarity, content has been provided.

Glossary of Terms

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

ADJUST	To put in good working order; regulate; bring to a proper state or position.
APPLICATION	The use to which something is put and/or the circumstance in which an individual 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.

Glossary of Terms (*continued*)

SERVICE	Routine inspection and replacement of worn or deteriorating parts. An act or business function provided to a customer in the course of an individual's profession (e.g., haircut).
TECHNIQUE	Within a procedure, the manner in which technical skills are applied.
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.

Essential Skills Profile

Through extensive research, the Government of Canada and other national and international agencies have identified and validated key essential skills for the workplace. These skills are used in nearly every job and at different levels of complexity. They provide the foundation for learning all other skills and enable people to evolve with their jobs and adapt to workplace change.

Essential Skills Profiles describe how workers in various occupations use each of the key essential skills. They include:

- a brief description of the occupation;
- examples of tasks that illustrate how each essential skill is applied; and,
- complexity ratings that indicate the level of difficulty of the example tasks.

Essential Skills profiles can be found on the Employment and Social Development Canada (ESDC) website at www.esdc.gc.ca/eng/jobs/les/profiles/index.shtml

The development and improvement of these Essential Skills is inherent throughout the apprenticeship training program as apprentices work towards achieving journeyperson status.

Profile Chart

PERFORMS COMMON OCCUPATIONAL SKILLS			
SSI-100 Safety	SSI-105 Tools and Equipment	SSI-110 Access Equipment	SSI-115 Rigging, Hoisting and Lifting
SSI-120 Drawings I	SSI-125 Trade Related Documents	MENT-700 Mentoring I	SSI-160 Pipe Design and Installation I
SSI-165 Soldering, Brazing and Oxy-Acetylene Cutting	SSI-200 Pipe Design and Installation II	SSI-205 Drawings II	SSI-215 Commissioning Water Supply Systems I
SSI-220 Commissioning Fire Protection Systems I	SSI-315 Drawings III	SSI-320 Commissioning Water Supply Systems II	SSI-325 Commissioning Fire Protection Systems II
MENT-701 Mentoring II	SSI-375 Job Planning		
INSTALLS WATER SUPPLY			
SSI-240 Water Supply, Hydrants and Fire Department Connections	SSI-305 Fire Pumps & Controllers	SSI-310 Private Water Supply Systems	
INSTALLS PIPING			
SSI-135 Steel Pipe and Fittings	SSI-140 Plastic Pipe and Fittings	SSI-145 Copper Pipe and Tubing	SSI-150 Sprinkler Heads and Nozzles
SSI-155 Supports and Hangers	SSI-160 Pipe Design and Installation I	SSI-195 System Drainage I	SSI-200 Pipe Design and Installation II
SSI-210 System Drainage II	SSI-225 Seismic Protection	SSI-230 Cross-Connection Control	
INSTALLS AND LAYS OUT FIRE PROTECTION SYSTEMS AND DEVICES			
SSI-170 Wet Pipe Sprinkler Systems	SSI-175 Dry Pipe Sprinkler Systems	SSI-180 Antifreeze Sprinkler Systems	SSI-185 Pre-Action Systems I
SSI-190 Deluge Systems I	SSI-235 Standpipe and Hose Systems	SSI-245 Detection Devices	SSI-250 Signal-Initiating Devices
SSI-255 Pre-Action Systems II	SSI-260 Deluge Systems II	SSI-300 Portable Fire Extinguishers	SSI-335 Wet and Dry Chemical Extinguishing Systems
SSI-340 Water Mist and Hybrid Extinguishing Systems	SSI-345 Foam Extinguishing Systems	SSI-350 Carbon Dioxide Extinguishing Systems	SSI-355 Clean Agent Extinguishing Systems
SSI-360 Specialty Detection Devices			

Profile Chart *(continued)*

INSPECTS, TESTS AND MAINTAINS (ITM) FIRE PROTECTION SYSTEMS			
SSI-300 Portable Fire Extinguishers	SSI-365 Fire Protection Systems Repair and Maintenance	SSI-370 Fire Protection Systems Inspection and Testing	

Recommended Atlantic Level Structure

Level 1 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
SSI-100	Safety	9	19	N/A
SSI-105	Tools and Equipment	9	23	N/A
SSI-110	Access Equipment	4	25	N/A
SSI-115	Rigging, Hoisting and Lifting	4	27	1. Perform hand signals. 2. Perform tying of knots, bends and hitches.
SSI-120	Drawings I	13	30	Perform scaling of drawings in both imperial and metric.
SSI-125	Trade Related Documents	3	32	N/A
MENT-700	Mentoring I	6	34	N/A
SSI-135	Steel Pipe and Fittings	18	36	Perform cutting, threading and grooving of steel pipe.
SSI-140	Plastic Pipe and Fittings	17	38	Perform prep, cut and assemble of plastic pipe.
SSI-145	Copper Pipe and Tubing	7	40	Perform prep, cut bend and assemble copper pipe, tubing and fittings.
SSI-150	Sprinkler Heads and Nozzles	40	42	N/A
SSI-155	Supports and Hangers	17	45	N/A
SSI-160	Pipe Design and Installation I	17	48	Perform pipe installation and assembly.
SSI-165	Soldering, Brazing and Oxy-Acetylene Cutting	9	51	Perform soldering and brazing on various types of pipe.
SSI-170	Wet Pipe Sprinkler Systems	17	53	N/A
SSI-175	Dry Pipe Sprinkler Systems	20	56	Reset a dry pipe valve (DPV).
SSI-180	Antifreeze Sprinkler Systems	4	59	N/A
SSI-185	Pre-Action Systems I	9	61	N/A
SSI-190	Deluge Systems I	9	63	N/A
SSI-195	System Drainage I	4	65	N/A
SSI-600	Principles of Electricity	4	67	Use a multimeter.

Level 2 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
SSI-200	Pipe Design and Installation II	24	70	Calculate friction loss on sprinkler system types of pipe.
SSI-205	Drawings II	23	72	1. Produce isometric drawings. 2. Scale drawings and sketches. 3. Perform take-offs.
SSI-210	System Drainage II	11	75	N/A
SSI-215	Commissioning Water Supply Systems I	13	77	N/A
SSI-220	Commissioning Fire Protection Systems I	13	79	N/A
SSI-225	Seismic Protection	14	81	N/A
SSI-230	Cross-Connection Control	9	83	N/A
SSI-235	Standpipe and Hose Systems	25	85	N/A
SSI-240	Water Supply, Hydrants and Fire Department Connections	24	88	1. Assemble underground piping. 2. Flow testing. 3. Flush and treat an underground system.
SSI-245	Detection Devices	14	92	N/A
SSI-250	Signal-Initiating Devices	16	94	1. Adjust a pressure switch. 2. Troubleshoot signal-initiating devices using multimeters.
SSI-255	Pre-Action Systems II	28	96	Trim, test and reset a valve.
SSI-260	Deluge Systems II	26	99	Trim, test and reset a valve.

Level 3 - 8 Weeks

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
SSI-300	Portable Fire Extinguishers	8	103	
SSI-305	Fire Pumps & Controllers	24	105	1. Interpret graphs for flow calculations. 2. Plot a pump curve on a graph.
SSI-310	Private Water Supply Systems	16	108	
SSI-315	Drawings III	18	110	1. Generate a material take-off list. 2. Generate an as-built drawing.
SSI-320	Commissioning Water Supply Systems II	9	113	N/A
SSI-325	Commissioning Fire Protection Systems II	18	115	N/A
MENT-701	Mentoring II	6	117	N/A
SSI-335	Wet and Dry Chemical Extinguishing Systems	10	119	N/A
SSI-340	Water Mist and Hybrid Extinguishing Systems	10	121	N/A
SSI-345	Foam Extinguishing Systems	14	123	N/A
SSI-350	Carbon Dioxide Extinguishing Systems	9	126	N/A
SSI-355	Clean Agent Extinguishing Systems	8	129	N/A
SSI-360	Specialty Detection Devices	9	131	N/A

Unit Code	Unit Title	Sugg Hrs*	Pg #	Practical Objectives*
SSI-365	Fire Protection Systems Repair and Maintenance	21	133	N/A
SSI-370	Fire Protection Systems Inspection and Testing	20	136	N/A
SSI-375	Job Planning	10	138	Generate a complete job plan (material list, tools list, labour quantities, site access, safety requirements, regulatory requirements).
SSI-380	Program Review	30	140	N/A

***Suggested Hours:** The time it should take to cover the unit (a guide only).

***Practical Objectives:** The tasks/skills apprentices must be exposed to during technical training. An individual or group performance of the task/skill is recommended; if not possible, an instructor demonstration is acceptable. Training Providers should use practical, hands-on learning whenever possible, whether identified in the curriculum as a practical objective or not.

2017 RSOS Sub-task to AACS Unit Comparison

RSOS Sub-task	AACS Unit	
Task A-1 Performs safety-related functions		
A-1.01 Maintains safe work environment.	SSI-100	Safety
A-1.02 Uses personal protective equipment (PPE) and safety equipment.	SSI-100	Safety
A-1.03 Performs lock-out and tag-out procedures.	SSI-100	Safety
A-1.04 Performs work in confined space.	SSI-100	Safety
Task A-2 Uses and maintains tools and equipment		
A-2.01 Uses hand tools.	SSI-105	Tools and Equipment
A-2.02 Uses portable and stationary power tools.	SSI-105	Tools and Equipment
A-2.03 Uses measuring and testing equipment.	SSI-105	Tools and Equipment
A-2.04 Uses access equipment.	SSI-110	Access Equipment
A-2.05 Uses rigging, hoisting and lifting equipment.	SSI-115	Rigging, Hoisting and Lifting
A-2.06 Uses soldering and brazing equipment.	SSI-165	Soldering, Brazing and Oxy-Acetylene Cutting
Task A-3 Organizes work		
A-3.01 Interprets codes, standards, regulations and procedures.	SSI-125	Trade Related Documents
A-3.02 Uses drawings and specifications.	SSI-120	Drawings I
	SSI-205	Drawings II
	SSI-315	Drawings III
A-3.03 Uses documentation and reference material.	SSI-125	Trade Related Documents
A-3.04 Plans job tasks and procedures.	SSI-375	Job Planning
A-3.05 Prepares work site.	SSI-160	Pipe Design and Installation I
	SSI-200	Pipe Design and Installation II
A-3.06 Performs layout of systems.	SSI-160	Pipe Design and Installation I
	SSI-200	Pipe Design and Installation II
Task A-4 Commission systems		
A-4.01 Commissions water supply systems.	SSI-215	Commissioning Water Supply Systems I
	SSI-320	Commissioning Water Supply Systems II
A-4.02 Commissions fire protection systems.	SSI-220	Commissioning Fire Protection Systems I
	SSI-325	Commissioning Fire Protection Systems II
Task A-5 Uses communication and mentoring techniques		
A-5.01 Uses communication techniques.	MENT-700	Mentoring I
	MENT-701	Mentoring II
A-5.02 Uses mentoring techniques.	MENT-700	Mentoring I
	MENT-701	Mentoring II

RSOS Sub-task	AACS Unit	
Task B-6 Installs underground water supplies		
B-6.01 Supervises trenching and backfilling.	SSI-240	Water Supply, Hydrants and Fire Department Connections
B-6.02 Installs underground piping and components.	SSI-240	Water Supply, Hydrants and Fire Department Connections
B-6.03 Flushes underground system.	SSI-240	Water Supply, Hydrants and Fire Department Connections
Task B-7 Installs fire pump units		
B-7.01 Determines location of pumps, drivers, controllers and components.	SSI-305	Fire Pumps & Controllers
B-7.02 Installs pumps, drivers, controllers and components.	SSI-305	Fire Pumps & Controllers
Task B-8 Installs fire department connections		
B-8.01 Determines location, size and type of fire department connections.	SSI-240	Water Supply, Hydrants and Fire Department Connections
B-8.02 Installs fire department connection piping and components.	SSI-240	Water Supply, Hydrants and Fire Department Connections
Task B-9 Installs private water supply systems		
B-9.01 Installs water tanks.	SSI-310	Private Water Supply Systems
B-9.02 Installs related equipment.	SSI-310	Private Water Supply Systems
Task C-10 Prepares pipe, tube and fittings for installation		
C-10.01 Cuts pipe and tube.	SSI-160	Pipe Design and Installation I
C-10.02 Bends pipe and tube.	SSI-160	Pipe Design and Installation I
C-10.03 Threads pipe.	SSI-160	Pipe Design and Installation I
C-10.04 Grooves pipe.	SSI-160	Pipe Design and Installation I
C-10.05 Drills pipe and tube.	SSI-160	Pipe Design and Installation I
C-10.06 Grinds pipe.	SSI-160	Pipe Design and Installation I
C-10.07 Prepares fittings.	SSI-160	Pipe Design and Installation I
Task C-11 Installs pipe, tube and fittings		
C-11.01 Installs steel pipe, tube and fittings.	SSI-135	Steel Pipe and Fittings
C-11.02 Installs plastic pipe, tube and fittings.	SSI-140	Plastic Pipe and Fittings
C-11.03 Installs copper pipe, tube and fittings.	SSI-145	Copper Pipe and Tubing
C-11.04 Paints and labels pipe and tube.	SSI-160	Pipe Design and Installation I
	SSI-200	Pipe Design and Installation II
Task C-12 Installs piping components		
C-12.01 Selects sprinklers.	SSI-150	Sprinkler Heads and Nozzles
C-12.02 Installs sprinklers and nozzles.		
C-12.03 Installs sleeves.	SSI-160	Pipe Design and Installation I
	SSI-200	Pipe Design and Installation II
C-12.04 Installs supports and hangers.	SSI-155	Supports and Hangers
C-12.05 Installs seismic protection.	SSI-225	Seismic Protection
C-12.06 Installs cross-connection control assemblies.	SSI-230	Cross-connection Control
C-12.07 Installs system drainage.	SSI-195	System Drainage I
	SSI-210	System Drainage II

RSOS Sub-task	AACS Unit	
Task D-13 Installs water-based systems		
D-13.01 Installs wet pipe systems.	SSI-170	Wet Pipe Sprinkler Systems
D-13.02 Installs dry pipe systems.	SSI-175	Dry Pipe Sprinkler Systems
D-13.03 Installs antifreeze systems.	SSI-180	Antifreeze Sprinkler Systems
D-13.04 Installs preaction/deluge systems.	SSI-185	Pre-Action Systems I
	SSI-190	Deluge Systems I
	SSI-255	Pre-Action Systems II
	SSI-260	Deluge Systems II
D-13.05 Installs foam systems.	SSI-345	Foam Extinguishing Systems
D-13.06 Installs standpipe systems.	SSI-235	Standpipe and Hose Systems
D-13.07 Installs water mist and hybrid systems.	SSI-340	Water Mist and Hybrid Extinguishing Systems
Task D-14 Installs specialty fire suppression systems		
D-14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems.	SSI-335	Wet and Dry Chemical Extinguishing Systems
	SSI-355	Clean Agent Extinguishing Systems
	SSI-350	Carbon Dioxide Extinguishing Systems
D-14.02 Installs portable extinguishers.	SSI-300	Portable Fire Extinguishers
Task D-15 Installs detection devices		
D -15.01 Installs wet and dry pilot lines.	SSI-245	Detection Devices
D -15.02 Installs heat-actuated devices (HADs).	SSI-245	Detection Devices
D -15.03 Installs spark detection systems.	SSI-360	Specialty Detection Devices
D -15.04 Installs air sampling systems.	SSI-360	Specialty Detection Devices
D -15.05 Installs electrical detection systems.	SSI-360	Specialty Detection Devices
Task D-16 Installs signal-initiating devices		
D -16.01 Installs alarm-initiating devices.	SSI-250	Signal-Initiating Devices
D -16.02 Installs supervisory-initiating devices.	SSI-250	Signal-Initiating Devices
Task E-17 Maintains and repairs fire protection systems		
E -17.01 Troubleshoots fire protection systems.	SSI-365	Fire Protection Systems Repair and Maintenance
E -17.02 Repairs deficiencies.	SSI-365	Fire Protection Systems Repair and Maintenance
E -17.03 Performs scheduled maintenance.	SSI-365	Fire Protection Systems Repair and Maintenance
Task E -18 Inspects and tests fire protection systems		
E -18.01 Performs scheduled tests.	SSI-370	Fire Protection Systems Inspection and Testing
E -18.02 Performs scheduled inspections.	SSI-370	Fire Protection Systems Inspection and Testing
E -18.03 Inspects portable fire extinguishers.	SSI-300	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 personal protective equipment (PPE) and safety equipment, their applications, maintenance and procedures for use.
- Demonstrate knowledge of regulatory requirements pertaining to safety.
- Demonstrate knowledge of applications and procedures for locking out/tagging out equipment.
- Demonstrate knowledge of applications and procedures for working in confined spaces.

2017 Red Seal Occupational Standard Reference:

1.01 Maintains safe work environment.
1.02 Uses personal protective equipment (PPE) and safety equipment.
1.03 Performs lock-out and tag-out procedures.
1.04 Performs work in confined space.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with safe work practices, personal protective (PPE) and safety equipment, lock-out, tag-out and confined space procedures.

2. Identify and interpret workplace health and safety documentation and associated regulations.
   i) safety-related documentation
      - field risk assessment
      - job hazard assessment
      - accident reports
      - equipment and PPE inspections

- tool box talk
- safety meeting minutes
- Workplace Hazardous Material Information System (WHMIS)/Globally Harmonized System (GHS) documents

ii) federal regulations
- WHMIS/GHS
- Transportation of Dangerous Goods

iii) provincial/territorial regulations
- Occupational Health and Safety

iv) municipal regulations

v) confined space documentation
- location
- work description
- hazard control
- atmosphere testing
- rescue plan

3. Identify workplace hazards, and describe safe work practices.

i) workplace hazards.
- personal (confined space, working at heights, lifting and ergonomics, trenches).
- workplace (hot work, lock-out/tag-out, high voltage, rotating equipment, barricades and flagging, radiation, extreme temperatures, noise).
- environmental (hazardous materials, quality of air, system drainage and disposal requirements).

ii) safe work practices.
- fall protection
- hot work
- confined space
- travel restraint
- using personal protective equipment (PPE)
- following site-specific requirements

4. Identify types of PPE, and describe their applications and procedures for use.

i) Basic PPE
- hard hats
- safety glasses
- hearing protection
- safety boots.

- high-visibility vests

ii) specialized
- site-specific PPE
- fall protection
- travel restraints

5. Identify types and location 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. Identify lock-out and tag-out equipment, and describe their applications and procedures for use.
   i) lock-out and tag-out equipment
      - lock and key
      - chains and tags
      - lock-out scissor clamp
      - lock-box
      - blanks

7. Identify safety procedures and hazards associated with confined spaces.
   i) confined spaces
      - manholes
      - crawl spaces
      - trenches
      - tanks
      - service chases
      - elevator shafts
      - attics
      - vaults
   ii) confined space hazards
      - air quality
      - lack of accessibility
      - location
      - hazards of the contents

8. Identify situations that require specialty safety equipment.

i) confined space
ii) fall protection
iii) hot work
iv) site specific

9. Describe the procedures used to inspect, maintain and store PPE and safety equipment.
   i) inspect and identify outdated or damaged PPE
      - expired hard hats
      - excessively worn boots
      - cracked safety glasses

10. Describe procedures for locking out/tagging out equipment and piping.
   i) determine lock-out and tag-out requirements for system components
   ii) obtain and install lock-out and tag-out equipment
   iii) remove designated lock-out and tag-out equipment

11. Describe procedures associated with confined spaces.
   i) confirm if area has been classified as a confined space
   ii) determine if confined space is safe for entry
   iii) determine hazards within confined space

Practical Objectives

N/A

SSI-105 Tools and Equipment

Learning Outcomes:

- Demonstrate knowledge of hand tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of portable and stationary power tools, their applications, maintenance and procedures for use.
- Demonstrate knowledge of measuring and testing equipment, their applications, maintenance and procedures for use.

2017 Red Seal Occupational Standard Reference:

2.01 Uses hand tools.
2.02 Uses portable and stationary power tools.
2.03 Uses measuring and testing equipment.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with tools and equipment.

2. Identify hazards and describe safe work practices pertaining to the use of tools, and equipment.
   i) dull saws and cutting blades
   ii) worn jaws on pipe wrenches
   iii) chipped cutting wheels
   iv) fractured, cracked or corroded equipment
   v) missing parts
   vi) defective or missing guards
   vii) frayed cords
   viii) defective blades

3. Identify types of tools and equipment, and describe their applications and procedures for use.
    i) hand tools
    ii) portable and stationary power tools
    iii) measuring and testing equipment

Practical Objectives

N/A

SSI-110 Access Equipment

Learning Outcomes:

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

2017 Red Seal Occupational Standard Reference:

2.04 Uses access equipment.

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

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
   iii) Canadian Standards Association (CSA)
   iv) American National Standards Institute (ANSI) standards

4. Identify types of access equipment, and describe their applications.

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.

8. Describe the procedures to inspect and operate power elevated work platforms.

Practical Objectives

N/A

SSI-115 Rigging, Hoisting and Lifting

Learning Outcomes:

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

2017 Red Seal Occupational Standard Reference:

2.05 Uses rigging, hoisting and lifting equipment.

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with rigging, hoisting and lifting equipment.

2. Identify hazards and describe safe work practices pertaining to rigging, hoisting and lifting equipment.
   i) hazards
      - overhead obstructions
      - excavations
      - excessive loads

3. Identify documentation and regulations pertaining to rigging, hosting and lifting equipment.

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) nylon
   ii) manila
   iii) graded
   iv) wire sling

6. Identify the factors to consider for selecting rigging equipment.
   i) load characteristics
   ii) environment
   iii) safety factors

7. Identify types of knots, bends and hitches used on ropes, and describe their applications and procedures to tie them.
   i) bowline
   ii) sheet bend
   iii) clove hitch

8. Identify and interpret hand signals used for hoisting and lifting.

9. Describe sling angle when preparing for hoisting and lifting operations.

10. Describe the procedures used to inspect, maintain and store hoisting, lifting and rigging equipment.

11. Describe the procedures used for attaching rigging equipment to the load.

12. Describe the factors to consider, and the procedures used to perform calculations related to rigging, hoisting and lifting operations.

13. Describe the communication methods used during hoisting, lifting and rigging operations.
   i) hand signals
   ii) electronic communications
   iii) audible/visual

14. Describe the procedures used to ensure the work area is safe for lifting.
    i) supervision of lift
    ii) securing work area
    iii) communication

15. 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

16. Describe the procedures to apply mathematical concepts to rigging, hoisting and lifting procedures
    i) weight conversions
    ii) safe working load
    iii) geometry
    iv) sling angles

Practical Objectives

1. Perform hand signals.

2. Perform tying of knots, bends and hitches.

SSI-120 Drawings I

Learning Outcomes:

- Demonstrate knowledge of sprinkler system drawings and on-site drawings.
- Demonstrate knowledge of the procedures to read and interpret drawings and on-site drawings.

2017 Red Seal Occupational Standard Reference:

3.02 Uses drawings and specifications.

Suggested Hours:

13 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with reading and sketching drawings.

2. Explain the fundamentals of orthographic and isometric projections.

3. Identify types of lines found on sprinkler system drawings.
   - i) object (visible)
   - ii) hidden
   - iii) center
   - iv) dimension
   - v) extension
   - vi) section cutting
   - vii) material section

4. Identify symbols found on sprinkler system drawings.

5. Identify types of views found on sprinkler system drawings.
   - i) plan
   - ii) elevation
   - ii) sections

iv) details

6. Identify types of scales and describe their characteristics and applications.
   i) metric scale (S.I.)
   ii) architect scale (imperial)
   iii) engineer scales

7. Identify divisions of drawings and describe their purpose.
   i) architectural
   ii) structural
   iii) mechanical
   iv) electrical
   v) plot
   vi) specifications
   vii) schedules

Practical Objectives

1. Perform scaling of drawings in both imperial and metric.

SSI-125 Trade Related Documents

Learning Outcomes:

- Demonstrate knowledge of trade related codes, standards, regulations, procedures and their applications.
- Demonstrate knowledge of trade related documentation and reference material and their application.

2017 Red Seal Occupational Standard Reference:

3.03 Uses documentation and reference material.
3.01 Interprets codes, standards, regulations and procedures.

Suggested Hours:

3 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with trade-related documentation, codes, standards, regulations, and reference material.

2. Identify types of trade-related documentation, codes, standards, regulations, reference material, and describe their applications.

3. Explain responsibilities associated with completing and/or signing trade related documents.

4. Describe the procedures used to complete trade related documents.

Practical Objectives

N/A

MENT-700 Mentoring I

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a learner.
- Demonstrate knowledge of strategies for learning skills in the workplace.

Red Seal Occupational Standard Reference:

5.01 Uses communication techniques
5.02 Uses mentoring techniques

Suggested Hours:

6 hours

Theoretical Objectives:

1. Describe the importance of one's own individual experiences.

2. Identify behaviours that demonstrate positive learning experiences.

3. Identify the benefits of workplace mentoring for the apprentice, mentor, and employer.

4. Identify the partners involved in apprenticeship training.

5. Describe the shared responsibilities for workplace learning in apprenticeship.

6. Identify different learning needs and strategies to address challenges or barriers in the workplace.
   i) learning disabilities
   ii) language
   iii) underrepresentation

7. Identify the components that create a positive and inclusive workplace culture.
   i) workplace characteristics
   ii) individual behaviours

8. Identify various learning styles and determine one's own learning preferences.

9. Explain how learning preferences impact learning new skills.

10. Identify different learning strategies to meet individual learning needs.

11. Describe the importance of adapting to a variety of teaching and learning methods in the workplace.

12. Identify techniques for effective communication as a learner.
    i) verbal and non-verbal
    ii) active listening

13. Identify and describe personal responsibilities and attitudes that contribute to on-the-job success.
    i) self advocating
    ii) asking questions
    iii) accepting constructive feedback
    iv) working safely
    v) employing time management techniques and being punctual

Practical Objectives:

N/A

SSI-135 Steel Pipe and Fittings

Learning Outcomes:

- Demonstrate knowledge of steel pipe, tube and fittings.
- Demonstrate knowledge of the procedures used to install steel pipe, tube and fittings.

2017 Red Seal Occupational Standard Reference:

11.01 Installs steel pipe, tube and fittings.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with steel pipe, tube and fittings.

2. Identify hazards and describe safe work practices related to installing steel pipe, tube and fittings.

3. Identify codes, standards and regulations pertaining to steel pipe, tube and fittings.

4. Identify information pertaining to steel pipe and tube installation found on drawings and specifications.

5. Identify types of steel pipe and tube.
   i) stainless
   ii) galvanized
   iii) carbon

6. Identify tools and equipment for installing steel pipe, tube and fittings, and describe their applications and procedures for use.
   i) wrenches

ii) levels
iii) sockets
iv) chain vices

7. Identify friction loss as it applies to steel pipe schedules and hydraulically calculated systems.

8. Identify the design considerations for installing steel pipe, tube and fittings.

9. Describe the procedures used to install steel pipe, tube and fittings.

10. Describe connection types related to steel pipe and tube.

11. Describe the procedures to apply mathematical concepts to steel pipe, tube and fittings.
    i) converting decimal feet in a linear measurement
    ii) metric and imperial conversions
    iii) geometry
    iv) fitting allowances
    v) bending allowances
    vi) Pythagorean theorem
    vii) pipe layout

Practical Objectives

1. Perform cutting, threading and grooving of steel pipe.

SSI-140 Plastic Pipe and Fittings

Learning Outcomes:

- Demonstrate knowledge of plastic pipe, tube and fittings.
- Demonstrate knowledge of the procedures used to install plastic pipe, tube and fittings.

2017 Red Seal Occupational Standard Reference:

11.02 Installs plastic pipe, tube and fittings.

Suggested Hours:

17 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with plastic pipe, tube and fittings.

2. Identify hazards and describe safe work practices related to installing plastic pipe, tube and fittings.

3. Identify codes, standards and regulations pertaining to plastic pipe, tube and fittings.

4. Identify information pertaining to plastic pipe and tube installation found on drawings and specifications.

5 Identify tools and equipment for installing plastic pipe and tube and, describe their applications and procedures for use.

6. Identify types of plastic pipe.
   i) chlorinated polyvinyl chloride (CPVC)
   ii) cross-linked polyethylene (PEX)
   iii) polyvinyl chloride (PVC)

7. Identify friction loss as it applies to plastic pipe and tube and hydraulically calculated systems.

8. Describe the procedures used to install plastic pipe, tube and fittings.

9. Describe connection types related to plastic pipe and tube.

10. Identify compatibility of plastic pipe and tube with site conditions and other materials.
    i) adhere to manufactures specifications and material safety data sheets (MSDS)

11. Identify the design considerations for installing plastic pipe, tube and fittings.

12. Describe the procedures to apply mathematical concepts to plastic pipe, tube and fittings.
    i) converting decimal feet in a linear measurement
    ii) metric and imperial conversions
    iii) geometry
    iv) fitting allowances
    v) Pythagorean theorem
    vi) pipe layout

Practical Objectives

1. Perform prep, cut and assemble of plastic pipe.

SSI-145 Copper Pipe and Tubing

Learning Outcomes:

- Demonstrate knowledge of copper pipe, tubing and fittings.
- Demonstrate knowledge of the procedures used to install copper pipe, tubing and fittings.

2017 Red Seal Occupational Standard Reference:

11.03 Installs copper pipe, tube and fittings.

Suggested Hours:

7 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with copper pipe, tubing and fittings.

2. Identify hazards and describe safe work practices related to installing copper pipe, tubing and fittings.

3. Identify codes, standards and regulations pertaining to copper pipe, tubing and fittings.

4. Identify information pertaining to copper pipe and tubing installation found on drawings and specifications.

5. Identify types of copper pipe and tubing and describe their applications.

6. Identify tools and equipment for installing copper pipe, tubing and fittings and describe their applications and procedures for use.

7. Describe the procedures used to install copper pipe, tubing and fittings.

8. Describe connection types related to copper pipe.

i) soldering
ii) brazing
iii) using grooved couplings
iv) compression type fittings

9. Explain the effect of electrolysis on piping and tubing materials.

10. Identify friction loss as it applies to copper pipe and tubing, and hydraulically calculated systems.

11. Identify the design considerations for installing copper pipe, tubing and fittings.

12. Describe the procedures used to prepare and assemble flare and compression joints using hand tools.

13. Describe the procedures to apply mathematical concepts to copper pipe, tubing and fittings.
    i) converting decimal feet in a linear measurement
    ii) metric and imperial conversions
    iii) geometry
    iv) fitting allowances
    v) bending allowances
    vi) Pythagorean theorem
    vii) pipe layout

Practical Objectives

1. Perform prep, cut, bend and assemble copper pipe, tubing and fittings.

SSI-150 Sprinkler Heads and Nozzles

Learning Outcomes:

- Demonstrate knowledge of sprinklers and nozzles and their selection.
- Demonstrate knowledge of the procedures used to install sprinklers and nozzles.

2017 Red Seal Occupational Standard Reference:

12.01 Selects sprinklers.
12.02 Installs sprinklers and nozzles.

Suggested Hours:

40 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with sprinklers and nozzles.

2. Identify hazards and describe safe work practices pertaining to sprinklers and nozzles.

3. Identify codes, standards and regulations pertaining to sprinklers and nozzles.

4. Identify information pertaining to sprinklers and nozzles found on drawings, specifications and listings.

5. Identify tools and equipment relating to sprinklers and nozzles, and describe their applications and procedures for use.

6. Explain the operation of sprinklers and nozzles in systems.

7. Identify types of sprinklers and nozzles, and describe their characteristics and applications.
   i) automatic sprinklers
      - solder

- bulb
- open

ii) standard spray sprinklers
- upright
- pendant
- sidewall

iii) extended coverage sprinklers
- pendant
- upright
- sidewall

iv) specialty sprinklers and nozzles
- residential
- institutional
- CMSA/large drop
- ESFR, in-rack
- attic
- old-style/conventional
- open sprinkler
- window
- dry
- foam
- CO^2
- clean agent
- combustible concealed space

v) flexible sprinkler assemblies

8. Identify conditions, hazard classification and commodity classification for selecting sprinklers.

i) conditions
- freezing
- excessive heat
- corrosive environment

ii) commodity classification
- high pile storage
- in-rack
- solid pile

9. Explain the importance of correct positioning for sprinklers and nozzles.

10. Identify required distances between standard spray and extended coverage sprinklers based on occupancy classification, manufacturers' specifications and National Fire Protection Association (NFPA) standards.
    i) occupancy classifications
        - light hazard
        - ordinary hazard
        - extra hazard

11. Identify obstructions of sprinklers and nozzles.

12. Identify clearances required between piled storage materials and sprinkler deflectors.

13. Identify the factors that affect maximum ceiling temperature.

14. Identify temperature ratings and colour coding.
    i) ordinary
    ii) intermediate
    iii) high
    iv) extra-high

15. Identify performance characteristics that apply to automatic sprinklers.
    i) deflector design/spray patterns
    ii) orifice size
    iii) temperature rating
    iv) temperature sensitivity
    v) orientation

16. Describe the procedures used to install sprinklers and nozzles.

17. Describe the procedures used and the factors to consider to protect, handle and care for sprinklers and nozzles prior to and during the installation process.

Practical Objectives

N/A

SSI-155 Supports and Hangers

Learning Outcomes:

- Demonstrate knowledge of supports and hangers, their characteristics and applications.
- Demonstrate knowledge of the procedures used to install supports and hangers.

2017 Red Seal Occupational Standard Reference:

12.04 Installs supports and hangers.

Suggested Hours:

17 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with supports and hangers.

2. Identify hazards and describe safe work practices pertaining to supports and hangers.

3. Identify codes, standards and regulations pertaining to supports and hangers.

4. Identify information pertaining to supports and hangers found on drawings and specifications.

5. Identify the factors to consider to perform grade and hanger location calculations.
   i) grade on pipe
   ii) slope of ceiling
   iii) hanger spacing
   iv) distance from hanger to attachment points
   v) surge restraints

6. Identify tools and equipment relating to supports and hangers, and describe their applications and procedures for use.
   i) hammer drills
   ii) adjustable wrenches
   iii) hacksaws
   iv) pliers

7. Identify types of supports and hangers used in the installation of pipe, tube and tubing, and describe their characteristics and applications.
   i) supports
      - ceiling flanges
      - side beam attachments
      - c-clamps
   ii) hangers
      - riser clamps
      - pipe clamps
      - swivel rings
      - clevis
      - split rings

8. Identify types and sizes of hanger rods, and describe their characteristics and applications.

9. Identify types of protective materials applied to hangers, and describe their purpose and applications.

10. Identify types of fasteners and inserts, and describe their characteristics and applications.

11. Describe the procedures used to install supports and hangers.

12. Describe the procedures used to install fasteners into structure material.

13. Describe the procedures to apply mathematical concepts to hangers, supports and bracing
   i) converting decimal feet in a linear measurement
   ii) metric and imperial conversions
   iii) geometry
   iv) Pythagorean theorem
   v) pipe layout

vi) trapeze

Practical Objectives

N/A

SSI-160 Pipe Design and Installation I

Learning Outcomes:

- Demonstrate knowledge of the procedures to plan and organize jobs.
- Demonstrate knowledge of procedures to receive materials.
- Demonstrate knowledge of procedures used to plan for and prepare work sites.
- Demonstrate knowledge of procedures used to store, secure, organize and maintain materials.
- Demonstrate knowledge of sprinkler system layout.
- Demonstrate knowledge of the tools, materials and procedures used to prepare pipe fittings.
- Demonstrate knowledge of the tools, equipment, materials used to cut, grind, groove, thread, bend, paint and label pipe and tube.
- Demonstrate knowledge of the procedures to cut, grind, groove, thread, bend, paint and label pipe and tube.
- Demonstrate knowledge of pipe sleeves and their installation.

2017 Red Seal Occupational Standard Reference:

3.04 Plans job tasks and procedures.
3.05 Prepares work site.
3.06 Performs layout of systems.
10.01 Cuts pipe and tube.
10.02 Bends pipe and tube.
10.03 Threads pipe.
10.04 Grooves pipe.
10.05 Drills pipe and tube.
10.06 Grinds pipe.
10.07 Prepares fittings.
11.04 Paints and labels pipe and tube.
12.03 Installs sleeves.

Suggested Hours:

17 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with pipe design and installation.
   - i) cutting pipe and tube
   - ii) grinding pipe
   - iii) grooving pipe
   - iv) threading pipe
   - v) drilling pipe and tube
   - vi) bending pipe and tube
   - vii) pipe fittings
   - viii) sleeves
   - ix) painting and labeling pipe and tube
   - x) job planning activities
   - xi sprinkler system layout

2. Identify hazards and describe safe work practices pertaining pipe design and installation.

3. Identify codes, standards and regulations pertaining to pipe design and installation.

4. Identify tools and equipment relating to pipe design and installation, and describe their applications and procedures for use.

5. Identify information pertaining to pipe design and installation found on drawings and specifications.

6. Identify the factors to consider for determining pipe design and installation requirements.

7. Describe the procedures used to cut pipe and tube to required dimensions.

8. Describe the procedures used to grind pipe.

9. Describe the procedures used to groove pipe.

10. Describe the procedures used to thread pipe.

11. Describe the procedures used to drilling pipe and tube.

12. Describe the procedures used to bend pipe and tube to required dimensions.

13. Describe the procedures used to prepare pipe fittings.

14. Describe the procedures used to size and install pipe sleeves.

15. Describe the procedures and materials used to paint and label pipe and tube.

16. Describe the procedures used to plan job tasks.

17. Describe the procedures used to lay out sprinkler systems and components.

18. Describe the procedures used to prepare work sites.

19. Describe the procedures used to and verify delivered materials.

20. Describe the procedures used to receive, store, secure, organize materials and maintain inventory.

21. Describe the procedures to apply mathematical concepts to pipe design and installation.
    - i) converting decimal feet in a linear measurement
    - ii) metric and imperial conversions
    - iii) geometry
    - iv) fitting allowances
    - v) bending allowances
    - vi) Pythagorean theorem
    - vii) pipe layout

Practical Objectives

1. Perform pipe installation and assembly.

SSI-165 Soldering, Brazing and Oxy-Acetylene Cutting

Learning Outcomes:

- Demonstrate knowledge of soldering and brazing equipment, applications and procedures.
- Demonstrate knowledge of the procedures used to grind pipe.
- Demonstrate knowledge of the procedures used to braze and solder joints.

2017 Red Seal Occupational Standard Reference:

2.06 Uses soldering and brazing equipment.
10.06 Grinds pipe.
11.03 Installs copper pipe, tube and fittings.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with soldering, brazing and oxy-acetylene cutting.

2. Identify hazards and describe safe work practices pertaining to soldering, brazing and oxy-acetylene cutting.

3. Identify codes, standards and regulations pertaining to soldering, brazing and oxy-acetylene cutting.

4. Interpret information pertaining to soldering, brazing and oxy-acetylene cutting found on drawings and specifications.

5. Identify types of soldering, brazing and oxy-acetylene equipment and consumables.
   i) oxy-fuel and air-fuel torches
   ii) gas cylinders
   iii) torch heads and tips

iv) brazing alloy and flux
v) soldering alloy and flux
vi) sand cloth
vii) gases (oxygen, acetylene, MAPP, propane, butane)

6. Identify different soldering and brazing processes and applications.

7. Describe the procedures to use oxy-acetylene equipment.

8. Describe the procedures used to solder and braze joints.

9. Describe the procedures used to inspect, maintain and store soldering, brazing and oxy-acetylene equipment.

Practical Objectives

1. Perform soldering and brazing on various types of pipe

SSI-170 Wet Pipe Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of wet pipe systems, and their operation and characteristics.
- Demonstrate knowledge of the procedures used to install wet pipe systems and components.

2017 Red Seal Occupational Standard Reference:

13.01 Installs wet pipe systems.

Suggested Hours:

17 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with wet pipe systems.

2. Identify hazards and describe safe work practices pertaining to wet pipe systems.

3. Identify codes, standards and regulations pertaining to wet pipe systems.

4. Identify information pertaining to wet pipe systems found on drawings and specifications.

5. Identify tools and equipment relating to wet pipe systems, and describe their applications and procedures for use.

6. Identify types of wet pipe systems, and describe their operating principles and characteristics.
   i) tree
   ii) gridded
   iii) looped

7. Identify wet pipe system components, and describe their location, purpose and operation.
    i) fire department connection
    ii) test connections and drains
    iii) sprinklers, alarm devices
    iv) control valves
    v) alarm check valves
    vi) water flow alarm devices
    vii) relief valves
    viii) valves
    ix) flow switches
    x) riser manifolds
    xi) air vents

8. Identify alarm valves to be trimmed, and describe their components and relevant design characteristics.

9. Determine characteristics and application of sprinklers.

10. Identify design criteria for wet pipe systems.
    i) density
    ii) square footage
    iii) occupancy classifications

11. Identify drainage requirements for each water-based system.

12. Describe the procedures used to layout and install wet pipe systems and their components.

13. Describe the procedures used to install alarm valve trim.

14. Identify the factors to consider and requirements for installing auxiliary drains on wet pipe systems.

15. Describe the preventative methods used to prevent false alarms.

16. Identify the requirements for pressure testing of wet pipe systems and describe the associated procedures.

17. Describe methods used to prevent freezing.

18. Describe the procedures to apply mathematical concepts to wet pipe sprinkler systems.
    i) converting decimal feet in the a linear measurement
    ii) metric and imperial conversions
    iii) geometry
    iv) Pythagorean theorem
    v) pipe layout

Practical Objectives

N/A

SSI-175 Dry Pipe Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of dry pipe systems, their operation and characteristics.
- Demonstrate knowledge of the procedures used to install dry pipe systems and their components.

2017 Red Seal Occupational Standard Reference:

13.02 Installs dry pipe systems.

Suggested Hours:

20 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with dry pipe systems.

2. Identify hazards and describe safe work practices pertaining to dry pipe systems.

3. Identify codes, standards and regulations pertaining to dry pipe systems.

4. Identify information pertaining to dry pipe systems found on drawings and specifications.

5. Identify tools and equipment relating to dry pipe systems, and describe their applications and procedures for use.

6. Identify types of dry pipe systems, and describe their operating principles and characteristics.
   i) tree
   ii) looped

7. Identify dry pipe system components, and describe their locations, purpose and operation.

i) fire department connections
ii) test connections and drains
iii) water flow alarm devices
iv) control valves
v) dry pipe valves
vi) regulated air supply
vii) regulated nitrogen supply
viii) valves
ix) qods
x) anti-flooding devices
xi) auxiliary drains
xii) drum drips
xiii) high/low supervisory devices
xiv) pressure gauges

8. Identify dry pipe valves to be trimmed, and describe their components and design characteristics.

9. Identify the factors to consider and requirements for installing auxiliary drains on dry pipe systems.

10. Identify the requirements for pressure testing of dry pipe systems, and describe the associated procedures.

11. Describe the procedures used to layout and install dry pipe systems and components.
    i) grade pipe mains and branch lines
    ii) low point drains

12. Describe the procedures used to install dry pipe valve trim.

13. Describe the preventative methods used to prevent false alarms.
    i) air and nitrogen supply
    ii) air dryer
    iii) air maintenance device

14. Identify calculations pertaining to capacity of dry pipe systems and air or nitrogen supply.

15. Describe the procedures to apply mathematical concepts to dry pipe sprinkler systems.
    i) converting decimal feet in a linear measurement
    ii) metric and imperial conversions
    iii) geometry
    iv) Pythagorean theorem
    v) pipe layout

Practical Objectives

1. Reset a dry pipe valve (DPV).

SSI-180 Antifreeze Sprinkler Systems

Learning Outcomes:

- Demonstrate knowledge of antifreeze systems, their operation and characteristics.
- Demonstrate knowledge of the procedures to install and maintain antifreeze systems.

2017 Red Seal Occupational Standard Reference:

13.03 Installs antifreeze systems.

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with antifreeze systems.

2. Identify hazards and describe safe work practices pertaining to antifreeze systems.

3. Identify codes, standards and regulations pertaining to antifreeze systems.

4. Identify information pertaining to antifreeze systems found on drawings and specifications.

5. Identify tools and equipment relating to antifreeze systems, and describe their applications and procedures for use.

6. Identify the factors to consider for determining the need for freezing protection or antifreeze systems.
   i) location
   ii) accessibility
   iii) cost

7. Identify types of antifreeze systems and their components, and describe their purpose and applications.
   i) configuration
   ii) types of solutions
   iii) temperature mixtures

8. Identify types and mixtures 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 valves required for antifreeze systems.

11. Identify installation requirements for antifreeze systems.
   i) antifreeze loop
   ii) cross-connection control

12. Describe the procedures used to test and maintain antifreeze systems.

13. Identify the requirements for pressure testing of antifreeze systems, and describe the associated procedures.

Practical Objectives

N/A

SSI-185 Pre-Action Systems I

Learning Outcomes:

- Demonstrate knowledge of pre-action systems, their applications and operating principles.

2017 Red Seal Occupational Standard Reference:

13.04 Installs pre-action systems.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with pre-action systems.

2. Identify hazards and describe safe work practices pertaining to pre-action systems.

3. Identify codes, standards and regulations pertaining to pre-action systems.

4. Identify 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) pre-action systems
     - non-interlock
     - single interlock
     - double interlock
   - ii) applications

- computer rooms
- freezers
- aircraft hangers
- electrical rooms

7. Identify trim components used on pre-action valves, and describe their design variations and applications.

8. Identify types of alarms that a pre-action valve will operate.
   i) solenoid actuators
   ii) diaphragm actuators

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.

Practical Objectives

N/A

SSI-190 Deluge Systems I

Learning Outcomes:

- Demonstrate knowledge of deluge systems, their applications and operating principles.

2017 Red Seal Occupational Standard Reference:

13.04 Installs deluge systems.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with deluge systems.

2. Identify hazards and describe safe work practices pertaining to deluge systems.

3. Identify codes, standards and regulations pertaining to deluge systems.

4. Identify 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.
   - i) deluge systems
     - deluge
     - high speed deluge
   - ii) applications
     - aircraft hangers
     - petro-chemical

- mining
- pulp and paper
- theatrical stages
- marine
- wharfs
- transformers

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.
   i) solenoid actuators
   ii) diaphragm actuators

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 deluge systems.

Practical Objectives

N/A

SSI-195 System Drainage I

Learning Outcomes:

- Demonstrate knowledge of system drainage.

2017 Red Seal Occupational Standard Reference:

12.07 Installs system drainage.

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with system drainage.

2. Identify hazards and describe safe work practices pertaining to system drainage.

3. Identify tools and equipment relating to system drainage, and describe their applications and procedures for use.

4. Identify types of system drainage, and describe their operating principles and characteristics.
   i) main
   ii) auxiliary
   iii) sectional

5. Identify grading requirements for system drainage.

6. Identify system drainage components and their applications.
   i) drain valves
   ii) drain cups
   iii) air gaps
   iv) drum drip

7. Describe the procedures to apply mathematical concepts to systems of drainage.
   i) converting decimal feet in a linear measurement
   ii) metric and imperial conversions
   iii) geometry
   iv) Pythagorean theorem
   v) pipe layout

Practical Objectives

N/A

SSI-600 Principles of Electricity

Learning Outcomes:

- Demonstrate knowledge of the basic concepts of electricity.

2017 Red Seal Occupational Standard Reference:

N/A

Suggested Hours:

4 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with electricity as related to the trade.

2. Identify hazards and describe safe work practices pertaining to electricity.

3. Identify electrical-related information found on drawings and specifications.

4. Identify tools and equipment used to test electrical circuits, and describe their applications and procedures for use.

5. Identify and explain Ohm's law.

6. Identify types of current and describe their characteristics and applications.
   i) direct current (DC)
   ii) alternating current (AC)

7. Identify types of electrical circuits and describe their characteristics, operation and applications.
   i) series
   ii) parallel
   iii) series-parallel

8. Identify types of related electrical equipment and components, and describe their characteristics, operation and applications.

Practical Objectives

1. Use a multimeter.

Level 2

SSI-200 Pipe Design and Installation II

Learning Outcomes:

- Demonstrate knowledge of the procedures to plan and organize jobs.
- Demonstrate knowledge of procedures to receive materials.
- Demonstrate knowledge of procedures used to plan for and prepare work sites.
- Demonstrate knowledge of procedures used to store, secure, organize and maintain materials.
- Demonstrate knowledge of sprinkler system layout.
- Demonstrate knowledge of the procedures to paint and label pipe and tube.
- Demonstrate knowledge of pipe sleeves and their installation.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
3.04 Plans job tasks and procedures.
3.05 Prepares work site.
3.06 Performs layout of systems.
11.04 Paints and labels pipe and tube.
12.03 Installs sleeves.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with pipe design and installation.
   i) sleeves
   ii) painting and labeling pipe and tube
   iii) job planning activities
   iv) sprinkler system layout

2. Identify hazards and describe safe work practices pertaining to pipe design and installation.

3. Identify codes, standards and regulations pertaining to pipe design and installation.

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. Identify the factors to consider for determining pipe design and installation requirements.

7. Describe and apply mathematical concepts related to pipe design and installation.

8. Describe the procedures used to size and install pipe sleeves.

9. Describe the procedures and materials used to paint and label pipe and tube.

10. Describe the procedures used to plan job tasks.

11. Describe the procedures used to lay out sprinkler systems and components.

12. Describe the procedures used to prepare work sites.

13. Describe the procedures used to and verify delivered materials.

14. Describe the procedures used to receive, store, secure, organize materials and maintain inventory.

Practical Objectives

1. Calculate friction loss on sprinkler system types of pipe.

SSI-205 Drawings II

Learning Outcomes:

- Demonstrate knowledge of sprinkler system drawings and on-site drawings.
- Demonstrate knowledge of the procedures to read and interpret drawings and on-site drawings.
- Demonstrate knowledge of the procedures to draw and label orthographic and isometric drawings.
- Demonstrate knowledge of the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings.

2017 Red Seal Occupational Standard Reference:

3.02 Uses drawings and specifications.

Suggested Hours:

23 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with reading and sketching drawings.

2. Explain the fundamentals of orthographic and isometric projections.

3. Identify types of lines found on sprinkler system drawings.
   - i) object (visible)
   - ii) hidden
   - iii) center
   - iv) dimension
   - v) extension
   - vi) section cutting
   - vii) material section

4. Identify symbols found on sprinkler system drawings.

5. Identify types of views found on sprinkler system drawings.
   i) plan
   ii) elevation
   iii) sections
   iv) details

6. Identify types of scales and describe their characteristics and applications.
   i) metric scale (S.I.)
   ii) architect scale (imperial)
   iii) engineer scales

7. Identify drafting tools and drawing equipment, and describe their applications and procedures for use.

8. Identify divisions of drawings, and describe their purpose.
   i) architectural
   ii) structural
   iii) mechanical
   iv) electrical
   v) plot
   vi) specifications
   vii) schedules

9. Identify views and drawings of a building, and describe their purpose.

10. Describe the procedures used to interpret sprinkler systems information found on drawings.

11. Describe the procedures used to interpret dimensions on drawings.

12. Describe the procedures used to interpret a site plan in both metric and imperial units.

13. Describe the procedures used to create orthographic and isometric drawings.

14. Describe the procedures used to interpret metric and imperial scaling.

15. Describe the procedures used to prepare orthographic and isometric sketches.

16. Describe the procedures used to prepare single line pipe drawings such as orthographic and isometric.

Practical Objectives

1. Produce isometric drawings.

2. Scale drawings and sketches.

3. Perform take-offs.

SSI-210 System Drainage II

Learning Outcomes:

- Demonstrate knowledge of system drainage, and its operation and characteristics.
- Demonstrate knowledge of the procedures to install system drainage and components according to code requirements.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
12.07 Installs system drainage.

Suggested Hours:

11 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with system drainage.

2. Identify hazards and describe safe work practices pertaining to system drainage.

3. Identify codes, standards and regulations pertaining to system drainage.

4. Interpret information pertaining to system drainage found on drawings and specifications.

5. Identify tools and equipment relating to system drainage, and describe its applications and procedures for use.

6. Identify types of system drainage, and describe its operating principles and characteristics.
   i) main
   ii) auxiliary

iii) sectional

7. Identify system drainage components, and describe its location, purpose and operation.
   i) drain valves
   ii) drain cups
   iii) air gaps

8. Describe the procedures used to layout and install system drainage and components.

9. Describe and apply mathematical concepts related to system drainage.

Practical Objectives

N/A

SSI-215 Commissioning Water Supply Systems I

Learning Outcomes:

- Demonstrate knowledge of the procedures used to commission water supply systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
4.01 Commissions water supply systems.

Suggested Hours:

13 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with participating in the commissioning of water supply systems.

2. Identify workplace hazards and describe safe work practices pertaining to participating in the commissioning of water supply systems.

3. Identify codes, standards and regulations pertaining to participating in the commissioning of water supply systems.

4. Interpret information pertaining to participating in the commissioning of water supply systems found on drawings and specifications.

5. Identify tests to be performed on water supply systems.

6. Describe the procedures used to commission water supply systems.

7. Calculate flow rates and discharge pressures.

Practical Objectives

N/A

SSI-220 Commissioning Fire Protection Systems I

Learning Outcomes:

- Demonstrate knowledge of the procedures used to commission fire protection systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
4.02 Commissions fire protection systems.

Suggested Hours:

13 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with participating in the commissioning of fire protection systems.

2. Identify safety hazards and describe safe work practices pertaining to participating in the commissioning of fire protection systems.

3. Identify codes, standards and regulations pertaining to participating in the commissioning of fire protection systems.

4. Interpret information pertaining to participating in the commissioning of fire protection systems found on drawings and specifications.

5. Identify tests and checks to be performed on fire protection systems.

6. Describe the procedures used to commission fire protection systems.

Practical Objectives

N/A

SSI-225 Seismic Protection

Learning Outcomes:

- Demonstrate knowledge of the procedures used to select and locate sway/seismic bracing.
- Demonstrate knowledge of the procedures used to install sway/seismic bracing.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
12.05 Installs seismic-protection.

Suggested Hours:

14 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with sway/seismic bracing.

2. Identify hazards and describe safe work practices pertaining to sway/seismic bracing.

3. Identify codes, standards and regulations pertaining to sway/seismic bracing.

4. Interpret information pertaining to sway/seismic bracing found on drawings and specifications.

5. Identify tools and equipment relating to sway/seismic bracing, and describe their applications and procedures for use.

6. Identify types of sway/seismic bracing, and describe their purpose and applications.

7. Identify types of fasteners and inserts, and describe their characteristics and applications.

8. Describe the procedures used to install sway/seismic bracing assemblies.

9. Describe the procedures used to install fasteners and inserts.

10. Describe the procedures used to install flexible joints.

11. Describe and apply mathematical concepts related to seismic protection.
    i) converting decimal feet in a linear measurement
    ii) geometry
    iii) Pythagorean theorem
    iv) pipe layout

Practical Objectives

N/A

SSI-230 Cross-Connection Control

Learning Outcomes:

- Demonstrate knowledge of cross-connection control assemblies, their applications and operating principles.
- Demonstrate knowledge of the procedures used to install cross-connection control assemblies.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
12.06 Installs cross-connection control assemblies.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with cross-connection control assemblies.

2. Identify types of cross-connection control assemblies, and describe their characteristics, purpose and operation.
   i) reduced pressure backflow (RP)
   ii) double check valve assembly (DCVA)

3. Identify hazards and describe safe work practices pertaining to cross-connection control assemblies.

4. Identify codes, standards and regulations pertaining to cross-connection control assemblies.

5. Identify training and certification requirements regarding testing of cross-connection control assemblies.

6. Interpret information pertaining to cross-connection control assemblies found on drawings and specifications.

7. Identify tools and equipment pertaining to cross-connection control assemblies, and describe their applications and procedures for use.

8. Identify the factors to consider for selecting and installing cross-connection control assemblies.

9. Describe the procedures used to install cross-connection control assemblies.

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Practical Objectives

N/A

SSI-235 Standpipe and Hose Systems

Learning Outcomes:

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

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
13.06 Installs standpipe systems.

Suggested Hours:

25 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with standpipe and hose systems.

2. Identify hazards and describe safe work practices pertaining to standpipe and hose systems.

3. Identify codes, standards and regulations pertaining to standpipe and hose systems.

4. Identify code requirements pertaining to flushing connections in piping systems.

5. Interpret information pertaining to 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 1
   ii) class 2
   iii) class 3

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
   vi) semi-automatic dry

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
   vi) AHJ
   vii) gauge location

10. Identify types of hoses, hose valves and associated fittings, and describe their characteristics and applications.

11. Identify types of hose cabinets and hose stations.

12. Identify types of hose spray nozzles, and describe their applications.

13. Describe the procedures used to lay out standpipe and hose systems.

14. Describe the procedures used to install hose cabinets and stations, 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 pressure testing of standpipe and hose systems, and describe the associated procedures.

18. Describe and apply mathematical concepts related to standpipe and hose systems.
    i) converting decimal feet in a linear measurement
    ii) geometry
    iii) Pythagorean theorem
    iv) pipe layout

Practical Objectives

N/A

SSI-240 Water Supply, Hydrants and Fire Department Connections

Learning Outcomes:

- Demonstrate knowledge of safety procedures and requirements for trenching and backfilling.
- Demonstrate knowledge of communication practices for trenching and backfilling.
- Demonstrate knowledge of clearances and tolerances for underground piping.
- Demonstrate knowledge of water source connections for underground piping.
- Demonstrate knowledge of underground piping and their components' installation procedures.
- Demonstrate knowledge of flushing requirements of underground systems.
- Demonstrate knowledge of safe work procedures for flushing of underground systems.
- Demonstrate knowledge of fire department equipment and their installation procedures.
- Demonstrate knowledge of fire department equipment and their installation procedures.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
6.01 Supervises trenching and backfilling
6.02 Installs underground piping and components.
6.03 Flushes underground system.
8.01 Determines location, size and type of fire department connections.
8.02 Installs fire department connection piping and components.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with water supply, hydrants and fire department connections.

2. Identify worksite 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. Identify 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.
   i) pitot tube
   ii) fire hoses
   iii) fire hydrant wrenches
   iv) diffusers
   v) burlap sack and tie wires
   vi) cut-off saws
   vii) portable grinders
   viii) torque wrenches
   ix) pry bars
   x) measuring devices
   xi) levels
   xii) straight edges

6. Identify types of access equipment related to trenching and backfilling.

7. Identify types of water supply, hydrants and fire department connections, and describe their purpose and their installation requirements.
   i) water supply
      - municipal water supply
      - raw water sources
      - tanks
      - cisterns
   ii) fire department hose connections

- National Hose Standard (NHS)
- Canadian Standards Association (CSA)
- Storz

iii) installation requirements
- requirements for check valves
- placement of fire department connections
- requirements for drainage of fire department connections
- requirements for hose thread connections (AHJ)

8. Identify required flow rates for flushing of underground systems.

9. Identify required proximity of fire department connections in relation to hydrants.

10. Describe audible/visual procedures for communicating during trenching and backfilling.

11. Describe shoring requirements and piping requirements for water supply, hydrants and fire department connections.

12. Describe site conditions that affect trenching and backfilling.

13. Describe the procedures used to flush underground systems.

14. Describe 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

15. Describe and apply mathematical concepts related to water supply, hydrants and fire department connections.
i) converting decimal feet in a linear measurement
ii) geometry
iii) Pythagorean theorem
iv) pipe layout

Practical Objectives

1. Assemble underground piping.

2. Flow testing.

3. Flush and treat an underground system.

SSI-245 Detection Devices

Learning Outcomes:

- Demonstrate knowledge of the procedures used to install, test and maintain wet and dry pilot lines and their associated pilot line detectors.
- Demonstrate knowledge of the procedures used to install, test and maintain heat-actuated devices (HADs) and their associated components.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
15.01 Installs wet and dry pilot lines.
15.02 Installs heat-actuated devices. (HADs)

Suggested Hours:

14 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with wet and dry pilot lines.

2. Define terminology associated with heat-actuated devices (HADs).

3. Identify hazards and describe safe work practices pertaining to wet and dry pilot lines.

4. Identify hazards and describe safe work practices pertaining to HADs.

5. Identify codes, standards and regulations pertaining to wet and dry pilot lines.

6. Identify codes, standards and regulations pertaining to HADs.

7. Interpret information pertaining to wet and dry pilot lines, found on drawings and specifications.

8. Interpret information pertaining to HADs, found on drawings and specifications.

9. Identify tools and equipment relating to wet and dry pilot lines, and describe their applications and procedures for use.

10. Identify tools and equipment relating to HADs, and describe their applications and procedures for use.

11. Identify types of wet and dry pilot lines and their components, and describe their characteristics, parameters and applications.

12. Identify types of HADs and describe their characteristics, parameters and applications.
    i) types of HADs
        - fixed temperature
        - rate of rise detectors
        - linear heat detector
    ii) parameters
        - spacing
        - temperature
        - type

13. Describe the procedures used to install, test and maintain wet and dry pilot lines.

14. Describe the procedures used to install, test and maintain HADs.

Practical Objectives

N/A

SSI-250 Signal-Initiating Devices

Learning Outcomes:

- Demonstrate knowledge of the procedures used to test alarm-initiating devices.
- Demonstrate knowledge of procedure used to install alarm-initiating devices.
- Demonstrate knowledge of procedures used to maintain alarm-initiating devices.
- Demonstrate knowledge of the procedures used to test supervisory-initiating devices.
- Demonstrate knowledge of procedure used to install supervisory-initiating devices.
- Demonstrate knowledge of procedures used to maintain supervisory-initiating devices.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
16.01 Installs alarm-initiating devices.
16.02 Installs supervisory-initiating devices.

Suggested Hours:

16 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with signal-initiating devices.

2. Identify hazards and describe safe work practices pertaining to signal-initiating devices.

3. Identify codes, standards and regulations pertaining to signal-initiating devices.

4. Interpret information pertaining to signal-initiating devices found on drawings and specifications.

5. Identify tools and equipment relating to signal-initiating devices, and describe their applications and procedures for use.

6. Identify types of signal-initiating devices, and describe their applications and operating principles.
   i) alarm-initiating devices
      - paddle-type flow switches
      - pressure switches
   ii) supervisory-initiating devices
      - low air pressure
      - low water pressure
      - tamper (switches)

7. Describe the procedures used to install signal-initiating devices.

8. Describe the procedures used to test and maintain signal-initiating devices.

9. Identify installation locations for signal-initiating devices.

Practical Objectives

1. Adjust a pressure switch.

2. Troubleshoot signal-initiating devices using multimeters.

SSI-255 Pre-Action Systems II

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.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
13.04 Installs pre-action/deluge systems.

Suggested Hours:

28 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with pre-action systems.

2. Identify hazards and describe safe work practices pertaining to pre-action systems.

3. Identify 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) pre-action systems

- non-interlock
- single interlock
- double interlock

ii) applications
- computer/data rooms
- freezers
- aircraft hangers
- electrical rooms

7. Identify trim components used on pre-action valves, and describe their design variations and applications.

8. Identify types of alarms that a pre-action valve will operate.
   i) solenoid actuators
   ii) diaphragm actuators

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. Describe the procedures used to install system controls required for pre-action systems.

12. Explain 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 service and maintain pre-action systems.

16. Identify the requirements for functional and pressure testing of pre-action systems and describe the associated procedures.

17. Describe and apply mathematical concepts related to applications and pre-action systems.

i) converting decimal feet in a linear measurement
ii) geometry
iii) Pythagorean theorem
iv) pipe layout

Practical Objectives

1. Trim, test and reset a valve**.**

SSI-260 Deluge Systems II

Learning Outcomes:

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

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
13.04 Installs pre-action/deluge systems.

Suggested Hours:

26 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with deluge systems.

2. Identify hazards and describe safe work practices pertaining to deluge systems.

3. Identify 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.
   i) deluge systems
      - deluge

- high speed deluge

ii) applications
- aircraft hangers
- petro-chemical
- mining
- pulp and paper
- theatrical stages
- marine
- wharfs
- transformers

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.
   i) solenoid actuators
   ii) diaphragm actuators

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 deluge systems.

11. Describe the procedures used to install system controls required for deluge systems.

12. Explain the requirements for drainage of deluge systems.

13. Describe the procedures used to lay out and install deluge systems.

14. Describe the procedures used to trim deluge valves.

15. Describe the procedures used to service and maintain deluge systems.

16. Identify the requirements for functional and pressure testing of deluge systems and describe the associated procedures.

17. Describe and apply mathematical concepts related to application deluge systems.
    i) converting decimal feet in a linear measurement
    ii) geometry
    iii) Pythagorean theorem
    iv) pipe layout

Practical Objectives

1. Trim, test and reset a valve.

Level 3

SSI-300 Portable Fire Extinguishers

Learning Outcomes:

- Demonstrate knowledge of procedures and requirements used to install portable fire extinguishers.
- Demonstrate knowledge of the procedures used to inspect and maintain portable fire extinguishers.

2017 Red Seal Occupational Standard Reference:

14.02 Installs portable extinguishers.
18.03 Inspects portable fire extinguishers.

Suggested Hours:

8 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with portable fire extinguishers.

2. Identify hazards and describe safe work practices pertaining to portable fire extinguishers.

3. Identify 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.
   i) wet and dry chemical

ii) carbon dioxide
iii) water-based
iv) clean agent

7. Identify the components of portable fire extinguishers.

8. Identify the installation requirements and procedures for portable fire extinguishers and cabinets.

9. Identify installation locations for portable fire extinguishers.
   i) cabinet
   ii) wall-mount
   iii) wheeled

10. Describe the procedures used to operate portable fire extinguishers.

11. Describe the liabilities and responsibilities for the installation of portable fire extinguishers.

12. Describe the procedures used to inspect and service portable fire extinguishers

Practical Objectives

N/A

SSI-305 Fire Pumps & Controllers

Learning Outcomes:

- Demonstrate knowledge of pumps, drivers, controllers and components.
- Demonstrate knowledge of water source connections.
- Demonstrate knowledge of the procedures used to install fire pumps.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
7.01 Determinates location of pumps, drivers, controllers and components.
7.02 Installs pumps, drivers, controllers and components.

Suggested Hours:

24 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with locating and installing pumps, drivers, controllers and components.

2. Identify hazards and describe safe work practices pertaining to locating and installing pumps, drivers, controllers and components.
   i) personal safety
   ii) safety of infrastructure
   iii) environmental requirements

3. Identify codes, standards and regulations pertaining to locating and installing pumps, drivers, controllers and components.

4. Interpret information pertaining to locating and installing pumps, drivers, controllers and components, found on drawings and specifications.

5. Identify tools and equipment relating to locating and installing pumps, drivers, controllers and components, and describe their applications and procedures for use.
   i) measuring devices
   ii) chalk lines
   iii) laser levels
   iv) straight edges
   v) hoisting equipment

6. Identify types of water supplies used for fire pump installations and system demand requirements.
   i) municipal
   ii) limited (tanks, reservoirs)
   iii) raw water

7. Identify the requirements of cross-connection control as they relate to fire pump demand.

8. Identify fire pump components.
   i) sensing lines
   ii) test headers
   iii) flow meters
   iv) by-pass connections
   v) relief valves
   vi) controller cabinets
   vii) suction and discharge piping
   viii) anti-vortex plate

9. Identify types of fire pumps.
   i) diesel
   ii) electric
   iii) steam

10. Describe the procedures used to install fire pumps.

11. Describe and apply mathematical concepts related to fire pumps and controllers.
   i) converting decimal feet in a linear measurement
   ii) geometry
   iii) pipe layout

Practical Objectives

1. Interpret graphs for flow calculations.

2. Plot a pump curve on a graph.

SSI-310 Private Water Supply Systems

Learning Outcomes:

- Demonstrate knowledge of water tanks and related equipment.
- Demonstrate knowledge of the procedures used to install of water tanks and related equipment.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
9.01 Installs water tanks.
9.02 Installs related equipment.

Suggested Hours:

16 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with water tanks and related equipment.

2. Identify hazards and describe safe work practices pertaining to water tanks and related equipment.

3. Identify codes, standards and regulations pertaining to water tanks and related equipment.

4. Interpret information pertaining to water tanks and related equipment found on drawings and specifications.

5. Identify tools and equipment pertaining to water tanks and related equipment, and describe their applications and procedures for use.

6. Identify types of water tanks and related equipment, and describe their characteristics, principles of operation and applications.

i) water tanks
   - gravity
   - pressure
   - below-grade
   - residential water supply

ii) related equipment
   - overflow
   - vent
   - water level
   - drain and heating system

7. Identify types of water supplies, and describe their purpose and installation requirements.
   i) water supply
      - raw water sources
      - tanks
      - cisterns

8. Identify types of water connections and their associated components.

9. Identify the methods used for protection of tanks.

10. Identify the arrangement of fire pump unit components.

11. Describe procedures used in the installation of water tanks and related equipment.

12. Describe procedures used to maintain private water supply systems.

13. Describe supply and discharge piping requirements.

14. Describe and apply mathematical concepts related to private water supply systems.
   i) converting decimal feet in a linear measurement
   ii) head pressures
   iii) water volume
   iv) unit conversion

Practical Objectives

N/A

SSI-315 Drawings III

Learning Outcomes:

- Demonstrate knowledge of sprinkler system drawings and on-site drawings.
- Demonstrate knowledge of the procedures to read and interpret drawings and on-site drawings.
- Demonstrate knowledge of the procedures to draw and label orthographic and isometric drawings.
- Demonstrate knowledge of the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings.

2017 Red Seal Occupational Standard Reference:

3.02 Uses drawings and specifications.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with reading and sketching drawings.

2. Explain the fundamentals of orthographic and isometric projections.

3. Identify types of lines found on sprinkler system drawings.
   i) object (visible)
   ii) hidden
   iii) center
   iv) dimension
   v) extension
   vi) section cutting
   vii) material section

4. Identify symbols found on sprinkler system drawings.

5. Identify types of views found on sprinkler system drawings.
   i) plan
   ii) elevation
   iii) sections
   iv) details

6. Identify types of scales and describe their characteristics and applications.
   i) metric scale (S.I.)
   ii) architect scale (imperial)
   iii) engineer scales

7. Identify drafting tools and drawing equipment, and describe their applications and procedures for use.

8. Identify divisions of drawings and describe their purpose.
   i) architectural
   ii) structural
   iii) mechanical
   iv) electrical
   v) plot
   vi) specifications
   vii) schedules

9. Identify views and drawings of a building, and describe their purpose.

10. Describe the procedures used to interpret sprinkler systems information found on drawings.

11. Describe the procedures used to interpret dimensions on drawings.

12. Describe the procedures used to interpret a site plan in both metric and imperial units.

13. Describe the procedures used to create orthographic and isometric drawings.

14. Describe the procedures used to interpret metric and imperial scaling.

15. Describe the procedures used to prepare orthographic and isometric sketches.

16. Describe the procedures used to prepare single line pipe drawings such as orthographic and isometric.

17. Describe the procedures used to perform material take-offs.

18. Describe the procedures used to create as-built drawings.

Practical Objectives

1. Generate a material take-off list.

2. Generate an as-built drawing.

SSI-320 Commissioning Water Supply Systems II

Learning Outcomes:

- Demonstrate knowledge of the procedures used to commission water supply systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
4.01 Commissions water supply systems.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with the commissioning of water supply systems.

2. Identify workplace hazards and describe safe work practices pertaining to the commissioning of water supply systems.

3. Identify codes, standards and regulations pertaining to the commissioning of water supply systems.

4. Interpret information pertaining to the commissioning of water supply 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)

vi) signal initiating devices

6. Describe the procedures used to commission water supply systems.

7. Calculate flow rates and discharge pressures.

Practical Objectives

N/A

SSI-325 Commissioning Fire Protection Systems II

Learning Outcomes:

- Demonstrate knowledge of the procedures used to commission fire protection systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
4.02 Commissions fire protection systems.

Suggested Hours:

18 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with commissioning of fire protection systems.

2. Identify safety hazards and describe safe work practices pertaining to the commissioning of fire protection systems.

3. Identify codes, standards and regulations pertaining to the commissioning of fire protection systems.

4. Interpret information pertaining to the commissioning of fire protection systems found on drawings and specifications.

5. Identify tests and checks to be performed on fire protection systems.
   i) hydrostatic
   ii) pneumatic
   iii) seal of penetrations
   iv) placement of
      - hangers
      - brackets

- supports
- restraints

v) grade/elevation
vi) flushing and swabbing
vii) labelling
viii) blank testing gaskets
ix) escutcheons
x) performance (trip test)

6. Describe the procedures used to commission fire protection systems.

Practical Objectives

N/A

MENT-701 Mentoring II

Learning Outcomes:

- Demonstrate knowledge of effective communication practices as a mentor.
- Demonstrate knowledge of strategies for teaching workplace skills.

Red Seal Occupational Standard Reference:

5.01 Uses communication techniques
5.02 Uses mentoring techniques

Suggested Hours:

6 hours

Theoretical Objectives:

1. Identify the different roles played by a workplace mentor.

2. Identify strategies to create a supportive learning environment.

3. Identify techniques for effective communication as a mentor.
   i) constructive feedback
   ii) active listening
   iii) leading meetings and one-on-one sessions

4. Describe the steps in teaching a skill.
   i) identifying the point of lesson
   ii) linking the lesson
   iii) demonstrating the skill
   iv) providing practice
   v) giving feedback
   vi) assessing skill and progress

5. Identify strategies to assist in teaching a skill while meeting individual learning needs.
   i) principles of instruction
   ii) coaching skills

6. Explain how to adjust a lesson for various situations.

SSI-335 Wet and Dry Chemical Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of wet and dry chemical systems, their applications and operating principles.
  Demonstrate knowledge of installation of wet and dry chemical systems.
- Demonstrate knowledge of procedures used to inspect and maintain wet and dry chemical systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems.

Suggested Hours:

10 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with wet and dry chemical systems.

2. Identify hazards and describe safe work practices pertaining to wet and dry chemical systems.

3. Identify codes, standards, regulations and manufacturers' specifications pertaining to wet and dry chemical systems.

4. Interpret information pertaining to wet and dry chemical systems found on drawings and specifications.

5. Identify tools and equipment relating to wet and dry chemical systems, and describe their applications and procedures for use.
   i) swabs
   ii) acetone

iii) rags

6. Identify types of wet and dry chemical systems, and describe their characteristics, operation and applications.

7. Identify applicable certification requirements pertaining to wet and dry chemical systems.

8. Identify the components of wet and dry chemical systems, and describe their purpose and operation.

9. Identify types of pipe and fittings used for wet and dry chemical systems.

10. Describe fixed pipe systems.
    i) total flooding
    ii) local application

11. Describe the operating principles and applications of wet and dry chemical systems.

12. Identify the extinguishing properties of wet and dry chemical systems.

13. Identify the factors to consider and limitations pertaining to wet and dry chemical systems.

14. Identify the installation requirements for wet and dry chemical systems.

15. Describe the procedures used to install wet and dry chemical systems.

16. Identify the requirements of inspection and acceptance testing of wet and dry chemical systems.

17. Describe the liabilities and responsibilities for the inspection and testing of wet and dry chemical systems.

18. Describe the procedures used to service, maintain and remove wet and dry chemical systems.

Practical Objectives

N/A

SSI-340 Water Mist and Hybrid Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of water mist and hybrid systems, their applications and operating principles.
- Demonstrate knowledge of procedures used to install water mist and hybrid systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
13.07 Installs water mist and hybrid systems.

Suggested Hours:

10 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with water mist and hybrid systems.

2. Identify hazards and describe safe work practices pertaining to water mist and hybrid systems.

3. Identify codes, standards and regulations pertaining to water mist and hybrid systems.

4. Interpret information pertaining to water mist and hybrid systems found on drawings and specifications.

5. Identify tools and equipment relating to water mist and hybrid systems, and describe their applications and procedures for use.

6. Identify types of water mist and hybrid systems, and describe their operating principles, characteristics and applications.
   i) single fluid
   ii) twin fluid
   iii) high pressure
   iv) medium pressure
   v) low pressure

7. Identify applicable certification requirements pertaining to water mist and hybrid systems.

8. Describe the procedures used to layout and install water mist and hybrid systems and components.

9. Identify system controls for water mist and hybrid systems and their installation requirements.
   i) materials
   ii) supports and hangers
   iii) system actuation
   iv) testing
   v) manufacturers' specifications/training
   vi) handling and storage

10. Explain the requirements for drainage of water mist and hybrid systems.

11. Identify the requirements for pressure testing of water mist and hybrid systems and describe the associated procedures.

Practical Objectives

N/A

SSI-345 Foam Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of foam systems, their applications and operating principles.
- Demonstrate knowledge of procedures used to install foam.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
13.05 Installs foam systems.

Suggested Hours:

14 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with foam systems.

2. Identify hazards and describe safe work practices pertaining to foam systems.
   i) environmental considerations
   ii) containment
   iii) disposal

3. Identify 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 types of foam systems, and describe their operating principles and applications.

7. Identify the system controls required for foam systems.

8. Identify types of concentrate used in foam systems, and describe their characteristics and applications.
   i) aircraft hangers
   ii) fuel storage tanks
   iii) chemical manufacturing and storage facilities

9. Identify supplemental fire detection systems, and describe their operating principles and applications.
   i) electric
   ii) pneumatic
   iii) hydraulic

10. Describe the procedures used to layout and install foam systems and components.

11. Describe the installation requirements of foam systems.
   i) materials
   ii) hangers
   iii) supports and bracing
   iv) system actuation
   v) testing, manufacturers' specifications

12. Describe the procedures used to fill foam concentrate tanks.

13. Describe the requirements for drainage of the system.

14. Describe the operation of a balanced pressure proportioning system.

15. Describe the procedures used to trim foam systems.

16. Describe the operation of a pressure proportioning tank with and without bladder.

17. Describe the procedures used to test and maintain foam systems.

18. Identify the requirements for pressure testing of foam systems and describe the associated procedures.

Practical Objectives

N/A

SSI-350 Carbon Dioxide Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of carbon dioxide systems and their operation and characteristics.
- Demonstrate knowledge of the procedures used to install carbon dioxide systems.
- Demonstrate knowledge of procedures used to inspect and maintain carbon dioxide systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with carbon dioxide systems.

2. Identify hazards and describe safe work practices pertaining to carbon dioxide systems.

3 Identify codes, standards, regulations and manufacturers' specifications pertaining to carbon dioxide systems.

4. Interpret information pertaining to carbon dioxide systems found on drawings and specifications.

5. Identify tools and equipment relating to carbon dioxide systems, and describe their applications and procedures for use.
   i) swabs

ii) acetone
iii) rags

6. Identify types of carbon dioxide systems, and describe their characteristics, operation and applications.

7. Identify applicable certification requirements pertaining to carbon dioxide systems.

8. Identify the components of carbon dioxide systems, and describe their purpose and operation.

9. Identify types of pipe and fittings used for carbon dioxide systems.

10. Describe fixed pipe systems.
    i) total flooding
    ii) local application

11. Identify the extinguishing properties of carbon dioxide systems.

12. Identify the factors to consider and limitations pertaining to carbon dioxide systems.

13. Identify the installation requirements for carbon dioxide systems.

14. Describe the procedures used to install carbon dioxide systems.

15. Identify the requirements of inspection and acceptance testing of carbon dioxide systems.

16. Describe the liabilities and responsibilities for the inspection and testing of carbon dioxide systems.

17. Describe the procedures used to service, maintain and remove carbon dioxide systems.

18. Describe the procedures used to calculate the quantity of carbon dioxide extinguishing agent required for a system.

Practical Objectives

N/A

SSI-355 Clean Agent Extinguishing Systems

Learning Outcomes:

- Demonstrate knowledge of clean agent systems and their operation and characteristics.
- Demonstrate knowledge of installation of clean agent systems.
- Demonstrate knowledge of procedures used to inspect and maintain clean agent systems.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems.

Suggested Hours:

8 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with clean agent systems.

2. Identify hazards and describe safe work practices pertaining to clean agent systems.

3. Identify codes, standards, regulations and manufacturers' specifications pertaining to clean agent systems.

4. Interpret information pertaining to clean agent systems found on drawings and specifications.

5. Identify tools and equipment relating to clean agent systems, and describe their applications and procedures for use.
   i) swabs
   ii) acetone

iii) rags

6. Identify types of clean agent systems, and describe their characteristics, operation and applications.

7. Identify applicable certification requirements pertaining to clean agent extinguishing systems.

8. Identify the components of clean agent systems, and describe their purpose and operation.

9. Identify types of pipe and fittings used for clean agent systems.

10. Describe fixed pipe systems.
    i) total flooding
    ii) local application

11. Identify the extinguishing properties of clean agent systems.

12. Identify the factors to consider and limitations pertaining to clean agent systems.

13. Identify the installation requirements for clean agent systems.

14. Describe the procedures used to install clean agent systems.

15. Identify the requirements of inspection and acceptance testing of clean agent systems.

16. Describe the liabilities and responsibilities for the inspection and testing of clean agent systems.

17. Describe the procedures used to service, maintain and remove clean agent systems.

18. Describe the procedures used to calculate the quantity of clean agent extinguishing agent required for a system.

Practical Objectives

N/A

SSI-360 Specialty Detection Devices

Learning Outcomes:

- Demonstrate knowledge of the procedures used to install, test and maintain spark detection systems and their associated components.
- Demonstrate knowledge of the procedures used to install, test and maintain air sampling systems and their associated components.
- Demonstrate knowledge of the procedures used to install, test and maintain electrical detection systems and their associated components.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
15.03 Installs spark detection systems.
15.04 Installs air sampling systems.
15.05 Installs electrical detection systems.

Suggested Hours:

9 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with specialty detection devices.

2. Identify hazards and describe safe work practices pertaining to specialty detection devices.

3. Identify codes, standards and regulations pertaining to specialty detection devices.

4. Interpret information pertaining to specialty detection devices found on drawings and specifications.

5. Identify tools and equipment relating to specialty detection devices, and describe their applications and procedures for use.

6. Identify types of specialty detection devices, and describe their characteristics, parameters and applications.

7. Describe the procedures used to install, test and maintain specialty detection devices.

Practical Objectives

N/A

SSI-365 Fire Protection Systems Repair and Maintenance

Learning Outcomes:

- Demonstrate knowledge of procedures and requirements used to troubleshoot, repair and maintain fire protection systems and their components.
- Demonstrate knowledge of the relationship between sprinkler systems and fire panels.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
17.01 Troubleshoots fire protection systems.
17.02 Repairs deficiencies.
17.03 Performs scheduled maintenance.

Suggested Hours:

21 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with troubleshooting, repairing and maintaining fire protection systems and their components.

2. Identify hazards and describe safe work practices pertaining to troubleshooting, repairing and maintaining fire protection systems and their components.

3. Identify codes, standards and regulations pertaining to troubleshooting, repairing and maintaining fire protection systems and their components.

4. Identify tools and equipment relating to troubleshooting, repairing and maintaining fire protection systems, and describe their applications and procedures for use.

5. Identify types of fire panels and signals, and describe their operation and purpose.
   i) fire panels
      - alarm
      - release
      - annunciator
   ii) signals
      - trouble
      - alarm
      - supervisory

6. Identify the testing and troubleshooting methods for signaling devices.

7. Identify the classifications of needed corrections and repairs, and explain the associated requirements.
   i) impairment (pre-plan and emergency)
   ii) critical deficiency
   iii) non-critical deficiency

8. Identify requirements for inspecting and testing systems that have been altered or repaired.

9. Identify common causes of fire protection system failures.

10. Identify frequency of maintenance of fire protection systems and components.

11. Describe the liabilities and responsibilities for the maintenance of fire protection systems.

12. Describe the operation of release devices.

13. Describe the procedures used to troubleshoot fire protection systems and components.

14. Describe the procedures used to repair fire protection systems and components.

15. Describe the procedures used to maintain fire protection systems and components.
   i) checking for blockage or frost plugs

ii) changing desiccant in air dryers
iii) cleaning strainers
iv) investigating obstructions
v) draining low points on dry and pre-action systems
vi) performing lubrication and corrosion prevention measures

16. Describe the procedures used to shut down and reactivate sprinkler systems and associated alarms and supervisory devices.

Practical Objectives

N/A

SSI-370 Fire Protection Systems Inspection and Testing

Learning Outcomes:

- Demonstrate knowledge of procedures and requirements used to test fire protection systems and their components.
- Demonstrate knowledge of the procedures and requirements to perform scheduled inspections of fire protection systems and their components.
- Demonstrate knowledge of the relationship between sprinkler systems and fire panels.

2017 Red Seal Occupational Standard Reference:

3.01 Interprets codes, standards, regulations and procedures.
3.03 Uses documentation and reference material.
18.01 Performs scheduled tests.
18.02 Performs scheduled inspections.

Suggested Hours:

20 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with the inspection and the testing of fire protection systems.

2. Identify hazards and describe safe work practices pertaining to the testing of fire protection systems.

3. Identify codes, standards and regulations pertaining to the inspection and testing of fire protection systems.

4. Interpret information found on drawings and specifications pertaining the inspection and testing of fire protection systems.

5. Identify tools and equipment relating to the inspection and testing of fire protection systems.

6. Identify frequency of the inspection and testing of fire protection systems.

7. Describe the liabilities and responsibilities for the inspection and testing of fire protection systems.

8. Identify requirements for the inspection and testing of fire protection systems.

9. Describe the procedures used to inspect and test fire protection systems

10. Identify applicable certification requirements pertaining to inspecting and testing fire protection systems

Practical Objectives

N/A

SSI-375 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.

2017 Red Seal Occupational Standard Reference:

3.04 Plans job tasks and procedures.

Suggested Hours:

10 Hours

Objectives and Content:

Theoretical Objectives

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

11. Describe and apply mathematical concepts related to job planning.

Practical Objectives

1. Generate a complete job plan.
   i) material list
   ii) tools list
   iii) labour quantities
   iv) site access
   v) safety requirements
   vi) regulatory requirements

SSI-380 Program Review

Learning Outcomes:

- Demonstrate knowledge of the Red Seal Occupational Standard (RSOS) and its relationship to the Interprovincial Examination.
- Demonstrate knowledge of overall comprehension of the trade in preparation for the Red Seal Examination.

Entire 2017 Red Seal Occupational Standard

Suggested Hours:

30 Hours

Objectives and Content:

Theoretical Objectives

1. Define terminology associated with a Red Seal Occupational Standard (RSOS).
   i) levels
   ii) major work activities
   iii) tasks
   iv) sub-tasks

2. Explain how an RSOS is developed and the link it has with the Red Seal Examination.
   i) development
   ii) validation
   iii) level and task weighting
   iv) examination breakdown (pie-chart)

3. Identify Red Seal products and describe their use for preparing for the Red Seal Examination.
   i) Red Seal website
   ii) examination preparation guide
   iii) sample questions
   iv) examination counselling sheets

4. Explain the relationship between the RSOS and the Atlantic Apprenticeship Curriculum Standard (AACS).

5. Review common occupational skills for the Sprinkler Fitter trade as identified in the RSOS.
   i) safety-related functions
   ii) tools and equipment
   iii) organizes work
   iv) commissions systems
   v) communication and mentoring

6. Review process to perform water supply installation for the Sprinkler Fitter trade as identified in the RSOS.
   i) underground water supplies
   ii) fire pump units
   iii) fire department connections
   iv) private water supply systems

7. Review process to perform piping installation for the Sprinkler Fitter trade as identified in the RSOS.
   i) prepares pipe, tube and fittings
   ii) installs pipe, tube and fittings
   iii) installs piping components

8. Review process to perform installations and layout of fire protection systems and devices for the Sprinkler Fitter trade as identified in the RSOS.
   i) installs water-based systems
   ii) installs specialty fire suppression systems
   iii) installs detection devices
   iv) installs signal-initiating devices

9. Review process to inspect, test and maintain (ITM) fire protection systems for the Sprinkler Fitter trade as identified in the RSOS.
   i) maintains and repairs fire protection systems
   ii) inspects and tests fire protection systems

Practical Objectives

N/A

Feedback and Revisions

This AACS will be amended periodically; comments or suggestions for improvements should be directed to:

New Brunswick:
Apprenticeship and Occupational Certification
Post-Secondary Education, Training and Labour
470 York St., Rm. 110, PO Box 6000
Fredericton, NB E3B 5H1
Tel: 506-453-2260
Toll Free in NB: 1-855-453-2260
www.gnb.ca

Prince Edward Island:
Apprenticeship, Training and Certification
Atlantic Technology Centre
212-176 Great George St.,
PO Box 2000
Charlottetown, PE C1A 7N8
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www.apprenticeship.pe.ca

Newfoundland and Labrador:
Apprenticeship and Trades Certification Immigration, Population Growth & Skills
Confederation Bldg., West Block
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St. John's, NL A1B 4J6
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www.gov.nl.ca/atcd

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Toll Free in NS: 1-800-494-5651
www.nsapprenticeship.ca

Any comments or suggestions received will be reviewed and considered to determine the course of action required. If the changes are deemed to be minor, they will be held for implementation during the next review cycle. If immediate change is deemed appropriate and approved by the Atlantic Trade Advisory Committee, it will result in a revision to this version of the AACS and will be detailed in the following section.

Version Changes

Revision Date	Section	Description of Change
May 2024	Levels 1 and 3	Integration of MENT-700 Mentoring I and MENT-701 Mentoring II