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apprenticeship

NOVA SCOTIA APPRENTICESHIP AGENCY

SPRINKLER SYSTEM INSTALLER 2009

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pg. 98 for Program Structure

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Name	Province
Barry Andersen	Alberta
Rob Bradbury	British Columbia
James Bryden	Manitoba
Robert Christensen	Saskatchewan
Brian Foley	Newfoundland and Labrador
Michael Laycock	Nova Scotia
Jim Mernickle	Northwest Territories
Ted Ryan	National Sprinkler JATC
Richard Smith	New Brunswick
Jaime Stasiuk	Alberta
John Terry	Nova Scotia
Ken Tracey	Ontario

Project Supervision and Coordination

Human Resources and Social Development Canada
Canadian Council of Directors of Apprenticeship

Heather Umlah	Program Administration Officer, Nova Scotia
Susan Harbin	Program Coordinator, Ontario
John Lampey	Manager, Industry Programs and Standards, Alberta

Table of Contents

Nova Scotia-related Content

Introduction

The Interprovincial Program Guide (IPG) for the Sprinkler System Installer trade has been developed by the Sprinkler System industry in partnership with the Canadian Council of Directors of Apprenticeship. The initiative started in response to the request of the National Pipe Trades Council in order to promote consistency in training and enhance mobility of apprentices throughout Canada. The aims of the initiative are in keeping with the CCDA's mission statement:

The mission statement of the Canadian Council of Directors of Apprenticeship is to cooperatively foster the development of a highly skilled workforce and to facilitate interprovincial mobility through the development, implementation and recognition of interprovincial Red Seal occupational standards.

User Guide

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

Learning outcomes contained in the IPG represent the minimum common core content for the development of jurisdictional training standards and outlines. This document has been developed based on the 2003 National Occupational Analysis.

The IPG is intended to assist program development staff and instructors in the design and delivery of technical courses in support of the Sprinkler System Installer trade. It is intended as a basis for the design of jurisdictional plans for training and does not replace the need for these to be developed. Each jurisdiction has the flexibility to add content specific and unique to that jurisdiction.

The IPG was deliberately constructed for simplicity and flexibility of structure in order to adapt to all delivery requirements. It details units of training, unit outcomes objectives, evaluation and references to the National Occupational Analysis. It does not impose a delivery model specific curricula or teaching format.

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

Structure

The IPG creates three "levels" of training. Within each level, units may be delivered and outcomes evaluated within whatever structure and delivery format the jurisdiction uses, e.g. blocks of training, modules, full time, part time, etc. At the end of a "level" each apprentice should have received the same minimum package of learning and met all common outcomes regardless of jurisdiction.

The content of the IPG is divided into units. Unit codes are used as a means of identification and are not intended to convey the order of delivery.

Prerequisites have not been detailed. Jurisdictions are free to deliver units one at a time or concurrently within the "level" structure provided all outcomes are met.

The IPG does not indicate the amount of time to be spent on a particular unit. The length of time required to deliver an outcome successfully will depend upon the learning activities and teaching methods used. Jurisdictions are encouraged to use practical demonstration and opportunities for hands-on learning; however, these are only required in units where essential practical elements have been specified.

Outcomes and Evaluation

The unit outcomes are the specific performances that must be evaluated. Wording of outcomes, "Demonstrate knowledge of," acknowledges the broad spectrum of ways in which knowledge can be shown (practical projects, multiple choice testing, presentations). Only where industry representatives have identified an essential practical element has an outcome been stated in practical terms. In these cases, the evaluation statement requires that outcomes be tested through practical application.

Objectives

Safety considerations will be dealt with as each topic is introduced. Jurisdictions may wish to include an introductory unit dealing with basic safety practices, equipment and regulations. Code is considered an essential element and is included wherever it applies rather than being dealt with as a separate topic.

Extensive lists have not been attached to objectives at the direction of the industry participants. Where detail is required by training providers for clarity, the list is intended to specify the items that are essential to be covered. Lists may be added or extended in jurisdictional training plans.

References to the NOA

References establish links to the practical components experienced in the workplace.

Essential Skills Profile

The Human Resources and Skill Development Canada Essential Skills Profile for the Sprinkler System Installer Trade is located at:
http://srv108.services.gc.ca/english/profiles/205.shtml

This piece is not under review at this time and so has been excluded from the IPG.

PLEASE NOTE: NS Program Structure Appears on Page 98

IPG Recommended Level Structure

Level 1

Unit codes are used as a means of identification and do not convey order of delivery.

Unit Code	Unit Name
SSI-101	Hand and Power Tools
SSI-102	Mathematics I
SSI-103	Science I
SSI-104	Blueprint Reading and Sketching I
SSI-105	Steel and Copper Pipe and Joining Techniques
SSI-106	Plastic Pipe and Fittings
SSI-107	Rigid Copper Pipe and Flexible Tubing
SSI-108	Control Valves
SSI-109	Hangers, Supports and Bracing
SSI-110	Rigging and Hoisting
SSI-111	Access Equipment
SSI-112	Sprinkler Heads I
SSI-113	Wet Pipe Sprinkler Systems
SSI-114	Dry Pipe Sprinkler Systems
SSI-115	Antifreeze Sprinkler Systems

Level 2

Unit codes are used as a means of identification and do not convey order of delivery.

Unit Code	Unit Name
SSI-116	Trim I (Alarm and Dry Pipe Valves)
SSI-117	Blueprint Reading and Sketching II
SSI-118	Mathematics II
SSI-119	Science II
SSI-120	Piping Practices
SSI-121	Sprinkler Heads II
SSI-122	Water Supply, Hydrants and Fire Department Connections
SSI-123	Standpipe, Hose and Portable Extinguisher Systems
SSI-124	Copper Brazing, Soldering and Oxy-Acetylene Cutting
SSI-135	Inspection, Testing and Maintenance I
SSI-126	Report Writing and Communications

Level 3

Unit codes are used as a means of identification and do not convey order of delivery.

Unit Code	Unit Name
SSI-127	Special Extinguishing Systems
SSI-128	Basic Hydraulic Calculations
SSI-129	Blueprint Reading and Sketching III
SSI-130	Mathematics III
SSI-131	Science III
SSI-132	Pipe Bending, Tube Bending and Joining
SSI-133	Fire Pumps and Controllers
SSI-134	Pre-action and Deluge Systems
SSI-136	Inspection, Testing and Maintenance II
SSI-138	Trim II (Pre-action and Deluge Valves)
SSI-137	Specialty Sprinkler Heads

SSI-101 Hand and Power Tools

Overview:

This unit is designed to provide all apprentices with a common base of knowledge for selecting and using hand, power and powder actuated tools. Topics include types of tools, their applications, maintenance and procedures for their safe use.

Learning Outcomes:

– Demonstrate knowledge of the types of hand and power tools, their applications, maintenance and procedures for safe use.

Objectives:

1. Identify hand and power tools used in the trade and describe their applications.

2. Describe procedures for safe use of hand and power tools.

3. Describe the care of hand and power tools.
   3.01. identification of worn and defective parts
   3.02. manufacturer recommendations

4. List powder actuated tools used in the trade and describe their applications and training requirements.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

2.01 Uses hand tools.
2.02 Maintains hand tools.
2.03 Uses portable power tools.
2.04 Maintains portable power tools.
3.01 Uses equipment.
3.02 Maintains equipment.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-102 Mathematics I

Overview:

This unit is designed to refresh basic mathematical skills in the context of the Sprinkler System Installer trade. Topics include arithmetic, number conversions, linear measurement, perimeter and area, percentage values and real values from percentage values, offsets and length of travel for offsets.

Learning Outcomes:

– Perform basic mathematical operations used in the Sprinkler System Installer Trade.

Objectives:

1. Perform mathematical operations.
   - 1.01. add, subtract, multiply and divide whole numbers
   - 1.02. add, subtract, multiply and divide decimal numbers
   - 1.03. add, subtract, multiply and divide fractions
   - 1.04. add, subtract, multiply and divide using a basic calculator
   - 1.05. add, subtract, multiply and divide mixed numbers

2. Perform number conversions.
   - 2.01. convert metres, centimetres and millimeters
   - 2.02. convert fractional values to decimal values (from fractional one sixteenth)
   - 2.03. convert decimal values to fractional values
   - 2.04. convert fractional inches to decimal inches (from fractional sixteenths)
   - 2.05. convert decimal and fractional inches.

3. Calculate percent of known values.

4. Calculate real values from percentage values.

5. Perform grade and hanger calculations.
   - 5.01. grade on pipe
   - 5.02. grade from percentage
   - 5.03. progressive lengths of hanger rod
   - 5.04. number of hangers for given lengths of pipe

6. Describe types of triangles and their characteristics.
    6.01. calculations
        - length of sides
        - sum of angles

    6.02. squaring
        - 3-4-5 triangle

7. Perform piping offset calculations.
    7.01. formula
    7.02. offset travel
    7.03. parallel
    7.04. equal spread

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.01 Interprets drawings and specifications.

This unit is also relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-103 Science I

Overview:

This unit is designed to provide apprentices with science principles relevant to the trade. Topics include properties of water and their relevance, pressure, its effects and transmission; properties of atmosphere, atmospheric pressure, and calculations for pressure conversion.

Learning Outcomes:

– Demonstrate knowledge of trade related science principles and their applications in the trade.

Objectives:

1. Explain terms associated with the properties of water.
   - 1.01. adhesion
   - 1.02. cohesion
   - 1.03. surface tension
   - 1.04. capillarity
   - 1.05. density

2. Describe the effects of freezing and heating water.
   - 2.01. chemical properties
   - 2.02. physical properties

3. Explain terms associated with pressure and atmosphere.
   - 3.01. relative density
   - 3.02. water pressure
   - 3.03. properties of atmosphere
   - 3.04. atmospheric pressure

4. Explain the effects of pressure on water.

5. Explain the transmission of pressure within pipes and tanks.

6. Describe the effects of altitude on atmospheric pressure.

7. Perform conversions between gauge and absolute pressures in both metric and imperial units.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

This unit is relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-104 Blueprint Reading and Sketching I

Overview:

The Sprinkler System Installer is required to identify and extract relevant information from construction drawings and to produce basic sketches. This unit is designed to introduce the apprentice to reading drawings and to sketching at a basic level. Topics include sketching and drawing equipment, lines on a blueprint, orthographic and isometric projections, architectural dimension and scaling, use of symbols, specifications and site plans.

Learning Outcomes:

Practical Outcomes:

– Read and interpret basic sprinkler blueprints.

Objectives:

1. Identify typical lines found on a blueprint of a sprinkler system.
   - 1.01. visible line
   - 1.02. hidden line
   - 1.03. central line
   - 1.04. dimension line
   - 1.05. extension line
   - 1.06. section cutting line
   - 1.07. material section line

2. Describe the fundamentals of orthographic projection.

3. Identify sketching and drawing equipment and explain how it is used.

4. Draw and label three basic views of an object.

5. Describe views of a building with the aid of an installation drawing.
   - 5.01. plan
   - 5.02. elevation

6. Identify and interpret architectural dimension and scaling.
   - 6.01. S.I. scale rule

6.02. architect scale rule (imperial)
6.03. engineer scale rule
6.04. typical scales
6.05. floor plans
6.06. elevations
6.07. sections
6.08. details

7. Interpret symbols found on typical sprinkler system blueprints.

8. Interpret specifications.

9. Interpret a site plan in both metric and imperial units.

10. Draw and label orthographic single line piping drawings using 90 degree elbows and tees.

11. Draw and label isometric single line piping drawings using 90 degree elbows and tees.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.01 Interprets drawings and specifications.
1.05 Completes contractual site requirements.

This unit is also relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of the outcomes. Evaluation of the remaining outcomes of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-105 Steel and Copper Pipe and Joining Techniques

Overview:

This unit is designed to introduce the apprentice to steel and copper pipe and its associated fittings. Topics include materials and their applications as well as procedures for preparation and joining of fittings to pipe. Practical outcomes are intended to provide an opportunity for apprentices to thread, groove and drill pipe in a training setting under the guidance of an instructor.

Learning Outcomes:

- Demonstrate knowledge of threaded steel pipe and fittings and their associated joining techniques.
- Demonstrate knowledge of flanged steel pipe and fittings and their associated joining techniques.
- Demonstrate knowledge of grooved steel pipe and fittings and their associated joining techniques.

Practical Outcomes
- Thread, groove, and drill pipe.
- Calculate, measure, cut and join offsets.

Objectives:

1. Identify piping components and describe their purpose and relationships.
   - 1.01. system riser
   - 1.02. riser
   - 1.03. feed mains
   - 1.04. cross mains
   - 1.05. branch lines
   - 1.06. header

2. Describe criteria for selection of steel pipe.
   - 2.01. schedule numbers and grades
   - 2.02. pressure ratings
   - 2.03. pipe sizes and lengths
   - 2.04. end finishes
   - 2.05. protective coatings and linings

2.06. codes
2.07. manufacturers' specifications
2.08. manufacturing techniques

3. Describe the equipment and techniques used to thread pipe.
   3.01. hand tools
   3.02. powered threaders
   3.03. nipple chucks
   3.04. thread cutting lubricants
   3.05. thread standards

4. Identify the types of threaded pipe fittings and describe their characteristics and applications.
   4.01. malleable
   4.02. cast iron
   4.03. steel
   4.04. galvanized
   4.05. non-ferrous
   4.06. stainless

5. Identify and Interpret code regulations pertaining to threaded pipe and fittings.

6. Describe the procedures used to join threaded pipe and install fittings on pipe.

7. Identify types of flanges and their associated fittings and gaskets, and describe their selection criteria.
   7.01. materials
   7.02. flange markings
   7.03. gasket specifications
   7.04. manufacturers' specifications

8. Identify and interpret codes and regulations pertaining to flanged pipe fittings and gasket materials.

9. Describe the design requirements for pipe schedule systems.
   9.01. steel pipe
   9.02. copper pipe

10. Explain the difference in schedules for above and below ceilings.

11. Identify code requirements pertaining to piping systems.
    11.01. special situations
    11.02. branch lines
    11.03. sizing of caps
    11.04. return bends for pendant sprinklers
    11.05. system testing pipes for dry and wet systems

12. Identify types of grooved and grip style pipe fittings and gaskets and describe their selection criteria.
    12.01. materials and types
    12.02. markings
    12.03. pressure and temperature ratings
    12.04. colour coding of gaskets
    12.05. joining techniques

13. Describe procedures used to join grooved and grip style fittings to pipe.

14. Interpret codes, regulations and manufacturer's specifications pertaining to gasket selection assembly of grooved and grip style fittings on pipe.

15. Identify tools and equipment used for preparing and joining grooved pipe and describe joining techniques.
    15.01. hand tools
    15.02. power tools (cut grooves, roll grooves)
    15.03. machines

16. Describe equipment and techniques used to drill pipe.

17. Describe procedures used to prepare and paint steel pipe.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

6.03 Installs piping and components.
8.01 Cuts pipe.
8.03 Threads pipe.
8.04 Grooves pipe.

8.06 Drills pipe.
8.07 Installs fittings.
8.08 Paints pipe.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of the outcomes. Evaluation of the remaining outcomes of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-106 Plastic Pipe and Fittings

Overview:

This unit is designed to introduce the apprentice to plastic pipe and associated fittings. Topics include materials and their applications as well as procedures for preparation and joining of fittings to pipe.

Learning Outcomes:

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

Objectives:

1. Describe criteria for selection of plastic pipe.
   - 1.01. types
   - 1.02. pressure and temperature ratings
   - 1.03. sizes
   - 1.04. manufacturers' specifications

2. Identify and Interpret code regulations pertaining to plastic pipe and fittings.

3. Describe the types of fittings and solvents used with plastic pipe.

4. Describe the procedures used to join plastic pipe using the solvent welding process.
   - 4.01. safety requirements
   - 4.02. fabrication process and materials
   - 4.03. drilling and cleaning
   - 4.04. assembly
   - 4.05. tools
   - 4.06. ventilation
   - 4.07. cure times
   - 4.08. testing

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

8.01 Cuts pipe.
8.07 Installs fittings.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-107 Rigid Copper Pipe and Flexible Tubing

Overview:

This unit is designed to introduce apprentices to procedures and materials associated with tube and tubing. Topics include materials and their applications and joining techniques, including procedures for soldering and brazing.

Learning Outcomes:

- Demonstrate knowledge of tube and tubing, associated fittings and joining techniques.
- Demonstrate knowledge of soldering and brazing techniques.

Objectives:

1. Describe criteria for selection of tube and tubing.
   - 1.01. types
   - 1.02. schedule numbers and grades
   - 1.03. pressure ratings
   - 1.04. sizes and lengths
   - 1.05. end finishes
   - 1.06. codes
   - 1.07. manufacturers' specifications
   - 1.08. manufacturing techniques

2. Identify the types of tube and tubing fittings and their characteristics and applications.
   - 2.01. ferrous
   - 2.02. non-ferrous

3. Identify and Interpret code regulations pertaining to tube and tubing and fittings.

4. Describe the tools, equipment and techniques used to join tube and tubing.
   - 4.01. brazing
   - 4.02. soldering
   - 4.03. compression
   - 4.04. flaring

5. Describe selection criteria for solders and brazing alloys.
    5.01. types
    5.02. pressure rating
    5.03. temperature rating
    5.04. application

6. Identify types of flux used in soldering or brazing and describe their purpose, applications and effects.

7. Describe procedures used to solder or braze joints.
    7.01. types of torches
        - fuel
        - electric
    7.02. torch and tip selection
    7.03. code interpretation and application

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

8.01 Cuts pipe.
8.02 Bends pipe.
8.07 Installs fittings.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-108 Control Valves

Overview:

This unit is designed to introduce apprentices to the various types of valves used in Sprinkler systems and associated piping. Topics include applications and characteristics, installation techniques and maintenance practices.

Learning Outcomes:

– Demonstrate knowledge of control valve selection, installation and maintenance.

Objectives:

1. Identify types of valves and describe their operation and applications.
   - 1.01. ball
   - 1.02. butterfly
   - 1.03. check
   - 1.04. gate
   - 1.05. globe
   - 1.06. pressure reducing valves
   - 1.07. pressure relief valves
   - 1.08. test and drain valves
   - 1.09. cross connection control devices
     - double check valve assemblies
     - reduced pressure principle backflow assemblies

2. Describe major design variations and construction features of valves.

3. Identify indicating valves and explain their operation.

4. Describe procedures used to install valves.

5. Describe maintenance problems common in valves.

6. Describe code requirements for drainage of mains, branches and valves.
   6.01. grading of piping
   6.02. main drain
      - installation requirements
      - testing and maintenance
   6.03. auxiliary drain
      - wet pipe
      - dry pipe
      - deluge and pre-action
      - tie-in drains
      - drum drips
      - location
      - sizing
      - installation requirements
      - testing and maintenance
   6.04. installation procedures
   6.05. testing and maintenance

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

6.03 Installs piping and components.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-109 Hangers, Supports and Bracing

Overview:

This unit is designed to introduce apprentices to the various types of hangers and supports used in sprinkler systems and associated piping. Topics include hanger types, their applications and characteristics, location of hangers and installation techniques.

Learning Outcomes:

– Demonstrate knowledge of hanger selection, location and installation.

Objectives:

1. Identify types of hangers used in the installation of pipe, tube and tubing and describe their characteristics and applications.

2. Identify sway bracing and describe its applications.

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

4. Identify code requirements for spacing and sizing of hangers.

5. Identify code requirements for fasteners and inserts used to secure hangers and describe their applications.
6. Identify hanger requirements for various systems.

7. Describe procedures used to install fasteners and inserts.

8. Identify types and sizes of hanger rod and describe their applications.

9. Identify tools and procedures used for installation of hangers and supports.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

9.01 Installs pipe support.
9.05 Installs sway/seismic bracing.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-110 Rigging and Hoisting

Overview:

This unit is designed to provide the apprentice with the knowledge and skills required for rigging and lifting of loads. Topics include fibre and wire ropes, knots and hitches, chain falls and come-alongs. Practical outcomes are intended to provide an opportunity for apprentices to select and tie knots in a training setting under the guidance of an instructor.

Note: On completion of this unit the apprentice will not receive a rigging certification, nor will she or he necessarily have been required to rig or lift loads.

Learning Outcomes:

– Demonstrate knowledge of rigging and hoisting equipment and procedures for its use.

Practical Outcomes
– Select and tie knots for specific applications.
– Demonstrate crane operator hand signals.

Objectives:

1. Identify rigging and hoisting equipment and describe its applications and safe working loads.
   1.01. cable clamps
   1.02. chain block hoist
   1.03. chains
   1.04. choker
   1.05. come-alongs (cable or chain)
   1.06. fork-lift
   1.07. jacks
   1.08. turfor
   1.09. overhead hoist
   1.010. pipe buggy (pipe cannon)
   1.011. pipe stand
   1.012. portable boom
   1.013. shackles

1.014. slings
1.015. spreader bar
1.016. tugger

2. Describe types of ropes and slings, their characteristics and applications.
   2.01. natural
      - types
      - safe working loads
   2.02. synthetic
      - types
      - safe working loads
   2.03. wire
      - types
      - safe working loads

3. Describe care and maintenance of the various types of ropes and slings.
   3.01. storage
   3.02. drying
   3.03. testing
   3.04. strength
   3.05. cleanliness
   3.06. kinks
   3.07. overloads

4. Describe knots and hitches used on ropes.
   4.01. types
      - square knot
      - round turn and half hitch
      - clove hitch
      - timber hitch
      - bowline
      - catspaw
   4.02. applications
   4.03. safety factors

5. Describe procedures used to rig and lift a load.
   5.01. selection of equipment
   5.02. set-up of equipment
   5.03. calculation of weight of load
   5.04. slinging
   5.05. placement
   5.06. disconnecting the load

6. Describe safe methods of tying loads on trucks.

7. Identify and interpret crane operator hand signals.

8. Tie knots for specific applications.
   - 8.01. square knot
   - 8.02. round turn and half hitch
   - 8.03. clove hitch
   - 8.04. timber hitch
   - 8.05. bowline
   - 8.06. catspaw

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

3.01 Uses equipment.
3.02 Maintains equipment.
4.01 Erects staging, scaffolding, and ladders.
4.02 Uses and maintains power-elevated work platforms.
4.03 Uses material handling equipment.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of the outcomes. Evaluation of the remaining outcomes of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-111 Access Equipment

Overview:

This unit is designed to provide the apprentice with the knowledge and skills required for the selection, assembly and use of access equipment. Topics include step ladders, scaffolds and power elevated work platforms.

Learning Outcomes:

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

Objectives:

1. Identify access equipment and describe their applications and safe working loads.
   1.01. ladder
   1.02. scaffolding
   1.03. fork-lift
   1.04. swing stages
   1.05. man lifts

2. Identify and locate relevant certifications and regulations.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

3.01 Uses equipment.
4.01 Erects staging, scaffolding, and ladders.
4.02 Uses and maintains power-elevated work platforms.
4.03 Uses material handling equipment.

This unit is also relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-112 Sprinkler Heads I

Overview:

This unit is designed to introduce apprentice to a range of commonly used automatic sprinkler heads and their installation. Topics include types and designs of sprinkler heads, their construction and operating characteristics, location and installation procedures.

Learning Outcomes:

– Demonstrate knowledge of types of automated sprinkler heads, their selection, installation and removal according to code and/or manufacturer specifications.

Objectives:

1. Describe the materials used in manufacturing sprinkler heads.

2. Identify the listing information on sprinkler heads.

3. Identify the various categories of sprinkler heads.
   - 3.01. solder
   - 3.02. bulb
   - 3.03. open
   - 3.04. nozzle

4. Identify performance characteristics that apply to sprinkler heads.
   - 4.01. deflector design/spray patterns
   - 4.02. orifice sizes
   - 4.03. temperature rating
   - 4.04. temperature sensitivity
   - 4.05. orientation

5. Describe procedures used to install sprinkler heads.
   - 5.01. care and storage of heads
   - 5.02. wrenches and other tools required
   - 5.03. selection of head

6. Identify factors that affect maximum ceiling temperature.

7. Identify temperature ratings and colour coding.
   7.01. fusible link
   7.02. glass bulb
   7.03. decorative

8. Describe methods for protection of sprinkler heads.
   8.01. shipping
   8.02. unpacking
   8.03. storage
   8.04. installation

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.03 Plans work process.
11.01 Installs sprinkler heads.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-113 Wet Pipe Sprinkler Systems

Overview:

This unit is designed to introduce the apprentice to wet pipe sprinkler systems. Topics include types of system and their applications, operating principles, water supply requirements, components and controls as well as procedures used for installation and testing.

Learning Outcomes:

– Demonstrate knowledge of wet pipe sprinkler systems and their installation according to code.

Objectives:

1. Identify wet pipe sprinkler systems and describe their operating principles and characteristics.
   1.01. applications
   1.02. codes and regulations
   1.03. manufacturers' specifications

2. Identify components of wet pipe sprinkler systems and describe their location, purpose and operation.
   2.01. fire department connection
   2.02. test and drains
   2.03. alarm devices
   2.04. control valves
   2.05. alarm check valve

3. Describe methods for preventing false alarms.
   3.01. excess pressure pumps
   3.02. retarding chamber
   3.03. flow switch retard
   3.04. check bypass

4. Describe requirements for pressure and alarm testing wet pipe sprinkler systems.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.01 Installs wet systems.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-114 Dry Pipe Sprinkler Systems

Overview:

This unit is designed to introduce the apprentice to dry pipe sprinkler systems and their installation. Topics include types of system, their operating principles and applications, components and controls. Procedures used for installation and requirements for testing systems are also covered.

Learning Outcomes:

– Demonstrate knowledge of dry pipe sprinkler systems and their installation according to code.

Objectives:

1. Identify dry pipe sprinkler systems and describe their operating principles and characteristics.
   1.01. applications
   1.02. codes and regulations
   1.03. manufacturers' specifications

2. Identify components of dry pipe sprinkler systems and describe their location, purpose and operation.
   2.01. fire department connection
   2.02. test and drains
   2.03. alarm devices
   2.04. control valves
   2.05. dry pipe valves
   2.06. air supply
   2.07. quick opening devices
   2.08. auxiliary drains
   2.09. drum drips

3. Describe methods for preventing false alarms.

4. Describe requirements for pressure and alarm testing dry pipe sprinkler systems.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.02 Installs dry systems.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-115 Antifreeze Sprinkler Systems

Overview:

This unit is designed to introduce the apprentice to antifreeze sprinkler systems, and their installation. Topics include types of system, their operating principles and applications, components and controls and freezing protection. Procedures used for installation, cross connection control, requirements for testing and system maintenance are also covered.

Learning Outcomes:

– Demonstrate knowledge of antifreeze sprinkler systems and their installation and maintenance in accordance with codes and regulations.

Objectives:

1. Explain freezing protection of sprinkler controls and systems.
   - 1.01. codes and regulations
   - 1.02. antifreeze
     - types of buildings
     - cross connection control
     - MSDS information
     - safety requirements
   - 1.03. non-freeze systems
     - types of buildings
     - dry or pre-action systems

2. Identify antifreeze sprinkler systems and describe their purpose.
   - 2.01. codes
   - 2.02. components
   - 2.03. regulations
   - 2.04. manufacturers' specifications

3. Identify types of antifreeze solutions and their applications.
   - 3.01. potable water supply
   - 3.02. non-potable water supply

4. Describe installation requirements for antifreeze sprinkler systems.
   - 4.01. total capacity

4.02. antifreeze loop
4.03. cross connection control

5. Identify valves required for antifreeze sprinkler systems.
   5.01. type
   5.02. location
   5.03. test connections

6. Describe maintenance procedures associated with antifreeze sprinkler systems.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.03 Installs anti-freeze systems.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-116 Trim 1 (Alarm and Dry Pipe Valves)

Overview:

This unit is designed to build upon Alarm and Dry Pipe Valve Trim 1. Practical outcomes are intended to provide an opportunity for apprentices to trim, test and reset alarm and dry pipe valves in a training setting under the guidance of an instructor.

Learning Outcomes:

Practical Outcomes

- Trim alarm and dry pipe valves in accordance with manufacturers' procedures and drawings.
- Test and reset alarm and dry pipe valves.

Objectives:

1. Identify alarm valves to be trimmed and their relevant design characteristics.

2. Perform installation of alarm valve trim.
   - 2.01. location of alarm valves
   - 2.02. trim and accessories required
   - 2.03. manufacturers' installation procedures
   - 2.04. code requirements and regulations

3. Identify dry pipe valves to be trimmed and describe their relevant design characteristics.

4. Select dry pipe valve trim components.

5. Perform installation of dry pipe valve trim.
   - 5.01. location of dry pipe valves
   - 5.02. trim and accessories required
   - 5.03. manufacturers' installation procedures
   - 5.04. code requirements and regulations

6. Describe procedures used to test and reset alarm and dry pipe valves.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.01 Installs wet systems.
10.02 Install dry systems.
17.02 Performs required tests.

Evaluation:

Evaluation of this unit must include practical demonstration of the outcomes.

SSI-117 Blueprint Reading and Sketching II

Overview:

This unit is designed to build upon and apply knowledge acquired in Blueprint Reading and Sketching 1. Topics include divisions of blueprints, views and drawings of a building, metric and imperial elevations. Apprentices will be expected to extract information relevant to sprinkler system installation from construction drawings and documents. Use of sketching will be extended to single line pipe drawings. Practical outcomes are intended to provide an opportunity for apprentices to perform tasks in a training setting under the guidance of an instructor.

Learning Outcomes:

– Demonstrate knowledge of construction drawings.

Practical Outcomes
– Identify and interpret symbols and information pertaining to sprinkler system contained in blueprints and construction documents.
– Perform basic orthographic and isometric sketching.

Objectives:

1. Prepare single line pipe drawings.
   1.01. orthographic
      - 45º fittings
      - 90º fittings
   1.02. detail drawings (spool sheet) with north arrow indicators
      - Orthographic North to isometric North
      - North orientation
      - cut sheets

2. Identify divisions of blueprints and describe their purpose.
   2.01. architectural
   2.02. structural
   2.03. mechanical
   2.04. electrical
   2.05. plot
   2.06. specifications and schedules

3. Identify views and drawings of a building and describe their purpose.
    3.01. plans
    3.02. elevations
    3.03. sections
    3.04. details
4. Interpret metric and imperial scaling.

5. Identify and interpret sprinkler systems information.
    5.01. grades
    5.02. dimensioning and scaling
    5.03. cutting plane lines
    5.04. extension lines
    5.05. symbols and abbreviations
    5.06. single line pipe drawings

6. Prepare orthographic and isometric sketches.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.01 Interprets drawings and specifications.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of outcomes. Evaluation of the remainder of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-118 Mathematics II

Overview:

This unit is designed to build upon the knowledge and mathematical skills acquired in Mathematics 1. Application will include calculations necessary to plan and install sprinkler systems. Topics include volume and capacity measurements, grade and hanger calculations, piping offset calculations, conversions, and calculation and squaring of triangles.

Learning Outcomes:

- Perform calculations for volume, grade and piping offsets.
- Calculate triangular dimensions.
- Convert between scales.

Objectives:

1. Define linear measurements, perimeter and area.

2. State the formula for calculating the perimeter of a flat plane.

3. Calculate the perimeter of shapes in both metric and imperial units.
   - 3.01. rectangles
   - 3.02. squares
   - 3.03. circles

4. State the formula for calculating the area of a flat plane.

5. Calculate the area of shapes in both metric and imperial units.
   - 5.01. rectangles
   - 5.02. squares
   - 5.03. circles

6. State the formulas for calculating the surface area of regular shaped solids, tanks and cylinders.

7. Calculate surface area of regular shaped tanks and cylinders in both metric and imperial units.

7.01. rectangular tanks
7.02. flat ended cylinders

8. Calculate volume measurements in metric and imperial units.
   8.01. formula
   8.02. solids, tanks and cylinders
      - cubes
      - flat ended cylinders

9. Perform conversions.
   9.01. temperature
   9.02. pressure
   9.03. weight
   9.04. linear

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.01 Interprets drawings and specifications.

This unit is also relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-119 Science II

Overview:

This unit is designed to build upon the knowledge of trade related science principles acquired in Science 1. Topics include terms associated with pressure and force, density of water and air, chemical properties of water, and effects of temperature on water.

Learning Outcomes:

– Demonstrate knowledge of forces and principles affecting the installations and functions of sprinkler systems.

Objectives:

1. Define and explain terms associated with the pressure and force.

2. Identify the specific gravity and specific weight of water.

3. Identify the density of air.

4. Describe the chemical properties of water.

5. Describe the effects of temperature on water.
   5.01. density
   5.02. solubility
   5.03. chemical reactions
   5.04. expansion

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

This unit is relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-120 Piping Practices

Overview:

This unit is designed to build on the knowledge and skills of piping practices acquired in Steel Piping and Joining Techniques. Topics include material specifications, effect of electrolysis, friction loss, freezing protection, drainage of mains, branches and valves, and residential sprinkler systems. Practical outcomes are intended to provide an opportunity for apprentices to carry out a piping project in a training setting under the guidance of an instructor.

Learning Outcomes:

– Demonstrate knowledge of piping system components and piping assembly according to code requirements.

Practical Outcomes
– Thread pipe.
– Groove pipe.

Objectives:

1. Identify codes and regulations pertaining to piping materials and sizing for sprinkler systems.

2. Describe the effect of electrolysis on piping materials.

3. Describe techniques and materials used for painting pipe.

4. Explain friction loss as it applies to pipe schedule and hydraulically calculated systems.

5. Identify code requirements pertaining to piping systems.
   5.01. pipe sleeves
      - location
      - installation
      - leak prevention (smoke, fire, water)
   5.02. coring
   5.03. hand hose connections

5.04. testing and maintenance

6. Explain freezing protection of sprinkler controls and systems.
   6.01. tools and materials
   6.02. testing and maintenance procedures

7. Describe code requirements and regulations for residential sprinkler systems.
   7.01. materials
   7.02. tools
   7.03. water supply requirements
   7.04. control valves
   7.05. alarm requirements
      - installation
      - locations
      - types
      - alarm tests
   7.06. sprinkler heads
      - spacing
      - installation
   7.07. testing
   7.08. servicing

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

8.03 Threads pipe.
8.04 Grooves pipe.
8.07 Installs fittings.
8.08 Paints pipe.
9.02 Installs sleeves.
9.03 Installs pipes.
9.04 Prevents leaks from sleeves.

This unit is also relevant throughout the tasks in Block C of the National Occupational Analysis.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of the outcomes. Evaluation of the remaining outcomes of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-121 Sprinkler Heads II

Overview:

This unit is designed to build on the knowledge and skills of sprinkler head designs and installation procedures acquired in Sprinkler Heads 1. Topics include code installation requirements, sprinkler head specifications, types of construction, obstructions, hazards, deflectors, and special situations.

Learning Outcomes:

– Demonstrate knowledge of sprinkler head selection and installation according to code and manufacturers' specifications.

Objectives:

1. Identify and describe code installation requirements for standard spray, extended coverage, pendant, upright and sidewall sprinkler heads.
   1.01. minimum and maximum distance between sprinklers
   1.02. minimum and maximum distance off wall
   1.03. minimum and maximum distance from ceiling
   1.04. maximum areas of protection
   1.05. obstruction rules
   1.06. types of construction
   1.07. temperature ratings

2. Explain the importance of correct locations for sprinkler heads.

3. Identify sprinkler head symbols used on blueprints, spools and other piping drawings.

4. List and define location requirements of sprinkler heads in relation to:
   4.01. bays
   4.02. beams
   4.03. girders
   4.04. joists
   4.05. open bar joists
   4.06. open ceilings
   4.07. trusses

5. Identify required distances between sprinkler heads for specific hazards.
    5.01. light hazard
    5.02. ordinary hazard
    5.03. extra hazard

6. Identify sprinkler deflector orientation and location.
    6.01. low-pitched roofs
    6.02. partitions
    6.03. peaks
    6.04. roofs
    6.05. stair and ramps

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

8. Identify code installation requirements for special situations.
    8.01. concealed spaces
    8.02. vertical shafts
    8.03. stairways
    8.04. vertical openings
    8.05. building service shafts
    8.06. elevator hoists ways and machine rooms
    8.07. spaces in underground floors
    8.08. exterior docks and platforms
    8.09. exterior roofs or canopies
    8.010. dwelling units
    8.011. library stockrooms
    8.012. electrical equipment
    8.013. ceilings types
    8.014. fire curtains

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

11.01 Installs sprinkler heads.

This unit is relevant throughout the tasks in Block C of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-122 Water Supply, Hydrants and Fire Department Connections

Overview:

This unit is designed to introduce the apprentice to water sources and connections. Topics include connections to public water main, residential water connections, fire department connections, fire pumper connections, sizing, installing and maintaining fire hydrants and associated equipment.

Learning Outcomes:

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

Objectives:

1. Describe types of water supply used for sprinkler and hose systems.
   - 1.01. municipal
   - 1.02. tanks
   - 1.03. pumps
   - 1.04. reservoir

2. Identify code requirements for installation, testing and maintenance of water supplies.

3. Describe procedures used to install underground water mains.
   - 3.01. tools and equipment
   - 3.02. types of pipe and joining methods
   - 3.03. materials list
   - 3.04. procedures to control thrust
   - 3.05. safety
   - 3.06. trenching & shoring
   - 3.07. testing
   - 3.08. flushing
   - 3.09. leakage

4. Identify types of water supply connections and describe procedures used to connect to sprinkler systems inside the building.
   4.01. types
   4.02. components for connections
   4.03. tools and materials
   4.04. installation

5. Describe residential water connections.
   5.01. sprinkler valves
   5.02. cross connection control

6. Describe the requirements of cross connection control.
   6.01. programs
   6.02. testers certification
   6.03. responsibilities
      - manufacturer
      - installer
      - tester
      - building owner
      - enforcing authority

7. Describe the consequences of back flow and cross connection.
   7.01. liability
   7.02. health hazards

8. Describe regulations and codes relating to cross connection control devices.
   8.01. installation
   8.02. maintenance
   8.03. testing

9. Describe the operation of cross connection control devices.
   9.01. air gap
   9.02. vacuum breaker
   9.03. pressure vacuum breaker

10. Describe cross connection control programs and backflow prevention along with their associated regulations and codes.
   10.01. double check valve assembly
   10.02. reduced pressure principle
   10.03. thermal expansion

11. Describe protection of water supply in the sprinkler industry.

12. Describe procedures for testing protection devices.

13. Describe fire department connections and their installation.
    13.01. purpose
    13.02. code requirements for installation and sizing
    13.03. requirements for check valves
    13.04. placement of fire department connections
    13.05. requirements for drainage of fire department connections
    13.06. requirements for hose thread connections (AHJ)
    13.07. tools
    13.08. materials

14. Identify types of fire hydrants and associated equipment and describe their characteristics.
    14.01. codes
    14.02. types
        - wall
        - yard
        - roof
    14.03. materials
    14.04. purpose and location
    14.05. sizes of hydrants and hose outlets.
    14.06. thread types

15. Describe the installation requirements for hydrants and related equipment.
    15.01. tools
    15.02. materials
    15.03. spacing of hydrants
    15.04. type
    15.05. control valve
    15.06. valve box
    15.07. valve cover
    15.08. setting and support of hydrants
    15.09. thrust blocks
    15.010. drainage
    15.011. frost protection
    15.012. physical damage protection

16. Identify common types of hydrant hoses and describe their installation requirements.

17. Identify types of hydrant houses and describe their installation.
    17.01. installation requirements
    17.02. equipment inside hydrant house

18. Identify types of hose cabinets and describe their installation.
    18.01. installation requirements
    18.02. equipment inside hose cabinet

19. Describe safety practices to be used when installing and servicing fire hydrants and associated equipment.
    19.01. personal safety
    19.02. safety of infrastructure

20. Describe the use of pitot gauge and play pipe/velocity diffuser.

21. Describe flow test procedures used to determine water flow data for sprinkler system.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

5.03 Supervises trenching and backfilling.
5.04 Installs underground piping and components.
5.05 Flushes underground system.
5.06 Performs required tests.
6.01 Determines location for pumps.
7.02 Installs water tanks and reservoirs.
7.03 Installs related equipment.
7.04 Performs required tests.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-123 Standpipe, Hose and Portable Extinguisher Systems

Overview:

This unit is designed to introduce the apprentice to standpipe and hose systems. Topics include system operating principles, code requirements, installation procedures, and hose connections. Material also covers common types of portable fire extinguishers.

Learning Outcomes:

– Demonstrate knowledge of standpipe and hose systems and their installation in accordance with codes and regulations.
– Demonstrate knowledge of portable extinguishers, their installation and requirements for testing.

Objectives:

1. Identify types of standpipe systems and describe their operating principles, characteristics and applications.
   1.01. Classes i, ii, iii
   1.02. types
      - wet pipe systems
      - dry pipe systems
      - manual
      - automatic
   1.03. sizing
   1.04. flow rate and pressures
   1.05. location
   1.06. hose thread connection requirements (AHJ)

2. Describe code requirements for installation of wet and dry standpipe systems.

3. Identify types of hose valve connections and describe their characteristics and applications.
   3.01. types
   3.02. location
   3.03. fittings and valve types
   3.04. sizes
   3.05. pressure reducing valves

4. Identify types of hose cabinets and describe their installation.
   4.01. installation requirements
   4.02. equipment inside hose cabinet

5. Identify types of hose spray nozzles and describe their applications and installation.

6. Describe safe procedures for flow testing at the most remote cabinet.

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

8. Identify types of portable fire extinguishers and describe their applications.

9. Explain the characteristics and operation of each type of fire extinguisher.

10. Describe the testing and maintenance requirements of each type of fire extinguisher.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.10 Installs standpipe systems.
10.12 Installs portable extinguishers.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-124 Copper Brazing, Soldering and Oxy-Acetylene Cutting

Overview:

This unit is designed to provide the apprentice with the knowledge and skills to cut, solder and braze joints using oxy-acetylene equipment. Practical outcomes are intended to provide an opportunity for apprentices to cut pipe, braze and solder joints in a training setting under the guidance of an instructor.

Learning Outcomes:

Practical Outcomes
- Cut pipe to specifications using oxy-acetylene equipment.
- Braze joints.
- Solder joints.

Objectives:

1. Describe safe procedures for cutting, soldering and brazing.
   - 1.01. personal protective clothing
     - protective clothing best suited for welding
     - clothing materials that should not be worn when welding
   - 1.02. eye protection
     - welding flash
     - tint shades of eye protection
     - visible light rays
     - ultraviolet light rays
     - infrared rays
     - chipping and grinding particles
     - hot metal from flame cutting
   - 1.03. handling hot metals
     - degree of burns
   - 1.04. fire prevention
     - fire watch
     - fire triangle
     - fuel
     - oxygen
     - ignition

1.05. explosion prevention
- risk factors
- precautions

1.06. protection against harmful vapours
- vapours and their effects
- precautions

2. Describe gas cutting equipment, its assembly and maintenance.

2.01. cylinders
- types
- design, construction and identification
- components
- safety devise
- storage procedures
- securing
- maximum draw rate

2.02. regulators
- single stage
- two stage

2.03. installation

2.04. grease

2.05. repairing

2.06. maximum working pressure

2.07. opening cylinder valve

2.08. hoses
- types
- repairing
- safety precautions

2.09. torches and tips
- operation
- numbering system and purpose
- tip selection
- maintenance procedures

3. Describe the procedures for lighting and balancing the torch.

4. Describe oxy-fuel cutting procedures.

5. Identify materials used for brazing and soldering joints.

5.01. name

5.02. grade

5.03. size

6. Identify types of brazed joints and describe procedures used for brazing joints.
    6.01. applications
    6.02. equipment
    6.03. tip and balancing the torch
    6.04. type and flux
    6.05. fillers

7. Identify types of soldered joints and describe procedures used for soldering joints.
    7.01. applications
    7.02. equipment
    7.03. tip and balancing the torch
    7.04. type and flux
    7.05. fillers

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

8.01 Cuts pipe.
8.05.03 Knowledge of brazing procedures.
8.07 Installs fittings.
14.05 Performs fire watch function.

Evaluation:

Evaluation of this unit must include practical demonstration of the outcomes.

SSI-126 Report Writing and Communications

Overview:

This unit is designed to provide the sprinkler system installer apprentice with an overview of communication documents required in the trade and practice presenting information in written form. Material also deals with forums for verbal trade communication as well as generating and keeping necessary records. Basic planning principles such as scheduling and coordination of work will be introduced.

Learning Outcomes:

- Demonstrate knowledge of documentation and reports used in the trade, their purpose and completion.
- Demonstrate knowledge of site communication.
- Demonstrate knowledge of planning and scheduling.

Objectives:

1. Identify reports used in the trade and describe their purpose.
   - 1.01. time sheets
   - 1.02. progress reports
   - 1.03. safety forms and reports
   - 1.04. test report and certificate
   - 1.05. inspection report
   - 1.06. property damage report

2. Describe site communication and time management strategies, and their relevance.
   - 2.01. site meetings
   - 2.02. scheduling
   - 2.03. work distribution
   - 2.04. safety meetings
   - 2.05. coordination

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.01 Interprets drawings and specifications.
1.02 Determines materials and labour requirements.
1.03 Plans work process.
1.04 Schedules equipment and materials.
1.05 Completes contractual site requirements.
5.06 Performs required tests.
6.02 Installs pumps and controllers.
6.04 Performs required tests.
7.04 Performs required tests.
14.01 Schedules maintenance.
14.02 Services fire protection systems.
14.03 Service auxiliary equipment.
14.05 Performs fire watch function.
15.01 Schedules repairs.
15.02 Troubleshoots fire protection systems
15.03 Repairs deficiencies.
15.04 Tests repairs.
16.01 Schedules inspections.
16.02 Performs visual inspection.
16.03 Completes reports.
17.01 Schedules tests.
17.02 Performs required tests.
17.03 Completes reports.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-127 Special Extinguishing Systems

Overview:

This unit is designed to provide the apprentice with the knowledge required to plan and install special extinguishing systems. Topics covered include dry and wet chemical systems, fixed water spray systems, water mist systems, foam extinguishing systems, carbon dioxide, clean agent extinguishing systems, outside exposure systems, and removal and decommissioning of halon systems.

Learning Outcomes:

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

Objectives:

<u>Dry and Wet Chemical Systems</u>

1. Identify types of dry and wet chemical systems and describe their operating principles and applications.
   - 1.01. methods of dispensing dry and wet chemicals
     - hand hose line systems
     - fixed piping systems
   - 1.02. applications and action of expellant gas
   - 1.03. extinguishing properties
   - 1.04. handling and storage

2. Describe fixed pipe systems.
   - 2.01. total flooding
   - 2.02. local application

3. Describe common installation requirements of all dry and wet chemical systems.
   - 3.01. codes and regulations
   - 3.02. materials
   - 3.03. supports and hangers
   - 3.04. system actuation
   - 3.05. testing
   - 3.06. servicing

3.07. manufacturers' specifications

Fixed Water Spray Systems

4. Describe fixed water spray systems and their operating principles.
   4.01. applications
   4.02. codes and regulations
   4.03. water supply required
   4.04. design of system
      - water spray nozzles
      - characteristics
   4.05. applications
   4.06. exposure protection

5. Describe installation requirements for fixed water spray systems.
   5.01. codes and regulations
   5.02. materials
   5.03. supports
   5.04. system actuation
   5.05. testing
   5.06. servicing
   5.07. manufacturers' specifications

6. Describe the system controls for the fixed water spray system and installation.

7. Explain the requirements for leak testing the system.

8. Explain the requirements for drainage of the system.

9. Describe service and maintenance procedures for a fixed water spray system.

Water Mist Systems

10. Describe water mist systems and their operating principles.
   10.01. applications
   10.02. codes and regulations
   10.03. water supply required
   10.04. design of system
   10.05. characteristics and selection of water spray nozzles
   10.06. exposure protection

11. Describe installation requirements for water mist systems.
    11.01. codes and regulations
    11.02. materials
    11.03. supports
    11.04. system actuation
    11.05. testing
    11.06. servicing
    11.07. manufacturers' specifications

12. Describe the system controls for water mist system and installation.

13. Explain the requirements for leak testing the system.

14. Explain the requirements for drainage of the system.

15. Describe service and maintenance procedures for a water mist system.

<u>Foam Extinguishing Systems</u>

16. Describe foam extinguishing systems and their operating principles.
    16.01. applications
    16.02. codes and regulations
    16.03. water supply required
    16.04. design of system
    16.05. characteristics and selection of water spray nozzles
    16.06. exposure protection

17. Describe the installation requirements of foam extinguishing systems.
    17.01. codes and regulations
    17.02. materials
    17.03. supports
    17.04. system actuation
    17.05. testing
    17.06. servicing
    17.07. manufacturers' specifications

18. Describe the system controls for the foam extinguishing system and installation.

19. Describe the typical installation of foam extinguishing systems.
    19.01. foam liquid storage tank and trim
    19.02. reserve tank and trim
    19.03. foam liquid pump

19.04. check valves, strainers and orifice plates
19.05. deluge valves
19.06. piping
19.07. cross connection control devices
19.08. discharge methods

20. Explain the operation of a balanced pressure proportioning system.

21. Explain the operation of a pressure proportioning tank with and without diaphragm.

22. Describe testing and maintenance procedures for foam extinguishing systems.

Carbon Dioxide Systems

23. Describe carbon dioxide systems and its operating principles.
    23.01. applications
    23.02. codes and regulations
    23.03. design of system
    23.04. exposure protection
    23.05. local application or total flooding
    23.06. safety practices
        - handling
        - storing
        - testing
        - servicing

24. Describe the methods of system operations.
    24.01. types
        - total flooding
        - local application
        - hand directed operation
    24.02. actuation of each system
    24.03. detection of fires
    24.04. low pressure and high pressure systems
    24.05. supervision of system
    24.06. working pressure
    24.07. alarms and indicators

25. Describe the requirements for carbon dioxide.
    25.01. amount of carbon dioxide
    25.02. storage requirements for carbon dioxide containers

25.03. storage temperatures

26. Describe the requirements for the installation of the carbon dioxide system.
    26.01. codes and regulations
    26.02. piping requirements
    26.03. tools and materials
    26.04. discharge nozzles
    26.05. manufacturers' specifications

27. Identify the requirements for leak testing the carbon dioxide system.

28. Describe service, maintenance and removal procedures for carbon dioxide systems.

29. Describe service, maintenance and removal procedures for halon systems.

<u>Clean Agent Extinguishing Systems</u>

30. Describe clean agent extinguishing systems and their operating principles.
    30.01. applications
    30.02. codes and regulations
    30.03. design of system
    30.04. exposure protection
    30.05. local application or total flooding
    30.06. safety practices
        - handling
        - storing
        - testing
        - servicing

31. Identify the components used in clean agent systems.
    31.01. quantity of agent
    31.02. storage container requirements
    31.03. distribution of extinguishing agents
    31.04. pipe and materials
    31.05. discharge nozzles
    31.06. pressure relief venting

32. Describe detection, activation, alarm and control systems for the clean agent extinguishing system.

33. Identify inspection, testing and maintenance requirements for the clean agent extinguishing system.

34. Describe possible safety hazards.

Outside Exposure Systems

35. Describe outside exposure systems, their operating principles and applications.

36. Describe the installation requirements for outside exposure systems.
    36.01. codes and regulations
    36.02. water service requirements
    36.03. methods of actuation
    36.04. sprinkler heads
    36.05. strainers and trim

37. Describe the requirements of hydrostatic testing of the outside exposure system.

38. Describe the requirements for drainage of the outside exposure system.

39. Describe service and maintenance procedures for outside exposure systems.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.05 Installs chemical systems.
10.06 Installs clean agent systems.
10.07 Services halon systems.
10.08 Installs foam systems.
10.09 Installs carbon dioxide systems.
10.11 Installs water mist systems.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-128 Basic Hydraulic Calculations

Overview:

This unit is designed to introduce the apprentice to basic hydraulic calculations in a trade context. While Sprinkler Systems Installers do not perform these calculations routinely, an understanding of the factors involved and the effects of their variation is necessary in the trade.

Learning Outcomes:

– Explain the importance and purpose of hydraulic calculations and the factors involved.

Objectives:

1. Define terminology and how it applies to Sprinkler Systems Installer trade.
   - 1.01. hydraulic calculation
   - 1.02. equivalent length
   - 1.03. friction loss
   - 1.04. static pressure
   - 1.05. residual pressure
   - 1.06. hand hose allowance
   - 1.07. design densities
   - 1.08. design area
   - 1.09. system demand

2. Describe the flow of water.
   - 2.01. laminar
   - 2.02. turbulent
   - 2.03. velocity
   - 2.04. friction
   - 2.05. pressure
   - 2.06. pressure drop
   - 2.07. equivalent length
   - 2.08. flow rate

3. Describe the effects of volume, flow and pressure through a venturi.

4. Describe the effect in change of height on pressure.

5. Describe the effects of friction loss on pressure.

6. Describe the importance of water densities over a prescribed area.

7. List and describe the classification of occupancies.
8. Identify applicable codes and regulations regarding the layout for hydraulic calculated sprinkler system.
9. Determine available water supply.

10. Identify system requirements regarding pipe sizes, branch lines and cross mains.

11. Identify sprinkler head that can be used with this system.

12. Identify minimum operating pressure of system.

13. Identify type of piping to be used.

14. Explain requirements for future additional heads.

15. Describe procedures used to perform a flow test at municipal hydrants.
16. Describe the occupancy hazard design requirements for pipe schedule systems.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

Task 10 Installs fire protection systems.

This unit is also relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-129 Blueprint Reading & Sketching III

Overview:

This unit is designed to provide the sprinkler system installer apprentice with the ability to apply knowledge of sprinkler system information found in blueprints and construction documents, draw and label orthographic and isometric single line pipe drawings, compile a materials list and estimate materials and hours of labour requirements. Practical outcomes are intended to provide the opportunity for apprentices to perform tasks under the guidance of an instructor.

Learning Outcomes:

Practical Outcomes

- Complete and label basic drawings of typical sprinkler installations.
- Develop a materials list from information contained in construction documentation.

Objectives:

1. Create a working plan and elevation view drawings of a typical sprinkler system installation.
   - 1.01. establish design criteria
   - 1.02. sprinkler head location
   - 1.03. distribution piping
   - 1.04. scaling & dimensioning
   - 1.05. symbols and abbreviations
   - 1.06. riser detail

2. Compile materials list.

3. Identify the criteria used to estimate labour requirements.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.01 Interprets drawings and specifications.
1.02 Determines materials and labour requirements.
1.05 Completes contractual site requirements.
11.01 Installs sprinkler heads.

Evaluation:

Evaluation of this unit must include practical demonstration of the outcomes.

SSI-130 Mathematics III

Overview:

This unit is designed to review mathematical content to date and introduce the mathematics required to plan piping systems. Topics covered include piping offsets and length of travel for basic and other offsets.

Learning Outcomes:

Practical Outcomes

– Perform piping calculations used in the trade.

Objectives:

1. Review basic trade calculations.
   - 1.01. linear measurement
   - 1.02. percentages
   - 1.03. conversions
   - 1.04. area
   - 1.05. perimeter

2. Calculate piping offsets.
   - 2.01. formula
   - 2.02. length of travel
   - 2.03. unequal spread
   - 2.04. rolling offset

3. Calculate length of travel for offsets in imperial and SI units.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

This unit is relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of the outcomes.

SSI-131 Science III

Overview:

This unit is designed to provide the Sprinkler System Installer apprentice with an overview of science in the trade and industry. Topics include principles of electricity, direct and alternate current flow of electricity, simple electrical circuits, electromagnetic devices, pressure and tamper switches, water pressure problems and hydraulically calculated sprinkler systems.

Learning Outcomes:

- Demonstrate knowledge of basic electricity as it applies to the trade.
- Demonstrate knowledge of water pressure and flow.

Objectives:

1. Describe the basic principles of electricity.
   - 1.01. electron theory
   - 1.02. amps
   - 1.03. volts
   - 1.04. ohms
   - 1.05. direct current flow
   - 1.06. alternating current
   - 1.07. series
   - 1.08. parallel
   - 1.09. transformers
   - 1.010. solenoids
   - 1.011. pressure actuating switches

2. Draw simple electrical circuits.

3. Explain the principles of electromagnetic devices.

4. Describe the operation and function of flow, pressure and tamper switches.

5. Define terms relating to water pressure and flow and their application to the Sprinkler System Installer trade.

6. Calculate water pressure changes.
    6.01. hydraulic calculation
    6.02. equivalent length
    6.03. friction loss
    6.04. static pressure
    6.05. residual pressure
    6.06. water pressure
    6.07. effect of change of height on pressure
    6.08. effect of friction loss on pressure
    6.09. codes and regulations
    6.010. water service requirements
        - type of pipe
        - pipe sizes
        - branch lines
        - cross mains
    6.011. design densities, design area
    6.012. minimum operating pressure

7. Describe the systems layout of a hydraulically calculated sprinkler system.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

This unit is relevant throughout the tasks of the National Occupational Analysis.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-132 Pipe Bending, Tube Bending and Joining

Overview:

This unit is designed to provide the apprentice with the knowledge and skills required to work with tube. Topics include tube and materials used by a Sprinkler System Installer, bending practices, flare and compression joints and tightening joints. This unit will also introduce apprentices to equipment and techniques used to bend pipe. Practical outcomes are intended to provide apprentices with the opportunity to perform bending and joining procedures under the guidance of an instructor.

Learning Outcomes:

– Demonstrate knowledge of pipe bending equipment and techniques.

Practical Outcomes
– Perform tube bending and joining procedures to specific requirements.

Objectives:

1. Identify the tube and pipe used for bending purposes.
   1.01. Name
   1.02. Grade
   1.03. Size
   1.04. Material

2. Identify tools used for pipe and tube bending and describe procedures for their use.

3. Perform bending to required dimensions.

4. Prepare and assemble flare and compression joints using hand tools.

5. Cut, prepare and join tubing to required dimensions.

6. Assemble and tighten joints in accordance with regulations and specifications.

7. Describe equipment and procedures used to bend pipe.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

6.03 Installs piping and components.
8.02 Bends pipes.

Evaluation:

Evaluation of the practical outcomes of this unit must include practical demonstration of the outcomes. Evaluation of the remaining outcomes of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-133 Fire Pumps and Controllers

Overview:

This unit is designed to introduce various types of fire pumps and provide the knowledge required to select, install, maintain and test pumps. Topics include applications of special service fire pumps, fire pump installations and controllers, problems which may occur with fire pumps, maintenance and testing procedures, limited water supply, and pressure tanks and their use.

Learning Outcomes:

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

Objectives:

1. Identify types of pumps and describe their principles of operations and applications.
   1.01. types of drivers
   1.02. pump and pipe sizing
   1.03. capacity of pumps
   1.04. pressure ratings
   1.05. pump performance
   1.06. fire pump curve
   1.07. testing requirements
   1.08. start mechanisms
   1.09. pre-commissioning checks

2. Describe head pressure as it relates to pumps.

3. Describe requirements for fire, booster and jockey pump installations.
   3.01. codes and regulations
   3.02. manufacturers' specifications

4. Identify types of controllers and describe their applications, installation, testing and maintenance.

5. Describe the effects of potential problems and their solutions.

5.01. air leaks
5.02. cavitation
5.03. air pockets
5.04. rotation
5.05. drivers
5.06. rpm
5.07. pressure relief valves

6. Describe code and manufacturers' requirement for maintenance and testing of fire pumps.

7. Identify limited water supply conditions.
   7.01. reservoirs
   7.02. pressure tanks
   7.03. gravity tanks
   7.04. municipal
   7.05. codes and regulations
   7.06. testing and maintenance

8. Describe pressure and gravity tanks and their applications.
   8.01. locations
   8.02. codes and regulation
   8.03. tank sizes and pressure
   8.04. operation
   8.05. water supply requirements
   8.06. installation
      - piping, valves, trim and accessories
      - electrical requirements
      - requirements for the discharge and drainage pipe
   8.07. testing
   8.08. servicing and maintenance requirements and procedures

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

6.01 Determines location for pumps.
6.02 Installs pumps and controllers.
6.03 Installs piping and components.

6.04 Performs required tests.
7.02 Installs water tanks and reservoirs.
7.03 Installs related equipment.
7.04 Performs required tests.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-134 Pre-action and Deluge Systems

Overview:

This unit is designed to introduce pre-action and deluge systems. Topics include installation requirements, systems control, leak testing, drainage, service and maintenance of pre-action systems. Also included are installation requirements and controls, rate-of-rise, leak testing, drainage, service and maintenance procedures for deluge systems.

Learning Outcomes:

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

Objectives:

1. Identify pre-action and deluge systems and describe their operating principles and applications.

2. Identify supplemental fire detection systems and describe their operating principles and applications.

3. Describe installation requirements for pre-action and deluge systems.
   - 3.01. Codes and regulations
   - 3.02. Materials
   - 3.03. Supports
   - 3.04. System actuation
   - 3.05. Testing
   - 3.06. Servicing
   - 3.07. Manufacturers' specifications

4. Identify the system controls required for pre-action and deluge systems and describe their installation.

5. Explain the requirements for leak testing the system.

6. Explain the requirements for drainage of the system.

7. Describe service and maintenance procedures for pre-action and deluge systems.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.04 Installs pre-action/deluge systems.
11.02 Installs wet and dry pilot lines.
11.03 Installs detector wire systems.
11.04 Installs heat-actuated detectors (HAD).

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-135 Inspection, Testing and Maintenance I

Overview:

This unit is designed to provide the apprentice with the knowledge required to inspect, test and maintain sprinkler systems. Topics include general care and maintenance of sprinkler systems, inspection, testing and maintenance of water based sprinkler systems, antifreeze systems, special extinguishing systems and component parts, alteration and repairs to systems, frequency of inspection, common causes of sprinkler system failure, consequences of inadequate back flow in water supply, fire alarm panels and supervisory signals, testing and maintenance requirements for the fire alarm panels and associated devices and procedures for shutting down and reactivation of fire alarm panels.

Learning Outcomes:

– Demonstrate knowledge of the inspection, testing and maintenance requirements for sprinkler systems.

Objectives:

1. Describe the liabilities and responsibilities for the general care and maintenance of sprinkler systems.
   1.01. code and regulations
   1.02. manufacturers' responsibility
   1.03. installer
   1.04. enforcing authority
   1.05. building owner
   1.06. fire watch function

2. Describe procedures regarding alterations and repairs to systems.

3. Identify frequency of inspection, testing and maintenance of sprinkler systems and component parts.

4. Describe procedures for shutting down and reactivation of sprinkler systems and associated alarms and supervisory devices.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.05 Completes contractual site requirements.
5.06 Performs required tests.
6.03 Performs required tests.
7.04 Performs required tests.
14.01 Schedules maintenance.
14.05 Performs fire watch function.
15.01 Schedules reports.
16.01 Schedules inspections.
16.02 Performs visual inspection.
17.01 Schedules tests.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-136 Inspection, Testing and Maintenance II

Overview:

This unit is designed to provide the apprentice with the knowledge required to inspect, test and maintain of sprinkler systems. Topics include general care and maintenance of sprinkler systems, inspection, testing and maintenance of water based sprinkler systems, antifreeze systems, special extinguishing systems and component parts, alteration and repairs to systems, frequency of inspection, common causes of sprinkler system failure, consequences of inadequate back flow in water supply, fire alarm panels and supervisory signals, testing and maintenance requirements for the fire alarm panels and associated devices and procedures for shutting down and reactivation of fire alarm panels.

Learning Outcomes:

– Demonstrate knowledge of the inspection, testing and maintenance requirements for sprinkler systems and their components.

Objectives:

1. Describe inspection, testing and maintenance of water based sprinkler systems.
   - 1.01. wet pipe
   - 1.02. dry pipe
   - 1.03. pre-action and deluge
   - 1.04. limited water supply
   - 1.05. standpipe hose systems
   - 1.06. fixed water spray
   - 1.07. water spray nozzle
   - 1.08. fire pumps
   - 1.09. antifreeze systems
   - 1.010. hydrants

2. Describe the procedures used to flush sprinkler systems.
   - 2.01. hydraulic
   - 2.02. hydro-pneumatic

3. Describe inspection, testing and maintenance of special extinguishing systems.

4. Describe common causes of sprinkler system failure.

5. Describe troubleshooting procedures.

6. Describe methods of correcting system failures.

7. Describe the requirements for inspecting backflow preventers.

8. Describe fire alarm panels and supervisory signals.
   - 8.01. common terms
   - 8.02. types
   - 8.03. basic operation
   - 8.04. purpose
   - 8.05. trouble signal
   - 8.06. alarm signal

9. Describe testing and maintenance requirements for associated devices of the fire alarm panel.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

1.05 Completes contractual site requirements.
5.05 Flushes underground system.
5.06 Performs required tests.
6.02 Installs pumps and controllers.
6.03 Performs required tests.
7.04 Performs required tests.
14.01 Schedules maintenance.
14.02 Services fire protection systems.
14.03 Service auxiliary equipment.
14.05 Performs fire watch function.
15.01 Schedules reports.
15.02 Troubleshoots fire protection systems.
15.03 Repairs deficiencies.
15.04 Tests repairs.
16.01 Schedules inspections.
16.02 Performs visual inspection.
16.03 Completes reports.

17.01 Schedules tests.
17.02 Performs required tests.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

SSI-138 Trim II (Pre-action and Deluge Valves)

Overview:

This unit is designed to provide the apprentice with the knowledge and skills required to install and trim pre-action and deluge valves. Practical outcomes are intended to provide an opportunity for apprentices to trim pre-action and deluge valves in a training setting under the guidance of an instructor.

Learning Outcomes:

Practical Outcomes

- Install and trim pre-action valves to specific codes and requirements.
- Install and trim deluge valves to specific codes and requirements.
- Select and trim alarm valves to specific codes and requirements.

Objectives:

Deluge Valves

1. Identify deluge valves to be trimmed.

2. Describe design variations of types of deluge valves.

3. Describe types of alarms that a deluge valve operates.

4. Describe methods of valve actuation.

5. Describe installation of deluge valves.
   - 5.01. location of deluge valves
   - 5.02. trim and accessories required
   - 5.03. procedures
   - 5.04. NFPA requirements and other applicable codes

Pre-action Valves

6. Identify trim on a pre-action valve.

7. Describe various types of pre-action valves.

8. Describe types of alarms the pre-action valve will operate.

9. Describe installation of pre-action valves.
    9.01. location of pre-action valves
    9.02. trim and accessories required
    9.03. procedures
    9.04. NFPA requirements and other applicable codes

10. Trim deluge and pre-action valves.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

10.04 Installs pre-action/deluge systems.
11.02 Installs wet and dry pilot lines.
11.03 Installs detector wire systems.
11.04 Installs heat-actuated detectors (HAD).

Evaluation:

Evaluation of this unit must include practical demonstration of the outcomes.

SSI-137 Specialty Sprinkler Heads

Overview:

This unit is designed to provide the apprentice with the knowledge and skills required to select and install a variety of specialty sprinkler heads. Topics include types of specialty heads, their operating characteristics, applications and installation procedures. Applicable codes will be covered.

Learning Outcomes:

– Demonstrate knowledge of specialty sprinkler heads and describe their applications and installation requirements specific to codes.

Objectives:

1. Identify specialty sprinkler heads and describe their characteristics and applications.
   1.01. residential
   1.02. large drop
   1.03. early suppression fast response (ESFR)
   1.04. quick response early suppression (QRES)
   1.05. in-rack
   1.06. attic
   1.07. extended coverage
   1.08. nozzles
   1.09. old-style/conventional
   1.010. open sprinkler
   1.011. spray sprinkler
   1.012. window
   1.013. on/off
   1.014. dry sidewall
   1.015. dry upright
   1.016. dry pendant

2. Describe requirements for installation of specialty sprinkler heads.

3. Identify and interpret applicable codes and regulations.

4. Manufacturers' specifications.

References to National Occupational Analysis:

Successful completion of this unit of instruction will contribute to the development of the knowledge, skills and abilities identified in the following sections of the National Occupational Analysis:

11.01 Installs sprinkler heads.

Evaluation:

Evaluation of this unit may be based on theoretical or practical application of the material or on a combination of both. Jurisdictions are free to include practical demonstrations or opportunities for hands-on learning.

Program Structure – Nova Scotia Apprenticeship Program

The units listed below are required technical training in the Sprinkler System Installer Apprenticeship Program.

Level 1 (8 Weeks)

Unit Code	Unit Name	Page #
MENT-1801	Workplace Mentoring I - Integrated Milestone (*NS Specific*)	101
SSI-101	Hand and Power Tools	10
SSI-102	Mathematics I	12
SSI-103	Science I	14
SSI-104	Blueprint Reading and Sketching 1	16
SSI-105	Steel and Copper Pipe and Joining Techniques	18
SSI-106	Plastic Pipe and Fittings	22
SSI-107	Rigid Copper Pipe and Flexible Tubing	24
SSI-108	Control Valves	26
SSI-109	Hangers, Supports and Bracing	28
SSI-110	Rigging and Hoisting	30
SSI-111	Access Equipment	33
SSI-112	Sprinkler Heads I	35
SSI-113	Wet Pipe Sprinkler Systems	37
SSI-114	Dry Pipe Sprinkler Systems	39
SSI-115	Antifreeze Sprinkler Systems	41

Level 2 (8 Weeks)

SSI-116	Trim I (Alarm and Dry Pipe Valves)	43
SSI-117	Blueprint Reading and Sketching II	45
SSI-118	Mathematics II	47
SSI-119	Science II	49
SSI-120	Piping Practices	51
SSI-121	Sprinkler Heads II	54
SSI-122	Water Supply, Hydrants and Fire Department Connections	57
SSI-123	Standpipe, Hose and Portable Extinguisher Systems	61
SSI-124	Copper Brazing, Soldering and Oxy-Acetylene Cutting	63
SSI-135	Inspection, Testing and Maintenance I	89
SSI-126	Report Writing and Communications	66

Level 3 (8 Weeks)

Unit Code	Unit Name	Page #
MENT-1802	Workplace Mentoring II - Integrated Milestone (*NS Specific*)	102
SSI-127	Special Extinguishing Systems	68
SSI-128	Basic Hydraulic Calculations	74
SSI-129	Blueprint Reading and Sketching III	76
SSI-130	Mathematics III	78
SSI-131	Science III	80
SSI-132	Pipe Bending, Tube Bending and Joining	82
SSI-133	Fire Pumps and Controllers	84
SSI-134	Pre-action and Deluge Systems	87
SSI-136	Inspection, Testing and Maintenance II	91
SSI-138	Trim II (Pre-action and Deluge Valves)	94
SSI-137	Specialty Sprinkler Heads	96
SSIA-1830	Program Review	100

SSIA-1830 Program Review

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Upon successful completion of this unit, the apprentice will complete a study plan based on the National Occupational Analysis.

Objectives and Content:

1. Identify areas of the program where knowledge of theory is weakest.

2. Identify areas where workplace experience is lacking or weak.

3. Identify resources necessary to address areas of shortfall.

4. Identify timelines to address areas of weakness.

Suggested Learning Activities:

1. Conduct a mock certification exam to be used for diagnostic purposes.
2. Review the National Occupational Analysis.
3. Review the Apprentice Logbook.
4. Review the Exam Preparation information found at www.nsapprenticeship.ca under Quick Links, Exam Preparation.
5. Conduct a final mock certification exam.

Resources:

These are the recommended resources to use in the delivery of this unit:

- Exam Preparation information, including videos, occupational analyses, exam counseling sheets, practice exams and sample questions, and other study materials and resources, can be found at www.nsapprenticeship.ca under Quick Links, Exam Preparation.
- Apprentice's personal logbook
- Applicable codes and regulations
- Program texts

Evaluation: pass/fail

MENT-1801 Workplace Mentoring I

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for learning workplace skills.
- Demonstrate strategies to assist in learning skills in the workplace.

Objectives and Content:

1. Describe the importance of your own experiences.

2. Identify the partners involved in apprenticeship.

3. Describe the shared responsibilities for workplace learning.

4. Determine your own learning preferences and explain how these relate to learning new skills.

5. Describe the importance of different types of skills in the workplace.

6. Describe the importance of essential skills in the trade.

7. Identify different ways of learning.

8. Identify your learning preferences.

9. Identify different learning needs and strategies to meet learning needs.

10. Identify techniques for effective communication.

11. Identify strategies to assist in learning a skill.

Resource:

- Recommended resource to use in the delivery of this unit: www.apprenticeship.nscc.ca/mentoring/apprentice.htm

MENT-1802 Workplace Mentoring II

(Nova Scotia Unit of Instruction)

Learning Outcomes:

- Identify and explain strategies for teaching workplace skills.
- Demonstrate strategies to assist in teaching skills in the workplace

Objectives and Content:

1. Describe the impact of your own experiences in teaching skills.
2. Identify the different roles played by a workplace mentor.
3. Describe the six-step approach to teaching skills.
4. Explain the importance of identifying the point of the lesson.
5. Identify how to choose a good time to present a lesson.
6. Explain the importance of linking the lessons.
7. Identify the components of the skill (the context).
8. Describe considerations for demonstrating a skill.
9. Identify types of skill practice.
10. Describe considerations in setting up opportunities for skill practice.
11. Explain the importance of providing feedback.
12. Identify techniques for giving effective feedback.
13. Describe a skill assessment.
14. Identify methods of assessing progress.
15. Explain how to adjust a lesson to different situations.

Resource:

- Recommended resource to use in the delivery of this unit: www.apprenticeship.nscc.ca/mentoring/apprentice.htm

Nova Scotia Document Evaluation Form

Thank you for your interest in the development and revision of this document. Upon review of the document, please record your feedback in relation to the following items:

- course division and organization
- relevancy of the content
- errors or omissions
- other suggestions for improvement and consideration

Overall comments are to be entered on this evaluation form and specific changes are to be entered directly on the document in the relevant area(s). When making proposed corrections(s) in the document, please use red ink. When all feedback has been recorded, return this evaluation form along with the document to the Apprenticeship Office noted at the bottom of the page.

(PLEASE PRINT)

Trade: Sprinkler System Installer

Full Name: _____

Type of Position: (Trade Practitioner, Instructor, etc.): _____

Company: _____

Address: _____

Telephone: _____

Comments: (Use a separate sheet of paper if necessary)

_____

_____

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Return Evaluation Form and Document to:

Nova Scotia Apprenticeship Agency
1256 Barrington Street, 3rd Floor
PO Box 578
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