Saskatchewan Apprenticeship and Trade Certification Commission

Sprinkler Fitter

Guide to Course Content

2021

Online: www.saskapprenticeship.ca

Recognition:
To promote transparency and consistency, this document has been adapted from the 2017 Sprinkler Fitter Red Seal Occupational Standard (Employment and Social Development Canada).

A complete version of the Occupational Standard can be found at www.red-seal.ca

STRUCTURE OF THE GUIDE TO COURSE CONTENT

To facilitate understanding of the occupation, this guide to course content contains the following sections:

Description of the Sprinkler Fitter trade: an overview of the trade's duties and training requirements.

Essential Skills Summary: an overview of how each of the nine essential skills is applied in this trade.

Elements of harmonization of apprenticeship training: includes adoption of Red Seal trade name, number of levels of apprenticeship, total training hours (on-the-job and in-school) and consistent sequencing of technical training content. Implementation for harmonization will take place progressively.

Task Matrix: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard detailing the essential skills and the level of training where the content is covered.

Major Work Activity (MWA): the largest division within the standard that is comprised of a distinct set of trade activities.

Task: distinct actions that describe the activities within a major work activity.

Sub-task: distinct actions that describe the activities within a task.

Training Profile Chart: a chart which outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training.

Technical Training Course Content for the Sprinkler Fitter trade: a chart which outlines the model for SATCC technical training sequencing. For the harmonized level of training, a cross reference to the Harmonized apprenticeship technical training sequencing, at the learning outcome level, is provided.

Appendix A: Post Harmonization Training Profile Chart: a chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

DESCRIPTION OF THE SPRINKLER FITTER TRADE

Sprinkler Fitters install, test and repair fixed fire suppression systems.

Sprinkler fitters lay out, install, repair, maintain, modify, inspect and test fire protection systems in a variety of buildings and settings. They work on fire protection systems such as wet, dry, water mist, preaction, foam, deluge, standpipe, clean agent, carbon dioxide, hybrid, antifreeze, and wet and dry chemical fire suppression system. Their duties include reading and interpreting engineered drawings, installing hangers and clamps to support the piping system, preparing the pipe, joining pipe using a variety of methods, installing associated equipment including cross-connection control, as well as maintaining, inspecting and testing all types of fire protection systems.

Sprinkler fitters usually, but not exclusively, work on industrial, institutional, commercial and residential sites such as office buildings, plants, factories, hospitals, hotels, houses, apartment buildings, airports and personal care homes. They may work for trade contractors, maintenance departments of factories, and servicing companies. They may also be self-employed. Sprinkler fitters may specialize in installation, maintenance, testing or inspection.

Sprinkler fitters use tools and equipment such as hand tools, portable and stationary power tools, measuring and testing equipment, access equipment, and rigging, hoisting and lifting equipment.

Sprinkler fitters work primarily indoors, often in unheated or temporarily heated spaces. They may also be required to install outdoor systems both above and below ground. The installation of sprinkler equipment takes place throughout all phases of construction, typically in the mid-to later stages of new construction or in situations where renovation of existing structures is undertaken or upgrading is legislated. Sprinkler fitters frequently work on the same site more than once and routinely perform a variety of tasks covering all aspects of the trade. They are frequently required to work in confined spaces and at heights. They may occasionally experience physical discomfort due to extensive lifting of various weights overhead, repetitive motion, temperature changes, noise and dust.

Key attributes for persons entering this trade are mechanical and mathematical aptitude, manual dexterity, good communication and problem solving skills and the ability to pay close attention to detail. Physical strength and stamina, and the ability to work at a considerable height are also assets in this trade.

This standard recognizes similarities or overlaps with the work of plumbers and steamfitter-pipefitters.

Experienced sprinkler fitters may advance to positions such as foreman, estimators, contractors, inspection personnel and instructors. They also act as mentors and trainers of apprentices in the trade.

Training Requirements: To graduate from each level of the apprenticeship program, an apprentice must successfully complete the required technical training and compile enough on-the-job experience to total at least 1800 hours each year. Total trade time required is 7200 hours and at least 4 years in the trade.

There are three levels of technical training delivered by Red Deer College in Red Deer, AB. In Alberta, pipe fitting trades attend a common Level One, therefore the recommended specific Sprinkler Fitter Level One topics (Piping Components and Water-Based Systems) are taught in Level Two. Additional differences to the Harmonized recommendations include that: Communications is taught in Level Three, not Level One, Deluge systems is taught in Level Three, not Level Two, and, Private Water Supply Systems is taught in Alberta Level Two, not in Level Three.

Level One: 8 weeks

Level Two: 8 weeks
Level Three: 8 weeks

***Any person who is not a journeyperson Sprinkler Fitter must become registered as an apprentice to work in this trade.**

The information contained in this guide to course content details the technical training delivered for each level of apprenticeship. An apprentice spends approximately 15% of their apprenticeship term in a technical training institute learning the technical and theoretical aspects of the trade. The hours and percentages of technical and practical training may vary according to class needs and progress.

The content of the technical training components is subject to change without notice.

Entrance Requirements for Apprenticeship Training

Your grade twelve transcripts (with no modified classes) or GED 12 is your guarantee that you meet the educational entrance requirements for apprenticeship in Saskatchewan. In fact, employers prefer and recommend apprentices who have completed high school. This ensures the individual has all of the necessary skills required to successfully complete the apprenticeship program, and receive journeyperson certification.

Individuals with “modified” or “general” classes in math or science do not meet our entry requirements. These individuals are required to take an entrance assessment prescribed by the SATCC.

English is the language of instruction in all apprenticeship programs and is the common language for business in Saskatchewan. Before admission, all apprentices and/or “upgraders” must be able to understand and communicate in the English language. Applicants whose first language is not English must have a minimum Canadian Language Benchmark Assessment of six (CLB6).

Note: A CLB assessment is valid for a one-year period from date of issue.

Designated Trade Name	**Math Credit** at the Indicated Grade Level❶	**Science Credit** at Grade Level
Sprinkler Fitter	Grade 11	Grade 10

❶ - (One of the following) WA – Workplace and Apprenticeship; or F – Foundations; or P – Pre-calculus, or a Math at the indicated grade level (Modified and General Math credits are not acceptable.).

*Applicants who have graduated in advance of 2015-2016, or who do not have access to the revised Science curricula will require a Science at the minimum grade level indicated by trade.

For information about high school curriculum, including Math and Science course names, please see: http://www.curriculum.gov.sk.ca/#

Individuals not meeting the entrance requirements will be subject to an assessment and any required training

ESSENTIAL SKILLS SUMMARY

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

Through extensive research, the Government of Canada and other national and international agencies have identified and validated nine essential skills. These skills are used in nearly every occupation and throughout daily life in different ways.

A series of CCDA-endorsed tools have been developed to support apprentices in their training and to be better prepared for a career in the trades. The tools can be used independently or with the assistance of a tradesperson, trainer, employer, teacher or mentor to:

- understand how essential skills are used in the trades;
- learn about individual essential skills strengths and areas for improvement; and
- improve essential skills and increase success in an apprenticeship program.

The tools are available online or for order at: https://www.canada.ca/en/employment-social-development/programs/essential-skills/tools.html

The application of these skills may be described throughout this document within the skills and knowledge which support each sub-task of the trade. The most important essential skills for each sub-task have also been identified. The following are summaries of the requirements in each of the essential skills, taken from the essential skills profile. A link to the complete essential skills profile can be found at www.red-seal.ca.

READING

Sprinkler fitters read texts such as short descriptions and directions on labels for products. They read bulletins, manuals, work orders, reports and procedures when installing, operating, diagnosing, maintaining, inspecting and repairing equipment. They also read emails and memos from supervisors, co-workers and suppliers about ongoing work.

DOCUMENT USE

Sprinkler fitters scan and locate data on labels, lists, tables and schedules. They reference applicable codes such as National Fire Protection Association (NFPA) and National Building Code (NBC) They may interpret graphs when monitoring equipment operation. They interpret or review schematics and engineered drawings of systems (pneumatic, mechanical, electrical, structural and hydraulic) to identify malfunctions. Sprinkler fitters may also retrieve and study data from scale drawings to identify and verify the location of equipment to be installed. They also complete forms such as test certificates, safety documents, purchase orders, inspection reports, maintenance forms, logbooks, time sheets and work orders.

WRITING

Sprinkler fitters write brief text entries in logbooks and in forms. They may write maintenance, repair and safe work procedures. Sprinkler fitters write emails to supervisors and co-workers about ongoing work, and suppliers about equipment specifications. They also write incident reports and update drawings as required.

ORAL COMMUNICATION

Sprinkler fitters talk to suppliers, engineers, contractors, co-workers, supervisors, other tradespersons and clients and members of the public about equipment specifications, access, orders, and delivery and service times. They discuss work orders, equipment malfunctions and job task coordination with co-workers. They also discuss safety, productivity, and procedural and policy changes at meetings with co-workers, supervisors, engineers and clients.

NUMERACY

Sprinkler fitters measure various physical properties of equipment. Calculations are required in multiple aspects of the sprinkler fitter trade, such as pneumatic, mechanical, structural and hydraulic systems. They calculate distances, totals, maximums, minimums, tolerances, fits and quantities required. They may calculate loads, capacities, speeds, velocities, flows and dimensions for mechanical components and systems. They perform calculations in order to adjust, level and align equipment according to specifications, and for diagnosing process variables. Sprinkler fitters assess weights and distances appropriate for rigging, hoisting, lifting and moving equipment.

THINKING

Thinking skills are critical to the sprinkler fitter trade. They need the ability to adapt on a day to-day basis to site conditions, design, fabrication and installation issues, safety concerns, performance and productivity goals. They may assess the feasibility of designs for small modifications to fire protection systems, ensuring that designs meet technical specifications, performance requirements and jurisdictional regulations. Sprinkler fitters also troubleshoot fire protection systems to determine service requirements.

DIGITAL TECHNOLOGY

Sprinkler fitters may use databases to perform queries on maintenance history, regulatory items and procedures. They may also enter data from completed work orders in a computerized maintenance management system (CMMS). They may use programs to aid in the adjustment of drawings with computer-assisted design (CAD) and building information modelling (BIM) software. Sprinkler fitters use hand-held computerized alignment and levelling measurement tools. They may use word processing software to write, edit and format texts such as incident reports and maintenance procedures. They may access work orders, asset information and documents on tablets, phones and other electronic devices.

WORKING WITH OTHERS

Sprinkler fitters are required to work independently, with other sprinkler fitters, other tradespeople and personnel from other departments and jurisdictional organizations depending on the scope of the work.

CONTINUOUS LEARNING

Sprinkler fitters read manuals and trade-related documents to stay up to date on developments in their trade. They also attend training sessions (online or classroom-based) on new technologies, equipment and safety procedures. In addition, they learn informally by exchanging information with co-workers and suppliers.

ELEMENTS OF HARMONIZATION FOR APPRENTICESHIP TRAINING

At the request of industry, the Harmonization Initiative was launched in 2013 to *substantively align* apprenticeship systems across Canada by making training requirements more consistent in the Red Seal trades. Harmonization aims to improve the mobility of apprentices, support an increase in their completion rates and enable employers to access a larger pool of apprentices.

As part of this work, the Canadian Council of the Directors of Apprenticeship (CCDA) identified four main harmonization priorities in consultation with industry and training stakeholders:

1. Trade name

The official Red Seal name for this trade is Sprinkler Fitter.

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for the Sprinkler Fitter trade is three.

3. Total Training Hours during Apprenticeship Training

The total hours of training, including both on-the-job and in-school training for the Sprinkler Fitter trade is 7200.

4. Consistent sequencing of training content (at each level) using the most recent Occupational Standard

Implementation for harmonization took place progressively.

White boxes are “Topics,” grey boxes are “In Context”. In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

Level 1	Level 2	Level 3
	Safety-Related Functions	**Safety-Related Functions**
	Tools and Equipment	**Tools and Equipment**
		Organizes Work
	Pipe, Tube and Fittings (Prepare)	
	Pipe, Tube and Fittings (Installs)	**Pipe, Tube and Fittings (Installs)**
	~~**Water-Based Systems**~~ *stand alone course*	
Signal-Initiating Devices (Installs)*		**Signal-Initiating Devices (Installs)**

Level 1	Level 2	Level 3
Safety-Related Functions		
Tools and Equipment		
Organizes Work	**Organizes Work**	**Organizes Work**
	Commissions Systems	**Commissions Systems**
~~**Communication**~~ **L2**		**Mentoring & Communication**
	Underground Water Supply	**Fire Pump Units**
		Fire Pump Units
	Fire Department Connections	
	Private Water Supply Systems (L2 only)	~~**Private Water Supply Systems****~~ **L2**
Pipe, Tube and Fittings (Prepare)		
Pipe, Tube and Fittings (Installs)		
~~**Piping Components**~~ **L2**	**Piping Components**	
~~**Water-Based Systems*****~~ **L2**	**Water-Based Systems*** *Deluge Systems* (L3)**	Water-Based Systems***
		Specialty Fire Suppression Systems
	Detection Devices (Installs)	**Detection Devices (Installs)**
	Signal-Initiating Devices (Installs)	
		Inspection, Testing and Maintenance

* Directly related to water-based (e.g. flow/pressure/tamper switches.)
**Components of fire pumps may be included.
*** Components of fire pumps may be included.
Red font and ~~crossed out~~ font topics deviate from harmonized recommendations

SPRINKLER FITTER TASK MATRIX CHART

This chart outlines the major work activities, tasks and sub-tasks from the 2016 Sprinkler Fitter Red Seal Occupational Standard. Each sub-task details the corresponding essential skill and level of training where the content is covered. *

* Sub Tasks with numbers in the boxes is where the content will be delivered in training. Implementation for harmonization took place progressively.

A - PERFORMS COMMON OCCUPATIONAL SKILLS 20%

Task A-1 Performs safety-related functions 23%	1.01 Maintains safe work environment 1	1.02 Uses personal protective equipment (PPE) and safety equipment 1	1.03 Performs lock-out and tag-out procedures 1	A-1.04 Performs work in confined space 1	
Task A-2 Uses and maintains tools and equipment 26%	A-2.01 Uses hand tools 1	A-2.02 Uses portable and stationary power tools 1	A-2.03 Uses measuring and testing equipment 1	A-2.04 Uses access equipment 1	A-2.05 Uses rigging, hoisting and lifting equipment 1
	A-2.06 Uses soldering and brazing equipment 1				
Task A-3 Organizes work 25%	A-3.01 Interprets codes, standards, regulations and procedures 1, 2, 3	A-3.02 Uses drawings and specifications 1, 2, 3	A-3.03 Uses documentation and reference material 1, 2	A-3.04 Plans job tasks and procedures 1, 2	A-3.05 Prepares work site 1, 2
	A-3.06 Performs layout of systems 1, 2				
Task A-4 Commission systems 18%	A-4.01 Commissions water supply systems 2, 3	A-4.02 Commissions fire protection systems 2, 3			

Task A-5 **Uses communication and mentoring techniques** **8%**	**A-5.01 Uses communication techniques** ~~1~~, 3	**A-5.02 Uses mentoring techniques** ~~1~~, 3

B – INSTALLS WATER SUPPLY — 15%

B-6 Prepares pipe **18%**	**B-6.01 Supervises trenching and backfilling (NOT COMMON CORE)** 2	**B-6.02 Installs underground piping and components (NOT COMMON CORE)** 2	**B-6.03 Flushes underground system** 2
Task B-7 **Installs fire pump units** **38%**	**B-7.01 Determines location of pumps, drivers, controllers and components** 3	**B-7.02 Installs pumps, drivers, controllers and components** 3	
Task B-8 **Installs fire department connections** **26%**	**B-8.01 Determines location, size and type of fire department connections** 2	**B-8.02 Installs fire department connection piping and components** 2	
Task B-9 **Installs private water supply systems** **18%**	**B-9.01 Installs water tanks** 3	**B-9.02 Installs related equipment** 3	

C – INSTALLS PIPING — 28%

Task C-10 **Prepares pipe, tube and fittings for installation** **27%**	**C-10.01 Cuts pipe and tube** 1	**C-10.02 Bends pipe and tube** 1	**C-10.03 Threads pipe** 1	**C-10.04 Grooves pipe** 1	**C-10.05 Drills pipe and tube** 1
	C-10.06 Grinds pipe 1	**C-10.07 Prepares fittings** 1			

Task C-11 **Installs pipe, tube and fittings** **37%**	**C-11.01 Installs steel pipe, tube and fittings** 1	**C-11.02 Installs plastic pipe, tube and fittings** 1	**C-11.03 Installs copper pipe, tube and fittings** 1	**C-11.04 Paints and labels pipe and tube** 1	
Task C-12 **Installs piping components** **36%**	**C-12.01 Selects sprinklers** ~~1~~, 2	**C-12.02 Installs sprinklers and nozzles** ~~1~~, 2	**C-12.03 Installs sleeves** ~~1~~, 2	**C-12.04 Installs supports and hangers** ~~1~~, 2	**C-12.05 Installs seismic protection** 2
	C-12.06 Installs cross-connection control assemblies 2	**C-12.07 Installs system drainage** ~~1~~, 2			

D – INSTALLS AND LAYS OUT FIRE PROTECTION SYSTEMS AND DEVICES

21%

Task D-13 **Installs water-based systems** **58%**	**D-13.01 Installs wet pipe systems** ~~1~~, 2	**D-13.02 Installs dry pipe systems** ~~1~~, 2	**D-13.03 Installs antifreeze systems** ~~1~~, 2	**D-13.04 Installs preaction/deluge systems** ~~1~~, 2, 3	**D-13.05 Installs foam systems** 3
	D-13.06 Installs standpipe systems 2	**D-13.07 Installs water mist and hybrid systems** 3			
Task D-14 **Installs specialty fire suppression systems** **17%**	**D-14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems** 3	**D-14.02 Installs portable extinguishers** 3			
Task D-15 **Installs detection devices** **11%**	**D -15.01 Installs wet and dry pilot lines** 2	**D -15.02 Installs heat-actuated devices (HADs) (NOT COMMON CORE)** 2	**D -15.03 Installs spark detection systems (NOT COMMON CORE)** 3	**D -15.04 Installs air sampling systems (NOT COMMON CORE)** 3	**D -15.05 Installs electrical detection systems (NOT COMMON CORE)** 3
Task D -16 **Installs signal-initiating devices** **14%**	**D -16.01 Installs alarm-initiating devices** 2	**D -16.02 Installs supervisory-initiating devices** 2			

E – INSPECTS, TESTS AND MAINTAINS (ITM) FIRE PROTECTION SYSTEMS

16%

Task E-17 **Maintains and repairs fire protection systems** **54%**	**E -17.01** **Troubleshoots fire protection systems** **3**	**E -17.02 Repairs deficiencies** **3**	**E -17.03 Performs scheduled maintenance** **3**
Task E -18 **Inspects and tests fire protection systems** **46%**	**E -18.01 Performs scheduled tests** **3**	**E -18.02 Performs scheduled inspections** **3**	**E -18.03 Inspects portable fire extinguishers** **3**

Red and ~~crossed out~~ font topics indicate deviations from harmonized recommendations

TRAINING PROFILE CHART

Since Saskatchewan Sprinkler Fitter technical training is completed in Alberta, this Training Profile Chart represents the Harmonized Alberta technical training at the topic level.

Level One	Hours
In Context	
Signal-Initiating Devices (Installs)*	
Workplace Safety and Rigging	24
Tools, Equipment and Materials	92
Metal Fabrication	46
Drawing and Specifications	30
Calculations and Science	48
	240

Level Two	Hours
In Context	
Safety-Related Functions	
Tools and Equipment	
Pipe, Tube and Fittings (Prepare)	
Pipe, Tube and Fittings (Installs)	
Fire Sprinkler Systems	81
Water-Based Systems	68
Water Supply	51
Work Organization	40
	240

Level Three	Hours
In Context	
Safety-Related Functions	
Tools and Equipment	
Organizes Work	
Pipe, Tube and Fittings (installs)	
Fire Pump Units	42
Specialty Hazard Systems	101
Inspection, Testing and Maintenance	36
Detection and Signal Initiating Devices	39
Emerging Technology, Communication and Apprenticeship	22
	240

TECHNICAL TRAINING COURSE CONTENT

This chart outlines the model for Saskatchewan Apprenticeship and Trade Certification Commission (SATCC) technical training sequencing. For the harmonized level of training, a cross reference to the Red Seal Occupational Standard (RSOS) apprenticeship technical training sequencing, at the learning outcome level, is provided.

Sub-tasks listed are the minimum to be covered in a topic. Related sub-tasks not listed may be used as a reference and taught "in context" in other topics.

Implementation for harmonization took place progressively. Since the Sprinkler Fitter technical training takes place in Alberta, they were responsible for implementation of the Harmonized training. For your information, Alberta has kept the name of the trade as *Sprinkler Fitter Installer*, not the Harmonized recommended name of *Sprinkler Fitter*. Additionally, in Alberta, the pipe fitting trades attend a common Level One, therefore the recommended specific Sprinkler Fitter Level One topics (*Piping Components* and *Water-Based Systems*) are taught in Level Two, not as recommended in Level One. Additional differences to the Harmonized recommendations include that *Communications* is taught in Level Three, not Level One, *Deluge Systems* is taught in Level Three, not Level Two, and, *Private Water Supply Systems* is taught in Alberta Level Two, not in Level Three.

Level One — 8 weeks — 240 hours

Workplace Safety & Rigging — 24 hours

A. Safety Legislation, Regulations & Industry Policy in the Trades — 4 hours

- demonstrate the application of the Occupational Health and Safety Act, Regulation and Code
- describe the employer's and employee's role with Occupational Health and Safety (OH&S) regulations, Worksite Hazardous Materials Information Systems (WHMIS), fire regulations, Workers Compensation Board regulations and related advisory bodies and agencies
- describe industry practices for hazard assessment and control procedures
- describe the responsibilities of worker and employers to apply emergency procedures
- describe tradesperson attitudes with respect to housekeeping, personal protective equipment and emergency procedures
- describe the roles and responsibilities of employers and employees with the selection and use of personal protective equipment (PPE)
- maintain required PPE for tasks
- use required PPE for tasks

B. Climbing, Lifting, Rigging and Hoisting — 6 hours

- describe manual lifting procedures
- describe rigging hardware and associated safety factors
- select equipment for rigging loads
- describe hoisting and load moving procedures
- maintain personal protective equipment (PPE) for climbing, lifting and load moving equipment
- use PPE for climbing, lifting and moving equipment

C. Hazardous Materials & Fire Protection — 4 hours

- describe roles, responsibilities, features and practices related to the Workplace Hazardous Materials Information System (WHMIS) program
- describe the three key elements of WHMIS

- describe handling, storing and transporting procedures for hazardous material
- describe venting procedures when working with hazardous materials
- describe fire hazards, classes, procedures and equipment related to fire protection

D. Apprenticeship Training Program 3 hours

- describe the contractual responsibilities of the apprentice, employer and Alberta Apprenticeship and Industry Training
- describe the purpose of the record book
- describe the procedure for changing employers during an active apprenticeship
- describe the purpose of the course outline
- describe the procedure for progressing through an apprenticeship
- describe advancement opportunities in this trade

E. Pipe Trades Codes 3 hours

- identify code documents relating to pipe trades including ASME/ ABSA, CSA, NRC, NFPA, ASHRAE
- explain the purpose of codes and standards
- describe where codes and standards are applicable and by what authority
- describe the procedures for the acceptance of the codes by the provinces and the local authorities

F. Electrical Safety 4 hours

- identify safe work practices to protect from arc flash hazards
- describe lockout/tagout procedures
- identify safe work practices to prevent electrical shock

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
A-1 Performs safety-related functions
A-1.01 Maintains safe work environment

- safe work practices
- regulatory requirements pertaining to safety

A-1.02 Uses personal protective equipment (PPE) and safety equipment

- PPE and safety equipment, their applications, maintenance and procedures for use
- regulatory requirements pertaining to safety

A-1.03 Performs lock-out and tag-out procedures

- applications and procedures for locking out/tagging out equipment

A-1.04 Performs work in confined space

- applications and procedures for working in confined spaces

Tools Equipment and Materials — 92 hours

A. Hand Tools 6 hours

- identify the types of hand tools
- describe use of hand tools
- describe the maintenance of hand tools

B. Power Tools 6 hours

- identify the types of power tools
- describe use of power tools
- describe the maintenance of power tools

C. Welded Pipe and Fittings 12 hours

- identify types, markings, designations and pressure rating for welded pipe fittings
- identify stud tensioning systems
- state factors, methods and torque measurements for bolt ups
- identify types, markings, designations, temperature and pressure ratings of flanged fittings and gaskets
- describe the fabrication process for welded pipe and fittings to the tack-up stage
- describe flange preparation and joining techniques for flanged joints

D. Plastic Pipe and Tube 12 hours

- identify types, applications and designations of plastic pipe, tubing and fittings
- describe fabrication processes for solvent welding plastic pipe
- describe fabrication processes for plastic pipe and tubing using alternative joining methods
- describe fabrication processes for bell end joints
- describe fabrication processes for plastic pipe using thermal fusion and electric resistance welding
- fabricate and test a solvent weld spool to manufacturer's specifications
- fabricate and test a fusion weld spool to manufacturer's specifications

E. Threaded and Grooved Pipe 15 hours

- identify types, markings, designations, temperature and pressure ratings of ferrous pipe and fittings
- identify applications of codes, regulations and manufacturer's specifications
- describe the composition of ferrous, alloyed and non-ferrous pipe
- describe the fabrication steps for threading and grooving pipe
- calculate cut length for threaded and grooved pipe
- demonstrate use of hand tools to thread and groove pipe
- demonstrate use of power tools to thread and groove pipe
- assemble and pressure test an assigned project

F. Tube and Tubing 12 hours

- identify types, designations and pressure ratings
- identify fitting types and joining techniques
- identify applications and manufacturer's specifications pertaining to joining methods
- identify health and safety issues pertaining to joining methods
- describe the process for bending tubing
- describe the fabrication processes for joining tubing systems
- assemble and pressure test an assigned project including flared, compression joints and bending components

G. Valves 12 hours

- identify types of valves
- describe fundamental design variations and their applications
- describe service and maintenance procedures
- explain specifications and manufacturer's requirements for valves

H. Hangers, Supports and Fasteners 10 hours

- identify types of hangers, supports and fasteners
- describe applications of hangers, supports and fasteners
- describe installation techniques for hangers, supports and fasteners
- explain specifications and manufacturer requirements for hangers, supports and fasteners

I. Pressure Testing 3 hours

- identify equipment used for pressure testing piping installations
- describe procedures and requirements for pneumatic and hydrostatic testing
- describe hazards specific to pressure testing

J. Pumps 4 hours

- identify types of pumps
- describe applications for pumps
- describe factors affecting the operation of a pump

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
A-1 Safety-related functions
A-1.01 Maintains safe work environment
- safe work practices
- regulatory requirements pertaining to safety

A-2 Uses and maintains tools and equipment
A-2.01 Uses hand tools
- hand tools, their applications, maintenance and procedures for use

A-2.02 Uses portable and stationary power tools
- portable and stationary power tools, their applications, maintenance and procedures for use

A-2.03 Uses measuring and testing equipment
- measuring and testing equipment, their applications, maintenance and procedures for use

A-2.04 Uses access equipment
- the selection, assembly and procedures for using access equipment

A-2.05 Uses rigging, hoisting and lifting equipment
- rigging, hoisting and lifting equipment, their applications, limitations and procedures for use
- calculations required to perform rigging, hoisting and lifting operations
- knots, bends and hitches, their applications and procedures for tying
- communication methods used for hoisting and lifting

A-3 Organizes Work
A-3.01 Interprets codes, regulations and procedures
- trade-related codes, standards, regulations, procedures and their applications
- Uses drawings and specifications
- sprinkler system drawings and on-site drawings
- the procedures to read and interpret drawings and on-site drawings
- the procedures to draw and label orthographic and isometric drawings
- the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings

A-3.03 Uses documentation and reference material
- trade-related documentation and reference material and their application

A-3.04 Plans job tasks and procedures
- the procedures to plan and organize jobs

A-3.05 Prepares work site
- procedures to receive materials
- procedures used to store, secure, organize and maintain materials
- procedures used to plan for and prepare work sites

A-3.06 Performs layout of systems.
- sprinkler system layout

C Installs Piping
C-10 Prepares pipe, tube and fittings for installation
C-10.01 Cuts pipe and tube
- pipe and tube cutting equipment and techniques
- procedures to cut pipe and tube

C-10.02 Bends pipe and tube
- procedures used to bend pipe and tube

- tools and equipment used for pipe and tube bending
- procedures used to calculate degree of bend

C-10.03 Threads pipe
- procedures used to thread pipe
- tools and equipment used to thread pipe

C-10.04 Grooves pipe
- procedures to groove pipe
- tools and equipment used to groove pipe

C-10.05 Drills pipe and tube
- procedures to drill pipe and tubeC-10.06 Grinds pipe
- tools and equipment used to drill pipe and tube

C-10.06 Grinds Pipe
- procedures used to grind pipe
- tools and equipment used to grind pipe

C-10.07 Prepares fittings
- procedures used to prepare pipe fittings
- tools and materials used to prepare pipe fittings

Metal Fabrication — 46 hours

A. Welding Safety — 4 hours

- identify hazards for welding and cutting operations
- identify personal protective equipment for welding and cutting operations
- explain hazards involved with welding fumes and gases
- identify welding fume ventilation methods
- explain the effects of electricity and precautions used to prevent injury
- describe procedures for welding or cutting in confined spaces
- interpret sections of the Occupational Health and Safety Act, general safety regulations

B. Welding — 30 hours

- identify five basic joint types
- describe types of welds and their required dimensions
- identify types of metals using practical tests
- identify oxy-fuel cutting equipment
- identify arc welding equipment
- build a bracket project
- build a spool project

C. Brazing and Soldering — 12 hours

- identify applications of brazed and solder joints
- identify equipment and materials required to braze and solder
- describe brazing and soldering procedures
- assemble and test assigned project

RSOS topics covered in this section of training:
A – Performs Common Occupational Skills
A-2 Uses and maintains tools and equipment
A-2.06 Uses soldering and brazing equipment
- describe procedures used to plan and perform rigging, hoisting and lifting operations

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Drawings and Specifications — 30 hours

A. Sketching and Drawing — 6 hours

- identify the types of drafting equipment
- explain the use of drafting equipment

- identify the types of drafting lines found on a drawing
- identify the three views of an orthographic projection
- draw and label the three views of an orthographic drawing

B. Single Line Drawing 12 hours

- identify piping symbols
- draw and label orthographic single-line drawings
- draw and label isometric single-line piping drawings

C. Drawing Interpretation

- identify the views of a drawing
- explain usage of scales
- calculate dimensions using imperial and metric scales
- describe symbols found on a drawing
- identify the five divisions of a drawing package
- describe the purpose of drawing divisions
- use architectural and mechanical drawings

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
A-3 Organizes Work

A-3.01 Interprets codes, regulations and procedures

- trade-related codes, standards, regulations, procedures and their applications

A-3.02 Uses drawings and specifications

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

A-3.03 Uses documentation and reference material

- trade-related documentation and reference material and their application

A-3.04 Plans job tasks and procedures

- the procedures to plan and organize jobs

A-3.05 Prepares work site

- procedures to receive materials
- procedures used to store, secure, organize and maintain materials
- procedures used to plan for and prepare work sites

A-3.06 Performs layout of systems

- sprinkler system layout

Calculations and Science **48 hours**

A. Applied Calculations 8 hours

- perform calculations using whole numbers, fractions and decimals
- describe the metric and imperial measurement systems
- describe the operation of the AIT calculator
- perform number conversions using whole numbers, fractions and decimals
- perform measurement conversions using whole numbers, fractions and decimals

B. Perimeters, Areas, Percentage and Grade 11 hours

- identify concepts when working with formulas
- apply formulas for calculating perimeters of a rectangle, triangle and a circle
- apply formulas for calculating the surface area of regular-shaped solids, tanks and cylinders

- apply the formula for calculating percentages
- calculate grades in percentage, fractions and ratio

C. Volumes and Capacities 4 hours

- apply formulas for calculating volumes of regular shaped solids, tanks and cylinders
- calculate capacities of regular shaped tanks and cylinders using both metric and imperial values

D. Piping Offsets 6 hours

- calculate offsets for right angle triangles
- apply formulas for 45° and 90° offsets
- calculate offset dimensions around an object

E. Matter, Density and Relative Density 6 hours

- describe three common states of matter
- define the terms matter, element, compound and mixture
- define the terms adhesion, cohesion, surface tension and capillarity
- calculate density, mass and volume of substances
- calculate mass and density using relative densities

F. Pressure and Atmosphere 6 hours

- define pressure and force
- state the six principles of hydrostatics
- define pressure constants used for calculating pressures
- describe atmospheric pressure and the effect of altitude
- perform pressure and force calculations in both imperial and metric units
- perform calculations to convert absolute, gauge and mercury pressures

G. Principles of Electricity 7 hours

- identify principles of electricity including direct and alternating current flow, electrolysis and electromagnetism
- sketch series and parallel electrical circuits
- apply Ohm's Law

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
A-3 Organizes Work

A-3.01 Interprets codes, regulations and procedures

- trade-related codes, standards, regulations, procedures and their applications
- uses drawings and specifications
- sprinkler system drawings and on-site drawings
- the procedures to read and interpret drawings and on-site drawings
- the procedures to draw and label orthographic and isometric drawings
- the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings

A-3.03 Uses documentation and reference material

- trade-related documentation and reference material and their application

A-3.04 Plans job tasks and procedures.

- the procedures to plan and organize jobs

A-3.05 Prepares work site

- procedures to receive materials
- procedures used to store, secure, organize and maintain materials
- procedures used to plan for and prepare work sites

A-3.06 Performs layout of systems

- sprinkler system layout

~~Piping Components~~ (*Taught in L2 not in L1 as Harm recommended*)

~~Water Based Systems~~ (*Taught in L2 not in L1 as Harm recommended*)

~~Communications~~ (*Taught in L2 not in L1 as Harm recommended*)

Level One topics from the RSOS that are taught in context:

D – INSTALLS AND LAYS OUT FIRE PROTECTION SYSTEMS AND DEVICES

D-16 Installs signal-initiating devices
D-16.01 Installs alarm-initiating devices.
D-16.02 Installs supervisory-initiating devices.

For details regarding the In-Context Topic, see page 35

Level Two — 8 weeks — 240 hours

Fire Sprinkler Systems — 81 hours

A. Hazard Classifications — 8 hours
- describe fire science terms
- describe sprinkler system design
- describe hazard classifications
- explain methods of fire containment
- perform hazard assessments

B. Piping Arrangements — 22 hours
- identify formulas for multiple piping offsets
- describe piping system types
- describe piping system components
- describe hand hose connections
- describe application of equal and unequal spread offsets
- explain pipe schedule systems
- explain hydraulically calculated systems
- explain special piping arrangements
- explain flushing connections
- explain pipe sleeve clearances
- design pipe schedule systems
- construct piping systems

C. Sprinkler System Drainage — 5 hours
- describe drainage installation requirements
- describe drainage components for sprinkler systems
- explain grade requirements for piping systems
- explain sprinkler system drainage maintenance procedures
- install sprinkler system drains

D. Piping Support Systems (**Piping Components** Taught in L2 not Harm L1 as recommended) — 7 hours
- describe hanger types
- describe bracing types
- describe hanger components
- describe bracing components
- explain seismic bracing requirements
- explain installation of sprinkler system supports
- perform trapeze hanger calculations

- perform rod sizing calculations

E. Sprinkler Installation 22 hours

- describe sprinkler types
- describe nozzle types
- describe sprinkler components
- describe nozzle components
- describe sprinkler installation
- describe nozzle installation
- explain sprinkler care
- explain clearance requirements for sprinklers.
- explain sprinkler selection.
- explain sprinkler spray patterns.
- explain obstruction rules.
- calculate clearances for sprinkler installation.
- install sprinklers

F. System Hydraulic Design 14 hours

- describe hydraulic calculation terminology
- describe hydraulic calculation procedures
- describe pressure loss
- explain water density requirements over a design area
- perform pressure loss calculation
- perform water demand calculation
- use hydraulic calculations for system layout

G. Access Equipment 3 hours

- describe elevated work platform types
- explain OH&S standards for elevated work platforms

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills

A-3 Organizes Work

A-3.01 Interprets codes, regulations and procedures

- trade-related codes, standards, regulations, procedures and their applications

A-3.02 Uses drawings and specifications

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

A-3.03 Uses documentation and reference material

- trade-related documentation and reference material and their application

A-3.04 Plans job tasks and procedures

- the procedures to plan and organize jobs

A-3.05 Prepares work site

- procedures to receive materials
- procedures used to store, secure, organize and maintain materials
- procedures used to plan for and prepare work sites

A-3.06 Performs layout of systems

- sprinkler system layout

B – Installs Water Supply

B-6 Prepares pipe

B-6.03 Flushes underground system

- flushing requirements of underground systems
- safe work procedures for flushing of underground systems

C – Installs Piping
C-12 Installs piping components

C-12.02 Installs sprinklers and nozzles
- sprinklers and nozzles
- and nozzles installation

C-12.03 Installs sleeves
- pipe sleeves and their installation

C-12.04 Installs supports and hangers
- supports and hangers and their installation procedures

C-12.05 Installs seismic protection
- procedures to select and locate sway/seismic bracing
- procedures used to install sway/seismic bracing

C-12.06 Installs cross-connection control assemblies
- cross-connection control assemblies, their characteristics, purpose, applications and operation
- the procedures to install cross-connection control assemblies

C-12.07 Installs system drainage
- system drainage, and their operation and characteristics
- the procedures to install system drainage and components according to code requirements

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Water-Based Systems (Taught in L2 not Harm L3 as recommended) — 68 hours

A. Residential Sprinkler Systems — 10 hours
- describe residential sprinkler system types
- describe water supply requirements
- describe material requirements
- explain maintenance procedures
- perform residential piping installation
- explain OH&S standards for elevated work platforms

B. Wet Sprinkler Systems — 18 hours
- describe wet system types
- describe wet system components
- explain wet system testing procedures
- explain wet system maintenance
- sketch an isometric drawing of an alarm check valve
- perform trim installation on an alarm valve

C. Dry Sprinkler Systems — 22 hours
- describe dry system types
- describe dry system components
- explain dry system testing procedures
- explain dry system maintenance
- explain air supply requirements for a dry system
- sketch an isometric drawing of a dry pipe valve
- perform trim installation on a dry pipe valve

D. Freeze Protection — 6 hours
- describe freeze protection systems
- describe freeze protection components
- describe freeze protection for piping
- explain freeze protection system hazards
- explain freeze protection testing procedures
- service freeze protection systems

E. Stand Pipe Systems — 12 hours
- describe stand pipe system types
- describe stand pipe system components

- describe stand pipe system testing requirements
- explain stand pipe system maintenance requirements

RSOS topics covered in this section of training:

D – Installs and Lays Out Fire Protection Systems and Devices
D-13 Installs water based systems
D-13.01 Installs wet pipe systems
- wet pipe systems, and their operation and characteristics
- procedures used to install wet pipe systems and components

D-13.02 Installs dry pipe systems
- dry pipe systems, their operation and characteristics
- procedures used to install dry pipe systems and their components

D-13.03 Installs antifreeze systems
- antifreeze systems, their operation and characteristics
- procedures to install and maintain antifreeze systems

D-13.04 Installs preaction/deluge systems
- preaction/deluge systems, their applications and operating principles
- installation requirements and associated test procedures for preaction/deluge systems

D-13.06 Installs standpipe systems
- standpipe and hose systems, their applications and operating principles
- installation requirements and associated test procedures for standpipe systems

D-15.01 Installs wet and dry pilot lines
- the procedures used to install, test and maintain wet and dry pilot lines and their associated pilot line detectors

D-15.02 Installs heat-actuated devices (HADs) (NOT COMMON CORE)
- the procedures used to install, test and maintain HADs and their associated components

D-16.0101 Installs alarm-initiating devices
- the procedures and requirements to install, test and maintain alarm-initiating devices

D-16.02 Installs supervisory-initiating devices
- procedures and requirements to install, test and maintain supervisory-initiating devices

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Water Supply — 51 hours

A. Public Water Supply — 6 hours
- describe public water supply
- describe water supply terminology
- explain flushing requirements
- explain types of public water supply connections

B. Private Water Supply (Taught in L2 not Harm L3 as recommended) — 6 hours
- describe private water supply systems
- describe private water supply storage tanks
- describe private water supply components
- describe corrosive water supplies
- explain flushing requirements
- perform tank size calculation

C. Cross Connection Control — 6 hours
- identify cross connection control categories. Describe cross connection control terminology
- describe American Water Works Association (AWWA) certification
- explain cross connection control installation procedures
- explain cross connection control testing procedures

D. Fire Department Connections — 4 hours
- describe fire department connections
- describe fire department connection components

- describe fire department connection testing
- explain fire department connection installation

E. Fire Hydrant 15 hours

- identify hydrant tools
- describe hydrant types
- describe hydrant components
- describe hydrant operation
- describe hydrant maintenance
- perform hydrant flow test calculation

F. Underground Piping 10 hours

- describe underground piping systems
- describe underground piping system components
- explain flushing requirements

G. Water Properties 4 hours

- describe chemical properties of water
- describe water flow terminology
- explain Venturi effect
- explain head pressure
- interpret water properties

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
Task A-4 Commission systems
A-4.01 Commissions water supply systems
- procedures to commission water supply systems

A-4.02 Commissions fire protection systems
- procedures to commission fire protection systems

B – Installs Water Supply
B-6 Prepares pipe
B-6.03 Flushes underground system
- flushing requirements of underground systems
- safe work procedures for flushing of underground systems

B-8 Installs fire department connections
B-8.01 Determines location, size and type of fire department connections
- fire department equipment and their installation procedures

B-8.02 Installs fire department connection piping and components
- fire department equipment and their installation procedures

C – Installs Piping
C-12 Installs piping components
C-12.06 Installs cross-connection control assemblies
- cross-connection control assemblies, their characteristics, purpose, applications and operation
- procedures to install cross-connection control assemblies

Work Organization 40 hours

A. Legislated Requirements 16 Hours

- identify environmental regulations
- describe fire protection legislation
- explain National Fire Protection Association (NFPA) standards
- explain Alberta Fire Code (AFC)
- explain Alberta Building Code (ABC)
- explain National Building Code (NBC)

B. System Layout 12 Hours

- interpret installation specifications
- interpret blueprints
- perform system layout

C. Job Site Planning 12 Hours

- identify project management requirements
- identify jobsite requirements
- identify factors that affect jobsite requirements
- describe jobsite reports
- explain work permits
- coordinate tasks with other trades

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
Task A-3 Organizes work
A-3.01 Interprets codes, regulations and procedures.
- trade-related codes, standards, regulations, procedures and their applications

A-3.02 Uses drawings and specifications.
- sprinkler system drawings and on-site drawings
- the procedures to read and interpret drawings and on-site drawings
- the procedures to draw and label orthographic and isometric drawings
- the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings

A-3.03 Uses documentation and reference material.
- trade-related documentation and reference material and their application

A-3.04 Plans job tasks and procedures.
- the procedures to plan and organize jobs

A-3.05 Prepares work site.
- procedures to receive materials
- procedures used to store, secure, organize and maintain materials
- procedures used to plan for and prepare work sites

A-3.06 Performs layout of systems.
- sprinkler system layout

A-4 Commission systems
A-4.01 Commissions water supply systems
- procedures to commission water supply systems

A-4.02 Commissions fire protection systems
- procedures to commission fire protection systems

~~**Deluge Systems**~~ **(Taught in L3 not in L2 as Harm recommended)**

Level Two topics from the RSOS that are taught in context:

A – Performs Common Occupational Skills
A-1 Safety-related functions
A-1.01 Maintains safe work environment
- *safe work practices*
- *regulatory requirements pertaining to safety*

A-1.02 Uses personal protective equipment (PPE) and safety equipment
- *PPE and safety equipment, their applications, maintenance and procedures for use*
- *regulatory requirements pertaining to safety*

A-1.03 Performs lock-out and tag-out procedures.
- *applications and procedures for locking out/tagging out equipment.*

A-1.04 Performs work in confined space.
- *applications and procedures for working in confined spaces*

A-2 Uses and maintains tools and equipment

A-2.01 Uses hand tools.

- *hand tools, their applications, maintenance and procedures for use*

A-2.02 Uses portable and stationary power tools.

- *portable and stationary power tools, their applications, maintenance and procedures for use*

A-2.03 Uses measuring and testing equipment

- *measuring and testing equipment, their applications, maintenance and procedures for use*

A-2.04 Uses access equipment.

- *the selection, assembly and procedures for using access equipment*

A-2.05 Uses rigging, hoisting and lifting equipment.

- *rigging, hoisting and lifting equipment, their applications, limitations and procedures for use*
- *calculations required to perform rigging, hoisting and lifting operations*
- *knots, bends and hitches, their applications and procedures for tying*
- *communication methods used for hoisting and lifting*

A-3 Organizes Work

A-3.01 Interprets codes, regulations and procedures.

- *trade-related codes, standards, regulations, procedures and their applications*
- *Uses drawings and specifications.*
- *sprinkler system drawings and on-site drawings*
- *the procedures to read and interpret drawings and on-site drawings*
- *the procedures to draw and label orthographic and isometric drawings*
- *the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings*

A-3.03 Uses documentation and reference material.

- *trade-related documentation and reference material and their application*

A-3.04 Plans job tasks and procedures.

- *the procedures to plan and organize jobs*

A-3.05 Prepares work site.

- *procedures to receive materials*
- *procedures used to store, secure, organize and maintain materials*
- *procedures used to plan for and prepare work sites*

A-3.06 Performs layout of systems.

- *sprinkler system layout*

C – Installs Piping

C-10 Prepares pipe, tube and fittings for installation

C-10.01 Cuts pipe and tube

- *pipe and tube cutting equipment and techniques*
- *procedures to cut pipe and tube*

C-10.02 Bends pipe and tube

- *procedures used to bend pipe and tube*
- *tools and equipment used for pipe and tube bending*
- *procedures used to calculate degree of bend*

C-10.03 Threads pipe

- *procedures used to thread pipe*
- *tools and equipment used to thread pipe*

C-10.04 Grooves pipe

- *procedures to groove pipe*
- *tools and equipment used to groove pipe*

C-10.05 Drills pipe and tube

- *procedures to drill pipe and tubeC-10.06 Grinds pipe*
- *tools and equipment used to drill pipe and tube*

C-10.06 Grinds Pipe

- *procedures used to grind pipe*
- *tools and equipment used to grind pipe*

C-10.07 Prepares fittings

- *procedures used to prepare pipe fittings*

- *tools and materials used to prepare pipe fittings*

C Installs Piping
C-11 Installs pipe, tube and fittings
C-11.01 Installs steel pipe, tube and fittings
- *pipe, tube and fittings*
- *the procedures used to install steel pipe, tube and fittings*

C-11.02 Installs plastic pipe, tube and fittings
- *plastic pipe, tube and fittings*
- *the procedures used to install plastic pipe, tube and fittings*

C-11.03 Installs copper pipe, tube and fittings
- *copper pipe, tube and fittings*
- *procedures used to install copper pipe, tube and fittings*
- *the procedures used to braze and solder joints*

D – Installs and Lays Out Fire Protection Systems and Devices
D-13 Installs water-based systems
D-13.01 Installs wet pipe systems
- *wet pipe systems, and their operation and characteristics*

For details regarding the In-Context Topic, see page 35

Level Three — 8 weeks — 240 hours

Fire Pump Units — 42 hours

A. Fire Pumps — 30 Hours
- describe fire pumps
- describe fire pump operation principles
- describe fire pump components
- describe jockey pumps
- describe pipe sizing
- explain fire pump commissioning
- explain fire pump maintenance
- explain fire pump room
- sketch fire pump room
- perform fire pump curve calculations

B. Drivers — 6 Hours
- identify driver performance
- identify power supplies
- describe drivers
- describe driver components
- describe driver operation
- explain driver-to-pump alignment
- perform water horsepower calculation

C. Controllers — 6 Hours
- describe controllers
- describe controller operation
- describe controller components
- explain sensing line installations

RSOS topics covered in this section of training:

A – Performs Common Occupational Skills
A-4 Commission systems
A-4.01 Commissions water supply systems

- procedures to commission water supply systems

A-4.02 Commissions fire protection systems
- procedures to commission fire protection systems

B – Installs Water Supply
B-7 Installs fire pump units

B-7.01 Determines location of pumps, drivers, controllers and components
- pumps, drivers, controllers and components

B-7.02 Installs pumps, drivers, controllers and components
- water source connections
- fire pump components and their installation

Specialty Hazard Systems — 101 hours

A. Chemical Systems — 6 Hours
- describe chemical systems
- describe dry chemical system components
- describe wet chemical system components
- describe operations of dry chemical systems
- describe wet chemical systems
- explain maintenance of chemical systems

B. Extinguishers — 6 Hours
- describe fire extinguisher classes
- describe fire extinguisher components
- explain fire extinguisher inspection
- explain fire extinguisher maintenance

C. Foam Systems — 15 Hours
- describe foam systems.
- describe foam concentrates.
- describe foam system discharge devices.
- explain foam system component installation
- explain commissioning of foam systems
- explain operation of a foam system

D. Clean Agent Systems — 10 Hours
- describe clean agent systems
- describe clean agent system components
- describe clean agent system operation
- explain clean agent system testing requirements

E. Carbon Dioxide Systems — 6 Hours
- describe carbon dioxide systems
- describe carbon dioxide system components
- describe carbon dioxide system operations
- explain carbon dioxide system testing

F. Pre-Action Systems — 22 Hours
- describe pre-action systems
- describe pre-action system components
- describe pre-action system operations
- explain pre-action systems testing requirements
- perform trim installation on a pre-action valve

G. Deluge Systems (*Taught in L3 not Harm L2 as recommended*) — 20 Hours
- describe deluge systems
- describe deluge system components
- describe deluge system operation

- describe fixed water spray systems
- describe outside exposure systems
- perform trim installation on a deluge valve

H. Water Mist Systems 10 Hours

- describe water mist systems
- describe water mist system components
- describe water mist system operations
- describe hybrid systems
- describe hybrid system components
- describe hybrid system operation

I. Corrosion Inhibiting 6 Hours

- describe piping corrosion
- describe corrosion inhibiting system devices
- explain corrosion inhibiting methods

RSOS topics covered in this section of training:

A – Performs common occupational skills
A-4 Commission systems
A-4.01 Commissions water supply systems
- procedures to commission water supply systems

A-4.02 Commissions fire protection systems
- procedures to commission fire protection systems

D – Installs and Lays Out Fire Protection Systems and Devices
D-13 Installs water-based systems
D-13.04 Installs preaction/deluge systems
- preaction/deluge systems, their applications and operating principles
- installation requirements and associated test procedures for preaction/deluge systems

D-13.05 Installs foam systems
- foam systems, their applications and operating principles
- installation requirements and associated test procedures for foam systems

D-13.07 Installs water mist and hybrid systems
- water mist and hybrid systems, their applications and operating principles
- requirements for water mist and hybrid systems

D-14 Installs specialty fire suppression systems
D-14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems
- wet and dry chemical, clean agent and carbon dioxide systems and their operation and characteristics
- installation of wet and dry chemical, clean agent and carbon dioxide systems
- inspection, and testing of wet and dry chemical, clean agent and carbon dioxide systems
- procedures used to service, maintain and remove wet and dry chemical, clean agent and carbon dioxide systems

D-14.02 Installs portable extinguishers
- procedures and requirements to install portable fire extinguishers

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Inspection, Testing and Maintenance 36 hours

A. Inspect Fire Protection Systems 10 Hours

- identify owner's responsibilities for disarming systems
- identify sprinkler systems installer's responsibilities for disabling systems
- describe required testing procedures
- describe tools used for testing
- describe equipment used for testing
- describe types of inspection report documents
- describe inspection report terminology

- describe report document preparation
- perform a fire protection system inspection

B. Fire Protection System Maintenance 10 Hours

- identify owner's responsibilities for sprinkler systems
- identify sprinkler systems installer's legal responsibilities
- describe tools required for system maintenance
- describe equipment required for system maintenance
- describe routine maintenance procedures

C. Deficiencies 16 Hours

- describe system deficiencies
- describe system impairments
- describe sprinkler system failures
- describe sprinkler system repair procedures

RSOS topics covered in this section of training:

E – Inspects, Test and Maintains (ITM) Fire Protection Systems
E-17 Maintains and repairs fire protection systems
E-17.01 Troubleshoots fire protection systems

- procedures and requirements used to troubleshoot fire protection systems and their components
- the relationship between sprinkler systems and fire panels

E-17.02 Repairs deficiencies

- procedures and requirements used to repair fire protection systems and their components.
- the relationship between sprinkler systems and fire panels.

E-17.03 Performs scheduled maintenance

- procedures used to maintain fire protection systems and their components.
- the relationship between sprinkler systems and fire panels.

E -18 Inspects and tests fire protection systems
E-18.01 Performs scheduled tests

- procedures and requirements used to test fire protection systems and their components.
- the relationship between sprinkler systems and fire panels.

E-18.02 Performs scheduled inspections

- the procedures and requirements to perform scheduled inspections of fire protection systems and their components
- the relationship between sprinkler systems and fire panels

E-18.03 Inspects portable fire extinguishers

- procedures and requirements to inspect portable fire extinguishers

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Detection and Signal Initiating Devices

A. Actuating Devices 9 Hours

- describe actuating devices
- describe actuating device components
- explain device actuation

B. Spark Detection Systems 3 Hours

- describe spark detection systems
- describe spark detection system components
- describe spark detection system operation

C. Air Sampling Systems 6 Hours

- describe air sampling systems
- describe air sampling system components
- explain operation of air sampling systems

D. Signal Initiating Devices 7 Hours

- describe signal initiating devices
- describe signal initiating device components
- explain operation of a signal initiating device

E. Fire Alarm Panels 8 Hours

- describe fire alarm panels
- describe fire alarm panel terminology
- explain fire alarm devices
- explain fire alarm panel bypassing procedures
- explain fire alarm panel reset procedures
- operate fire alarm panels

F. Electrical Test Equipment 6 Hours

- identify electrical test equipment
- describe electrical test equipment functions
- use electrical test equipment

RSOS topics covered in this section of training:

D – Installs and Lays Out Fire Protection Systems and Devices
D-15 Installs detection devices
D-15.03 Installs spark detection systems (NOT COMMON CORE)

- procedures used to install, test and maintain spark detection systems and their associated components

D-15.04 Installs air sampling systems (NOT COMMON CORE)

- procedures used to install, test and maintain air sampling systems and their associated components

D-15.05 Installs electrical detection systems (NOT COMMON CORE)

- the procedures used to install, test and maintain electrical detection systems and their associated components

E – Inspects, tests and maintains (ITM) fire protection systems
E-18 Inspects and tests fire protection systems
E-18.01 Performs scheduled tests

- procedures and requirements used to test fire protection systems and their components.
- the relationship between sprinkler systems and fire panels

E-18.02 Performs scheduled inspections

- the procedures and requirements to perform scheduled inspections of fire protection systems and their components
- the relationship between sprinkler systems and fire panels

E-18.03 Inspects portable fire extinguishers

- procedures and requirements to inspect portable fire extinguishers

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Emerging Technology, Communication and Apprenticeship — 22 Hours

A. Estimation 10 Hours

- define scope of work
- describe contract purpose
- explain estimating principles
- explain contract change order process
- perform a jobsite estimate

B. Building Information Modelling 6 Hours

- describe building information modelling
- explain building information modelling functions
- use building information modelling software

C. Communication Techniques (Taught in L3 not Harm L1 as recommended) 3 Hours

- describe professional expectations
- describe effective communications skills
- describe conflict resolution processes
- use communication techniques

D. Workplace Coaching Skills 1 Hour

- describe the process for coaching an apprentice

E. Alberta's Industry Network 1 Hour

- describe Alberta's Apprenticeship and Industry Training system
- describe the roles and responsibilities of the Alberta Apprenticeship and Industry Training Board, the Government of Alberta and post-secondary institutions
- describe the roles and responsibilities of the Provincial Apprenticeship Committees (PACs), Local Apprenticeship Committees (LACs) and Occupational Committees (OCs)

F. Interprovincial Standards Red Seal Program 1 Hour

- identify Red Seal products used to develop Interprovincial examinations
- use Red Seal products to prepare for an Interprovincial examination

RSOS topics covered in this section of training:
A – Performs common occupational skills
A-3 Organizes work
A-3.04 Plans Job tasks and procedures

- procedures to plan and organize jobs

A-3.05 Prepares work site

- procedures to receive materials
- procedures used to store, secure, organize and maintain materials
- procedures used to plan for and prepare work sites

A-5 Uses communication and mentoring techniques
A-5.01 Uses communication techniques

- trade terminology

A-5.01 Uses mentoring techniques

- effective communication practices

~~**Private Water Supply**~~ (Taught in L2 not in Level 3 as Harm Recommended)

Level Three topics from the RSOS that are taught in context:

A – Performs common occupational skills
A-2 Uses and maintains tools and equipment
A-2.01 Uses hand tools

- *hand tools, their applications, maintenance and procedures for use*

A-2.02 Uses portable and stationary power tools

- *portable and stationary power tools, their applications, maintenance and procedures for use*

A-2.03 Uses measuring and testing equipment

- *measuring and testing equipment, their applications, maintenance and procedures for use*

A-2.04 Uses access equipment

- *the selection, assembly and procedures for using access equipment*

A-2.05 Uses rigging, hoisting and lifting equipment

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

A-2.06 Uses soldering and brazing equipment

- *soldering and brazing equipment, applications and procedures*

A-3 Organizes Work

A-3.01 Interprets codes, regulations and procedures

- *trade-related codes, standards, regulations, procedures and their applications*

A-3.02 Uses drawings and specifications

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

A-3.03 Uses documentation and reference material

- *trade-related documentation and reference material and their application*

A-3.04 Plans job tasks and procedures

- *procedures to plan and organize jobs*

A-3.05 Prepares work site

- *procedures to receive materials*
- *procedures used to store, secure, organize and maintain materials*
- *procedures used to plan for and prepare work sites*

A-3.06 Performs layout of systems (introduction)

- *sprinkler system layout*

C Installs Piping

C-11 Installs pipe, tube and fittings

C-11.01 Installs steel pipe, tube and fittings

- *steel pipe, tube and fittings*
- *the procedures used to install steel pipe, tube and fittings*

C-11.02 Installs plastic pipe, tube and fittings

- *plastic pipe, tube and fittings*
- *the procedures used to install plastic pipe, tube and fittings*

C-11.03 Installs copper pipe, tube and fittings

- *copper pipe, tube and fittings*
- *the procedures used to install copper pipe, tube and fittings*
- *the procedures used to braze and solder joints*

C-11.04 Paints and labels pipe and tube

- *the procedures used to paint and label pipe and tube*

D Installs and Lays Out Fire Protection Systems and Devices

D-Installs and Lays Out Fire Protection Systems and Devices

D-16 Installs signal-initiating devices

D-16.01 Installs alarm-initiating devices

- *the procedures and requirements to install, test and maintain alarm-initiating devices.*

D-16.02 Installs supervisory-initiating devices

- *procedures and requirements to install, test and maintain supervisory-initiating devices*

For details regarding the In-Context Topic, see page 35

- *Red font and ~~Crossed out~~ font topics deviate from harmonized recommendations*

IN CONTEXT TOPICS

In context means learning that has already taken place and is being applied to the applicable task. Learning outcomes for in context topics are accomplished in other topics in that level.

A – Performs Common Occupational Skills

A-1 Safety-related functions

A-1.01 Maintains safe work environment

- *safe work practices*
- *regulatory requirements pertaining to safety*

A-1.02 Uses personal protective equipment (PPE) and safety equipment

- *PPE and safety equipment, their applications, maintenance and procedures for use*
- *regulatory requirements pertaining to safety*

A-1.03 Performs lock-out and tag-out procedures.

- *applications and procedures for locking out/tagging out equipment.*

A-1.04 Performs work in confined space.

- *applications and procedures for working in confined spaces*

A-2 Uses and maintains tools and equipment

A-2.01 Uses hand tools.

- *hand tools, their applications, maintenance and procedures for use*

A-2.02 Uses portable and stationary power tools.

- *portable and stationary power tools, their applications, maintenance and procedures for use*

A-2.03 Uses measuring and testing equipment

- *measuring and testing equipment, their applications, maintenance and procedures for use*

A-2.04 Uses access equipment.

- *the selection, assembly and procedures for using access equipment*

A-2.05 Uses rigging, hoisting and lifting equipment.

- *rigging, hoisting and lifting equipment, their applications, limitations and procedures for use*
- *calculations required to perform rigging, hoisting and lifting operations*
- *knots, bends and hitches, their applications and procedures for tying*
- *communication methods used for hoisting and lifting*

A-2.06 Uses soldering and brazing equipment

- *soldering and brazing equipment, applications and procedures*

A-3 Organizes Work

A-3.01 Interprets codes, regulations and procedures.

- *trade-related codes, standards, regulations, procedures and their applications*
- *Uses drawings and specifications.*
- *sprinkler system drawings and on-site drawings*
- *the procedures to read and interpret drawings and on-site drawings*
- *the procedures to draw and label orthographic and isometric drawings*
- *the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings*

A-3.02 Uses drawings and specifications

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

A-3.03 Uses documentation and reference material.

- *trade-related documentation and reference material and their application*

A-3.04 Plans job tasks and procedures.

- *the procedures to plan and organize jobs*

A-3.05 Prepares work site.

- *procedures to receive materials*

- *procedures used to store, secure, organize and maintain materials*
- *procedures used to plan for and prepare work sites*

A-3.06 Performs layout of systems.

- *sprinkler system layout*

C – Installs Piping

C-10 Prepares pipe, tube and fittings for installation

C-10.01 Cuts pipe and tube

- *pipe and tube cutting equipment and techniques*
- *procedures to cut pipe and tube*

C-10.02 Bends pipe and tube

- *procedures used to bend pipe and tube*
- *tools and equipment used for pipe and tube bending*
- *procedures used to calculate degree of bend*

C-10.03 Threads pipe

- *procedures used to thread pipe*
- *tools and equipment used to thread pipe*

C-10.04 Grooves pipe

- *procedures to groove pipe*
- *tools and equipment used to groove pipe*

C-10.05 Drills pipe and tube

- *procedures to drill pipe and tubeC-10.06 Grinds pipe*
- *tools and equipment used to drill pipe and tube*

C-10.06 Grinds Pipe

- *procedures used to grind pipe*
- *tools and equipment used to grind pipe*

C-10.07 Prepares fittings

- *procedures used to prepare pipe fittings*
- *tools and materials used to prepare pipe fittings*

C-11 Installs pipe, tube and fittings

C-11.01 Installs steel pipe, tube and fittings

- *pipe, tube and fittings*
- *the procedures used to install steel pipe, tube and fittings*

C-11.02 Installs plastic pipe, tube and fittings

- *plastic pipe, tube and fittings*
- *the procedures used to install plastic pipe, tube and fittings*

C-11.03 Installs copper pipe, tube and fittings

- *copper pipe, tube and fittings*
- *procedures used to install copper pipe, tube and fittings*
- *the procedures used to braze and solder joints*

C-11.04 Paints and labels pipe and tube

- *the procedures used to paint and label pipe and tube*

D – Installs and Lays Out Fire Protection Systems and Devices

D-13 Installs water-based systems

D-13.01 Installs wet pipe systems

- *wet pipe systems, and their operation and characteristics*

D-16 Installs signal-initiating devices

D-16.01 Installs alarm-initiating devices

- *the procedures and requirements to install, test and maintain alarm-initiating devices.*

D-16.02 Installs supervisory-initiating devices

- *procedures and requirements to install, test and maintain supervisory-initiating devices*

APPENDIX A: POST HARMONIZATION TRAINING PROFILE CHART

This chart which outlines the finalized model for SATCC technical training sequencing with a cross reference to the Harmonized apprenticeship technical training sequencing, at the topic level.

Implementation for harmonization took place progressively.

SATCC Level One	Hours	Pan-Canadian Harmonized Level One
		In Context
		Signal-Initiating Devices (installs)*
Workplace Safety & Rigging	24	Safety Related Functions
		Organizes Work
		~~Communications~~
Tools, Equipment and Materials	92	Tools and Equipment
Metal Fabrication	46	Pipe, Tube and Fittings (prepare) Pipe, Tube and Fittings (installs) ~~Piping Components~~ ~~Water-Based Systems***~~
Drawing and Specification	30	
Calculations and Science	48	
	240	

SATCC Level Two	Hours	Pan-Canadian Harmonized Level Two
		In Context
		Safety Related Functions
		Tools and Equipment
		Pipe, Tube and Fittings (Prepare)
		Pipe, Tube and Fittings (Installs)
		Water-Based Systems
Work Organization	40	Organizes Work (In-Context)
Water Supply	51	Underground Water Supply
		Commissions Systems
Fire Sprinkler Systems	81	Fire Department Connections
		Detection Devices
		Signal-Initiating Devices (Installs) (~~Deluge Systems~~)
		Piping Components
Water Based Systems	68	Water Based Systems
		Private Water Supply Systems**
	240	

SATCC Level Three	Hours	Pan-Canadian Harmonized Level Three
		In Context
		Safety-Related Functions
		Tools and Equipment
		Organizes Work
		Pipe, Tube and Fittings (installs)
		Signal-Initiating Devices (Installs)
Emerging Technology, Communication and Apprenticeship	22	Organizes Work
		Communication and Mentoring
Fire Pump Units	42	Fire Pump Units
Specialty Hazard Systems	101	Specialty Fire Suppression Systems (Deluge Systems)
		~~Private Water Supply Systems**~~
		Water Based Systems***
		Commissions Systems
Detection and Signal Initiating Devices	39	Detection Devices (Installs)
Inspection, Testing and Maintenance	36	Inspection, Testing and Maintenance
	240	

- *Red font and ~~Crossed out~~ font topics deviate from harmonized recommendations*