PROGRAM PROGRAMME
EXCELLENCE
RED SEAL · SCEAU ROUGE

RED SEAL OCCUPATIONAL STANDARD

Sprinkler Fitter

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Employment and Social Development Canada
Emploi et Développement social Canada

Canada

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SPRINKLER FITTER

INTERPROVINCIAL STANDARD
CANADA
NORME INTERPROVINCIALE

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FOREWORD

The Canadian Council of Directors of Apprenticeship (CCDA) recognizes this Red Seal Occupational Standard (RSOS) as the Red Seal standard for the Sprinkler Fitter trade.

Background

The first National Conference on Apprenticeship in Trades and Industries, held in Ottawa in 1952, recommended that the federal government be requested to cooperate with provincial and territorial apprenticeship committees and officials in preparing analyses of a number of skilled occupations. Employment and Social Development Canada (ESDC) sponsors the Red Seal Program, which, under the guidance of the CCDA, develops a national occupational standard for each of the Red Seal trades.

Standards have the following objectives:

- to describe and group the tasks performed by skilled workers;
- to identify which tasks are performed in every province and territory;
- to develop instruments for use in the preparation of Interprovincial Red Seal Examinations and assessment tools for apprenticeship and certification authorities;
- to develop common tools for apprenticeship on-the-job and technical training in Canada;
- to facilitate the mobility of apprentices and skilled workers in Canada;
- to supply employers, employees, associations, industries, training institutions and governments with analyses of occupations.

Any questions, comments, or suggestions for changes, corrections, or revisions to this standard or any of its related products may be forwarded to:

Trades and Apprenticeship Division
Apprenticeship and Regulated Occupations Directorate
Employment and Social Development Canada
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This standard was prepared by the Apprenticeship and Regulated Occupations Directorate of ESDC. The coordinating, facilitating and processing of this analysis were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and of the Ontario College of Trades, the host jurisdiction for this trade.

STRUCTURE OF THE OCCUPATIONAL STANDARD

To facilitate understanding of the occupation, this standard contains the following sections:

Description of the Sprinkler Fitter trade: an overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Sprinkler Fitter trade: some of the trends identified by industry as being the most important for workers in this trade

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

Industry Expected Performance: description of the expectations regarding the level of performance of the tasks, including information related to specific codes, regulations and standards that must be observed

Language Requirements: description of the language requirements for working and studying in this trade in Canada

Pie Chart: a graph which depicts the national percentages of exam questions assigned to the major work activities

Task Matrix and Examination Weightings: a chart which outlines graphically the major work activities, tasks and sub-tasks of this standard and their respective exam weightings

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

Task Descriptor: a general description of the task

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

Essential Skills: the most relevant essential skills for this sub-task

Skills

Performance Criteria: description of the activities that are done as the sub-task is performed

Evidence of Attainment: proof that the activities of the sub-task meet the expected performance of a tradesperson who has reached journeyperson level

Knowledge

Learning Outcomes: describes what should be learned relating to a sub-task while participating in technical or in-school training

Learning Objectives: topics to be covered during technical or in-school training in order to meet the learning outcomes for the sub-task

Range of Variables: elements that provide a more in-depth description of a term used in the performance criteria, evidence of attainment, learning outcomes, or learning objectives

Appendix A – Acronyms: a list of acronyms used in the standard with their full name

Appendix B – Tools and Equipment: a non-exhaustive list of tools and equipment used in this trade

Appendix C – Glossary: definitions or explanations of selected technical terms used in the standard

DESCRIPTION OF THE SPRINKLER FITTER TRADE

"Sprinkler Fitter" is this trade's official Red Seal occupational title approved by the CCDA. This analysis covers tasks performed by sprinkler fitters whose occupational title has been identified by some provinces and territories of Canada under the following names:

	NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
Pipefitter - Fire Protection Mechanic Specialty (Construction)					✓								
Sprinkler and Fire Protection Installer						✓							
Sprinkler System Fitter	✓	✓	✓	✓			✓	✓		✓	✓	✓	✓
Sprinkler Systems Fitter									✓				

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.

TRENDS IN THE SPRINKLER FITTER TRADE

Installation Environments

There is a demand for residential sprinkler systems due to increased life safety awareness and insurance requirements. This will continue to expand work outside the typical industrial, commercial and institutional (ICI) sectors. This necessitates more communication with non-tradespeople and end users.

Increasing concerns regarding the protection of life and property has resulted in new, more stringent legislation regarding installation, maintenance, inspection and testing of fire protection systems. These new requirements increase the need for building retrofits.

Safety and Environmental Considerations

Safety has become more important in the workplace. Compliance with safety regulations and practices is mandatory, and non-compliance is met with severe penalties for workers, employers and contractors.

Water usage is a growing consideration for the trade, and the trade needs to be cognizant of this during testing, retrofitting and installation.

Technology and Code

The advances in technology and changes to code require sprinkler fitters to upgrade their skills and knowledge to adapt to the increased complexity of fire protection systems and to seek access to manufacturer specific training. For example, wet sprinkler systems that use early suppression fast response (ESFR) and control mode specific application (CMSA) technology are increasing in use because they provide more cost-efficient fire control and allow the elimination of in-rack sprinkler systems in storage occupancies. Specialty fire protection systems, including hybrid and clean agent systems, are becoming more common in areas with sensitive electronic equipment such as office areas and server/network rooms.

Components such as small valve stations and riser manifolds are being manufactured with the option of pre-assembly. There are new specialized sprinklers available; more models deal with specific applications.

Due to authority having jurisdiction (AHJ) requirements and advances in technology, devices require more frequent and scheduled maintenance, inspection and testing to ensure proper operation of fire protection systems.

Tools and Equipment

Use of tools such as laser levels, laser plumbs and cordless tools is increasing in the trade. Due to the complexity of the trade and more frequent testing, there is an increase in the variety of diagnostic equipment. Digital technology such as smart phones and tablets are more common and assist with ongoing learning, communication and record keeping.

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 competency statements which support each subtask of the trade. 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 http://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.

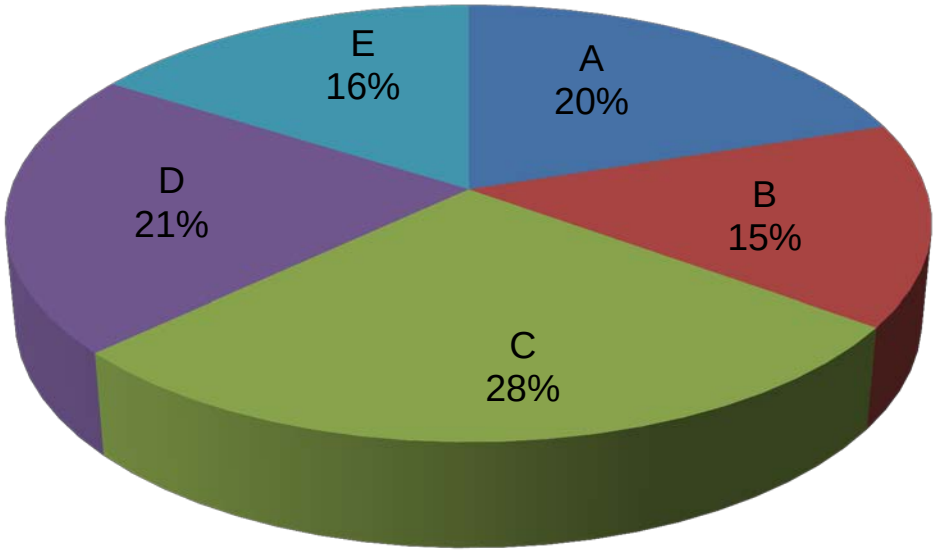
INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to the applicable jurisdictional codes and standards. All health and safety standards must be respected and observed. Work should be done efficiently and at a high quality without material waste or environmental damage. All requirements of the manufacturer, client specifications, the National Fire Protection Association (NFPA), Underwriter Laboratories of Canada (ULC), Factory Mutual (FM), National Building Code (NBC), fire codes and AHJ must be met. At a journeyperson level of performance, all tasks must be done with minimal direction and supervision. As a journeyperson progresses in their career there is an expectation that they continue to upgrade their skills and knowledge to keep pace with industry and promote continuous learning in their trade through mentoring of apprentices.

LANGUAGE REQUIREMENTS

It is expected that journeypersons are able to understand and communicate in either English or French, which are Canada's official languages. English or French are the common languages of business as well as languages of instruction in apprenticeship programs.

PIE CHART
OF RED SEAL EXAMINATION WEIGHTINGS



MWA A	Performs common occupational skills	20%
MWA B	Installs water supply	15%
MWA C	Installs piping	28%
MWA D	Installs and lays out fire protection systems and devices	21%
MWA E	Installs, tests and maintains (ITM) fire protection systems	16%

This pie chart represents a breakdown of the interprovincial Red Seal examination. Percentages are based on the collective input from workers from the trade from across Canada. The Task Matrix on the next pages indicates the breakdown of tasks and sub-tasks within each Major Work Activity and the breakdown of questions assigned to the Tasks. Interprovincial examinations for this trade typically have 120 questions.

SPRINKLER FITTER

TASK MATRIX

A - PERFORMS COMMON OCCUPATIONAL SKILLS — 20%

Task A-1 **Performs safety-related functions** **23%**	**A-1.01 Maintains safe work environment**	**A-1.02 Uses personal protective equipment (PPE) and safety equipment**	**A-1.03 Performs lock-out and tag-out procedures**
	A-1.04 Performs work in confined space		
Task A-2 **Uses and maintains tools and equipment** **26%**	**A-2.01 Uses hand tools**	**A-2.02 Uses portable and stationary power tools**	**A-2.03 Uses measuring and testing equipment**
	A-2.04 Uses access equipment	**A-2.05 Uses rigging, hoisting and lifting equipment**	**A-2.06 Uses soldering and brazing equipment**
Task A-3 **Organizes work** **25%**	**A-3.01 Interprets codes, standards, regulations and procedures**	**A-3.02 Uses drawings and specifications**	**3.03 Uses documentation and reference material**
	A-3.04 Plans job tasks and procedures	**A-3.05 Prepares work site**	**A-3.06 Performs layout of systems**
Task A-4 **Commission systems** **18%**	**A-4.01 Commissions water supply systems**	**A-4.02 Commissions fire protection systems**	
Task A-5 **Uses communication and mentoring techniques** **8%**	**A-5.01 Uses communication techniques**	**A-5.02 Uses mentoring techniques**	

B - INSTALLS WATER SUPPLY — 15%

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

C - INSTALLS PIPING — 28%

Task C-10 **Prepares pipe, tube and fittings for installation** **27%**	**C-10.01 Cuts pipe and tube**	**C-10.02 Bends pipe and tube**	**C-10.03 Threads pipe**
	C-10.04 Grooves pipe	**C-10.05 Drills pipe and tube**	**C-10.06 Grinds pipe**
	C-10.07 Prepares fittings		
Task C-11 **Installs pipe, tube and fittings** **37%**	**C-11.01 Installs steel pipe, tube and fittings**	**C-11.02 Installs plastic pipe, tube and fittings**	**C-11.03 Installs copper pipe, tube and fittings**
	C-11.04 Paints and labels pipe and tube		

Task C-12 **Installs piping components** **36%**	**C-12.01 Selects sprinklers**	**C-12.02 Installs sprinklers and nozzles**	**C-12.03 Installs sleeves**
	C-12.04 Installs supports and hangers	**C-12.05 Installs seismic-protection**	**C-12.06 Installs cross-connection control assemblies**
	C-12.07 Installs system drainage		

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**	**D-13.02 Installs dry pipe systems**	**D-13.03 Installs antifreeze systems**
	D-13.04 Installs preaction/deluge systems	**D-13.05 Installs foam systems**	**D-13.06 Installs standpipe systems**
	D-13.07 Installs water mist and hybrid systems		
Task D-14 **Installs specialty fire suppression systems** **17%**	**D-14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems**	**D-14.02 Installs portable extinguishers**	

Task D-15 **Installs detection devices** **11%**	**D -15.01 Installs wet and dry pilot lines**	**D -15.02 Installs heat-actuated devices (HADs) (NOT COMMON CORE)**	**D -15.03 Installs spark detection systems (NOT COMMON CORE)**
	D -15.04 Installs air sampling systems (NOT COMMON CORE)	**D -15.05 Installs electrical detection systems (NOT COMMON CORE)**	
Task D -16 **Installs signal-initiating devices** **14%**	**D -16.01 Installs alarm-initiating devices**	**D -16.02 Installs supervisory-initiating devices**	

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**	**E -17.02 Repairs deficiencies**	**E -17.03 Performs scheduled maintenance**
Task E -18 **Inspects and tests fire protection systems** **46%**	**E -18.01 Performs scheduled tests**	**E -18.02 Performs scheduled inspections**	**E -18.03 Inspects portable fire extinguishers**

MAJOR WORK ACTIVITY A

Performs common occupational skills

TASK A-1 Performs safety-related functions

TASK DESCRIPTOR

Safety is critical in this trade. These tasks are performed to ensure that each individual worker is working in a safe manner and those around them are also safe. Through procedures and documentation the requirements of Occupational Health and Safety (OH&S) are being met.

A-1.01 Maintains safe work environment

Essential Skills Oral Communication, Document Use, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.01.01P	follow ***specified safety procedures***	***specified safety procedures*** are followed according to OH&S regulations and site-specific requirements
A-1.01.02P	recognize ***workplace hazards***	***workplace hazards*** are recognized according to site-specific requirements
A-1.01.03P	maintain a clean and tidy work site	a clean and tidy work site is maintained to avoid injuries to self and others
A-1.01.04P	coordinate tasks	tasks with other workers are coordinated to avoid injury to self and others
A-1.01.05P	place flagging, pylons and signage	flagging, pylons and signage are placed when working in high-traffic areas to avoid injury to persons in the vicinity of the worksite
A-1.01.06P	handle hazardous materials	hazardous materials are handled according to ***Workplace Hazardous Materials Information System (WHMIS) procedures***
A-1.01.07P	participate in safety meetings and discussions	safety meetings and discussions are participated in to ensure that information is recorded and distributed to all team members

A-1.01.08P	recognize and report unsafe conditions	unsafe conditions are recognized and reported to ensure they are mitigated
A-1.01.09P	complete ***safety-related documentation***	***safety-related documentation*** is completed and submitted according to company policy

RANGE OF VARIABLES

specified safety procedures include: fall protection, hot work, confined space, travel restraint, using personal protective equipment (PPE), following site-specific requirements

workplace hazards include: systems under pressure, high voltage, rotating equipment, working at heights, working around hazardous materials, other work being performed in the area

WHMIS procedures include: disposal, labelling, use of PPE

safety-related documentation includes: field risk assessment, job hazard assessment, accident reports, equipment and PPE inspections, tool box talk, safety meeting minutes, WHMIS documents

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.01.01L	demonstrate knowledge of safe work practices	define terminology associated with safe work practices
		identify ***workplace hazards*** and describe safe work practices
A-1.01.02L	demonstrate knowledge of regulatory requirements pertaining to safety	identify and interpret ***workplace safety and health regulations***

RANGE OF VARIABLES

workplace hazards include: systems under pressure, high voltage, rotating equipment, working at heights, working around hazardous materials, other work being performed in the area

workplace safety and health regulations include: federal (WHMIS, Transportation of Dangerous Goods [TDG]), provincial/territorial (OH&S), municipal

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

Essential Skills Thinking, Document Use, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.02.01P	select, adjust, wear and maintain ***PPE***	***PPE*** is selected, adjusted, worn and maintained for specific tasks and as identified by site policies and jurisdictional regulations

A-1.02.02P	inspect and identify ***outdated or damaged PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** is inspected and damage or wear is identified according to manufacturers' specifications and jurisdictional regulations
A-1.02.03P	locate and use ***safety equipment***	***safety equipment*** is located and used according to manufacturers' specifications, jurisdictional regulations and specific task
A-1.02.04P	store ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** is stored in an accessible manner and according to manufacturers' specifications

RANGE OF VARIABLES

PPE includes: basic PPE (hard hats, safety glasses, hearing protection, safety boots, high-visibility vests), specialized (site-specific) PPE, fall protection/travel restraints

outdated or damaged PPE includes: expired hard hats, excessively worn boots, cracked safety glasses

safety equipment includes: fire extinguishers, eye wash stations, first aid kits, spill kits, air-monitoring devices

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.02.01L	demonstrate knowledge of ***PPE*** and ***safety equipment***, their applications, maintenance and procedures for use	define terminology associated with ***PPE*** and ***safety equipment***
		identify ***workplace hazards*** and describe safe work practices and ***safety equipment***
		identify types of ***PPE*** and describe their applications and procedures for use
		identify types and location of site ***safety equipment***, and describe their applications and procedures for use
		describe the procedures used to inspect, maintain and store ***PPE*** and ***safety equipment***
A-1.02.02L	demonstrate knowledge of regulatory requirements pertaining to safety	identify and interpret ***workplace safety and health regulations***

RANGE OF VARIABLES

PPE includes: basic PPE (hard hats, safety glasses, hearing protection, safety boots, high-visibility vests), specialized (site-specific) PPE, fall protection/travel restraints

safety equipment includes: fire extinguishers, eye wash stations, first aid kits, spill kits, air-monitoring devices

workplace hazards include: personal (confined space, working at heights, lifting and ergonomics, trenches), workplace (hot work, lock-out/tag-out, high voltage, rotating equipment, barricades and flagging, radiation, extreme temperatures, noise, access equipment [ladders, scaffolding, swing stages, power-elevated work platforms]), environmental (hazardous materials, quality of air, system drainage and disposal requirements)

workplace safety and health regulations include: federal (WHMIS, TDG), provincial/territorial (OH&S), municipal

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

Essential Skills Oral Communication, Working with Others, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-1.03.01P	determine lock-out/tag-out requirements for system components	requirements for lock-out/tag-out are met according to ***regulations***, local AHJ and site-specific guidelines
A-1.03.02P	obtain and install ***lock-out/tag-out equipment***	***lock-out/tag-out equipment*** is installed according to task and site-specific requirements
A-1.03.03P	remove designated ***lock-out/tag-out equipment***	designated ***lock-out/tag-out equipment*** is removed according to task and site-specific requirements

RANGE OF VARIABLES

regulations include: federal, OH&S, municipal

lock-out/tag-out equipment includes: lock and key, chains and tags, lock-out scissor clamp, lock-box, blanks

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.03.01L	demonstrate knowledge of applications and procedures for ***locking out/tagging out equipment***	identify situations that require lock-out/tag-out
		describe procedures for locking out/tagging out equipment and piping

RANGE OF VARIABLES

lock-out/tag-out equipment includes: lock and key, chains and tags, lock-out scissor clamp, lock-box, blanks

A-1.04 Performs work in confined space

Essential Skills Oral Communication, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.04.01P	confirm if area has been classified as a ***confined space*** prior to entry	pre-job hazard assessment documentation has been completed
A-1.04.02P	determine if ***confined space*** is safe for entry	***confined space*** is determined safe for entry according to OH&S and ***confined space documentation***
A-1.04.03P	determine hazards within confined space	***confined space hazards*** are identified and necessary safety equipment is implemented

RANGE OF VARIABLES

confined space includes: manholes, crawl spaces, trenches, tanks, service chases, elevator shafts, attics, vaults

confined space documentation includes: location, work description, hazard control, atmosphere testing, date and time, rescue plan

confined space hazards include: air quality, lack of accessibility, location, hazards of contents

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.04.01L	demonstrate knowledge of applications and procedures for working in ***confined spaces***	identify situations that require specialty safety equipment
		describe procedures for verification of entry permit
		identify safety procedures associated with ***confined spaces***

RANGE OF VARIABLES

confined spaces include: manholes, crawl spaces, trenches, tanks, service chases, elevator shafts, attics, vaults

TASK A-2 Uses and maintains tools and equipment

TASK DESCRIPTOR

Sprinkler fitters select, use and maintain tools and equipment to allow them to perform the tasks of their trade safely and efficiently.

A-2.01 Uses hand tools

Essential Skills	Continuous Learning, Thinking, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.01.01P	inspect ***hand tools***	***hand tools*** are inspected for ***damage*** or excessive wear that affects function
A-2.01.02P	maintain ***hand tools***	***hand tools*** are lubricated and cleaned after use to prevent corrosion and sustain usability
A-2.01.03P	store ***hand tools***	***hand tools*** are stored in a clean, dry and secure place to ensure they are easily located and are in operating condition

A-2.01.04P	replace ***hand tool parts***	***hand tool parts*** are replaced according to manufacturers' specifications and function
A-2.01.05P	operate ***hand tools***	***hand tools*** are operated according to task at hand and intended purpose

RANGE OF VARIABLES

hand tools include: see appendix B (Tools and Equipment)

damage includes: dull saws and cutting blades, worn jaws on pipe wrenches, chipped cutting wheels, fractured, cracked or corroded equipment

hand tool parts include: cutting blades, cutting wheels, pipe wrench jaws

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.01.01L	demonstrate knowledge of ***hand tools,*** their applications, maintenance and procedures for use	define terminology associated with ***hand tools***
		identify hazards and describe safe work practices pertaining to the use of ***hand tools***
		identify types of ***hand tools***, and describe their applications and procedures for use

RANGE OF VARIABLES

hand tools include: see appendix B (Tools and Equipment)

A-2.02 Uses portable and stationary power tools

Essential Skills Thinking, Continuous Learning, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.02.01P	inspect ***portable and stationary power tools*** and their accessories for functionality	***portable and stationary power tools*** and their accessories are inspected for ***unsafe conditions*** and to identify defects, faults and wear
A-2.02.02P	clean ***portable and stationary power tools***	***portable and stationary power tools*** are cleaned to ensure they are free from corrosion, safe and ready to use
A-2.02.03P	lubricate ***portable and stationary power tools***	***portable and stationary power tools*** are lubricated as part of preventive maintenance according to manufacturers' specifications
A-2.02.04P	set up and operate ***portable and stationary power tools***	***portable and stationary power tools*** are set up according to manufacturers' specifications and company policies
A-2.02.05P	store ***portable and stationary power tools***	***portable and stationary power tools*** are stored in a clean, dry and secure place to ensure they are in operating condition and easily located

RANGE OF VARIABLES

portable and stationary power tools include: see appendix B (Tools and Equipment)
unsafe conditions include: missing parts, defective or missing guards, frayed cords, defective blades

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.02.01L	demonstrate knowledge of ***portable and stationary power tools***, their applications, maintenance and procedures for use	define terminology associated with ***portable and stationary power tools***
		identify hazards and describe safe work practices pertaining to ***portable and stationary power tools***
		identify types of ***portable and stationary power tools***, and describe their applications and procedures for use

RANGE OF VARIABLES

portable and stationary power tools include: see appendix B (Tools and Equipment)

A-2.03 Uses measuring and testing equipment

Essential Skills Numeracy, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.03.01P	verify calibration of ***equipment***	calibration of ***equipment*** is performed and is current according to calibration documentation and manufacturers' specifications
A-2.03.02P	operate ***measuring and testing equipment***	***measuring and testing equipment*** is operated and analyzed according to manufacturers' specifications and company policy
A-2.03.03P	clean and drain ***measuring and testing equipment***	***measuring and testing equipment*** is cleaned and drained to prevent damage from freezing, corrosion and to prevent inaccurate readings
A-2.03.04P	store ***measuring and testing equipment***	***measuring and testing equipment*** is stored to prevent freezing and mechanical damage

RANGE OF VARIABLES

equipment that requires calibration includes: test gauges, cross-connection testing kits, refractometers, tachometers, flowmeters

measuring and testing equipment includes: see appendix B (Tools and Equipment)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-2.03.01L	demonstrate knowledge of ***measuring and testing equipment***, their applications, maintenance and procedures for use	define terminology associated with ***measuring and testing equipment***
		identify types of ***measuring and testing equipment***, and describe their applications and procedures for use

RANGE OF VARIABLES

measuring and testing equipment includes: see appendix B (Tools and Equipment)

A-2.04 Uses access equipment

Essential Skills Document Use, Reading, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.04.01P	select ladders and scaffolding	ladders and scaffolding for the job are selected taking into consideration ***factors***
A-2.04.02P	inspect ladders and scaffolding before use	ladders and scaffolding are inspected before use for damage and missing components, and inspection tags
A-2.04.03P	secure ***access equipment***	***access equipment*** is secured according to OH&S and job requirements
A-2.04.04P	erect, level and dismantle scaffolding	scaffolding is erected, levelled and dismantled according to OH&S and job requirements
A-2.04.05P	use ***access equipment***	***access equipment*** is used within operating limitations as indicated on manufacturers' tags, literature and in compliance with governmental regulations
A-2.04.06P	perform safety inspection of ***power-elevated work platforms***	documented safety inspections of ***power-elevated work platforms*** are performed prior to use
A-2.04.07P	select and operate ***power-elevated work platforms***	***power-elevated work platforms*** are selected according to ***factors,*** operated according to manufacturers' operation manual and OH&S
A-2.04.08P	inspect ***power-elevated work platform*** for wear, damage or defects	***power-elevated work platform*** is inspected for wear, damage or defects and removed from service, when necessary

RANGE OF VARIABLES

factors include: height, site conditions, task being performed
access equipment includes: see appendix B (Tools and Equipment)
power-elevated work platforms include: boom lifts, scissor lifts, swing stages

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.04.01L	demonstrate knowledge of the selection, assembly and procedures for using ***access equipment***	define terminology associated with ***access equipment***
		identify hazards and describe safe work practices pertaining to the use of ***access equipment***
		interpret ***codes and regulations*** pertaining to the use of ***access equipment***
		identify types of ***access equipment***, and describe their applications
		describe the procedures used to inspect and maintain ladders and scaffolding
		describe the procedures used to erect, level and dismantle scaffolding
		describe the procedures used to store and secure ***access equipment***

RANGE OF VARIABLES

access equipment includes: see appendix B (Tools and Equipment)

codes and regulations include: jurisdictional limitations, certification requirements, Canadian Standards Association (CSA), American National Standards Institute (ANSI) standards

A-2.05 Uses rigging, hoisting and lifting equipment

Essential Skills	Oral Communication, Working with Others, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.05.01P	select ***rigging, hoisting and lifting equipment***	***rigging, hoisting and lifting equipment*** is selected for task considering ***factors***
A-2.05.02P	inspect ***rigging, hoisting and lifting equipment***	***rigging, hoisting and lifting equipment*** is inspected for wear, damage and defects before each use
A-2.05.03P	remove defective ***rigging, hoisting and lifting equipment*** from service	defective ***rigging, hoisting and lifting equipment*** is removed from service by ***methods***
A-2.05.04P	identify ***hazards***	***hazards*** are identified

A-2.05.05P	rig loads	loads are rigged following rigging procedures to ensure safety and to prevent damage to rigging equipment and material
A-2.05.06P	attach and use tag lines	tag lines are attached and used to guide and position loads
A-2.05.07P	use basic hand signals	basic hand signals are used to communicate with equipment operators
A-2.05.08P	store ***rigging, hoisting and lifting equipment***	***rigging, hoisting and lifting equipment*** is stored in clean, dry and secure locations away from damaging conditions

RANGE OF VARIABLES

rigging, hoisting and lifting equipment includes: see appendix B (Tools and Equipment)
factors include: weight, loads, distance to be travelled
methods include: tag-out procedures, site-specific procedures, consulting manufacturers' specifications and OH&S regulations
hazards include: overhead obstructions, excavations, excessive loads

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.05.01L	demonstrate knowledge of ***rigging, hoisting and lifting equipment***, their applications, limitations and procedures for use	define terminology associated with ***rigging, hoisting and lifting equipment***
		identify ***hazards*** and describe safe work practices pertaining to ***rigging, hoisting and lifting equipment***
		identify types of ***rigging, hoisting and lifting equipment,*** and describe their applications, limitations and procedures for use
		identify ***types of ropes and slings***, and describe their characteristics, safe working loads and applications
		identify the ***factors to consider*** for selecting rigging equipment
		describe the procedures used to inspect, maintain and store ***hoisting, lifting and rigging equipment***
		describe the procedures used for attaching rigging equipment to the load
		explain sling angle when preparing for hoisting and lifting operations
A-2.05.02L	demonstrate knowledge of calculations required to perform rigging, hoisting and lifting operations	describe the ***factors to consider***, and the procedures used to perform calculations related to rigging, hoisting and lifting operations

A-2.05.03L	demonstrate knowledge of ***knots, bends and hitches***, their applications and procedures for tying	identify types of ***knots, bends and hitches*** used on ropes, and describe their applications and procedures to tie them
A-2.05.04L	demonstrate knowledge of ***communication methods*** used for hoisting and lifting	identify and interpret hand signals used for hoisting and lifting
		describe the ***communication methods*** used during hoisting, lifting and rigging operations
		describe the ***procedures used to ensure the work area is safe*** for lifting
A-2.05.05L	demonstrate knowledge of the procedures used to plan and perform rigging, hoisting and lifting operations	describe the ***procedures used to plan and perform a lift***

RANGE OF VARIABLES

rigging, hoisting and lifting equipment includes: see appendix B (Tools and Equipment)
hazards include: overhead obstructions, excavations, excessive loads
types of ropes and slings include: nylon, manila, graded, wire sling
factors to consider include: load characteristics, environment, safety factors
knots, bends and hitches include: bowline, sheet bend, clove hitch
communication methods include: hand signals, electronic communications, audible/visual
procedures used to ensure the work area is safe include: supervision of lift, securing work area, communication
procedures used to plan and perform a lift include: determine weight of the load, select equipment, determine set-up of equipment, determine communication methods, set up hoisting/lifting equipment, rig material/equipment to be lifted, attach tag line, perform pre-lift checks, lift and place load, perform post-lift inspection of the load, disconnect the load

A-2.06 Uses soldering and brazing equipment

Essential Skills Thinking, Continuous Learning, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-2.06.01P	obtain required permits and determine the need to disarm the fire detection system in the work area location	permits are obtained and fire detection disarming procedures are followed according to building policy
A-2.06.02P	select ***soldering and brazing equipment***	***soldering and brazing equipment*** is appropriate for applications and materials
A-2.06.03P	set up ***soldering and brazing equipment***	set up is performed according to application

A-2.06.04P	match alloys to specific components to be soldered or brazed	alloy selected is compatible with piping material to be joined
A-2.06.05P	select solder, flux and brazing alloy	solder, flux and brazing alloy selected meets capillary action requirements for copper alloy joints
A-2.06.06P	join copper alloy fittings and tubing components	minimum standards for joining copper alloy are met according to NFPA standards and standardized procedures
A-2.06.07P	protect equipment and flammable materials while soldering and brazing	flammable materials are protected or removed from vicinity of soldering and brazing work, and equipment is protected
A-2.06.08P	maintain ***soldering and brazing equipment***	***soldering and brazing equipment*** is in a safe and operable condition
A-2.06.09P	identify, tag and replace worn, damaged or defective ***soldering and brazing equipment***	defects in ***soldering and brazing equipment*** are identified and equipment is tagged and replaced
A-2.06.10P	store ***soldering and brazing equipment*** and ***consumables***	***soldering and brazing equipment*** and ***consumables*** are organized and stored to prevent damage and according to specifications

RANGE OF VARIABLES

soldering and brazing equipment includes: oxy-fuel and air-fuel torches, gas cylinders, torch heads and tips

consumables include: brazing alloy and flux, soldering alloy and flux, sand cloth, gases (oxygen, acetylene, methylacetylene-propadiene propane [MAPP], propane, butane)

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.06.01L	demonstrate knowledge of ***soldering and brazing equipment***, applications and procedures	identify types of ***soldering and brazing equipment***
		identify hazards and safety procedures pertaining to soldering and brazing
		identify different soldering and brazing processes and applications
		identify soldering and brazing ***consumables***
		describe soldering and brazing procedures
		describe the procedures used to inspect, maintain and store ***soldering and brazing equipment***
		explain what conditions would require the disarming of the detection systems

RANGE OF VARIABLES

soldering and brazing equipment includes: oxy-fuel and air-fuel torches, gas cylinders, torch heads and tips

consumables include: brazing alloy and flux, soldering alloy and flux, sand cloth, gases (oxygen, acetylene, MAPP, propane, butane)

TASK A-3 Organizes work

TASK DESCRIPTOR

Sprinkler fitters organize their work in order to complete their tasks safely, efficiently and effectively.

A-3.01 Interprets codes, standards, regulations and procedures

Essential Skills	Reading, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.01.01P	locate code and standard sections	sections that apply to the task being performed are located
A-3.01.02P	use code and standard information	information is used to determine required method and to perform necessary calculations
A-3.01.03P	interpret tables and charts in codes and standards	tables and charts are referred to and interpreted
A-3.01.04P	refer to ***jurisdictional and environmental regulations***	***jurisdictional and environmental regulations*** are referred to according to AHJ
A-3.01.05P	refer to facility and equipment procedures	facility and equipment procedures are referred to for ***tasks***
A-3.01.06P	refer to manufacturers' installation instructions	manufacturers' specifications are referred to in order to ensure equipment is installed as required
A-3.01.07P	adhere to ***company procedures***	***company procedures*** are adhered to

RANGE OF VARIABLES

jurisdictional and environmental regulations include: municipal fire standards and fire department requirements, insurance regulations

tasks include: lock-out, shutdown of sprinkler system, alarm systems, management of system impairments

company procedures include: service reports, safety and communication procedures

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.01.01L	demonstrate knowledge of trade-related codes, standards, regulations, procedures and their applications	define terminology associated with trade-related codes, standards, regulations, procedures
		identify ***types of trade-related documents*** and describe their applications
		explain responsibilities associated with completing and/or signing trade-related documents
		describe the procedures used to complete trade-related documents

RANGE OF VARIABLES

types of trade-related documents include: manufacturers' specifications, drawings, addendums, specifications, codes and standards, work orders, building and safety permits, technical bulletins, manuals, safety data sheets (SDS), safety logs, time sheets, OH&S reports, contractors' material and test certificates, commissioning papers, equipment operating certificates

A-3.02 Uses drawings and specifications

Essential Skills Continuous Learning, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.02.01P	refer to manufacturers' and shop drawings	manufacturers' and shop drawings are referred to in order to obtain ***equipment specifications***
A-3.02.02P	refer to engineering specifications	engineering specifications are referred to in order to determine required equipment
A-3.02.03P	refer to ***drawings***	***drawings*** are referred to in order to identify locations of components of fire protection systems and ***possible obstructions***
A-3.02.04P	interpret and scale ***drawings***	***drawings*** are interpreted and scaled to determine installation requirements and approximate location and dimensions of fire protection and other equipment

A-3.02.05P	interpret schematic drawings and pictorial diagrams	schematic drawings and pictorial diagrams are interpreted to obtain information on automatic valve assemblies, valve stations and electrical equipment
A-3.02.06P	create ***on-site drawings***	***on-site drawings*** are created to coordinate work and document work performed

RANGE OF VARIABLES

equipment specifications include: size, type of material, manufacturer and installation procedures

drawings include: isometric, orthographic, 3-D

possible obstructions include: fixtures, piping, ductwork, ceiling construction (beams, purlins, bulkheads, overhead walkways)

on-site drawings include: sketches, mark-ups, as-builts

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.02.01L	demonstrate knowledge of sprinkler system ***drawings*** and ***on-site drawings***	define terminology associated with reading and sketching drawings
A-3.02.02L	demonstrate knowledge of the procedures to read and interpret ***drawings*** and ***on-site drawings***	explain the fundamentals of orthographic and isometric projections
		identify ***types of lines*** found on sprinkler system drawings
		identify symbols found on sprinkler system drawings
		identify ***types of views*** found on sprinkler system drawings
		describe the procedures used to interpret dimensions on drawings
		identify ***types of scales*** and describe their characteristics and applications
		identify drafting tools and drawing equipment, and describe their applications and procedures for use
		describe the procedures used to interpret a site plan in both metric and imperial units
A-3.02.03L	demonstrate knowledge of the procedures to draw and label orthographic and isometric drawings	describe the procedures used to create orthographic and isometric drawings
A-3.02.04L	demonstrate knowledge of the procedures to read and interpret information pertaining to sprinkler systems found in construction drawings	identify ***divisions of drawings*** and describe their purpose
		identify views and ***drawings*** of a building and describe their purpose

	interpret sprinkler systems information found on drawings
	describe the procedures used to interpret metric and imperial scaling
	describe the procedures used to prepare orthographic and isometric sketches
	describe the procedures used to prepare single line pipe drawings such as orthographic and isometric

RANGE OF VARIABLES

drawings include: isometric, orthographic, 3-D

on-site drawings include: sketches, mark-ups, as-builts

types of lines include: object (visible), hidden, centre, dimension, extension, section cutting, material section

types of views include: plan, elevation, sections, details

types of scales include: metric scale (S.I.), architect scale (imperial), engineer scales

divisions of drawings include: architectural, structural, mechanical, electrical, plot, specifications, schedules

A-3.03 Uses documentation and reference material

Essential Skills	Document Use, Writing, Reading

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.03.01P	refer to technical bulletins and manuals	technical bulletins and manuals are referred to in order to obtain detailed information about equipment
A-3.03.02P	submit as-built drawings	as-built drawings that indicate modifications to original plans are submitted according to job specifications
A-3.03.03P	maintain and complete ***written documents***	***written documents*** are maintained and completed according to contract requirements, job progress and AHJ
A-3.03.04P	complete and submit ***reports***	***reports*** are completed and submitted to keep accurate records for future reference
A-3.03.05P	interpret and follow change orders and site instructions	change orders and site instructions are interpreted and followed according to contract requirements and job progress

RANGE OF VARIABLES

written documents include: service requests, work orders, on-site change notices, incident reports, hot work permits, time sheets

reports include: inspection, material and test sheets, verification reports, deficiency lists, company-specific reports

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.03.01L	demonstrate knowledge of trade-related documentation and reference material and their application	define terminology associated with trade-related documentation and reference material
		identify ***types of trade related documentation and reference material*** and describe their applications
		explain responsibilities associated with completing and/or signing trade-related documents
		describe the procedures used to complete trade-related documents

RANGE OF VARIABLES

types of trade-related documents and reference material include: manufacturers' specifications, drawings, addendums, specifications, codes and standards, work orders, building and safety permits, technical bulletins, manuals, SDS, safety logs, time sheets, OH&S reports, contractors' material and test certificates, commissioning papers, equipment operating certificates, deficiency lists

A-3.04 Plans job tasks and procedures

Essential Skills Thinking, Working with Others, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.04.01P	prepare material list	material list is prepared for ordering material and confirming availability
A-3.04.02P	schedule delivery	delivery of equipment and materials is scheduled according to job progress
A-3.04.03P	arrange for storage	materials are stored in a safe and secure lay down location until required for task according to job progress
A-3.04.04P	manage schedule	schedule is managed to arrange access to work site, avoid down time and delays, and maximize efficiency on the job

A-3.04.05P	coordinate tasks with other ***tradespeople***	tasks with other ***tradespeople*** are coordinated to avoid job conflicts
A-3.04.06P	assign personnel to specific locations and tasks	personnel are assigned to specific locations and tasks according to scope of work
A-3.04.07P	arrange for use of ***specialized tools and equipment***	use of ***specialized tools and equipment*** is arranged according to the scope of work
A-3.04.08P	organize tools and equipment usage	tools and equipment usage is organized according to scope of work
A-3.04.09P	estimate labour needs	labour needs for completion of tasks is estimated taking into consideration ***factors***

RANGE OF VARIABLES

tradespeople include: crane operators, carpenters, plumbers, electricians, sheet metal workers, steamfitter/pipefitters

specialized tools and equipment include: cranes, power-elevated work platforms, coring machines, x-ray scanners

factors to consider for estimating labour needs include: tools and equipment, deadlines, expertise, movement of material and equipment

KNOWLEDGE

	Learning Outcomes	Learning Objectives
A-3.04.01L	demonstrate knowledge of the procedures to plan and organize jobs	define terminology associated with job planning activities
		identify ***sources of information*** relevant to job planning
		identify the ***factors to consider for determining job requirements***
		describe the procedures used to ***plan job tasks***
		describe the procedures used to receive and verify delivered materials
		describe the procedures used to store, organize and maintain inventory
		identify ***factors that affect material take-off lists***, and describe their applications and the procedures used to produce them

RANGE OF VARIABLES

sources of information include: documentation, drawings, related professionals, clients

factors to consider for determining job requirements include: personnel, tools and equipment, materials, permits

plan job tasks include: scheduling, estimating, coordinating site access

factors that affect material take-off lists include: material estimation, material installation

A-3.05 Prepares work site

Essential Skills	Document Use, Oral Communication, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-3.05.01P	receive, inspect and verify delivered material	delivered material is received, inspected and verified using packing slips, serial numbers, model numbers to detect shipping damage and confirm quantity
A-3.05.02P	check or apply labels on ***hazardous materials and supplies***	labels on ***hazardous materials and supplies*** are checked or applied according to procedures
A-3.05.03P	secure ***materials and supplies***	***materials and supplies*** are secured using equipment such as chains, straps and slings
A-3.05.04P	select and use ***equipment***	***equipment*** is selected and used to move materials according to scope of work
A-3.05.05P	store ***materials and supplies***	***materials and supplies*** are stored at appropriate temperature and location to prevent deterioration or damage
A-3.05.06P	set up fabrication tools and equipment in close proximity	fabrication tools and equipment are set up in close proximity to work being performed taking into consideration other trades
A-3.05.07P	locate washrooms, ***site safety equipment*** and emergency exits	location of washrooms, ***site safety equipment*** and emergency exits are located on-site
A-3.05.08P	locate ***service points***	***service points*** are located
A-3.05.09P	locate ***isolation points***	***isolation points*** are located

RANGE OF VARIABLES

hazardous materials and supplies include: cutting oils, fuel containers, fire extinguishers, antifreeze, solvent cement, pressurized gas cylinders

materials and supplies include: sprinklers, solvent cement, pressurized gas cylinders, chlorinated polyvinyl chloride (CPVC) pipe and fittings

equipment includes: forklifts, power jacks, hand carts

site safety equipment includes: fire extinguishers, eye wash stations, first aid kits, spill kits, air-monitoring devices

service points include: water, electricity

isolation points include: water and electrical controls

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.05.01L	demonstrate knowledge of procedures to receive materials	describe the procedures used to receive and verify delivered materials
A-3.05.02L	demonstrate knowledge of procedures used to store, secure, organize and maintain materials	describe the procedures used to store, secure, organize and maintain inventory
A-3.05.03L	demonstrate knowledge of procedures used to plan for and prepare work sites	describe the ***procedures used to prepare work sites***
		identify location and types of ***site safety equipment***

RANGE OF VARIABLES

procedures used to prepare work sites include: lay down, erecting barricades and flagging, identifying hazards, locating service points, locating isolation points, material take-off lists

site safety equipment includes: fire extinguishers, eye wash stations, first aid kits, spill kits, air-monitoring devices

A-3.06 Performs layout of systems

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.06.01P	determine number, type and location of sprinklers	number, type and location of sprinklers are determined according to ***factors***
A-3.06.02P	plot location of ***main lines*** and branch lines	***main line*** and branch line locations are measured and confirmed to meet site conditions and approved drawings
A-3.06.03P	determine hanger locations	hanger locations are determined to ensure sprinkler lines are installed consistently in a straight line according to industry standards and site conditions
A-3.06.04P	use level to aid in the installation of supports and hangers	level is used to ensure pitch and straightness of lines
A-3.06.05P	determine location of penetrations	location of penetrations is identified according to drawings and site conditions

A-3.06.06P	confirm information on ***drawings***	information on ***drawings*** concurs with and matches site conditions
A-3.06.07P	modify layout to accommodate ***site conditions***	layout is modified to accommodate ***site conditions***

RANGE OF VARIABLES

factors include: occupancy hazard, ceiling structure, type of system
main lines include: feed, cross, riser
drawings include: isometric, orthographic, 3-D
site conditions include: ducts, structural members, lighting, obstructions

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.06.01L	demonstrate knowledge of sprinkler system layout	describe the procedures used to lay out ***sprinkler systems*** and ***components***
		identify ***site conditions*** affecting layout

RANGE OF VARIABLES

sprinkler systems include: wet pipe, dry pipe, antifreeze, stand pipe and hose, preaction/deluge, water mist, foam
components include: feed mains, valves, pumps, cross mains, branch lines, risers, test connections, fittings, drains, tanks
site conditions include: ducts, structural members, lighting, obstructions

TASK A-4 Commissions systems

TASK DESCRIPTOR

Commissioning is the final step in installing fire protection systems. It involves verification and testing of the systems and their components to ensure they operate within design parameters, and meet all applicable codes, standards, specifications and AHJ requirements.

A-4.01 Commissions water supply systems

Essential Skills Document Use, Numeracy, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.01.01P	verify that hydrostatic, chlorination and flushing tests have been completed	hydrostatic, chlorination and flushing tests have been completed on underground piping and are verified prior to connection of system components through contractor's test and material certificate
A-4.01.02P	conduct acceptance test of fire pump system	acceptance test of fire pump system is conducted with manufacturer's representative to verify operation of pump assembly
A-4.01.03P	verify operation of ***water supply system components***	***water supply system components*** are operating according to system requirements and meets minimum system design performance and criteria
A-4.01.04P	confirm that water supply systems and their components are in compliance	AHJ has confirmed that water supply systems and their components are in compliance with codes and manufacturers' specifications
A-4.01.05P	complete documentation	documentation has been completed according to company policies, AHJ and NFPA standards

RANGE OF VARIABLES

water supply system components include: cross-connection control assemblies, water tanks, reservoirs, fire pumps

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.01.01L	demonstrate knowledge of the procedures to commission water supply systems	define terminology associated with commissioning of water supply systems
		identify workplace hazards and describe safe work practices pertaining to the commissioning of water supply systems
		interpret codes, standards and regulations pertaining to the commissioning of water supply systems
		interpret information pertaining to the commissioning of water supply systems found on drawings and specifications
		identify ***tests*** to be performed on water supply systems
		describe the procedures used to commission water supply systems
		calculate flow rates and discharge pressures

RANGE OF VARIABLES

tests include: hydrostatic, chlorination, flushing, acceptance test of fire pump, component operation (cross-connection control assemblies, water tanks, reservoirs)

A-4.02 Commissions fire protection systems

Essential Skills Document Use, Numeracy, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.02.01P	perform hydrostatic and pneumatic tests on piping systems	hydrostatic and pneumatic tests are performed on piping and components of piping installation according to NFPA standards and manufacturers' specifications
A-4.02.02P	perform hydrostatic and pneumatic tests on detection systems	hydrostatic and pneumatic tests are performed on detection components according to NFPA standards

A-4.02.03P	inspect seal of pipe penetrations	seal of pipe penetrations is inspected on floors, walls and ceilings to ensure fire rating, weatherproofing and compatibility according to manufacturers' specifications and AHJ
A-4.02.04P	check placement of hangers, brackets, supports and restraints	placement of hangers, brackets, supports and restraints are checked by inspecting and referring to project specifications and NFPA standards
A-4.02.05P	check pitch and elevation of piping installation	pitch and elevation of piping installation is checked according to NFPA standards and site-specific requirements
A-4.02.06P	ensure that piping, components and devices are protected	piping, components and devices are protected against environmental conditions (interior and exterior)
A-4.02.07P	verify that ***foreign material*** is removed	***pipe preparation*** is done to ensure that ***foreign material*** has been removed
A-4.02.08P	ensure pipe, systems and components are labelled	pipe, systems and components are labelled according to site specifications
A-4.02.09P	ensure that testing blanks and testing caps are removed and documentation has been completed	testing blanks and testing caps are removed to allow for system operation and documentation has been completed
A-4.02.10P	verify operation of ***control valves***	full range of operation of ***control valves*** is verified
A-4.02.11P	verify fire protection system ***components***	***components*** are verified to confirm their performance meets design criteria
A-4.02.12P	verify that escutcheons and guards are in place	escutcheons and guards are in place and sprinkler protectors are removed
A-4.02.13P	verify operation of ***detection devices***	operation of ***detection devices*** is verified according to AHJ-prescribed standards
A-4.02.14P	verify positioning of ***protection devices***	positioning of ***protection devices*** is verified to ensure proper coverage is achieved
A-4.02.15P	verify operation of ***signal initiating devices***	operation of ***signal initiating devices*** meets accepted parameters
A-4.02.16P	ensure that ***documentation*** is completed	***documentation*** is completed and submitted according to project specifications, AHJ, NFPA, FM and CAN/ULC standards

RANGE OF VARIABLES

foreign material includes: cut-out discs, oil and welding slag
pipe preparation includes: flushing, swabbing
control valves include: post indicator valves (PIVs), butterfly valves, outside stem & yoke (OS&Y) valves
components include: alarm valves, dry valves, deluge valves, check valves, accelerators
detection devices include: heat-actuated devices (HADs), air sampling devices, linear heat detectors
protection devices include: sprinklers, nozzles, emitters
signal-initiating devices include: flow, pressure, tamper switches
documentation includes: commissioning reports, as-built drawings

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.02.01L	demonstrate knowledge of the procedures to commission fire protection systems	define terminology associated with commissioning of fire protection systems
		identify safety hazards and describe safe work practices pertaining to the commissioning of fire protection systems
		interpret codes, standards and regulations pertaining to the commissioning of fire protection systems
		interpret information pertaining to the commissioning of fire protection systems found on drawings and specifications
		identify ***tests and checks*** to be performed on fire protection systems
		describe the procedures used to commission fire protection systems

RANGE OF VARIABLES

tests and checks include: hydrostatic, pneumatic, seal of penetrations, placement of hangers, brackets, supports and restraints, grade and elevation, flushing and swabbing, labelling, blank testing gaskets, escutcheons

TASK A-5 Uses communication and mentoring techniques

TASK DESCRIPTOR

Learning in the trades is done primarily in the workplace with tradespeople passing on their skills and knowledge to apprentices, as well as sharing knowledge among themselves. Apprenticeship is, and always has been about mentoring – learning workplace skills and passing them on. Because of the importance of this to the trade, this task covers activities related to communication in the workplace and mentoring skills.

A-5.01 Uses communication techniques

Essential Skills Oral Communication, Working with Others, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.01.01P	demonstrate two-way communication practices individually or in a group	instructions and messages are understood by both parties involved in communication
A-5.01.02P	listen using ***active listening*** practices	steps of ***active listening*** are used
A-5.01.03P	receive and respond to feedback on work	response to feedback indicates understanding and corrective measures are taken
A-5.01.04P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-5.01.05P	use questioning to improve communication	questions enhance understanding, on-the-job training and goal setting
A-5.01.06P	participate in safety and information meetings	meetings are attended and information is understood and applied
A-5.01.07P	communicate with ***non-tradespeople***	technical information is relayed and understanding is confirmed
A-5.01.08P	communicate with other ***tradespeople***	technical information is relayed and understanding is confirmed

RANGE OF VARIABLES

active listening includes: hearing, interpreting, reflecting, responding, paraphrasing

non-tradespeople include: consultants, engineers, owners, end-users

tradespeople include: crane operators, carpenters, plumbers, electricians, sheet metal workers, welders, steamfitter/pipefitters, refrigeration and air conditioning mechanics

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.01.01L	demonstrate knowledge of trade terminology	define terminology used in the trade
A-5.01.02L	demonstrate knowledge of effective communication practices	describe the importance of using effective verbal and non-verbal communication with ***people in the workplace***
		identify ***sources of information*** to effectively communicate
		identify communication and ***learning styles***
		describe effective listening and speaking skills
		identify ***personal responsibilities and attitudes*** that contribute to on-the-job success
		identify the value of diversity in the workplace
		identify communication that constitutes ***harassment*** and ***discrimination***

RANGE OF VARIABLES

people in the workplace include: other tradespeople, colleagues, apprentices, supervisors, clients, AHJ, manufacturers

sources of information include: regulations, codes, standards, OH&S requirements, AHJ requirements, prints, drawings, specifications, company and client documentation

learning styles include: seeing it, hearing it, trying it

personal responsibilities and attitudes include: asking questions, working safely, accepting constructive feedback, time management and punctuality, respect for authority, good stewardship of materials, tools and property, efficient work practices

harassment includes: objectionable conduct, comment or display made either on a one-time or continuous basis that demeans, belittles, or causes personal humiliation or embarrassment to the recipient

discrimination is prohibited based on race, national or ethnic origin, colour, religion, age, sex, sexual orientation, marital status, family status, disability or conviction for which a pardon has been granted

A-5.02 Uses mentoring techniques

Essential Skills	Oral Communication, Working with Others, Continuous Learning

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
A-5.02.01P	identify and communicate learning objective and point of lesson	apprentice or colleague can explain the objective and point of the lesson
A-5.02.02P	link lesson to other lessons and the job	lesson order and unplanned learning opportunities are defined
A-5.02.03P	demonstrate performance of a skill to an apprentice or colleague	***steps required to demonstrate a skill*** are performed
A-5.02.04P	set up conditions required for an apprentice to practice a skill	***practice conditions*** are set up so that the skill can be practiced safely by the apprentice
A-5.02.05P	assess apprentice or colleague's ability to perform tasks with increasing independence	performance improves with practice to a point where skill can be done with little supervision
A-5.02.06P	give supportive and corrective feedback	apprentice adopts best practice after having been given supportive or corrective feedback
A-5.02.07P	support apprentices in pursuing technical training opportunities	technical training is completed within the timeframe prescribed by apprenticeship authority
A-5.02.08P	support equity group apprentices	workplace is harassment and discrimination-free
A-5.02.09P	implement probationary period to assess suitability to the trade	commitment is demonstrated and more suitable career options are provided if required

RANGE OF VARIABLES

steps required to demonstrate a skill include: understanding the who, what, where, when and why, explaining, showing, giving encouragement, following up to ensure skill is performed correctly

practice conditions means: guided, limited independence, full independence

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.02.01L	demonstrate knowledge of strategies for learning skills in the workplace	describe the importance of individual experience
		describe the shared responsibilities for workplace learning
		determine one's own learning preferences and explain how these relate to learning new skills
		describe the importance of different types of skills in the workplace
		describe the importance of ***essential skills*** in the workplace
		identify different ways of learning
		identify different ***learning needs*** and strategies to meet ***learning needs***
		identify ***strategies to assist in learning a skill***
A-5.02.02L	demonstrate knowledge of strategies for teaching workplace skills	identify different roles played by a workplace mentor
		describe the ***steps*** involved in ***teaching skills***
		explain the importance of identifying the point of a lesson
		identify how to choose a good time to present a lesson
		explain the importance of linking the lessons
		identify the components of the skill (the context)
		describe considerations in setting up opportunities for skill practice
		explain the importance of providing feedback
		identify techniques for giving effective feedback
		describe a skills assessment
		identify methods of assessing progress
		explain how to adjust a lesson in different situations

RANGE OF VARIABLES

essential skills are: reading, document use, writing, oral communication, numeracy, thinking, working with others, digital technology, continuous learning

learning needs include: learning disabilities, learning preferences, language proficiency

strategies to assist in learning a skill include: understanding the basic principles of instruction, developing coaching skills, being patient, providing feedback

steps for teaching skills include: identifying the point of the lesson, linking the lesson, demonstrating the skill, providing practice, giving feedback, and assessing skills and progress

MAJOR WORK ACTIVITY B
Installs water supply

TASK B-6 Installs underground water supplies

TASK DESCRIPTOR

Sprinkler fitters install and connect underground piping and components from a predetermined water source to provide a reliable and adequate water supply to fire protection systems.

B-6.01 Supervises trenching and backfilling (NOT COMMON CORE)

Essential Skills	Working with Others, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	no	no	no	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-6.01.01P	lay out location for trench	location for trench is laid out to ensure accessibility for machinery, material and manpower
B-6.01.02P	verify location of underground/overhead ***utilities***	location of underground/overhead ***utilities*** is verified to prevent injury and disruption of service
B-6.01.03P	coordinate tie-ins with AHJ	tie-ins are coordinated with AHJ to avoid or minimize disruptions to water supply
B-6.01.04P	inspect trench	trench is inspected for adequate size and depth according to OH&S and AHJ
B-6.01.05P	coordinate laydowns	laydowns for debris, backfill and installation material and tools are coordinated according to scope of work
B-6.01.06P	select backfill material	backfill material is selected according to piping requirements and local requirements

B-6.01.07P	ensure safe access to trench	safe access to trench is ensured for the installation of underground materials
B-6.01.08P	verify backfill compaction	backfill compaction is verified according to site requirements and specifications

RANGE OF VARIABLES

utilities include: gas, power, sewage, telephone

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-6.01.01L	demonstrate knowledge of safety procedures and requirements for trenching and backfilling in accordance with codes and regulations	identify codes and standards and AHJ requirements related to trenching and backfilling
		identify tools and equipment and PPE related to trenching and backfilling
		identify OH&S requirements related to trenching and backfilling
		describe site conditions that affect trenching and backfilling
		describe shoring requirements and piping requirements
		identify types of access equipment related to trenching and backfilling
B-6.01.02L	demonstrate knowledge of communication practices for trenching and backfilling	describe audible/visual procedures for communicating during trenching and backfilling

B-6.02 Installs underground piping and components (NOT COMMON CORE)

Essential Skills	Document Use, Numeracy, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	no	no	no	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-6.02.01P	identify type and class of piping material and fittings	type and class of piping material and fittings are identified according to AHJ, drawings, specifications and NFPA standards
B-6.02.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work

B-6.02.03P	assemble pipe and fittings	pipe and fittings are assembled using ***joining methods*** according to specifications and NFPA standards
B-6.02.04P	restrain pipe and fittings	pipe and fittings are restrained with ***anchoring systems*** to provide stability, prevent pipe movement and separation, and protect against damage according to manufacturers' specifications, codes and standards
B-6.02.05P	apply ***protective material***	***protective material*** is applied below and above the pipe to prevent damage from ***foreign objects***
B-6.02.06P	attach ***components***	***components*** are attached to piping to allow control and isolation of fire water system
B-6.02.07P	connect piping to water source	piping is connected to water source with ***devices*** to ensure adequate water supply to fire protection system
B-6.02.08P	lay tracer wire and identification ribbon	tracer wire and identification ribbon are laid with pipe according to jurisdictional requirements to allow for future location and identification of pipe
B-6.02.09P	ensure cathodic/corrosion protection	cathodic/corrosion protection meets manufacturers' specifications and AHJ
B-6.02.10P	allow for clearances and tolerances	clearances and tolerances between piping and ***surrounding environment*** are allowed for to prevent damage caused by excessive stress loads
B-6.02.11P	seal pipe penetrations	pipe penetrations through ***structures*** are sealed to maintain impermeability of structure using various ***materials***
B-6.02.12P	terminate and cap pipe	pipe is terminated and capped in selected location inside building, ensuring its accessibility
B-6.02.13P	install testing connection to water termination point and fire hydrants	testing connection is installed to water termination point to allow for flushing, testing and chlorination according to AHJ, standards and codes
B-6.02.14P	test underground piping and components	underground piping and components are hydrostatically tested according to NFPA standards

RANGE OF VARIABLES

tools and equipment include: cut-off saws, portable grinders, torque wrenches, pry bars
joining methods include: bell and spigot, flange with gasket, mechanical
anchoring systems include: thrust blocks, rodding, anchors, clamps
protective material includes: sand, screened gravel, landscaping fabric
foreign objects include: rocks, roots, debris
components include: gate valves, PIVs, fire hydrants
devices include: tapping valves, underground tees

surrounding environment includes: under railroad tracks, through concrete structures
structures include: walls, foundations, floors
materials include: cement, caulking, flexible mastic

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-6.02.01L	demonstrate knowledge of clearances and tolerances	identify where clearances and tolerances should be taken into consideration
B-6.02.02L	demonstrate knowledge of water source connections	identify ***types of water sources*** and their connection requirements
		identify location of water source connection
B-6.02.03L	demonstrate knowledge of underground piping and their components' installation procedures	define terminology associated with underground piping and components
		identify worksite ***hazards*** and describe safe work practices pertaining to underground piping and components
		interpret codes, standards and regulations pertaining to underground piping and their components
		identify ***tools and equipment*** relating to underground piping and component installation
		describe ***procedures used to install underground water mains***

RANGE OF VARIABLES

types of water sources include: municipal water supply, raw water sources, tanks, cisterns
hazards include: personal safety, safety of infrastructure, environmental requirements
tools and equipment include: cut-off saws, portable grinders, torque wrenches, pry bars
procedures used to install underground water mains include: joining, controlling thrust, trenching and shoring, bedding and backfilling, leakage testing, chlorination/disinfection, flushing, completing documentation

B-6.03 Flushes underground system

Essential Skills	Thinking, Document Use, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	no	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-6.03.01P	select and install flanges, fittings and valves	flanges, fittings and valves are selected and installed on the underground connection inside the building to allow for required flow
B-6.03.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
B-6.03.03P	ensure underground control valve is open	underground control valve is open at water source to pressurize system
B-6.03.04P	connect hoses to flushing connections	hoses are connected to flushing connections at determined points and water is directed to safe location
B-6.03.05P	discharge water flow	water flow is discharged from flushing connections allowing predetermined flow requirements
B-6.03.06P	complete documentation	documentation is completed according to NFPA standards and AHJ

RANGE OF VARIABLES

tools and equipment include: pitot tube, fire hoses, fire hydrant wrenches, diffusers, burlap sack and tie wires

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-6.03.01L	demonstrate knowledge of flushing requirements of underground systems	identify codes and standards related to flushing of underground systems
		identify required flow rates for flushing of underground systems
		identify ***tools and equipment*** relating to flushing of underground systems and describe their applications and procedures for use
B-6.03.02L	demonstrate knowledge of safe work procedures for flushing of underground systems	identify worksite ***hazards*** and describe safe work practices pertaining to flushing of underground systems
		describe the procedures used to flush underground systems

RANGE OF VARIABLES

tools and equipment include: pitot tube, fire hoses, fire hydrant wrenches, diffusers, burlap sack and tie wires

hazards include: personal safety, safety of infrastructure, environmental requirements

TASK B-7 Installs fire pump units

TASK DESCRIPTOR

Fire pump units are an integral part of fire protection systems. They provide pressure and flow to the fire protection system. They can be used with stand-alone or secondary water supplies, or as a supplement to municipal water supply.

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

Essential Skills	Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
B-7.01.02P	inspect room layout	room layout is inspected prior to installation to confirm adequate space and prevent interference of pumps and components with other building services
B-7.01.03P	verify layout with drawings	layout is verified with drawings to ensure compliance with specifications
B-7.01.04P	lay out pumps and components	pumps and components are laid out in pump room to ensure accessibility for service
B-7.01.05P	determine if pump bypass is required	pump bypass is required when material value is provided by the water supply if the pump is not in operation according to NFPA standards and AHJ

RANGE OF VARIABLES

tools and equipment include: measuring devices, chalk lines, laser levels, straight edges, hoisting equipment

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.01.01L	demonstrate knowledge of pumps, drivers, controllers and components	define terminology associated with pumps, drivers, controllers and components
		identify ***hazards*** and describe safe work practices pertaining to pumps, drivers, controllers and components
		interpret codes, standards and regulations pertaining to the installation of pumps, drivers, controllers and components
		interpret information pertaining to pumps, drivers, controllers and components, found on drawings and specifications
		identify ***tools and equipment*** relating to determining location of pumps, drivers, controllers and components, and describe their applications and procedures for use

RANGE OF VARIABLES

hazards include: personal safety, safety of infrastructure, environmental requirements

tools and equipment include: measuring devices, chalk lines, laser levels, straight edges, hoisting equipment

B-7.02 Installs pumps, drivers, controllers and components

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.02.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
B-7.02.02P	place pumps	pumps are placed in predetermined locations on a base or pad according to NFPA standard and manufacturers' specifications
B-7.02.03P	adjust pump elevation	pump elevation is adjusted to set and secure pump in place using ***materials***
B-7.02.04P	mount controllers and power transfer switches	controllers and power transfer switches are mounted in desired location within the pump room and within sight of the pump according to codes and standards

B-7.02.05P	connect piping and ***fire pump components***	piping and ***fire pump components*** are connected to fire pump, jockey pump and controllers
B-7.02.06P	connect and align driver	driver is connected to and aligned with the pump using ***drive components*** to provide power to pump
B-7.02.07P	set fuel tanks and piping	fuel tanks and piping are set to allow fuel supply to diesel driver according to AHJ, NFPA and manufacturers' specifications
B-7.02.08P	install fuel lines	fuel lines between tank and engine are installed according to AHJ, NFPA standards and building codes
B-7.02.09P	install exhaust system	exhaust system is installed to evacuate exhaust from the pump room to exterior according to AHJ, NFPA standards, manufacturers' specification and building codes
B-7.02.10P	install strainers	strainers are installed on raw water supplies to protect pump from debris
B-7.02.11P	install required fire pump components	required ***fire pump components*** are installed according to manufacturers' specifications, NFPA standards and AHJ

RANGE OF VARIABLES

materials include: shims, mounts, grout and cement

fire pump components include: sensing lines, test headers, flowmeters, bypass connections, relief valves, controller cabinets, suction and discharge piping, anti-vortex plate

drive components include: right-angle gear drives, universal joints, flexible couplings

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.02.01L	demonstrate knowledge of water source connections	define terminology associated with water supply and system demand
		identify ***types of water supplies*** used for fire pump installations and system demand requirements
		identify the requirements of cross-connection control as they relate to fire pump demand
B-7.02.02L	demonstrate knowledge of ***fire pump components*** and their installation	identify ***fire pumps components***
		identify ***types of fire pumps***
		interpret information pertaining to fire pumps found on drawings and specifications

	identify tools and equipment relating to fire pump installation and describe their applications and procedures for use
	describe the procedures used to install fire pumps

RANGE OF VARIABLES

types of water supplies include: municipal, limited (tanks, reservoirs), raw water

fire pump components include: sensing lines, test headers, flowmeters, bypass connections, relief valves, controller cabinets, suction and discharge piping, anti-vortex plate

types of fire pumps include: diesel, electric, steam

TASK B-8 Installs fire department connections

TASK DESCRIPTOR

Fire department connections are an important component found on most sprinkler and standpipe systems. When a sprinkler system activates, the fire department connects hose lines from a pumper truck to the fire department connection. This connection allows the fire department to supplement the fire protection system in the event of a fire.

B-8.01 Determines location, size and type of fire department connections

Essential Skills	Document Use, Numeracy, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-8.01.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
B-8.01.02P	confirm system layout	system layout is confirmed prior to installation to verify adequate space, heating, code requirements, accessibility for fire department and AHJ requirements
B-8.01.03P	verify layout with drawings	layout is verified with drawings to ensure compliance with AHJ and NFPA standards
B-8.01.04P	determine size and type of ***hose connection***, check valves and additional components	size and type of ***hose connection***, check valves and additional components are determined according to AHJ and NFPA standards

RANGE OF VARIABLES

tools and equipment include: measuring devices, levels, straight edges
hose connections include: National Hose Standard (NHS), CSA, Storz

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-8.01.01L	demonstrate knowledge of fire department equipment and their installation procedures	identify required proximity of fire department connections in relation to hydrants
		identify hazards and describe safe work practices pertaining to fire department connections
		interpret codes, standards and regulations pertaining to fire department connections
		interpret information pertaining to fire department connections, found on drawings and specifications
		identify tools and equipment relating to fire department connections, and describe their applications and procedures for use
		identify types of fire department connections, and describe their purpose and their ***installation requirements***

RANGE OF VARIABLES

installation requirements include: requirements for check valves, placement of fire department connections, requirements for drainage of fire department connections, requirements for hose thread connections (AHJ)

B-8.02 Installs fire department connection piping and components

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.02.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
B-8.02.02P	install pipe and devices for fire department connections	pipe and devices for fire department connections are installed according to NFPA standards and AHJ
B-8.02.03P	orient and confirm thread compatibility of the fire department connections	fire department connections are oriented to achieve desired position and threads are confirmed to be compatible according to site conditions, application, manufacturers' specifications and AHJ

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-8.02.01L	demonstrate knowledge of fire department equipment and their installation procedures	identify required proximity of fire department connections in relation to hydrants
		identify hazards and describe safe work practices pertaining to fire department connections
		interpret codes, standards and regulations pertaining to fire department connections
		interpret information pertaining to fire department connections, found on drawings and specifications
		identify tools and equipment relating to fire department connections, and describe their applications and procedures for use
		identify types of fire department connections, and describe their purpose and their ***installation requirements***

RANGE OF VARIABLES

installation requirements include: requirements for check valves, placement of fire department connections, requirements for drainage of fire department connections, requirements for hose thread connections (AHJ)

TASK B-9 Installs private water supply systems

TASK DESCRIPTOR

Private water supply systems are typically the only water supply for the fire protection system in remote areas. They can also be used as a secondary supply in areas where municipal supply is insufficient.

B-9.01 Installs water tanks

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-9.01.01P	determine location and place water tank	location of water tank is determined and tank is placed according to site conditions, accessibility and load bearing requirements
B-9.01.02P	arrange for installation of base, mounts and anchors	base, mounts and anchors are installed to level, stabilize and support tank
B-9.01.03P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
B-9.01.04P	fill tank with water	tank is filled with water to verify its integrity according to specifications and AHJ
B-9.01.05P	apply cathodic and corrosion protection	cathodic protection is installed as required to prevent electrolysis and corrosion protection is applied to prevent exterior and interior corrosion

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-9.01.01L	demonstrate knowledge of water tanks	define terminology associated with water tanks
		identify ***types of water tanks*** and describe their characteristics, principles of operation and applications
		identify hazards and describe safe work practices pertaining to water tanks
		interpret codes, standards and regulations pertaining to water tanks

	identify tools and equipment relating to water tank installation and their applications and procedures for use
	identify ***types of water connections*** and their associated components
	identify the methods used for protection of tanks

RANGE OF VARIABLES

types of water tanks include: gravity, pressure, below grade, residential water supply
types of water connections include: sprinkler valves, auto-fill valves

B-9.02 Installs related equipment

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
B-9.02.01P	install ***controlling devices***	***controlling devices*** are installed on tank and in reservoirs according to NFPA standards and AHJ
B-9.02.02P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
B-9.02.03P	install ***hydrants***	***hydrants*** are installed according to NFPA standards and AHJ
B-9.02.04P	install fill line	fill line is installed to tank to allow for periodic filling of water supply tank
B-9.02.05P	connect test connection	test connection from fire pump is connected to tank to conserve water during testing procedures according to site conditions and AHJ
B-9.02.06P	verify installation of anti-vortex plate	installation of anti-vortex plate is verified to be done when required by site conditions and AHJ

RANGE OF VARIABLES

controlling devices include: pressure switches, agitators, control valves, thermostats, check valves
hydrants include: wall, roof, dry barrel, wet barrel

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-9.02.01L	demonstrate knowledge of installation of water tanks and ***related equipment***	identify procedures used in the installation of water tanks and ***related equipment***
		interpret codes, standards and regulations pertaining to water tank installation and ***related equipment***
		interpret information pertaining to water tank and ***related equipment*** found on drawings and specifications
		identify tools and equipment relating to water tank and ***related equipment*** installation and describe their applications and procedures for use
		explain supply and discharge piping requirements
		identify the arrangement of fire pump unit components

RANGE OF VARIABLES

related equipment includes: overflow, vent, water level, drain and heating system

MAJOR WORK ACTIVITY C
Installs piping

TASK C-10 Prepares pipe, tube and fittings for installation

TASK DESCRIPTOR

Sprinkler fitters prepare piping and fittings for the installation of the fire protection system. Preparation of piping can be done at a shop or on-site.

C-10.01 Cuts pipe and tube

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.01.01P	select pipe	pipe is selected according to drawings and project specifications
C-10.01.02P	calculate, measure and mark pipe	pipe requirements are calculated, measured and marked according to drawings
C-10.01.03P	select and use ***tools and equipment***	***tools and equipment*** are selected according to ***pipe material*** and size, and used according to manufacturers' specifications and scope of work
C-10.01.04P	ream pipe	pipe is reamed according to industry practice to remove burrs to promote hydraulic efficiency
C-10.01.05P	verify cut	cut is verified square according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: pipe cutters, hacksaws, hydraulic cutters, chop saws
pipe material includes: steel, copper, plastic, ductile iron

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.01.01L	demonstrate knowledge of pipe and tube cutting equipment and techniques	define terminology associated with cutting pipe and tube
		identify hazards and describe safe work practices pertaining to cutting pipe and tube
		interpret codes, standards and regulations pertaining to cutting pipe and tube
		interpret information pertaining to cutting pipe and tube found on drawings and specifications
		identify ***tools and equipment*** relating to pipe and tube cutting, and describe their applications and procedures for use
		identify the ***factors to consider*** for selecting pipe and tube for cutting
C-10.01.02L	demonstrate knowledge of the procedures to cut pipe and tube	describe the procedures used to cut pipe and tube to required dimensions

RANGE OF VARIABLES

tools and equipment include: pipe cutters, hacksaws, hydraulic cutters, chop saws
factors to consider for selecting pipe and tube for cutting include: grade, size, materials

C-10.02 Bends pipe and tube

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.02.01P	select pipe schedule and material	pipe schedule and material is selected according to drawings
C-10.02.02P	select the application and location of bend	application and location for bend is selected according to NFPA standards
C-10.02.03P	determine the radius of the bend	radius of the bend is determined according to NFPA standards

C-10.02.04P	calculate bend angle	bend angle is calculated according to installation requirements and site conditions
C-10.02.05P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to manufacturers' specifications and scope of work

RANGE OF VARIABLES

tools and equipment include: chain vices, hydraulic benders, manual benders, torches

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.02.01L	demonstrate knowledge of the procedures used to bend pipe and tube	define terminology associated with bending pipe and tube
		identify hazards and describe safe work practices pertaining to bending pipe and tube
		identify the ***factors to consider*** for selecting pipe and tube for bending
		describe the procedures used to bend pipe and tube to required dimensions
		interpret codes, standards and regulations pertaining to bending pipe and tube
		interpret information pertaining to bending pipe and tube found on drawings and specifications
C-10.02.02L	demonstrate knowledge of ***tools and equipment*** used for pipe and tube bending	identify ***tools and equipment*** relating to pipe and tube bending, and describe their applications and procedures for use
C-10.02.03L	demonstrate knowledge of procedures used to calculate degree of bend	describe basic trigonometry used to calculate angles
		apply metric and imperial measurements

RANGE OF VARIABLES

factors to consider for bending pipe include: grade, size, material, schedule
tools and equipment include: chain vices, hydraulic benders, manual benders, torches

C-10.03 Threads pipe

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.03.01P	adjust die head	die head is adjusted to achieve ***thread specifications*** to allow installation of fittings
C-10.03.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to size and type of material
C-10.03.03P	support pipe	pipe is supported using pipe stands while threading to prevent damage to thread and equipment
C-10.03.04P	select and apply cutting oil	cutting oil is selected and applied according to piping material to prevent damage to dies and threads
C-10.03.05P	clean inside and outside of pipe	inside and outside of pipe is cleaned to remove excess cutting oil and shavings

RANGE OF VARIABLES

thread specifications include: thread depth, taper, pitch, angle, length
tools and equipment include: ratchet dies, oilers, universal dies, thread gauges

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.03.01L	demonstrate knowledge of the procedures used to thread pipe	define terminology associated with threading pipe
		identify hazards and describe safe work procedures pertaining to threading pipe
		identify ***types of threads***
		interpret codes, standards and regulations pertaining to threading pipe

		interpret information pertaining to threading pipe found on drawings and specifications
C-10.03.02L	demonstrate knowledge of ***tools and equipment*** used to thread pipe	identify ***tools and equipment*** relating to threading pipe, and describe their applications and procedures for use

RANGE OF VARIABLES

types of threads include: National Pipe Thread (NPT), National Standard Thread (NST)
tools and equipment include: ratchet dies, oilers, universal dies, thread gauges

C-10.04 Grooves pipe

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.04.01P	identify the pipe material	pipe material is identified according to drawings and project specifications
C-10.04.02P	select ***grooving method***	***grooving method*** is selected according to manufacturers' specifications, and pipe schedule, material and size
C-10.04.03P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-10.04.04P	set up equipment	equipment is set up to achieve groove depth according to manufacturers' specifications
C-10.04.05P	support pipe	pipe is supported using pipe stands to prevent damage to groove and equipment
C-10.04.06P	select and apply cutting oil	cutting oil is selected and applied according to piping material to prevent damage to dies and cut grooves
C-10.04.07P	measure groove depth	groove depth is measured to ensure it corresponds to manufacturers' specifications for the couplings
C-10.04.08P	check flare	flare is measured to ensure it corresponds to manufacturers’ specifications

RANGE OF VARIABLES

grooving methods include: roll grooving, cut grooving

tools and equipment include: hydraulic groovers, cut groovers, portable or in-air/in-place groovers, pipe diameter tape, oilers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.04.01L	demonstrate knowledge of the procedures to groove pipe	define terminology associated with grooving pipe
		identify hazards and describe safe work practices pertaining to grooving pipe
		interpret codes, standards and regulations pertaining to grooving pipe
		interpret information pertaining to grooving pipe found on drawings and specifications
C-10.04.02L	demonstrate knowledge of ***tools and equipment*** used to groove pipe	identify ***tools and equipment*** relating to grooving pipe, and describe their applications and procedures for use

RANGE OF VARIABLES

tools and equipment include: hydraulic groovers, cut groovers, portable or in-air/in-place groovers, pipe diameter tape, oilers

C-10.05 Drills pipe and tube

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.05.01P	measure and mark pipe and tube	pipe and tube is measured and marked according to drawings
C-10.05.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-10.05.03P	find centre of pipe and tube	centre of pipe and tube is found using a centering punch
C-10.05.04P	drill hole in pipe and tube	hole in pipe and tube is drilled according to fitting and device specifications

C-10.05.05P	file hole	hole is filed to remove burrs
C-10.05.06P	recover cut-out disc	cut-out disc is recovered to prevent obstruction to flow

RANGE OF VARIABLES

tools and equipment include: drills, hole saws, centering punch, files, levels

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.05.01L	demonstrate knowledge of the procedures to drill pipe and tube	define terminology associated with drilling pipe and tube
		identify hazards and describe safe work practices pertaining to drilling pipe and tube
		interpret codes, standards and regulations pertaining to drilling pipe and tube
		interpret information pertaining to pipe and tube drilling found on drawings and manufacturers' specifications
C-10.05.02L	demonstrate knowledge of ***tools and equipment*** used to drill pipe and tube	identify ***tools and equipment*** relating to drilling pipe and tube, and describe their applications and procedures for use

RANGE OF VARIABLES

tools and equipment include: drills, hole saws, centering punch, files, levels

C-10.06 Grinds pipe

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-10.06.02P	secure pipe	pipe is secured while grinding to prevent damage to pipe and equipment
C-10.06.03P	grind pipe ends	pipe ends are ground to ensure they are square and true

C-10.06.04P	bevel pipe	pipe is bevelled at required angle to promote weld penetration according to industry standards
C-10.06.05P	chamfer pipe for fittings	pipe is chamfered at angle according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: power grinders, files, chamfering tools, chain vices, pipe stands, bench vices

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.06.01L	demonstrate knowledge of the procedures used to grind pipe	define terminology associated with grinding pipe
		identify hazards and describe safe work practices pertaining to grinding pipe
		interpret codes, standards and regulations pertaining to grinding pipe
		interpret information pertaining to grinding pipe found on drawings and specifications
		describe the procedures used to grind pipe
C-10.06.02L	demonstrate knowledge of the ***tools and equipment*** used to grind pipe	identify ***tools and equipment*** used for grinding pipe and describe their applications and procedures for use

RANGE OF VARIABLES

tools and equipment include: power grinders, files, chamfering tools, chain vices, pipe stands, bench vices

C-10.07 Prepares fittings

Essential Skills Numeracy, Thinking, Document Use

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.07.01P	select and use ***tools and materials***	***tools and materials*** are selected and used according to scope of work
C-10.07.02P	select fittings	fittings are selected according to ***connection type***

C-10.07.03P	select fitting size	fitting size is selected for the application according to drawings
C-10.07.04P	inspect fitting	fitting is inspected for ***deficiencies***
C-10.07.05P	grease, sand, grind, clean and flux fitting	fitting is greased, sanded, ground, cleaned and fluxed according to the ***type of fitting***

RANGE OF VARIABLES

tools and materials include: wire brushes, sand cloth, files, pipe joint compound or tape, flux, gasket lube

connection type includes: flanged, threaded, grooved, soldered, brazed, welded

deficiencies include: cracks, holes, absence of threads

type of fitting includes: copper, plastic, steel, cast iron

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.07.01L	demonstrate knowledge of the procedures used to prepare pipe fittings	define terminology associated with pipe fittings
		identify hazards and describe safe work practices pertaining to pipe fittings
		interpret codes, standards and regulations pertaining to pipe fittings
		interpret information pertaining to pipe fittings found on drawings and specifications
C-10.07.02L	demonstrate knowledge of the ***tools and materials*** used to prepare pipe fittings	identify ***tools and materials*** relating to preparing pipe fittings, and describe their applications and procedures for use

RANGE OF VARIABLES

tools and materials include: wire brushes, sand cloth, files, pipe joint compound or tape, flux, gasket lube

TASK C-11 Installs pipe, tube and fittings

TASK DESCRIPTOR

Sprinkler fitters connect various types of pipes, tubes and fittings (steel, plastic and copper) to distribute water from a predetermined source to provide reliable and adequate fire protection. They are responsible for painting and labelling pipe and tube post-installation when required.

C-11.01 Installs steel pipe, tube and fittings

Essential Skills Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.01.01P	verify location and spacing	location and spacing of the main and branch lines are verified according to drawings and NFPA standards
C-11.01.02P	modify pipe and tube layout	pipe and tube layout is modified according to site conditions and ***design considerations***
C-11.01.03P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-11.01.04P	install ***fittings*** on pipe and tube	***fittings*** are installed on pipe and tube according to drawings
C-11.01.05P	install pipe and tube in hangers	pipe and tube are installed in hangers according to NFPA standards
C-11.01.06P	connect pipes and tubes	pipes and tubes are connected using ***fittings*** according to drawings and manufacturers' specifications
C-11.01.07P	orient ***fittings***	***fittings*** are oriented according to application and site conditions
C-11.01.08P	level or pitch pipe and tube	pipe and tube is run level or pitched according to fire protection system requirements and NFPA standards

RANGE OF VARIABLES

design considerations include: pipe size, hazard classifications, drainage, grading and layout, materials, system design, flushing connections, friction loss

tools and equipment include: pipe wrenches, levels, wrenches, sockets, chain vices

fittings include: couplings, flanges, elbows, tees, crosses, adaptors

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.01.01L	demonstrate knowledge of steel pipe, tube and ***fittings***	define terminology associated with steel pipe, tube and ***fittings***
		identify ***types of steel pipe and tube***
		interpret codes, standards and regulations pertaining to steel pipe, tube and ***fittings***
		interpret information pertaining to steel pipe and tube installation found on drawings and specifications
C-11.01.02L	demonstrate knowledge of the procedures used to install steel pipe, tube and ***fittings***	identify hazards and describe safe work practices related to installing steel pipe, tube and ***fittings***
		identify ***tools and equipment*** for installing steel pipe, tube and ***fittings*** and describe their applications and procedures for use
		describe the procedures used to install steel pipe, tube and ***fittings***
		describe ***connection types*** related to steel pipe and tube
		explain friction loss as it applies to steel pipe schedules and hydraulically calculated systems
		identify the ***design considerations*** for installing steel pipe, tube and ***fittings***

RANGE OF VARIABLES

fittings include: couplings, flanges, elbows, tees, crosses, adaptors

types of steel pipe include: stainless, galvanized, carbon

types of steel tube include: stainless, mild

tools and equipment include: pipe wrenches, levels, wrenches, sockets, chain vices

connection types include: flanged, threaded, grooved couplings, welded

design considerations include: pipe size, hazard classifications, drainage, grading and layout, materials, system design, flushing connections, friction loss

C-11.02 Installs plastic pipe, tube and fittings

Essential Skills Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-11.02.01P	verify location and spacing of the main and branch lines	location and spacing of the main and branch lines is verified according to drawings and NFPA standards
C-11.02.02P	modify pipe and tube layout	pipe and tube layout is modified according to site conditions and ***design considerations***
C-11.02.03P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-11.02.04P	install fittings on pipe and tube	fittings are installed on pipe and tube according to drawings
C-11.02.05P	install pipe and tube in hangers	pipe and tube are installed in hangers according to NFPA standards
C-11.02.06P	connect pipes and tubes	pipes and tubes are connected using ***fittings*** according to drawings and manufacturers' specifications
C-11.02.07P	orient ***fittings***	***fittings*** are oriented according to application and site conditions
C-11.02.08P	level or grade pipe and tube	pipe and tube are run level or graded according to fire protection system requirements and NFPA standards

RANGE OF VARIABLES

design considerations include: pipe size, hazard classifications, drainage, grading and layout, materials, system design, flushing connections, friction loss

tools and equipment include: levels, wrenches

fittings include: couplings, flanges, elbows, tees, crosses, adaptors

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-11.02.01L	demonstrate knowledge of plastic pipe, tube and ***fittings***	define terminology associated with plastic pipe, tube and ***fittings***
		identify ***types of plastic pipe***
		interpret codes, standards and regulations pertaining to plastic pipe, tube and ***fittings***

		interpret information pertaining to plastic pipe and tube installation found on drawings and specifications
C-11.02.02L	demonstrate knowledge of the procedures used to install plastic pipe, tube and ***fittings***	identify hazards and describe safe work practices related to installing plastic pipe, tube and ***fittings***
		identify ***tools and equipment*** for installing plastic pipe and tube and, describe their applications and procedures for use
		describe the procedures used to install plastic pipe, tube and ***fittings***
		describe ***connection types*** related to plastic pipe and tube
		explain friction loss as it applies to plastic pipe and tube and hydraulically calculated systems
		identify compatibility of plastic pipe and tube with site conditions and other materials
		identify the ***design considerations*** for installing plastic pipe, tube and ***fittings***

RANGE OF VARIABLES

fittings include: couplings, flanges, elbows, tees, crosses, adaptors
types of plastic pipe include: CPVC, cross-linked polyethylene (PEX), polyvinyl chloride (PVC)
design considerations include: pipe size, hazard classifications, drainage, grading and layout, materials, system design, flushing connections, friction loss
tools and equipment include: levels, wrenches
connection types include: flanged, threaded, grooved couplings, solvent welded

C-11.03 Installs copper pipe, tube and fittings

Essential Skills Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-11.03.01P	verify location and spacing of the main and branch lines	location and spacing of the main and branch lines is verified according to drawings and NFPA standards

C-11.03.02P	modify pipe and tube layout	pipe and tube layout is modified according to site conditions and ***design considerations***
C-11.03.03P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-11.03.04P	select ***materials***	***materials*** are selected according to scope of work and job specifications
C-11.03.05P	install ***fittings*** on pipe and tube	***fittings*** are installed on pipe and tube according to drawings
C-11.03.06P	install dielectric fittings	dielectric fittings are installed to prevent electrolysis caused by the joining of dissimilar metals
C-11.03.07P	install pipe and tube in hangers	pipe and tube are installed in hangers according to NFPA standards
C-11.03.08P	connect pipes and tubes	pipes and tubes are connected using ***fittings*** according to drawings and manufacturers' specifications
C-11.03.09P	orient ***fittings***	***fittings*** are oriented according to application and site conditions
C-11.03.10P	level or grade pipe and tube	pipe and tube are run level or graded according to fire protection system requirements and NFPA standards

RANGE OF VARIABLES

design considerations include: pipe size, hazard classifications, drainage, grading and layout, materials, system design, flushing connections, friction loss

tools and equipment include: torches, levels, wrenches, sockets

materials include: solder, brazing rods, flux, sand cloth

fittings include: couplings, flanges, elbows, tees, crosses, adaptors

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.03.01L	demonstrate knowledge of copper pipe, tube and ***fittings***	define terminology associated with copper pipes, tube and ***fittings***
		identify ***types of copper pipe and tube*** and their applications
		interpret codes, standards and regulations pertaining to copper pipe, tube and ***fittings***
		interpret information pertaining to copper pipe and tube installation found on drawings and specifications
C-11.03.02L	demonstrate knowledge of the procedures used to install copper pipe, tube and ***fittings***	identify ***hazards*** and describe safe work practices related to installing copper pipe, tube and ***fittings***

		identify ***tools and equipment*** for installing copper pipe, tube and ***fittings*** and describe their applications and procedures for use
		describe the procedures used to install copper pipe, tube and ***fittings***
		describe ***connection types*** related to copper pipe
		explain the effect of electrolysis on piping and tubing materials
		explain friction loss as it applies to copper pipe and tube, and hydraulically calculated systems
		identify the ***design considerations*** for installing copper pipe, tube and ***fittings***
		describe the procedures used to prepare and assemble flare and compression joints using hand tools
C-11.03.03L	demonstrate knowledge of the procedures used to braze and solder joints	identify ***hazards*** and describe safe work practices pertaining to brazing and soldering joints
		interpret codes, standards and regulations pertaining to brazing and soldering joints
		interpret information, pertaining to brazing and soldering joints found on drawings and specifications
		identify ***materials*** and equipment used for brazing and soldering joints, and describe their applications
		describe the procedures used to solder and braze joints
		identify ***types of solders and brazing alloys***, and describe their characteristics and applications
		identify types of flux used in soldering or brazing and describe their purpose, applications and effects

RANGE OF VARIABLES

fittings include: couplings, flanges, elbows, tees, crosses, adaptors

types of copper pipe and tube include: K, L, M

hazards include: fire prevention, hot work procedures

tools and equipment include: torches, levels, wrenches, sockets

connection types include: soldering, brazing, using grooved couplings, compression type fittings

design considerations include: pipe size, hazard classifications, drainage, grading and layout, materials, system design, flushing connections, friction loss

materials include: solder, brazing rods, flux, sand cloth

types of solders and brazing alloys include: 95/5, lead-free, BCuP

C-11.04 Paints and labels pipe and tube

Essential Skills	Document Use, Thinking, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-11.04.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-11.04.02P	select paint	paint used for identification and corrosion protection is selected according to project specifications
C-11.04.03P	mix paint and epoxy	paint and epoxy are mixed according to manufacturers' specifications
C-11.04.04P	paint over wrench marks and bare threads	wrench marks and bare threads are painted over according to project specifications
C-11.04.05P	select type, size and spacing of labels	type, size and spacing of labelling is selected for pipe identification according to project specifications

RANGE OF VARIABLES

tools and equipment include: paint brushes, paint guns, stencils, wire brushes

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-11.04.01L	demonstrate knowledge of the procedures used to paint and label pipe and tube	identify symbols pertaining to labelling pipe and tube
		identify hazards and describe safe work procedures pertaining to painting pipe and tube
		interpret specifications pertaining to labeling pipe and tube
		describe the procedures and materials used to paint and label pipe and tube

TASK C-12 Installs piping components

TASK DESCRIPTOR

Sprinkler fitters connect various types of components such as accelerators, air compressors, sprinklers, nozzles and valves to the piping system to achieve a complete and efficient fire protection system according to drawings, AHJ and NFPA standards.

C-12.01 Selects sprinklers

Essential Skills	Thinking, Document Use, Reading

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.01.01P	identify sprinklers' temperature classification	sprinklers' temperature classification is identified according to NFPA standards
C-12.01.02P	identify ***sprinklers***	***sprinklers*** are identified to provide coverage according to ***conditions, occupancy classifications*** and ***commodity classifications*** according to drawings and NFPA standards
C-12.01.03P	interpret information listing	information on sprinklers' listing is interpreted according to manufacturers' specifications

RANGE OF VARIABLES

sprinklers include: automatic (solder, bulb, open), standard spray (pendant, upright, sidewall), extended coverage (pendant, upright, sidewall), specialty sprinklers and nozzles (residential, institutional, CMSA/large drop, ESFR, in-rack, attic, old-style/conventional, open sprinkler, window, dry)

conditions include: freezing, excessive heat, corrosive environment

occupancy classifications include: light hazard, ordinary hazard, extra hazard

commodity classifications include: high pile storage, in-rack, solid pile

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.01.01L	demonstrate knowledge of sprinklers and their selection	define terminology associated with sprinklers
		identify hazards and describe safe work practices pertaining to sprinklers
		interpret codes, standards and regulations pertaining to sprinklers

	interpret ***information*** pertaining to sprinklers found on drawings, specifications and listings
	explain the operation of sprinklers
	identify ***types of sprinklers***, and describe their characteristics and applications
	identify ***conditions***, hazard classification and ***commodity classification*** for selecting sprinklers
	identify ***temperature ratings*** and colour coding
	identify ***performance characteristics*** that apply to sprinklers
	identify ***location requirements***

RANGE OF VARIABLES

types of sprinklers include: automatic (solder, bulb, open), standard spray (pendant, upright, sidewall), extended coverage (pendant, upright, sidewall), specialty sprinklers and nozzles (residential, institutional, CMSA/large drop, ESFR, in-rack, attic, old-style/conventional, open sprinkler, window, dry)

information includes: listings, K-factor, temperature, date of manufacture, sprinkler identification number (SIN)

conditions include: freezing, excessive heat, corrosive environment

commodity classifications include: high pile storage, in-rack, solid pile

temperature ratings include: ordinary, intermediate, high, extra-high

performance characteristics include: deflector design/spray patterns, orifice size, temperature rating, temperature sensitivity, orientation

location requirements include: bays, beams, girders, joists, open bar joists, open ceilings, trusses

C-12.02 Installs sprinklers and nozzles

Essential Skills	Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-12.02.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work and manufacturers' specifications
C-12.02.02P	inspect for ***deficiencies***	sprinklers and nozzles are inspected for ***deficiencies***
C-12.02.03P	apply thread lubricant	thread lubricant is applied to prevent leakage and ensure fit according to industry practice

C-12.02.04P	position sprinklers and nozzles	sprinklers and nozzles are positioned according to manufacturers' specifications and NFPA standards
C-12.02.05P	select and install ***temporary protection***	***temporary protection*** is selected and installed to protect the sprinklers and nozzles from potential damage until job is completed
C-12.02.06P	select and install ***finishing plates***	***finishing plates*** are selected and installed according to manufacturers' specifications
C-12.02.07P	select and install permanent ***sprinkler protectors***	permanent ***sprinkler protectors*** are selected and installed according to manufacturers' specifications and site conditions

RANGE OF VARIABLES

tools and equipment include: sprinkler wrench, sprinkler socket
deficiencies include: broken bulbs, bent deflectors, bad threads, corrosion, lack of air bubble, no fluid
temporary protection includes: manufacturers' supplied protective caps, aluminium foil, plastic bags
finishing plates include: concealed, recess, deep cup escutcheons
sprinkler protectors include: sprinkler guards, wax coated, paper bags

KNOWLEDGE		
	Learning Outcomes	**Learning Objectives**
C-12.02.01L	demonstrate knowledge of ***sprinklers*** and ***nozzles***	define terminology associated with ***sprinklers*** and ***nozzles***
		identify hazards and describe safe work practices pertaining to ***sprinklers*** and ***nozzles***
		interpret codes, standards and regulations pertaining to ***sprinklers*** and ***nozzles***
		interpret information pertaining to ***sprinklers*** and ***nozzles*** found on drawings, specifications and listings
		identify tools and equipment relating to ***sprinklers*** and ***nozzles***, and describe their applications and procedures for use
		explain the operation of ***sprinklers*** and ***nozzles*** and systems
		identify types of ***sprinklers*** and ***nozzles***, and describe their characteristics and applications
C-12.02.02L	demonstrate knowledge of ***sprinklers*** and ***nozzles*** installation	describe the procedures used to install ***sprinklers*** and ***nozzles***
		describe the procedures used and the factors to consider to protect, handle and care for ***sprinklers*** and ***nozzles*** prior to and during the installation process

	explain the importance of correct positioning for ***sprinklers*** and ***nozzles***
	identify required distances between standard spray and extended coverage ***sprinklers*** based on ***occupancy classification,*** manufacturers' specifications and NFPA standards
	identify obstructions of ***sprinklers*** and ***nozzles***
	identify clearances required between piled storage materials and sprinkler deflectors
	identify the factors that affect maximum ceiling temperature
	identify ***temperature ratings*** and colour coding
	identify ***performance characteristics*** that apply to automatic ***sprinklers***

RANGE OF VARIABLES

sprinklers include: automatic (solder, bulb, open), standard spray (upright, pendant, sidewall), extended coverage (pendant, upright, sidewall), specialty sprinklers and nozzles (residential, institutional, CMSA/large drop, ESFR, in-rack, attic, old-style/conventional, open sprinkler, window, dry)

nozzles include: foam, CO_2, clean agent

occupancy classifications include: light hazard, ordinary hazard, extra hazard

temperature ratings include: ordinary, intermediate, high, extra-high

performance characteristics include: deflector design/spray patterns, orifice size, temperature rating, temperature sensitivity, orientation

C-12.03 Installs sleeves

Essential Skills	Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-12.03.01P	select sleeve material, diameter and length	sleeve material, diameter and length is selected according to ***factors***
C-12.03.02P	measure and determine sleeve location	sleeve location is measured and determined according to drawings prior to the concrete being poured
C-12.03.03P	attach sleeve to forms	sleeve is attached to forms using nails or screws when installed prior to concrete pour according to industry standards

C-12.03.04P	select ***tools and equipment***	***tools and equipment*** are selected according to scope of work
C-12.03.05P	cut holes for sleeves	holes are cut for sleeves through existing concrete according to scope of work
C-12.03.06P	select and apply fire stopping, caulking and sealant	fire stopping, caulking and sealant are selected and applied according to manufacturers' specifications

RANGE OF VARIABLES

factors for selecting include: pipe size, wall and floor thickness, NFPA standards
tools and equipment include: hammer drills, coring drills, hammers, cold chisels

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.03.01L	demonstrate knowledge of pipe sleeves and their installation	identify terminology related to pipe sleeve installation
		identify hazards and safe work practices related to pipe sleeve installation
		interpret codes, standards and regulations pertaining to pipe sleeves
		describe the procedures used to size and install pipe sleeves
		identify ***tools and equipment*** relating to the installation of pipe sleeves, and describe their applications and procedures for use

RANGE OF VARIABLES

tools and equipment include: hammer drills, coring drills, hammers, cold chisels

C-12.04 Installs supports and hangers

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.04.01P	select ***supports*** and ***hangers***	***supports*** and ***hangers*** are selected according to ***factors***
C-12.04.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work

C-12.04.03P	calculate size of trapeze hangers	size of trapeze hangers is calculated according to NFPA standards
C-12.04.04P	calculate rod size and length	rod size and length are calculated according to ***factors***
C-12.04.05P	select attachment points for ***supports***	attachment points for ***supports*** are selected according to NFPA standards
C-12.04.06P	fasten ***supports*** and ***hangers***	***supports*** and ***hangers*** are fastened to the attachment points on the ***structure material*** according to project and manufacturers' specifications, NFPA standards and AHJ

RANGE OF VARIABLES

supports include: ceiling flanges, side beam attachments, C-clamps
hangers include: riser clamps, pipe clamps, swivel rings, clevis, split rings
factors for selecting include: pipe material, pipe size, spacing, application, NFPA standards
tools and equipment include: hammer drills, adjustable wrenches, hacksaws, pliers
factors for calculating size include: pipe material, spacing, application, NFPA standards
structure material includes: wood, concrete, steel, lathe and plaster

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.04.01L	demonstrate knowledge of ***supports*** and ***hangers*** and their installation procedures	define terminology associated with ***supports*** and ***hangers***
		identify hazards and describe safe work practices pertaining to ***supports*** and ***hangers***
		interpret codes, standards and regulations pertaining to ***supports*** and ***hangers***
		interpret information pertaining to ***supports*** and ***hangers*** found on drawings and specifications
		identify the ***factors to consider*** to perform grade and ***hanger*** location calculations
		identify ***tools and equipment*** relating to ***supports*** and ***hangers*** and describe their applications and procedures for use
		identify types of ***supports*** and ***hangers*** used in the installation of pipe, tube and tubing, and describe their characteristics and applications
		identify ***supports*** and ***hanger*** requirements for various systems
		identify types and sizes of hanger rods, and describe their characteristics and applications

	identify types of protective materials applied to hangers and describe their purpose and applications
	identify types of fasteners and inserts, and describe their characteristics and applications
	describe the procedures used to install ***supports*** and ***hangers***
	describe the procedures used to install ***fasteners*** into ***structure material***

RANGE OF VARIABLES

supports include: ceiling flanges, side beam attachments, C-clamps

hangers include: riser clamps, pipe clamps, swivel rings, clevis, split rings

factors to consider for calculating grade include: grade on pipe, slope of ceiling, hanger spacing, distance from hanger to attachment points

tools and equipment include: hammer drills, adjustable wrenches, hacksaws, pliers

fasteners include: drop-in inserts, wood screws, coach screw rod, engineered fasteners

structure material includes: wood, concrete, steel, lathe and plaster

C-12.05 Installs seismic protection

Essential Skills Document Use, Thinking, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-12.05.01P	select location, material, diameter and length of ***brace***	location, material, diameter and length of ***brace*** is selected according to ***factors***
C-12.05.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-12.05.03P	determine NFPA-prescribed angle	NFPA-prescribed angle of the brace or restraint is determined in relation to the pipe and the place of attachment, and site conditions
C-12.05.04P	attach brace attachment	brace attachment is attached to the building structure according to NFPA standards, manufacturers' specifications, AHJ and drawings
C-12.05.05P	determine the brace length	brace length between brace attachment and pipe attachment is determined according to NFPA standards, manufacturers' specifications and AHJ

C-12.05.06P	cut ***bracing materials***	***bracing materials*** are cut to length according to site conditions
C-12.05.07P	install ***bracing materials*** and attachment	***bracing materials*** and attachment are connected to the brace attachment according to NFPA standards, manufacturers' specifications and AHJ
C-12.05.08P	install flexible joints	flexible joints are installed according to AHJ and NFPA standards
C-12.05.09P	install measures to prevent ***movement*** of pipe in hangers	pipe is protected from ***movement*** in hangers

RANGE OF VARIABLES

brace includes: longitudinal, lateral, restraint wire, restraint straps, 4-way

f***actors*** for selecting include: pipe size, location of structural members, drawings, NFPA standards

tools and equipment include: hammer drills, wrenches, pipe cutters, hacksaws, screwdrivers, pipes, adjustable wrenches, wire cutters

bracing materials include: pipe, angle iron, rod

movement includes: seismic activity, vibration, pipe thrust, water hammer

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.05.01L	demonstrate knowledge of the procedures to select and locate sway/seismic bracing	define terminology associated with sway/seismic bracing
		identify hazards and describe safe work practices pertaining to sway/seismic bracing
		interpret codes, standards and regulations pertaining to sway/seismic bracing
		interpret information pertaining to sway/seismic bracing found on drawings and specifications
C-12.05.02L	demonstrate knowledge of the procedures used to install sway/seismic bracing	identify ***tools and equipment*** relating to sway/seismic bracing, and describe the applications and procedures for use
		identify types of sway/seismic bracing and describe their purpose and applications
		describe the procedures used to install sway/seismic bracing assemblies
		identify types of fasteners and inserts, and describe their characteristics and applications
		describe the procedures used to install fasteners and inserts
		describe the procedures used to install flexible joints

RANGE OF VARIABLES

tools and equipment include: hammer drills, wrenches, pipe cutters, hacksaws, screwdrivers, pipes, adjustable wrenches, wire cutters

C-12.06 Installs cross-connection control assemblies

Essential Skills	Document Use, Continuous Learning, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-12.06.01P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
C-12.06.02P	identify and install ***cross-connection control assembly***	***cross-connection control assemblies*** are identified and installed according to plans, specifications and municipal regulations using ***methods*** appropriate to the device
C-12.06.03P	test operation of ***cross-connection control assembly***	operation of ***cross-connection control assemblies*** is tested and documented according to AHJ

RANGE OF VARIABLES

tools and equipment include: combination wrenches, pipe wrenches, measuring devices

cross-connection control assemblies include: reduced pressure backflow (RP), double check valve assembly (DCVA)

methods for installing include: grooving, flanging, threading

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-12.06.01L	demonstrate knowledge of cross-connection control assemblies, their characteristics, purpose, applications and operation	define terminology associated with cross-connection control assemblies
		identify ***types of cross-connection control assemblies***, and describe their characteristics, purpose and operation
		identify hazards and describe safe work practices pertaining to cross-connection control assemblies
		interpret codes, standards and regulations pertaining to cross-connection control assemblies

		identify training and certification requirements regarding testing of cross-connection control assemblies
C-12.06.02L	demonstrate knowledge of the procedures to install cross-connection control assemblies	interpret information pertaining to cross-connection control assemblies found on drawings and specifications
		identify tools and equipment pertaining to cross-connection control assemblies, and describe their applications and procedures for use
		identify the factors to consider for selecting and installing cross-connection control assemblies
		describe the procedures used to install cross-connection control assemblies

RANGE OF VARIABLES

types of cross-connection control assemblies include: RP, DCVA

C-12.07 Installs system drainage

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
C-12.07.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
C-12.07.02P	determine pipe size and measure locations of drain lines	pipe size and locations of drain lines are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
C-12.07.03P	measure and determine locations and requirements of ***components***	locations and requirements of ***components*** are measured and determined according to drawings, project specifications, site conditions, AHJ and NFPA standards

C-12.07.04P	measure and fabricate ***piping***	***piping*** is measured and fabricated on-site for installation according to drawings, AHJ, NFPA standards and site conditions
C-12.07.05P	install drain lines	drain lines are installed according to drawings, site conditions, AHJ and NFPA standards

RANGE OF VARIABLES

components include: drain valves, drain cups, air gaps
piping includes: steel, copper, plastic

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.07.01L	demonstrate knowledge of system drainage, and their operation and characteristics	define terminology associated with system drainage
		identify hazards and describe safe work practices pertaining to system drainage
		interpret codes, standards and regulations pertaining to system drainage
		interpret information pertaining to system drainage found on drawings and specifications
		identify tools and equipment relating to system drainage, and describe their applications and procedures for use
		identify ***types of system drainage*** and describe their operating principles and characteristics
		identify system drainage ***components*** and describe their location, purpose and operation
C-12.07.02L	demonstrate knowledge of the procedures to install system drainage and ***components*** according to code requirements	describe the procedures used to lay out and install system drainage and ***components***

RANGE OF VARIABLES

types of system drainage include: main, auxiliary, sectional
components include: drain valves, drain cups, air gaps

MAJOR WORK ACTIVITY D

Installs and lays out fire protection systems and devices

TASK D-13 Installs water-based systems

TASK DESCRIPTOR

Sprinkler fitters install water-based systems in institutional, commercial, industrial and residential buildings. These systems use water as an integral part of the suppression/control agent. They primarily remove heat from the fire to suppress or control the fire.

D-13.01 Installs wet pipe systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-13.01.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.01.02P	determine and measure locations of mains and branch lines	locations of mains and branch lines are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.01.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.01.04P	determine and measure locations of auxiliary drains and requirements for valves	locations of auxiliary drains and requirements for valves are determined and measured according to NFPA standards to ensure accessibility for servicing and testing
D-13.01.05P	measure and fabricate ***piping***	***piping*** is measured and fabricated for installation according to drawings, AHJ, NFPA standards and site conditions

D-13.01.06P	measure and install return bends and flexible drops	return bends and flexible drops on wet pipe systems are measured and installed according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.01.07P	connect piping to water supply	piping is connected to water supply using ***methods*** according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.01.08P	install ***auxiliary devices***	***auxiliary devices*** are installed according to NFPA standards to ensure accessibility for servicing and testing
D-13.01.09P	measure and install ***alarm valve trim***	***alarm valve trim*** is measured and installed according to manufacturers' specifications and NFPA standards
D-13.01.10P	pressure test wet pipe system	wet pipe system is pressure tested according to NFPA standards and AHJ
D-13.01.11P	install ***signage and identification***	***signage and identification*** are installed according to NFPA standards and AHJ

RANGE OF VARIABLES

components include: fire department connection, test connections and drains, sprinklers, alarm devices, control valves, alarm check valves, water flow alarm devices, relief valves, valves, flow switches, riser manifolds, air vents

piping includes: risers, starter pieces, drops, branch lines, feed mains, riser nipples, cross mains

methods include: flanged, soldered, welded, grooved, threaded joints

auxiliary devices include: water motor gongs, excess pressure pumps, signalling devices

alarm valve trim includes: alarm test valves, main drains, pressure gauges

signage and identification include: data plates, component identification, drain list

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-13.01.01L	demonstrate knowledge of wet pipe systems, and their operation and characteristics	define terminology associated with wet pipe systems
		identify hazards and describe safe work practices pertaining to wet pipe systems
		interpret codes, standards and regulations pertaining to wet pipe systems
		interpret information pertaining to wet pipe systems found on drawings and specifications
		identify tools and equipment relating to wet pipe systems, and describe their applications and procedures for use
		identify ***types of wet pipe systems*** and describe their operating principles and characteristics

		identify wet pipe system ***components*** and describe their location, purpose and operation
		identify alarm valves to be trimmed and describe their ***components*** and relevant design characteristics
		determine characteristics and application of sprinklers
		identify ***design criteria*** for wet pipe systems
		identify drainage requirements for each water-based system
D-13.01.02L	demonstrate knowledge of the procedures used to install wet pipe systems and ***components***	describe the procedures used to lay out and install wet pipe systems and ***components***
		describe the procedures used to install alarm valve trim
		identify the factors to consider and requirements for installing auxiliary drains on wet pipe systems
		describe the preventative methods used to prevent false alarms
		identify the requirements for pressure testing of wet pipe systems and describe the associated procedures
		describe methods used to prevent freezing

RANGE OF VARIABLES

types of wet pipe systems are only tree, gridded, looped

components include: fire department connection, test connections and drains, sprinklers, alarm devices, control valves, alarm check valves, water flow alarm devices, relief valves, valves, flow switches, riser manifolds, air vents

design criteria includes: density, square footage, occupancy classifications

D-13.02 Installs dry pipe systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.02.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.02.02P	determine and measure locations and grades for main and branch lines	locations and grades for main and branch lines are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.02.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.02.04P	determine and measure locations of auxiliary drains and requirements for valves	locations of auxiliary drains and requirements for valves are determined and measured according to NFPA standards to ensure accessibility for servicing, testing and winterizing
D-13.02.05P	identify ***devices***	***devices*** are identified according to NFPA standards in installation locations that are subject to freezing
D-13.02.06P	measure and install return bends and flexible drops	return bends and flexible drops on dry pipe systems are measured and installed according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.02.07P	connect piping to water supply	piping is connected to water supply using ***methods*** according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.02.08P	install auxiliary ***devices***	auxiliary ***devices*** are installed according to NFPA standards to ensure accessibility for servicing, testing and winterizing
D-13.02.09P	measure and install dry pipe valves and associated ***trim***	dry pipe valves and associated ***trim*** are measured and installed according to manufacturers' specifications and NFPA standards
D-13.02.10P	determine system capacity	system capacity of dry pipe systems is determined according to NFPA standards

D-13.02.11P	perform calculations	calculations are performed according to NFPA standards on the required fill-time of compressed air or nitrogen
D-13.02.12P	perform pressure tests	pressure tests are performed according to NFPA standards and AHJ

RANGE OF VARIABLES

components include: fire department connections, test connections and drains, water flow alarm devices, control valves, dry pipe valves, regulated air supply, regulated nitrogen supply, valves, quick opening devices (QODs), anti-flooding devices, auxiliary drains, drum drips, high/low supervisory devices, pressure gauges

devices include: dry pendant sprinklers, approved gaskets, air dryers

methods include: flanged, brazed, welded, grooved, threaded joints

trim includes: low air pressure switches, QODs, air maintenance devices

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.02.01L	demonstrate knowledge of dry pipe systems, their operation and characteristics	define terminology associated with dry pipe systems
		identify hazards and describe safe work practices pertaining to dry pipe systems
		interpret codes, standards and regulations pertaining to dry pipe systems
		interpret information pertaining to dry pipe systems found on drawings and specifications
		identify tools and equipment relating to dry pipe systems, and describe their applications and procedures for use
		identify ***types of dry pipe systems***, and describe their operating principles and characteristics
		identify dry pipe system ***components***, and describe their locations, purpose and operation
D-13.02.02L	demonstrate knowledge of the procedures used to install dry pipe systems and their ***components***	identify dry pipe valves to be trimmed, and describe their ***components*** and design characteristics
		identify the factors to consider and requirements for installing auxiliary drains on dry pipe systems
		identify the requirements for pressure testing of dry pipe systems and describe the associated procedures
		describe the procedures used to lay out and install dry pipe systems and ***components***

	describe the procedures used to install dry pipe valve trim
	describe the ***preventative methods*** used to prevent false alarms
	identify calculations pertaining to capacity of dry pipe systems and air or nitrogen supply

RANGE OF VARIABLES

types of dry pipe systems are tree and looped

components include: fire department connections, test connections and drains, water flow alarm devices, control valves, dry pipe valves, regulated air supply, regulated nitrogen supply, valves, QODs, anti-flooding devices, auxiliary drains, drum drips, high/low supervisory devices, pressure gauges

preventative methods include: use of air and nitrogen supply, air dryer, air maintenance device

D-13.03 Installs antifreeze systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.03.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.03.02P	determine and measure locations of main and branch lines	locations of main and branch lines are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.03.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.03.04P	determine and measure locations of auxiliary drains and requirements for valves	locations of auxiliary drains and requirements for valves are determined and measured according to NFPA standards to ensure accessibility for servicing and testing
D-13.03.05P	measure and fabricate ***piping***	***piping*** is measured and fabricated for installation according to drawings, NFPA standards, AHJ and site conditions

D-13.03.06P	connect ***piping*** to water supply	***piping*** is connected to water supply using ***methods*** according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.03.07P	determine antifreeze strength	antifreeze strength is determined according to NFPA guidelines and temperature of protected spaces and solution flammability restrictions by using refractometers
D-13.03.08P	install ***auxiliary devices***	***auxiliary devices*** are installed according to NFPA standards to ensure accessibility for servicing and testing
D-13.03.09P	vent air	air from system is vented at high point when filling system with antifreeze to prevent dilution of antifreeze by water
D-13.03.10P	determine system capacity	system capacity of antifreeze system is determined according to NFPA standards
D-13.03.11P	perform ***pressure tests***	***pressure tests*** are performed according to NFPA standards and AHJ
D-13.03.12P	install ***components***	***components*** are installed to protect systems' integrity

RANGE OF VARIABLES

components include: expansion tanks, RP, check valves
piping includes: risers, starter pieces, drops, branch lines, feed mains
methods include: flanged, soldered, welded, grooved, threaded joints
auxiliary devices include: flow switches, test points, fill cups
pressure tests include: hydrostatic, pneumatic testing

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.03.01L	demonstrate knowledge of antifreeze systems, their operation and characteristics	define terminology associated with antifreeze systems
		identify hazards and describe safe work practices pertaining to antifreeze systems
		interpret codes, standards and regulations pertaining to antifreeze systems
		interpret information pertaining to antifreeze systems found on drawings and specifications
		identify tools and equipment relating to antifreeze systems, and describe their applications and procedures for use
		identify the ***factors*** to consider for determining the need for freezing protection or antifreeze systems

		identify ***types of antifreeze systems*** and their components, and describe their purpose and applications
		identify ***types and mixtures of antifreeze solutions***, and describe their characteristics and applications
		identify the requirements and describe the procedures used to handle, store and dispose of antifreeze
		identify valves required for antifreeze systems
D-13.03.02L	demonstrate knowledge of the procedures to install and maintain antifreeze systems	identify ***installation requirements*** for antifreeze systems
		describe the procedures used to lay out and install antifreeze systems
		describe the procedures used to test and maintain antifreeze systems
		identify the requirements for pressure testing of antifreeze systems, and describe the associated procedures

RANGE OF VARIABLES

factors include: location, accessibility, cost

types of antifreeze systems include: configuration, types of solutions, temperature mixtures

types and mixtures of antifreeze solutions include: used with potable water supply, used with non-potable water supply

installation requirements include: antifreeze loop, cross-connection control

D-13.04 Installs preaction/deluge systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.04.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.04.02P	determine and measure locations of main and branch lines	locations of main and branch lines are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards

D-13.04.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.04.04P	determine and measure locations of auxiliary drains and requirements for valves	locations of auxiliary drains and requirements for valves are determined and measured according to NFPA standards to ensure accessibility for servicing, testing and winterizing
D-13.04.05P	identify ***devices***	***devices*** are identified according to NFPA standards in installation locations that are subject to freezing
D-13.04.06P	install preaction and deluge valves and ***trim***	preaction and deluge valves and ***trim*** are installed according to manufacturers' specifications and NFPA standards
D-13.04.07P	install return bends and flexible drops on preaction and deluge systems	return bends and flexible drops are installed on preaction and deluge systems according to NFPA standards to prevent plugging of sprinklers
D-13.04.08P	perform functional tests and meet intended ***design criteria***	functional tests are performed to verify operation of components and meet intended ***design criteria***
D-13.04.09P	perform pressure tests	pressure tests are performed according to NFPA standards and AHJ

RANGE OF VARIABLES

components include: fire department connections, test connections and drains, water flow alarm devices, control valves, preaction/deluge valves, regulated air supply, regulated nitrogen supply, valves, QODs, anti-flooding devices, auxiliary drains, high/low supervisory devices, pressure gauges

devices include: dry pendant sprinklers, flush seal gaskets and air dryers, detection devices

trim includes: solenoid actuators, diaphragm actuators

design criteria includes: interlock, double interlock, non-interlock, cross zoning

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.04.01L	demonstrate knowledge of preaction/deluge systems, their applications and operating principles	define terminology associated with preaction/deluge systems
		identify hazards and describe safe work practices pertaining to preaction/deluge systems
		interpret codes, standards and regulations pertaining to preaction/deluge systems
		interpret information pertaining to preaction/deluge systems found on drawings and specifications

		identify tools and equipment relating to preaction/deluge systems, and describe their applications and procedures for use
		identify ***types of preaction systems*** and describe their operating principles and ***applications***
		identify ***types of deluge systems*** and describe their operating principles and ***applications***
		identify ***trim*** components used on preaction/deluge valves, and describe their design variations and applications
		identify types of alarms that a preaction/deluge valve will operate
		identify ***supplemental fire detection systems***, and describe their operating principles and applications
		identify the system controls required for preaction/deluge systems
D-13.04.02L	demonstrate knowledge of installation requirements and associated test procedures for preaction/deluge systems	describe the procedures used to install system controls required for preaction/deluge systems
		explain the requirements for drainage of preaction/deluge systems
		describe the procedures used to lay out and install preaction/deluge systems
		describe the procedures used to trim preaction/deluge valves
		describe the procedures used to service and maintain preaction/deluge systems
		identify the requirements for functional and pressure testing of preaction/deluge systems and describe the associated procedures

RANGE OF VARIABLES

types of preaction systems include: non-interlock, single interlock, double interlock
applications include: computer rooms, freezers, aircraft hangers, electrical rooms
types of deluge systems include: deluge, high-speed deluge
trim includes: solenoid actuators, diaphragm actuators
supplemental fire detection systems include: electric, pneumatic, hydraulic

D-13.05 Installs foam systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.05.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.05.02P	determine and measure locations of main and branch lines	locations of main and branch lines are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.05.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.05.04P	determine and measure locations of auxiliary drains and requirements for valves	locations of auxiliary drains and requirements for valves are determined and measured according to NFPA standards to ensure accessibility for servicing and testing
D-13.05.05P	measure and fabricate ***piping***	***piping*** is measured and fabricated for installation according to drawings, NFPA standards, AHJ and site conditions
D-13.05.06P	install foam tanks	foam tanks are installed in close proximity to valves and to allow accessibility for refilling
D-13.05.07P	install ***valves and trim***	***valves and trim*** are installed according to manufacturers' specifications and NFPA standards
D-13.05.08P	install ***distribution devices***	***distribution devices*** are installed according to manufacturers' specifications and NFPA standards
D-13.05.09P	perform functional testing and meet intended ***design criteria***	functional tests are performed to verify operation of components and meet intended ***design criteria***
D-13.05.10P	fill foam concentrate tanks	foam concentrate tanks are filled according to manufacturers' specifications using ***equipment***
D-13.05.11P	perform pressure tests	pressure tests are performed according to NFPA standards and AHJ

RANGE OF VARIABLES

components include: foam concentrate tanks, fire department connections, test connections and drains, water flow alarm devices, control valves, alarm/preaction/deluge valves, regulated air supply, regulated nitrogen supply, QODs, anti-flooding devices, auxiliary drains, high/low supervisory devices, pressure gauges

piping includes: risers, starter pieces, drops, branch lines, feed mains

valves and trim include: hydraulic and solenoid actuators, proportioners, diaphragm actuators

distribution devices include: sprinklers, foam generators, nozzles

design criteria includes: single interlock, double interlock, non-interlock and cross zoning, wet, deluge

equipment includes: positive displacement pumps, siphons

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.05.01L	demonstrate knowledge of foam systems, their applications and operating principles	define terminology associated with foam systems
		identify ***hazards*** and describe safe work practices pertaining to foam systems
		interpret codes, standards and regulations pertaining to foam systems
		interpret information pertaining to foam systems found on drawings and specifications
		identify tools and equipment relating to foam systems, and describe their applications and procedures for use
		identify types of foam systems and describe their operating principles and applications
		identify the system controls required for foam systems
		identify types of concentrate used in foam systems and describe their characteristics and ***applications***
		identify ***supplemental fire detection systems***, and describe their operating principles and applications
D-13.05.02L	demonstrate knowledge of ***installation requirements*** and associated test procedures for foam systems	describe the procedures used to lay out and install foam systems and components
		describe the ***installation requirements*** of foam systems
		describe the procedures used to fill foam concentrate tanks
		explain the requirements for drainage of the system
		explain the operation of a balanced pressure proportioning system

	describe the procedures used to trim foam systems
	explain the operation of a pressure proportioning tank with and without bladder
	describe the procedures used to test and maintain foam systems
	identify the requirements for pressure testing of foam systems and describe the associated procedures

RANGE OF VARIABLES

hazards include: environmental considerations, containment, disposal

applications include: aircraft hangers, fuel storage tanks, chemical manufacturing and storage facilities

supplemental fire detection systems include: electric, pneumatic, hydraulic

installation requirements include: materials, hangers, supports and bracing, system actuation, testing, manufacturers' specifications

D-13.06 Installs standpipe systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.06.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.06.02P	determine and measure location of piping and ***valves***	location of piping and ***valves*** are determined and measured to allow for accessibility according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.06.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.06.04P	determine and measure fire hose valve locations	fire hose valve locations are determined and measured according to drawings, project specifications, site conditions, AHJ and NFPA standards

D-13.06.05P	install fire hose valve	fire hose valve is installed with thread pattern that is compatible with the local fire department jurisdictional area
D-13.06.06P	install pressure reducing devices	pressure reducing devices are installed to limit pressure according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.06.07P	install stand-alone standpipe and combination standpipe systems	stand-alone standpipe and combination standpipe systems are installed according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.06.08P	install temporary standpipe systems	temporary standpipe systems are installed to ensure fire protection during construction, according to drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.06.09P	perform pressure test	pressure tests are performed according to NFPA standards and AHJ

RANGE OF VARIABLES

valves include: pressure reducing valves, pressure restricting valves, control valves, fire hose valves, check valves, alarm valves, preaction/deluge valves

components include: fire department connections, drains, control valves, regulated air supply, QODs, auxiliary drains, high/low supervisory devices, pressure gauges, hose valves, pressure regulating devices

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.06.01L	demonstrate knowledge of standpipe and hose systems, their applications and operating principles	define terminology associated with standpipe and hose systems
		identify hazards and describe safe work practices pertaining to standpipe and hose systems
		interpret codes, standards and regulations pertaining to standpipe and hose systems
		interpret code requirements pertaining to flushing connections in piping systems
		interpret information pertaining to standpipe and hose systems found on drawings and specifications
		identify tools and equipment relating to standpipe and hose systems, and describe their applications and procedures for use
		identify the ***classes of standpipe systems***, and describe their characteristics and applications

		identify ***types of standpipe systems***, and describe their operating principles, characteristics and applications
		identify the ***factors to consider*** and the requirements to determine standpipe system design
		identify types of hoses, hose valves and associated fittings, and describe their characteristics and applications
		identify types of hose cabinets and hose stations
		identify types of hose spray nozzles and describe their applications
D-13.06.02L	demonstrate knowledge of installation requirements and associated test procedures for standpipe systems	describe the procedures used to lay out standpipe and hose systems
		describe the procedures used to install hose cabinets and stations, and associated equipment
		describe the procedures used to install hose spray nozzles
		describe the procedures used to test and maintain standpipe systems
		identify the requirements for pressure testing of standpipe and hose systems and describe the associated procedures

RANGE OF VARIABLES

classes of standpipe systems include: class I, class II, class III

types of standpipe systems include: wet pipe, dry pipe, manual, automatic, combined, semi-automatic dry

factors to consider for system design include: pipe sizing, flow rate, pressures, hose valve location, hose thread connection, AHJ, gauge location

D-13.07 Installs water mist and hybrid systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-13.07.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-13.07.02P	determine and measure location of piping and valves	location of piping and valves are determined and measured according to manufacturers' specifications, drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.07.03P	determine and measure locations and requirements of ***components***	locations and requirements of ***components*** are determined and measured according to manufacturers' specifications, drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.07.04P	measure and fabricate ***piping***	***piping*** is measured and fabricated for installation according to drawings, NFPA standards, AHJ and site conditions
D-13.07.05P	connect piping to water supply	piping is connected to water supply using ***methods*** according to manufacturers' specifications, drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.07.06P	install ***auxiliary devices***	***auxiliary devices*** are installed according to NFPA standards to ensure accessibility for servicing and testing
D-13.07.07P	flush system	system is flushed to prevent plugging of nozzles according to manufacturers' specifications, drawings, project specifications, site conditions, AHJ and NFPA standards
D-13.07.08P	perform functional tests and meet intended ***design criteria***	functional tests are performed to verify operation of components and meet intended ***design criteria***
D-13.07.09P	perform pressure tests	pressure tests are performed according to NFPA standards and AHJ

RANGE OF VARIABLES

components include: positive displacement pumps, relief valves, detection devices and nozzles, nitrogen cylinders, water tanks

piping includes: risers, starter pieces, drops, branch lines, feed mains

methods include: flanged, welded, grooved, threaded, compression

auxiliary devices include: nozzles, emitters

design criteria includes: manufacturers' discharge, time limitations

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.07.01L	demonstrate knowledge of water mist and hybrid systems, their applications and operating principles	define terminology associated with water mist and hybrid systems
		identify hazards and describe safe work practices pertaining to water mist and hybrid systems
		interpret codes, standards and regulations pertaining to water mist and hybrid systems
		interpret information pertaining to water mist and hybrid systems found on drawings and specifications
		identify tools and equipment relating to water mist and hybrid systems, and describe their applications and procedures for use
		identify ***types of water mist and hybrid systems***, and describe their operating principles, characteristics and applications
D-13.07.02L	demonstrate knowledge of ***installation requirements*** for water mist and hybrid systems	describe the procedures used to lay out and install water mist and hybrid systems and components
		identify system controls for water mist and hybrid systems and their ***installation requirements***
		explain the requirements for drainage of water mist and hybrid systems
		identify the requirements for pressure testing of water mist and hybrid systems and describe the associated procedures

RANGE OF VARIABLES

types of water mist and hybrid systems include: single fluid, twin fluid, high pressure, medium pressure, low pressure

installation requirements include: materials, supports and hangers, system actuation, testing, manufacturers' specifications/training, handling and storage

TASK D-14 Installs specialty fire suppression systems

TASK DESCRIPTOR

Specialty fire suppression systems are designed to extinguish a fire rather than control it. They have a finite supply of extinguishing agent and must be refilled after activation. These systems require a degree of specialization and unique skill sets among sprinkler fitters.

D-14.01 Installs dry and wet chemical, clean agent and carbon dioxide systems

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-14.01.01P	select pipe and fittings	pipe and fittings are selected to match ***manufacturers' specifications***
D-14.01.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
D-14.01.03P	remove possible obstructions	possible obstructions are removed in pipe by reaming, cleaning and blowing out
D-14.01.04P	install clamps	clamps are installed to prevent pipe movement during discharge of extinguishing agent according to NFPA standards
D-14.01.05P	measure and fabricate piping	piping is measured and fabricated to meet site conditions
D-14.01.06P	measure and modify system piping	system piping is measured and modified according to ***manufacturers' specifications*** and site conditions
D-14.01.07P	install piping and nozzles	piping and nozzles are installed according to drawings and specifications to ensure equal discharge, and according to NFPA standards
D-14.01.08P	install and secure storage cylinders	storage cylinders are installed and secured to ensure safety due to high pressure of cylinders, according to ***manufacturers' specifications*** and NFPA standards
D-14.01.09P	install activation devices	activation devices are installed according to ***manufacturers' specifications*** and NFPA standards

D-14.01.10P	pressure test system	system is pressure tested according to ***manufacturers' specifications***
D-14.01.11P	assist in verification	controls and actuators are verified by qualified personnel

RANGE OF VARIABLES

manufacturers' specifications include: extra heavy fittings, pipe size, seamless pipe
tools and equipment include: swabs, acetone, rags

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-14.01.01L	demonstrate knowledge of wet and dry chemical, clean agent and carbon dioxide systems and their operation and characteristics	define terminology associated with wet and dry chemical, clean agent and carbon dioxide systems
		interpret information pertaining to wet and dry chemical, clean agent and carbon dioxide systems found on drawings and specifications
		identify ***tools and equipment*** relating to wet and dry chemical, clean agent and carbon dioxide systems, and describe their applications and procedures for use
		identify ***types of*** wet and dry chemical, clean agent and ***carbon dioxide systems***, and describe their characteristics, operation and applications
		describe the operating principles and applications of wet and dry chemical, clean agent and carbon dioxide systems
		describe ***fixed pipe systems***
		identify the ***components*** of wet and dry chemical, clean agent and carbon dioxide systems and describe their purpose and operation
		explain the properties of carbon dioxide
		identify the extinguishing properties of wet and dry chemical, clean agent and carbon dioxide systems
		describe the procedures used to calculate the quantity of carbon dioxide extinguishing agent required for a system
		identify the factors to consider and limitations pertaining to halon systems
		identify types of pipe used for specialty fire suppression systems

		identify clean agent system media and their properties
		identify containment requirements for clean agent systems
		define the limited extinguishing ability of clean agent and carbon dioxide systems
		identify ***applications*** of clean agent and carbon dioxide systems
		identify ***hazards*** and describe safe work practices pertaining to wet and dry chemical, clean agent and carbon dioxide systems
D-14.01.02L	demonstrate knowledge of installation of wet and dry chemical, clean agent and carbon dioxide systems	identify the installation requirements for wet and dry chemical, and carbon dioxide systems and ***components***
		interpret codes, standards, regulations and manufacturers' specifications pertaining to wet and dry chemical, clean agent and carbon dioxide systems
		describe the procedures used to install wet and dry chemical, clean agent and carbon dioxide systems and components
D-14.01.03L	demonstrate knowledge of inspection, and testing of wet and dry chemical, clean agent and carbon dioxide systems	identify the requirements of inspection and acceptance testing of wet and dry chemical, clean agent and carbon dioxide systems
		explain the liabilities and responsibilities for the inspection and testing of wet and dry chemical, clean agent and carbon dioxide systems
D-14.01.04L	demonstrate knowledge of procedures used to service, maintain and remove wet and dry chemical, clean agent and carbon dioxide systems	describe the procedures used to service, maintain and remove wet and dry chemical, clean agent and carbon dioxide systems

RANGE OF VARIABLES

tools and equipment include: swabs, acetone, rags

types of carbon dioxide systems include: low pressure, high pressure

fixed pipe systems include: total flooding, local application

components include: for carbon dioxide system (alarms and indicators, life safety provisions, discharge nozzles, piping and fittings, supports, tanks and manifolds, release mechanisms, detection devices);
for clean agent system (alarms and indicators, life safety provisions, discharge nozzles, piping and fittings, supports, tanks and manifolds, release mechanisms, detection devices, pressure relief venting)

applications include: server rooms, archival storage, libraries, manufacturing facilities

hazards include: handling of materials and cylinders, accidental discharge

D-14.02 Installs portable extinguishers

Essential Skills Document Use, Numeracy, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-14.02.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
D-14.02.02P	determine type and location of extinguisher	type and location of extinguisher is determined according to drawings, specifications and AHJ
D-14.02.03P	install extinguisher and cabinets	extinguisher and cabinets are installed according to drawings, NFPA standards and AHJ
D-14.02.04P	confirm that extinguishers are fully charged	extinguishers are confirmed to be fully charged with pins and seals in place along with a currently dated inspection tag which is stamped by qualified personnel

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-14.02.01L	demonstrate knowledge of procedures and requirements to install portable fire extinguishers	define terminology associated with portable fire extinguishers
		identify hazards and describe safe work practices pertaining to portable fire extinguishers
		interpret codes, standards and regulations pertaining to portable fire extinguishers
		interpret information pertaining to portable fire extinguishers found on drawings and specifications
		identify tools and equipment relating to portable fire extinguishers, and describe their applications and procedures for use
		identify classes and ***types of portable fire extinguishers***, and describe their characteristics, operation and applications
		identify the components of portable fire extinguishers

	identify the installation requirements and procedures for portable fire extinguishers and cabinets
	identify ***installation locations*** for portable fire extinguishers
	describe the procedures used to operate portable fire extinguishers
	explain the liabilities and responsibilities for the installation of portable fire extinguishers

RANGE OF VARIABLES

types of portable fire extinguishers include: wet and dry chemical, carbon dioxide, water-based, clean agent

installation locations include: cabinet, wall mount, wheeled

TASK D-15 Installs detection devices

TASK DESCRIPTOR

These devices detect a fire situation and initiate a response of the fire protection system. The installation of electrical detection systems is performed by sprinkler fitters in some jurisdictions.

D-15.01 Installs wet and dry pilot lines

Essential Skills	Document Use, Thinking, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-15.01.01P	identify pilot line and pilot line detector	pilot line and pilot line detectors are identified according to temperature requirements for wet and dry pilot lines
D-15.01.02P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-15.01.03P	install pilot lines	pilot lines are installed according to ***parameters***
D-15.01.04P	space pilot line and fixed temperature HADs	pilot line and fixed temperature HADs are spaced according to NFPA standards and manufacturers' specifications

D-15.01.05P	connect pilot lines	pilot lines are connected to valve trim according to manufacturers' specifications
D-15.01.06P	perform pressure test	pressure test for pilot lines is performed according to NFPA standards

RANGE OF VARIABLES

parameters include: proximity to sprinklers on fire protection piping, heat collection and ceiling structure, spacing of pilot line detectors, sizing and installation methods

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.01.01L	demonstrate knowledge of the procedures used to install, test and maintain wet and dry pilot lines and their associated pilot line detectors	define terminology associated with wet and dry pilot lines
		identify hazards and describe safe work practices pertaining to wet and dry pilot lines
		interpret codes, standards and regulations pertaining to wet and dry pilot lines
		interpret information pertaining to wet and dry pilot lines, found on drawings and specifications
		identify tools and equipment relating to wet and dry pilot lines, and describe their applications and procedures for use
		identify types of wet and dry pilot lines and their components, and describe their characteristics, parameters and applications
		describe the procedures used to install, test and maintain wet and dry pilot lines

D-15.02 Installs heat-actuated devices (HADs) (NOT COMMON CORE)

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	no	yes	NV	yes,	no	yes	no	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-15.02.01P	determine location of ***HADs***	location of ***HADs*** is determined according to manufacturers' specifications and AHJ
D-15.02.02P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-15.02.03P	mount releasing panel	releasing panel is mounted in proximity to releasing devices to facilitate actuation of system
D-15.02.04P	install piping, tubing and wire	piping, tubing and wire are installed in area being protected according to manufacturers' specifications, AHJ and NFPA standards
D-15.02.05P	attach linear heat detection wire	linear heat detection wire is attached according to manufacturers' specifications
D-15.02.06P	test ***HADs***	***HADs*** are tested according to manufacturers' specifications

RANGE OF VARIABLES

HADs include: fixed temperature, rate of rise detectors, linear heat detectors

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-15.02.01L	demonstrate knowledge of the procedures used to install, test and maintain HADs and their associated components	define terminology associated with HADs
		identify hazards and describe safe work practices pertaining to HADs
		interpret codes, standards and regulations pertaining to HADs
		interpret information pertaining to HADs, found on drawings and specifications
		identify tools and equipment relating to HADs, and describe their applications and procedures for use

	identify ***types of HADs*** and describe their characteristics, ***parameters*** and applications
	describe the procedures used to install, test and maintain HADs

RANGE OF VARIABLES

types of HADs include: fixed temperature, rate of rise detectors, linear heat detector
parameters of HADs include: spacing, temperature, type

D-15.03 Installs spark detection systems (NOT COMMON CORE)

Essential Skills Numeracy, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	no	no	yes	NV	yes	yes	no	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-15.03.01P	determine location of system	location of system is determined according to manufacturers' specifications, site conditions, NFPA standards and AHJ
D-15.03.02P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-15.03.03P	fasten spark detector to structure	spark detector is fastened to structure to ensure detection of sparks and flame, and to prevent movement
D-15.03.04P	assemble system ***components***	system ***components*** are assembled according to manufacturers' specifications, NFPA standards and AHJ
D-15.03.05P	install piping	piping is installed to spark detection system according to manufacturers' specifications, NFPA standards and AHJ
D-15.03.06P	verify operation	operation is verified and calibrated according to site conditions, manufacturers' specifications and AHJ

RANGE OF VARIABLES

components include: solenoids, nozzles, spark detector sensors

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.03.01L	demonstrate knowledge of the procedures used to install, test and maintain spark detection systems and their associated ***components***	define terminology associated with spark detection systems
		identify hazards and describe safe work practices pertaining to spark detection systems
		interpret codes, standards and regulations pertaining to spark detection systems
		interpret information pertaining to spark detection systems, found on drawings and specifications
		identify tools and equipment relating to spark detection systems, and describe their applications and procedures for use
		identify types of spark detection systems and their ***components*** and describe their characteristics, ***parameters*** and applications
		describe the procedures used to install, test and maintain spark detection systems

RANGE OF VARIABLES

components include: solenoids, nozzles, spark detectors
parameters of spark detection systems include: spacing, location

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

Essential Skills Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	yes	no	yes	NV	yes	yes	no	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.04.01P	determine location of system	location of system is determined according to drawings, site conditions and manufacturers' specifications
D-15.04.02P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-15.04.03P	connect components	components of air sampling system are connected according to manufacturers' specifications and AHJ

D-15.04.04P	install air sampling pipe	air sampling pipe is installed to detect particulate concentration in area of application according to manufacturers' specifications and AHJ
D-15.04.05P	connect and terminate air sampling system	air sampling system is connected to, and terminated from sampling/activation panel according to manufacturers' specifications and AHJ

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.04.01L	demonstrate knowledge of the procedures used to install, test and maintain air sampling systems and their associated ***components***	define terminology associated with air sampling systems
		identify hazards and describe safe work practices pertaining to air sampling systems
		interpret codes, standards and regulations pertaining to air sampling systems
		interpret information pertaining to air sampling systems, found on drawings and specifications
		identify tools and equipment relating to air sampling systems, and describe their applications and procedures for use
		identify types of air sampling systems and describe their characteristics, parameters and applications
		describe the procedures used to install, test and maintain air sampling systems

RANGE OF VARIABLES

components include: sampling/activation panels, tubing, sampling point

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

Essential Skills	Thinking, Document Use, Numeracy

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
no	no	no	yes	NV	yes	no	no	no	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-15.05.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-15.05.02P	install smoke and heat detectors	smoke and heat detectors are installed according to job and site requirements, manufacturers' specifications and AHJ
D-15.05.03P	verify operation of smoke and heat detectors and ensure connections	operation of smoke and heat detectors are verified according to manufacturers' specifications, ***codes and standards*** and AHJ

RANGE OF VARIABLES

codes and standards include: Canadian Standards for Fire Alarm Systems (CAN/ULC), NFPA standards

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-15.05.01L	demonstrate knowledge of the procedures used to install, test and maintain electrical detection systems and their associated ***components***	define terminology associated with electrical detection systems
		identify hazards and describe safe work practices pertaining to electrical detection systems
		interpret ***codes, standards*** and regulations pertaining to electrical detection systems
		interpret information pertaining to electrical detection systems, found on drawings and specifications
		identify tools and equipment relating to electrical detection systems, and describe their applications and procedures for use

	identify ***types of electrical detection systems*** and describe their characteristics, parameters and applications
	describe the procedures used to install, test and maintain electrical detection systems

RANGE OF VARIABLES

components include: smoke detectors, heat detectors, releasing panels
codes and standards include: CAN/ULC, NFPA standards
types of electrical detection systems include: single zone, cross zone, addressable, conventional

TASK D-16 Installs signal-initiating devices

TASK DESCRIPTOR

Alarm-initiating devices provide electrical signals to the local alarms which warn of the activation of the fire protection system. Supervisory initiating devices provide notification of trouble or impairment of the fire protection system.

D-16.01 Installs alarm-initiating devices

Essential Skills Thinking, Document Use, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-16.01.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-16.01.02P	install device	device is installed according to pipe size, system type and location to allow for replacement and repair according to site conditions, manufacturers' specifications and AHJ
D-16.01.03P	determine location of alarm-initiating devices	location of alarm-initiating devices is determined according to drawings and NFPA standards and manufacturers' specifications
D-16.01.04P	attach devices to piping	devices are attached to piping by ***methods*** according to manufacturers' specifications

D-16.01.05P	install a means of ***testing***	a means of ***testing*** is installed according to manufacturers' specifications, NFPA standards and AHJ
D-16.01.06P	verify operation of devices	devices are field tested and adjusted according to manufacturers' specifications, NFPA standards and AHJ

RANGE OF VARIABLES

methods include: using threaded connections, using clamps
testing includes: a test and drain valve or an alarm test valve, inspectors' test connection

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-16.01.01L	demonstrate knowledge of the procedures and requirements to install, test and maintain alarm-initiating devices	define terminology associated with alarm-initiating devices
		identify ***types of alarm-initiating devices*** and describe their characteristics, parameters and applications
		identify hazards and describe safe work practices pertaining to alarm-initiating devices
		interpret codes, standards and regulations pertaining to alarm-initiating devices
		interpret information pertaining to alarm-initiating devices found on drawings and specifications
		identify tools and equipment relating to alarm-initiating devices and describe their applications and procedures for use
		describe the procedures used to install, test and maintain alarm-initiating devices
		identify installation locations for alarm-initiating devices
		describe operation and applications of alarm-initiating devices

RANGE OF VARIABLES

types of alarm-initiating devices include: paddle-type flow switches, pressure switches

D-16.02 Installs supervisory-initiating devices

Essential Skills	Thinking, Document Use, Working with Others

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
D-16.02.01P	select ***supervisory-initiating device***	***supervisory-initiating device*** is selected according to components being supervised, system type and location
D-16.02.02P	determine location of ***supervisory-initiating devices***	location of ***supervisory-initiating devices*** is determined according to site conditions, manufacturers' specifications and drawings
D-16.02.03P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
D-16.02.04P	attach ***supervisory-initiating devices***	***supervisory-initiating devices*** are attached to piping and components according to manufacturers' specifications, site conditions and AHJ
D-16.02.05P	verify operation of ***supervisory-initiating devices***	***supervisory-initiating devices*** are field tested and adjusted according to manufacturers' specifications, NFPA standards, site conditions and AHJ

RANGE OF VARIABLES

supervisory-initiating devices include: low air pressure, low water pressure, tamper (switches)

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-16.02.01L	demonstrate knowledge of procedures and requirements to install, test and maintain supervisory-initiating devices	define terminology associated with supervisory-initiating devices
		identify hazards and describe safe work practices pertaining to supervisory-initiating devices
		interpret codes, standards and regulations pertaining to supervisory-initiating devices
		interpret information pertaining to supervisory-initiating devices, found on drawings and specifications

	identify tools and equipment relating to supervisory-initiating devices, and describe their applications and procedures for use
	identify ***types of supervisory-initiating devices*** and describe their characteristics, parameters and applications
	describe the procedures used to install, test and maintain supervisory-initiating devices
	describe the operation and applications of supervisory-initiating devices

RANGE OF VARIABLES

types of supervisory-initiating devices include: low air pressure, low water pressure, tamper (switches)

MAJOR WORK ACTIVITY E

Inspects, tests and maintains (ITM) fire protection systems

TASK E-17 Maintains and repairs fire protection systems

TASK DESCRIPTOR

Sprinkler fitters perform maintenance and repairs on all types of fire protection systems to prevent malfunctions or failures.

E-17.01 Troubleshoots fire protection systems

Essential Skills	Oral Communication, Document Use, Thinking

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-17.01.01P	identify potential problems	problem is located by examining fire alarm panel, speaking with owner's representative, and performing visual inspection for abnormalities
E-17.01.02P	determine probable cause	symptoms of malfunction are identified and analyzed in problem area to determine probable cause
E-17.01.03P	determine required corrective action	required corrective action is determined to reinstate system's integrity and operation
E-17.01.04P	inform owner and obtain permission	owner is informed of required action and permission is obtained prior to initiating repair
E-17.01.05P	select and use tools and equipment	tools and equipment are selected and used according to scope of work

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-17.01.01L	demonstrate knowledge of procedures and requirements used to troubleshoot fire protection systems and their components	define terminology associated with fire protection systems and their components
		identify hazards and describe safe work practices pertaining to the troubleshooting of fire protection systems and their components
		interpret codes, standards and regulations pertaining to fire protection systems and their components
		identify tools and equipment relating to troubleshooting fire protection systems, and describe their applications and procedures for use
		explain the liabilities and responsibilities for the troubleshooting of fire protection systems
		identify common causes of fire protection system failures
		identify the testing and troubleshooting methods for signaling devices
		describe the procedures used to shut down and reactivate sprinkler systems and associated alarms and supervisory devices
		describe the procedures used to troubleshoot fire protection systems and components
		identify the ***classifications of needed corrections and repairs***, and explain the associated requirements
E-17.01.02L	demonstrate knowledge of the relationship between sprinkler systems and fire panels	identify ***types of fire panels*** and ***signals***, and describe their operation and purpose
		describe the operation of release devices

RANGE OF VARIABLES

classifications of needed corrections and repairs include: impairment (pre-plan and emergency), critical deficiency, noncritical deficiency

types of fire panels include: alarm, release, annunciator

signals include: trouble, alarm, supervisory

E-17.02 Repairs deficiencies

Essential Skills	Document Use, Thinking, Oral Communication

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.02.01P	notify owner's representative	owner's representative is notified to prevent false fire service responses and upon completion of work
E-17.02.02P	disable and disarm system	system is disabled and disarmed within ***determined parameters*** to allow for repairs
E-17.02.03P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
E-17.02.04P	repair or replace deficient components	deficient components are repaired or replaced based on nature of problem
E-17.02.05P	take ***corrective actions***	***corrective actions*** are taken to return system to normal operational status
E-17.02.06P	verify repair	repair is verified using appropriate ***testing procedures***

RANGE OF VARIABLES

determined parameters include: permission by owner/owner representative, AHJ

corrective actions include: adjusting and replacing devices and components, filling and recharging systems, isolating and draining systems, resetting fire alarm systems

testing procedures include: functional testing of valves, initiation of devices, performing flow, hydrostatic and pneumatic tests

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-17.02.01L	demonstrate knowledge of procedures and requirements used to repair fire protection systems and their components	define terminology associated with fire protection systems and their components
		identify hazards and describe safe work practices pertaining to fire protection systems and their components
		interpret codes, standards and regulations pertaining to the repair of fire protection systems and their components
		identify tools and equipment relating to the repair of fire protection systems, and describe their applications and procedures for use

		explain the liabilities and responsibilities for the repair of fire protection systems
		identify requirements for inspecting and testing systems that have been altered or repaired
		identify the testing requirements for signaling devices
		describe the procedures used to shut down and reactivate sprinkler systems and associated alarms and supervisory devices
		describe the procedures used to repair fire protection systems and components
		describe the procedures used to repair fire pump units and components
		describe the procedures used to repair hydrants and fire department connections
		identify the ***classifications of needed corrections and repairs***, and explain the associated requirements
E-17.02.02L	demonstrate knowledge of the relationship between sprinkler systems and fire panels	identify ***types of fire panels*** and ***signals***, and describe their operation and purpose
		describe the operation of release devices

RANGE OF VARIABLES

classifications of needed corrections and repairs include: impairment (pre-plan and emergency), critical deficiency, noncritical deficiency

types of fire panels include: alarm, release, annunciator

signals include: trouble, alarm, supervisory

E-17.03 Performs scheduled maintenance

Essential Skills	Document Use, Continuous Learning, Digital Technology

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.03.01P	notify owner's representative	owner's representative is notified to prevent false fire service responses and upon completion of work
E-17.03.02P	disable and disarm system	system is disabled and disarmed within ***determined parameters*** to allow for maintenance
E-17.03.03P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
E-17.03.04P	perform ***routine maintenance procedures***	***routine maintenance procedures*** are performed according to manufacturers' specifications, NFPA standards and scope of work
E-17.03.05P	inform owner's representative of any deficiencies or impairments	owner's representative is informed of any deficiencies or impairments

RANGE OF VARIABLES

determined parameters include: permission by owner/owner representative, AHJ

routine maintenance procedures include: checking for blockage or frost plugs, changing desiccant in air dryers, cleaning strainers, investigating obstructions, draining low points on dry and preaction systems, performing lubrication and corrosion prevention measures

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-17.03.01L	demonstrate knowledge of procedures used to maintain fire protection systems and their components	define terminology associated with maintenance of fire protection systems and their components
		identify hazards and describe safe work practices pertaining to the maintenance of fire protection systems and their components
		interpret codes, standards and regulations pertaining to the maintenance of fire protection systems and their components
		identify tools and equipment relating to maintenance of fire protection systems, and describe their applications and procedures for use

		explain the liabilities and responsibilities for the maintenance of fire protection systems
		identify frequency of maintenance of fire protection systems and components
		identify common causes of fire protection system failures
		identify the testing requirements for signaling devices
		describe the procedures used to shut down and reactivate sprinkler systems and associated alarms and supervisory devices
		describe the ***procedures*** used to maintain fire protection systems and components
		describe the ***procedures*** used to maintain fire pump units and components
		describe the ***procedures*** used to maintain hydrants and fire department connections
		identify the ***classifications of needed corrections and repairs***, and explain the associated requirements
E-17.03.02L	demonstrate knowledge of the relationship between sprinkler systems and fire panels	identify ***types of fire panels*** and ***signals***, and describe their operation and purpose
		describe the operation of release devices

RANGE OF VARIABLES

procedures include: checking for blockage or frost plugs, changing desiccant in air dryers, cleaning strainers, investigating obstructions, draining low points on dry and preaction systems, performing lubrication and corrosion prevention measures

classifications of needed corrections and repairs include: impairment (pre-plan and emergency), critical deficiency, noncritical deficiency

types of fire panels include: alarm, release, annunciator

signals include: trouble, alarm, supervisory

TASK E-18 Inspects and tests fire protection systems

TASK DESCRIPTOR

Frequent inspection and testing of fire protection systems is vital to ensure that these systems work within their required parameters. This is essential in the protection of life and property.

E-18.01 Performs scheduled tests

Essential Skills	Document Use, Writing, Digital Technology

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-18.01.01P	notify owner's representative	owner's representative is notified of scheduled test and completion of work
E-18.01.02P	select and use ***tools and equipment***	***tools and equipment*** are selected and used according to scope of work
E-18.01.03P	disable and disarm fire protection system	fire protection system is disabled and disarmed within ***determined parameters*** to allow for testing
E-18.01.04P	perform required tests	required tests are performed on fire protection system components to ensure that they work within established parameters
E-18.01.05P	complete all applicable documentation	documentation is completed according to NFPA standards, manufacturers' specifications, AHJ and company policies

RANGE OF VARIABLES

tools and equipment include: pitot gauges, refractometers, tachometers, calibrated pressure gauges, diffusers, flowmeters, backflow test kits, multimeters

determined parameters include: permission by owner/owner representative, AHJ

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-18.01.01L	demonstrate knowledge of procedures and requirements used to test fire protection systems and their components	define terminology associated with testing of fire protection systems and their components
		identify hazards and describe safe work practices pertaining to the testing of fire protection systems and their components
		interpret codes, standards and regulations pertaining to the testing of fire protection systems and their components
		identify ***tools and equipment*** relating to testing of fire protection systems, and describe their applications and procedures for use
		explain the liabilities and responsibilities for the testing of fire protection systems
		identify frequency of testing of fire protection systems and components
		identify requirements for testing fire protection systems that have been altered or repaired
		identify the testing requirements for signaling devices
		describe the procedures used to shut down and reactivate sprinkler systems and associated alarms and supervisory devices
		describe the procedures used to test fire protection systems and components
		describe the procedures used to test fire pump units and components
		describe the procedures used to test hydrants and fire department connections for operation and drainage
		describe the procedures used to test backflow prevention devices
		identify the ***classifications of needed corrections and repairs***, and explain the associated requirements

E-18.01.02L	demonstrate knowledge of the relationship between sprinkler systems and fire panels	identify ***types of fire panels*** and ***signals***, and describe their operation and purpose
		describe the operation of release devices

RANGE OF VARIABLES

tools and equipment include: pitot gauges, refractometers, tachometers, calibrated pressure gauges, diffusers, flowmeters, backflow test kits, multimeters

classifications of needed corrections and repairs include: impairment (pre-plan and emergency), critical deficiency, noncritical deficiency

types of panels include: alarm, release, annunciator

signals include: trouble, alarm, supervisory

E-18.02 Performs scheduled inspections

Essential Skills Document Use, Writing, Digital Technology

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	yes	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-18.02.01P	notify owner's representative	owner's representative is notified of scheduled inspection
E-18.02.02P	select and use inspection documents	inspection documents are selected and used according to NFPA standards, owner's instructions and company policies
E-18.02.03P	select and use tools and equipment	tools and equipment are selected and used according to scope of work
E-18.02.04P	identify abnormalities and deficiencies	abnormalities and deficiencies are identified by performing visual inspections and referring to previous reports

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-18.02.01L	demonstrate knowledge of the procedures and requirements to perform scheduled inspections of fire protection systems and their components	define terminology associated with inspection of fire protection systems and their components
		identify hazards and describe safe work practices pertaining to the inspection of fire protection systems and their components

		interpret codes, standards and regulations pertaining to the inspection of fire protection systems and their components
		identify tools and equipment relating to inspection of fire protection systems, and describe their applications and procedures for use
		explain the liabilities and responsibilities for the inspection
		identify frequency of inspection of fire protection systems and components
		identify common causes of fire protection system failures
		describe the procedures used to inspect, fire protection systems and components
		describe the procedures used to inspect fire pump units and components
		describe the procedures used to inspect hydrants and fire department connections for operation and drainage
		identify the ***classifications of needed corrections and repairs***, and explain the associated requirements
		identify the requirements for inspecting backflow preventers
E-18.02.02L	demonstrate knowledge of the relationship between sprinkler systems and fire panels	identify ***types of fire panels*** and ***signals***, and describe their operation and purpose
		describe the operation of release devices

RANGE OF VARIABLES

classifications of needed corrections and repairs include: impairment (pre-plan and emergency), critical deficiency, noncritical deficiency

types of fire panels include: alarm, release, annunciator

signals include: trouble, alarm, supervisory

E-18.03 Inspects portable fire extinguishers

Essential Skills Document Use, Writing, Digital Technology

NL	NS	PE	NB	QC	ON	MB	SK	AB	BC	NT	YT	NU
yes	yes	yes	yes	NV	yes	no	yes	yes	yes	NV	NV	NV

SKILLS

	Performance Criteria	Evidence of Attainment
E-18.03.01P	select and use tools and equipment	tools and equipment are selected and used according to scope of work and manufacturers' specifications
E-18.03.02P	perform visual inspection of condition of ***exterior components***	visual inspection is performed to ensure that ***exterior components*** are in place, secured and free from physical damage
E-18.03.03P	verify that hoses and nozzles are intact	hoses and nozzles are intact and clear of obstructions
E-18.03.04P	verify that required maintenance and hydrostatic tests are up-to-date	visual verification of prior maintenance and testing dates is documented
E-18.03.05P	verify gauge pressure and cylinder weight	gauge pressure and cylinder weight is verified to ensure it is within acceptable operating parameters
E-18.03.06P	determine type and location of fire extinguishers	type and location of fire extinguishers match the hazards of the area
E-18.03.07P	document inspection	inspection is documented on equipment tags according to NFPA standards and company policies

RANGE OF VARIABLES

exterior components include: pins, nozzles, tank shells, gauges, brackets/cabinets, hoses

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-18.03.01L	demonstrate knowledge of procedures and requirements to inspect portable fire extinguishers	define terminology associated with portable fire extinguishers
		identify hazards and describe safe work practices pertaining to portable fire extinguishers
		interpret codes, standards and regulations pertaining to portable fire extinguishers
		interpret information pertaining to portable fire extinguishers found on drawings and specifications

	identify tools and equipment relating to portable fire extinguishers, and describe their applications and procedures for use
	identify classes and types of portable fire extinguishers, and describe their characteristics, operation and applications
	identify the components of portable fire extinguishers
	describe the procedures used to inspect portable fire extinguishers
	explain the liabilities and responsibilities for the inspection of portable fire extinguishers
	identify frequency of inspection of portable fire extinguishers

APPENDIX A
ACRONYMS

AHJ	authority having jurisdiction
ANSI	American National Standards Institute
CAN/ULC	Canadian ULC Standard
CMSA	control mode specific application
CPVC	chlorinated poly vinyl chloride
CSA	Canadian Standards Association
DCVA	double check valve assembly
ESFR	early suppression fast response
FM	Factory Mutual
HAD	heat-actuated device
ITM	inspection, testing and maintenance
MAPP	methylacetylene-propadiene propane
NBC	National Building Code
NFPA	National Fire Protection Association
NPT	National Pipe Thread
NST	National Standard Thread
OH&S	Occupational Health and Safety
OS&Y	outside stem & yoke
PIV	post indicator valve
PPE	personal protective equipment
PVC	polyvinyl chloride
QOD	quick opening device
RP (RPBA)	reduced pressure backflow assembly
SDS	safety data sheets
TDG	transportation of dangerous goods
ULC	Underwriters Laboratories of Canada
WHMIS	Workplace Hazardous Materials Information System

APPENDIX B
TOOLS AND EQUIPMENT

Hand Tools / Outils manuels

adjustable wrenches (various sizes)	clés à ouverture réglable (de tailles diverses)
benders (pipe and tube)	cintreuses (pour tuyaux et tubes)
caulking gun	pistolets à calfeutrer
centre finder/contour marker	centreurs
centre punch	pointeaux centreurs
cold chisels (various sizes)	ciseaux à froid (de tailles diverses)
combination wrenches (metric and imperial)	clés mixtes (métriques et impériales)
crimping tools	sertisseurs
cutters (pipe and tube)	coupe-tuyaux et coupe-tubes
die and chasers	filières et peignes à fileter
drop-in anchor setting tool	outils d’ancrage à impact
drywall saw	scies passe-partout
extension cord	rallonges électriques
files (flat, half-round, rat-tail, bastard)	limes (plates, demi-ronde, queue de rat, bâtarde)
fitting brushes	brosses pour raccords
flaring tool	évaseurs
flashlight	lampes de poche
gasket cutter	coupe-garnitures
grease gun	pistolets graisseurs
hacksaw	scies à métaux
hammers (ball-peen, claw, sledge)	marteaux (à panne ronde, à panne fendue, masse)
hand saw	scies à main
head wrench	clés pour tête d’extincteur
hex wrenches (metric and imperial)	clés hexagonales (métriques et impériales)
hose wrench	clés à boyaux
in-air groovers	rainureuses à l’air libre
levels	niveaux
line-up bars	barres d’alignement
markers	traceurs de contour
nipple chuck	retenues filetées
oilers	burettes à huile
paint brushes	pinceaux
pick	pics
pipe stand	porte-tuyaux
pipe wrench	clés à tuyaux

pliers (needle nose, locking, slip joint, side cutting)	pinces (à becs pointus, étaux, à manchon coulissant, coupantes de côté)
plumb bob	plombs
pry bar (goose neck, wrecking, pinch)	leviers
ratchet cutters	coupe-tuyaux à rochet
rod cutters	coupe-tiges
rod dies	filières à boulons
scissors	ciseaux
scrapers (various sizes)	grattoirs (de tailles diverses)
screwdrivers (flat, Phillips, Robertson, various sizes)	tournevis (plat, cruciforme, à pointe carrée, de tailles diverses)
snips (heavy duty sheet metal cutting)	cisailles (pour tôles épaisses)
socket sets (metric and imperial)	jeux de douilles (métriques et impériales)
strap/chain wrench	clés à sangle
tripod vice	trépieds
trowels (concrete and pointer)	truelles (à béton et à joint)
utility knives	couteaux universels
vice bench vice	étaux d’établi
wire brush	brosses d’acier
wire cutter	coupe-fils

Portable and Stationary Power Tools / Outils mécaniques portatifs

air monitoring device	dispositifs de surveillance de l’air
chop saw	scies à tronçonner
compressor	compresseurs
concrete cutting machine	machines à couper le béton
coring machine core driller	carotteuses
die equipment	équipement de réglage de filière
electric drills (portable magnetic base, drill press, cordless, hammer, t-drill)	perceuses électriques (portative à socle aimanté, à colonne, sans fil)
flushing machine (hydraulic and hydrophneumatic)	appareils à purger
fusion welding machine	machines de soudage par fusion
grinders (wire brush, angle grinders)	meuleuses (outil à brosser, meuleuses d’angle)
groover (hydraulic, cut, press and roll)	rainureuses (hydraulique, par incision, par moletage)
hand-held electronic tape	rubans électroniques à main
heating torch	chalumeaux de chauffe
hole saw	scies emporte-pièce
hydraulic bender	cintreuses hydrauliques
hydraulic cutter	coupe-tuyaux hydrauliques
impact wrenches (electric, pneumatic and wireless)	clés à chocs (électriques, pneumatiques et sans fil)

oxy-fuel brazing torch	chalumeaux d’oxybrasage
oxy-fuelcutting torch	chalumeaux d’oxycoupage
pipe cutter	coupe-tuyaux
pipe threaders/groovers	filières à tuyau/rainureuses
plasma cutter	découpeuses au plasma
powder actuated tools	outils à charge explosive
power vice	étaux mécaniques
reamer (hand-held or mounted on power threader)	alésoirs (à main ou montés sur filière mécanique)
reciprocating saw	scies alternative
tamper	pilonneuses
tapping machine and attachments	machines à tarauder et accessoires
testing pump	pompes d’essai
threading machine	fileteuses
vacuum cleaner (wet/dry)	aspirateurs pour déchets secs ou humides
water pump	pompes à eau
wire wheel (body grinder or angle grinder with wire brush)	meuleuses à toile métallique (meuleuse de carrosserie ou d’angle avec outil à brosser)

Measuring and Testing Equipment / Outils de mesure et d’essai

amp/volt meter	ampèremètres/voltmètres
back flow test kit	trousse d’essai anti-retour
battery load tester	appareil de vérification de batterie
builder’s level	niveaux de bâtisseur
calibrating gauge	calibres d’étalonnage
calipers	calibres
dial indicator	comparateurs à cadran
differential pressure gauge	manomètres différentiels
diffuser	diffuseurs
drafting equipment (scale ruler, compass)	matériel à dessin
feeler gauge	jauges d’épaisseur
flow meter	débitmètres
heat lamp	lampes chauffantes
hoses	boyaux
hydrometer	hydromètres
laser level	niveaux laser
laser plumb	fils à plomb laser
liquid measuring containers	contenants gradués à liquide
magnetic level	niveaux magnétique
manometer	manomètres
multimeter	multimètres
pipe diameter tape	rubans diamétriques

Pitot tubes	tubes de Pitot
play pipes	tuyaux de lance
pressure gauge kit	ensemble de manomètres
refractometer	réfractomètres
sight tube	tubes d’observation
spirit level	niveaux à bulle (torpille, de 2 pieds)
square	équerres
stop watch	chronomètres
straightedge	règles droite
tachometer	tachymètres
tape measure	rubans à mesurer
temperature gauge	thermomètres
test hoses and securement	boyaux d’essai et arrimage
testing pump, excess, hydrostatic test pump	pompes d’essais, d’excès, d’essais protomatiques
thread depth gauge(ring/plug)	calibres de filetage (bague/tampon)
torque wrench	clés dynamométrique
transit	tachéomètres
vernier calliper	pieds à coulisse

Hoisting, Lifting and Access Equipment / Équipement de hissage, de levage et d’accès

beam clamps	pinces à poutre
cable clamps	connecteurs de câble
chain block hoist	palans à chaîne
chains	chaînes
come-alongs (cable or chain)	pince-câbles, palans à levier
fork-lift	chariots à fourche
grip hoist	treuils manuels
jack	crics
ladder	échelles
overhead hoist	palans aérien
pipe buggy (pipe cannon)	chargeuses de tuyaux
pipe dolly (grass hopper)	chariots à tubes (sauterelle)
portable booms	grues mobiles
power-elevated work platform	plateformes de levage (nacelles élévatrice, à ciseaux)
rope	cordes
scaffolding	échafaudages
shackles	manilles
sling	élingues
snatch blocks	poulies à chape ouvrantes
spreader bar	barres d’écartement

stand	bases
support	supports
tugger	chariots tracteur

Electronic Equipment (General)/ Équipement électronique (général)

digital camera	appareils photo numériques
calculator	calculatrices
cellular phone	téléphones cellulaires
computer	ordinateurs
hand-held and stationary radios	appareils radios portatifs et fixes

Personal Protective Equipment (PPE) and Safety Equipment / Équipement de sécurité et de protection individuelle

air hood	hottes
air monitoring device	dispositifs de surveillance de la qualité de l'air
apron	tabliers
boots	bottes
confined space entry equipment	équipement d'entrée d'espace clos
coveralls	combinaisons de travail
earplugs and earmuffs	bouchons d'oreille et cache-oreilles antibruit
eye wash stations	douches oculaires
face shield	masques faciaux
fall protection equipment	équipement de protection contre les chutes
fire blanket	couvertures antifeu
fire extinguisher	extincteurs
fire hoses	boyaux d'incendie
fire-retardant clothing	tenues de feu ignifuges
first aid kit	trousse de premiers soins
gloves	gants
goggles	lunettes de protection
hard hat	casques protecteurs
high voltage rubber insulating blankets and gloves	couvertures et gants en caoutchouc isolant de haute tension
knee pads	genouillères
reflector vest	vestes réfléchissantes
respirators (particle, vapour)	respirateurs (particules, vapeur)
safety glasses	lunettes de sécurité
self-contained breathing apparatus (SCBA)	appareil respiratoire autonome (ARA)
spill kit	équipement de lutte contre les déversements
tag- and lock-out devices	dispositifs de cadenassage et d'identification
welding partition screen	écrans de soudage

APPENDIX C
GLOSSARY

accelerators	quick opening device that speeds up the trip action of a dry pipe valve	**accélérateurs**	dispositifs d'ouverture rapide qui accélère le déclenchement des clapets d'alarme sous air
air dryer	any one of several types of air dryers, such as refrigerated air dryers and desiccant air dryers	**déshydrateurs**	systèmes utilisés pour enlever la vapeur d'eau de l'air comprimé dans les systèmes à préaction et les systèmes pilotes secs
backfill	earth, soil or gravel (aggregate) used in proper placement to bury underground piping	**remblai**	terre, sol, ou gravier criblé (granulats) utilisés comme assises des canalisations enterrées
cathodic protection	a method of grounding used primarily on steel water tanks and underground piping to prevent electrolysis	**protections cathodiques**	méthodes utilisées pour empêcher la corrosion causée par l'électrolyse sur la tuyauterie et les réservoirs souterrains
combined dry pipe/preaction system	dry pipe system that employs a supplemental detection system	**systèmes mixtes à préaction et sous air**	systèmes de gicleurs sous air qui utilisent un système de détection supplémentaire
cross-connection control	assemblies that prevent potentially contaminated water from flowing back into the water supply	**dispositifs de prévention du raccordement croisé**	utilisation de dispositifs antirefoulement pour empêcher l'eau possiblement polluée de retourner dans le réseau d'alimentation en eau potable
deluge system	a system with open sprinkler heads, set up so that when the system is tripped all heads spray simultaneously	**systèmes de gicleurs déluge**	réseaux sous air à gicleurs ouverts installés de sorte que tous les gicleurs se déclenchent en même temps une fois le robinet automatique de commande du débit de l'eau ouvert
dies	equipment used to cut external threads in rod or pipe	**filières**	outils servant à faire des filetages externes sur des tiges ou des tuyaux
dry pipe system	a sprinkler system charged with air, primarily used to prevent freezing in a cold environment	**réseaux sous air**	systèmes de protection-incendie généralement à air comprimé ou à l'azote utilisés là où il y a des conditions de gel
escutcheon (plate)	aesthetic or cosmetic plates through which sprinkler heads enter the building space (sometimes called escutcheon plates)	**rosaces**	plaques ou autres dispositifs servant à couvrir l'espace annulaire autour d'un gicleur afin de conserver le positionnement du gicleur au centre du point d'introduction

excess pressure pump	water pump that boosts pressure to prevent false alarms	**pompes de surpression**	pompes à eau automatique qui maintiennent la pression du système sous eau plus élevée que la plus haute pression d'alimentation prévue pour empêcher les fausses alarmes
fire pump assembly	water pump designed to supply or supplement flow and pressure dedicated to fire protection	**pompes d'incendies**	pompes à eau conçues pour offrir ou augmenter le débit et la pression consacrée à la protection contre les incendies
flow switch	a device that monitors water flow and initiates an alarm signal to a fire alarm panel or equivalent	**régulateurs de débit**	dispositifs qui déclenchent une alarme de débit d'eau en cas de conditions irrégulières du débit de l'eau
flushing connection	a connection used to flush water from piping and components; for example, at the end of a water main or hydrant	**raccords de purge**	raccords permettant de purger les débris d'une canalisation
grade	the slope of a pipe or trench, usually expressed as a ratio of rise (change in elevation) to run (change in distance)	**pente**	la pente d'un tuyau ou d'une tranchée, généralement exprimée comme le rapport entre l'inclinaison (changement dans l'élévation) et la course (changement dans la distance)
grooving (of pipe)	a process of mechanically joining pipe in which a groove is cut or pressed (rolled) around a pipe to accommodate a coupling	**rainurage (d'un tuyau)**	procédé par lequel la circonférence extérieure d'un tuyau est rainurée par enlèvement de métal, par pression ou par moletage
hangers	components installed to allow pipes to be attached overhead or to other support structures	**étriers de suspension de tuyaux**	composants qui offrent un support en hauteur aux tuyaux et aux composants des tuyaux
heat-actuated detectors (HAD)	heat-activated device, triggered when a specified temperature or rate of increasing temperature is detected	**appareils aérothermiques**	dispositifs qui se déclenchent à une température donnée ou à une élévation de température donnée
laydown	a pre-determined area where material is stored	**pièces de rangement**	endroits prédéterminé où le matériel est rangé
mark-ups / as-built drawing	a revised set of drawings submitted by a contractor upon completion of a project that reflect all changes made in the specifications and shop drawings during the construction process	**dessins d'après-exécution/conformes à l'exécution**	ensemble de dessins révisés soumis par le contracteur suite à la complétion d'un projet, et qui inclus les changements spécifiés et les dessins d'atelier effectués pendant la construction

preaction systems	a system that may or may not contain supervisory air or nitrogen that can be operated through detection or sprinkler activation	**systèmes à préaction**	systèmes qui utilisent des gicleurs automatiques reliés aux réseaux de tuyaux contenant de l'air pouvant être comprimé, et comportant un système additionnel de détection aux mêmes endroits que les gicleurs
pressure switch	a device used for monitoring high or low pressure in piping system	**interrupteurs de pression**	dispositifs utilisés pour surveiller les hautes et basses pressions dans les réseaux de tuyaux
pump room	also called pump house. A designated area or room in a building or outside a building that contains a fire pump and its components	**chambre des pompes**	local à l'intérieur ou à l'extérieur d'un bâtiment qui abrite une pompe d'incendie et ses éléments
reaming	a process to restore the pipe to its original inside diameter, usually by removing the internal burr or flare formed when the pipe was cut	**alésage**	opération qui consiste à redonner à un tuyau son diamètre intérieur d'origine, habituellement en enlevant les bavures ou l'évasement résultant de la coupe du tuyau
seismic/sway bracing	pipe restraint system	**contreventements parasismiques ou obliques**	systèmes de retenue qui empêchent le mouvement différentiel entre les tuyaux et le bâtiment en cas de tremblement de terre
shop drawings	a drawing or set of drawings produced by the contractor, supplier, manufacturer or subcontractor for the purpose of installing, fabricating and bidding	**dessins d'atelier**	dessins ou ensemble de dessins faits par le contracteur, le fournisseur, le fabricant ou le sous-traitant aux fins d'installation, de fabrication et d'appels d'offres
sleeve	installed before or after concrete or other structural placement to enable pipes to pass from one area of a structure to another	**manchons**	dispositifs qui donnent un libre accès à un point d'introduction du bâtiment
sling	any metal or synthetic flexible device used to cradle or support a load. Slings are attached to the hoist line of the lifting device to complete the lift	**élingues**	éléments souples en métal ou en matière synthétique servant à soutenir une charge dans le but de la lever ou de la déplacer
sprinkler guards	devices used to protect heads from damage	**protège-gicleurs**	dispositifs servant à protéger les gicleurs afin de réduire les dommages mécaniques
standpipe system	a system to which firefighting hoses may be attached	**réseaux de canalisation d'incendie**	réseaux de tuyaux soit verticaux ou horizontaux qui fournissent une alimentation en eau afin d'aider à combattre les incendies manuellement

suppression systems	types include wet/dry chemical, gas, clean agent, mist, hybrid	**systèmes d'extinction**	systèmes qui entraînent une rapide réduction du débit calorifique d'un feu, prévenant sa reprise par moyens directs et une application adéquate de médias de protection-incendie sur la surface en feu
tamper switch	device which monitors the opening or closing of a valve by sounding a signal in fire alarm panel	**interrupteurs de sécurité**	dispositifs de déclenchement du signal de dérangement dans le panneau d'alarme incendie actionnés par l'ouverture ou la fermeture d'une soupape
thrust block	concrete restraint cast in place at critical point in underground piping installations, in order to prevent hydraulic pressure from moving or separating pipe joints	**massifs de butée**	dispositifs de retenue en béton coulé sur place à l'endroit critique d'une canalisation enterrée pour empêcher la pression hydraulique de faire bouger un joint ou de le détacher
trim	smaller or auxiliary piping attached to installed devices such as valves and pumps. Often supplied as a "trim package"	**garnitures**	tuyauterie et composants fixés aux soupapes, aux réservoirs et aux pompes afin de favoriser un fonctionnement adéquat
valves	device placed in a pressurized piping system in order to control, direct or prevent the movement of chemicals, gases, liquids or other substances	**soupapes**	dispositifs placés dans les réseaux de tuyauterie afin de réguler ou diriger le mouvement des fluides
water motor gong	a water-operated local audible alarm	**cloches hydrauliques**	alarmes sonores locales actionnées par l'eau
wet pipe system	sprinkler system charged with water	**réseaux d'extinction automatique à eau**	systèmes de protection-incendie qui utilisent des gicleurs automatiques rattachés à un réseau de tuyauterie contenant de l'eau et connectés à un tuyau d'alimentation en eau de sorte que l'eau coule immédiatement des gicleurs en cas de chaleur ou d'un incendie