PROGRAM PROGRAMME
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Red Seal Occupational Standard

Insulator (Heat and Frost)

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Canada

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RED SEAL OCCUPATIONAL STANDARD

INSULATOR (HEAT AND FROST)

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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 Insulator (Heat and Frost) 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:

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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 standard were undertaken by employees of the standards development team of the Trades and Apprenticeship Division and of British Columbia, 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 Insulator (Heat and Frost) trade: An overview of the trade's duties, work environment, job requirements, similar occupations and career progression

Trends in the Insulator (Heat and Frost) 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 9 essential skills is applied in this trade

Roles and Opportunities for Skilled Trades in a Sustainable Future: an overarching description of how in the context of climate change, skilled trades play a large role in implementing solutions and adjusting to changes in the world. In addition to highlighting the importance of this awareness, the standard may also contain more details on activities, skills and knowledge elements that are specific to the 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 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

A complete version of the occupational standard, which provides additional detail for the trade activities, skills and knowledge can be found at www.red-seal.ca.

DESCRIPTION OF THE INSULATOR (HEAT AND FROST) TRADE

"Insulator (Heat and Frost)" is this trade's official Red Seal occupational title approved by the CCDA. This standard covers tasks performed by an insulator (heat and frost) 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
Heat and Frost Insulator						■							
Insulator					■								
Insulator (Heat and Frost)	■	■	■	■			■	■	■	■	■	■	■

Insulators (heat and frost) work with different kinds of insulating material to prevent or reduce the passage of heat, cold, vapour, moisture, sound or fire. They read and interpret drawings and specifications to determine insulation requirements, select the amount and type of insulation to be installed, and measure and cut insulating material to the required dimensions. They then apply, install, repair and maintain insulating material. Insulated surfaces may be finished with materials such as plastics, aluminum, galvanized steel and coated steel, stainless steel, canvas, mastic laminate or finishing cement. Insulators (heat and frost) also lay out and fabricate parts on-site, or remove or seal off old insulation.

Types of insulating materials that may be used include calcium silicate, ceramic fibre, elastomeric foam, nano-like technology, mineral fibre, fibreglass, polyurethane, polystyrene and cellular glass. They may be used for systems such as plumbing, air-handling, exhaust, heating, cooling and refrigeration, for piping equipment, pressure vessels and storage tanks, as well as for walls, floors and ceilings of buildings, industrial complexes and ships.

Removing old insulating material such as asbestos, ceramic fibres, lead and mould is also part of the trade. Special training and licenses may be required to deal with these types of materials. Spraying insulating materials and installing fireproofing and fire stop systems are also specialized parts of the trade.

Insulators (heat and frost) are employed by governments, construction companies, insulation contractors and industrial plants, or may also be self-employed. They work on residential, industrial, commercial and institutional projects. Their work schedules depend on the type of work they are doing, ranging from regular work weeks, to shift work or irregular work hours. Schedules may depend on the availability of contracts, or inconvenience or health risks to adjacent workers or the public.

Insulators (heat and frost) work with a number of hand tools and power tools. They use personal protective equipment to protect themselves from workplace hazards. Also, they frequently use scaffolds, aerial lifts and ladders to help them accomplish their tasks. They can work indoors or outdoors, often in extreme temperatures. They may perform some of their tasks in confined spaces. Depending on the location of work, they may be required to travel.

The ability to be focused and responsible is a vital part of insulators' (heat and frost) work and safety. The work often requires the insulators (heat and frost) to spend most of the day on their feet, bending, kneeling, working at heights, climbing (scaffolds, ladders) and lifting. Insulators (heat and frost) must be able to use their body to brace large items and guide objects or materials into place. This requires them to have a good combination of motor co-ordination, and manual and finger dexterity.

This standard recognizes similarities or overlaps with the work of boilermakers, roofers, sheet metal workers, painters and carpenters.

With experience, insulators (heat and frost) act as mentors and trainers to apprentices in the trade. They can also move into positions such as maintenance, instructor, contractor, foreperson, superintendent or estimator.

TRENDS IN THE INSULATOR (HEAT AND FROST) TRADE

Materials

There are new insulating materials being introduced such as aluminum impregnated insulation, nano-like technology and wicking type insulation. Endothermic sheets for fireproofing electrical trays are being used more and more frequently. Their application and maintenance requires that insulators (heat and frost) stay up-to-date. More prefabricated materials have emerged, but insulators are still required to do layout and fabrication on-site.

Tools and equipment

Many tools have become more technologically advanced. For example, there are more electric and power fabrication tools such as electric rollers and shears. Computer Numerical Control (CNC) machines may become more common in this industry for the fabrication of metal fittings.

Safety and environmental considerations

Workplace safety is increasingly being driven by government regulations. Training and certification for asbestos removal is becoming prevalent in many jurisdictions. Due to growing concerns for the environment, there is an increased demand by clients for the use of insulation for energy saving purposes and environmentally friendly products such as low volatile organic compound (VOC) products. Mechanical insulation plays a large role in efforts to lower carbon emissions to net zero. This is driving an increased use of environmentally friendly mechanical insulation and products. This can also help in Leadership in Energy and Environmental Design (LEED) certification.

Changes in building codes have had a large impact on energy conservation and the work of insulators (heat and frost).

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.

Tools are available online or for order at: https://www.canada.ca/en/employment-social-development/programs/essential-skills/profiles.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: www.red-seal.ca.

READING

Insulators (heat and frost) use reading skills to read manuals and details of job specifications such as material lists. They read safety notices, work permits, safety regulations and emergency procedures in order to maintain a safe work environment.

DOCUMENT USE

Documents that insulators (heat and frost) work with include material lists, Workplace Hazardous Materials Information System (WHMIS) sheets and labels, instructions, work orders, reports, dispatch sheets and memos. They may also consult and interpret blueprints, specifications and permits, and complete logbooks.

WRITING

Insulators (heat and frost) write lists of materials and instructions. They may write hazard assessments, accident reports or keep work records for themselves and apprentices.

ORAL COMMUNICATION

Insulators (heat and frost) use oral communication skills during daily or weekly toolbox meetings with co-workers and supervisors to discuss job details. They also meet with workers from other trades to coordinate work. Oral communication skills are important when training apprentices.

NUMERACY

Insulators (heat and frost) use numeracy skills for measuring and cutting insulation, and determining thickness of insulation for pipes, ducts and equipment. They use formulas for calculating surface areas of frustrums, cones, and regular and irregular shapes to estimate required materials. They also use formulas to determine the thickness of insulation. They may need to convert between metric and imperial measurements.

THINKING

Problem solving skills are used by insulators (heat and frost) to anticipate and deal with situations such as materials not arriving as scheduled, unplanned shortages, or the wrong materials being delivered. Every job is different and often plans change requiring insulators (heat and frost) to adapt to the current requirements. Insulators (heat and frost) use their decision making skills when dealing with various issues such as where to make cuts so the material can be formed to the required shape and how to accurately cut the material to avoid waste.

DIGITAL TECHNOLOGY

Computers may be used by insulators (heat and frost) for tasks such as accessing specifications and blueprints (Computer Assisted Drawing [CAD]), receiving work orders and for the delivery of safety training. They use digital measuring equipment such as heat guns and thermal imaging cameras, and software such as energy loss assessment. Internet-based applications are also commonly used for research and documentation.

WORKING WITH OTHERS

Insulators (heat and frost) mostly work independently. They co-ordinate their work with other workers on-site including apprentices, journeypersons, supervisory personnel and workers from other trades depending on the size of the work site and the type of work.

CONTINUOUS LEARNING

There is an ongoing requirement to learn while working as an insulator (heat and frost). Work sites and companies may have different protocols. Applications, materials and processes are continually changing and skills need to be kept up-to-date.

Roles and Opportunities for Skilled Trades in a Sustainable Future

Climate change affects all of us. Trades play a large role in implementing solutions and adjusting to changes in the world.

Throughout this standard, there may be specific references to tasks, skills and knowledge that clearly show this trade's role in a more sustainable future. Each trade has different roles to play and contributions to make in their own way.

For example:

- Construction tradespeople need to consider the materials they are using, building methods, and improvements to mechanical and electrical installations. There are important changes to codes and standards to help meet the climate change goals and commitments set for 2030 and 2050. Retrofits and new construction of low-energy buildings provide enormous opportunities for workers in this sector. Concepts, such as energy efficiency and regarding buildings as systems are foundational.

- Automotive and mechanical trades are seeing a shift towards the electrification of vehicles and equipment. As a result, new skills and knowledge will be required for tradespeople working in this sector. There are mandates for sales of new light-duty zero-emission vehicles (ZEV) in Canada, with the goal of achieving 100% ZEV sales by 2035. Due to this mandate, the demand for these vehicles is growing quickly among consumers and fleets. With this escalating demand, the need for skilled workers to maintain and repair these vehicles is also increasing.

- In industrial and resource sectors, there is pressure to move towards increased electrification of industrial processes. Many industrial and commercial facilities are also being upgraded to improve energy efficiency in areas such as lighting systems, and new production processes and technologies. There are also opportunities in carbon capture, utilization and storage (CCUS), as well as the production and export of low-carbon hydrogen.

- Trades in the service sector may also need to be aware of responsible sourcing, as well as efficient use of products and materials. New ways of working better are always a part of the job.

There are fast-moving changes in guidelines, codes, regulations and specifications. Many are being implemented for the purpose of energy efficiency and climate change. Those that affect specific trades may be mentioned within the standard. Examples of these guidelines and legislation include:

- The National Energy Code of Canada for Buildings (NECB).

- The Canadian Net-Zero Emissions Accountability Act (CNZEAA).

- programs that encourage sustainable building design and construction such as Leadership in Energy and Environmental Design (LEED) and the Zero Carbon Building (ZCB) standards.

- the Montreal Protocol for phasing out R22 refrigerants.

- energy efficiency programs such as ENERGY STAR.

- principles of the United Nations Declaration for the Rights of Indigenous Peoples pertaining to energy sector development.

Apprentices and tradespeople need to increase their climate literacy and reinforce their own understanding of energy issues and environmental practices. It is important for them to understand why these changes are happening and their effect on trades' work. While individual tradespeople and apprentices may not be able to choose certain elements like; the architectural design of buildings, building material selection, regulatory requirements, use of electric vehicles and technologies, they must understand the impact of using these elements in their work. Impacts include using environmentally friendly products and following requirements related to the disposal and recycling of materials.

In apprenticeship, as well as in ongoing professional development, employers and instructors should encourage learning about these concepts, why they are important, how they are implemented, and the overarching targets they are aiming to achieve.

All in all, it's about doing the work better and building a better world.

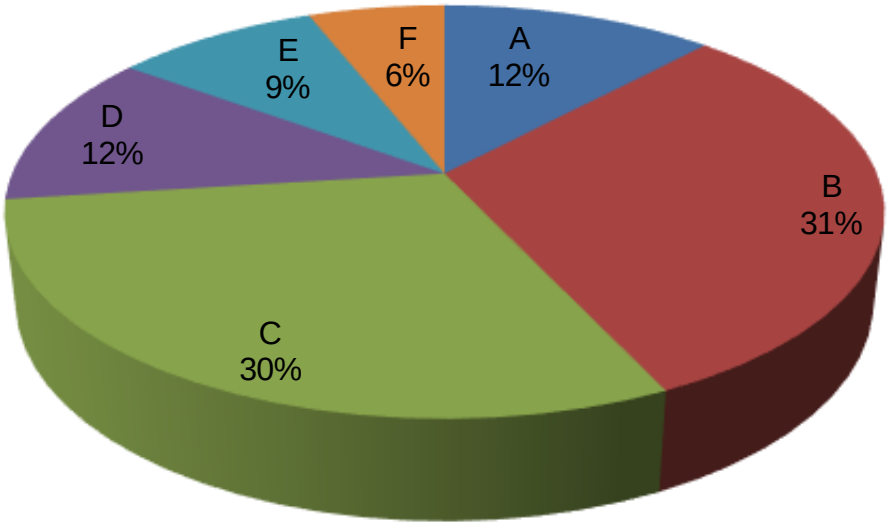
INDUSTRY EXPECTED PERFORMANCE

All tasks must be performed according to the applicable jurisdictional regulations and standards. All health and safety standards must be respected and observed. Work should be performed efficiently and at a high quality while minimizing material waste and environmental damage. All requirements of the manufacturer and client specifications must be met. At a journeyperson level of performance, all tasks must be completed with minimal direction and supervision. As a journeyperson progresses in their career there is an expectation 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 language of business as well as language of instruction in apprenticeship programs.

PIE CHART
OF RED SEAL EXAMINATION WEIGHTINGS



MWA A	Performs Common Occupational Skills	12%
MWA B	Performs Industrial Applications	31%
MWA C	Performs Commercial Applications	30%
MWA D	Performs Applications Common to Industrial and Commercial	12%
MWA E	Performs Specialized Applications	9%
MWA F	Performs Asbestos, Lead and Mould Abatement	6%

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 typically have between 100 and 150 questions.

INSULATOR (HEAT AND FROST)

TASK MATRIX

A - Performs routine occupational skills — 12%

Task A-1 **Performs safety-related functions** **16%**	**A-1.01 Uses personal protective equipment (PPE) and safety equipment**	**A-1.02 Maintains safe work environment**	
Task A-2 **Uses and maintains tools and equipment** **20%**	**A-2.01 Uses tools and equipment**	**A-2.02 Uses access equipment**	
Task A-3 **Organizes work** **17%**	**A-3.01 Performs task scheduling**	**A-3.02 Organizes materials on site**	
Task A-4 **Uses communication and mentoring techniques** **10%**	**A-4.01 Uses communication techniques**	**A-4.02 Uses mentoring techniques**	
Task A-5 **Performs routine trade practices** **37%**	**A-5.01 Performs measurements and calculations**	**A-5.02 Interprets specifications and drawings**	**A-5.03 Prepares substrates**

B - Performs industrial applications — 31%

Task B-6 Prepares for installation of insulation in industrial applications 21%	B-6.01 Selects materials for industrial applications	B-6.02 Performs layout for industrial applications	
Task B-7 Insulates piping and fittings 41%	B-7.01 Installs insulation on piping, fittings and hangers	B-7.02 Applies vapour barrier on piping and fittings	B-7.03 Installs cladding, jacketing and finishes on piping and fittings
Task B-8 Insulates tanks, vessels and equipment 38%	B-8.01 Installs insulation on tanks, vessels and equipment	B-8.02 Applies vapour barrier on tanks, vessels and equipment	B-8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment

C - Performs commercial applications — 30%

Task C-9 Prepares for installation of insulation in commercial applications 14%	C-9.01 Selects materials for commercial applications	C-9.02 Performs layout for commercial applications	
Task C-10 Insulates plumbing and mechanical piping systems 36%	C-10.01 Installs insulation on plumbing and mechanical piping systems	C-10.02 Applies vapour barrier on insulated plumbing and mechanical piping systems	C-10.03 Installs cladding, jacketing and finishes on insulated plumbing and mechanical piping systems
Task C-11 Insulates mechanical ducting 27%	C-11.01 Installs insulation on mechanical ducting	C-11.02 Applies vapour barrier on insulated mechanical ducting	C-11.03 Installs cladding, jacketing and finishes on insulated mechanical ducting
Task C-12 Insulates mechanical equipment 23%	C-12.01 Installs insulation on mechanical equipment	C-12.02 Applies vapour barrier on insulated mechanical equipment	C-12.03 Installs cladding, jacketing and finishes on insulated mechanical equipment

D - Performs applications common to industrial and commercial systems

12%

Task D-13 **Installs fire stop systems** **31%**	**D-13.01 Identifies approved fire stop system**	**D-13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components**	
Task D-14 **Insulates for soundproofing** **17%**	**D-14.01 Insulates piping for soundproofing**	**D-14.02 Insulates turbines, equipment and mechanical systems for soundproofing**	**D-14.03 Fabricates acoustic panels (Not Common Core)**
	D-14.04 Installs acoustic panels to ceilings and walls (Not Common Core)		
Task D-15 **Installs removable covers** **37%**	**D-15.01 Fabricates removable covers**	**D-15.02 Fastens removable covers**	
Task D-16 **Installs underground insulating systems** **15%**	**D-16.01 Installs pipe insulation to underground systems**	**D-16.02 Installs pour-in-place and spray-on insulation to underground systems**	

E - Performs specialized applications

9%

Task E-17 **Sprays sealers, coatings and spray-on insulation** **21%**	**E-17.01 Protects surrounding work area for spraying**	**E-17.02 Prepares material, equipment and substrate for spraying**	**E-17.03 Installs reinforcing material for spraying**
	E-17.04 Applies spray-on insulation, coatings and sealers		
Task E-18 **Installs fireproofing** **20%**	**E-18.01 Applies fireproofing to architectural, structural, mechanical and electrical components**	**E-18.02 Applies protective covering to fireproofing materials**	
Task E-19 **Installs insulation for refractory systems** **23%**	**E-19.01 Applies insulation to refractory systems**	**E-19.02 Installs reflective systems**	**E-19.03 Installs cladding, jacketing and finishes to refractory systems**
Task E-20 **Installs insulation for cryogenic systems** **36%**	**E-20.01 Applies insulation to cryogenic systems**	**E-20.02 Applies vapour barrier to insulated components of cryogenic systems**	**E-20.03 Installs cladding, jacketing and finishes to cryogenic systems**
Task E-21 **Insulates for marine applications (Not Common Core)**	**E-21.01 Insulates bulkheads, deckheads and hulls (Not Common Core)**	**E-21.02 Installs cladding, jacketing and finishes on marine applications (Not Common Core)**	

F - Performs asbestos, lead and mould abatement

6%

Task F-22 **Prepares for asbestos abatement** **32%**	**F-22.01 Determines required personal protective equipment (PPE) for asbestos abatement**	**F-22.02 Retrieves sample of asbestos for testing**	**F-22.03 Determines scope of work**
	F-22.04 Prepares site for removal and containment of asbestos	**F-22.05 Builds temporary enclosure**	
Task F-23 **Performs asbestos removal procedures** **39%**	**F-23.01 Removes asbestos**	**F-23.02 Disposes of asbestos materials**	**F-23.03 Performs decontamination of area and equipment**
Task F-24 **Performs maintenance and repair** **18%**	**F-24.01 Encapsulates asbestos**	**F-24.02 Encloses asbestos**	
Task F-25 **Performs lead abatement and mould remediation** **11%**	**F-25.01 Performs lead abatement**	**F-25.02 Performs mould remediation**	

Harmonization of Apprenticeship Training

Provincial and territorial apprenticeship authorities are each responsible for their respective apprenticeship programs. In the spirit of continual improvement, and to facilitate mobility among apprentices in Canada, participating authorities have agreed to work towards harmonizing certain aspects of their programs where possible. After consulting with their stakeholders in the trade, they have reached consensus on the following elements. Note that implementation of these elements may vary from jurisdiction to jurisdiction, depending on their own circumstances. For more information on the implementation in any province and territory, please contact that jurisdiction's apprenticeship authority.

1. Trade name

The official Red Seal name for this trade is Insulator (Heat and Frost).

2. Number of Levels of Apprenticeship

The number of levels of technical training recommended for this trade is 4 (four).

3. Total Training Hours During Apprenticeship Training

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

4. Sequencing Topics and Related Sub-tasks

The topic titles in the table below are placed in a column for each apprenticeship level for technical training. Each topic is accompanied by the sub-tasks and their reference number. The topics in the grey shaded cells represent those that are covered "in context" with other training in the subsequent years.

Level 1	Level 2	Level 3	Level 4
	Safety-Related Functions	Safety-Related Functions	Safety-Related Functions
	Tools and Equipment	Tools and Equipment	Tools and Equipment
	Communication	Communication	
	Piping and Fitting Insulation *(In context with other Industrial and commercial systems)*		
			Mechanical Equipment Insulation *(In context with Removable Covers)*

Safety-Related Functions
A-1.01 Uses personal protective equipment (PPE) and safety equipment
A-1.02 Maintains safe work environment

Tools and Equipment
A-2.01 Uses tools and equipment
A-2.02 Uses access equipment

Organizes Work
A-3.01 Performs task scheduling
A-3.02 Organizes materials on site

Communication and Mentoring Techniques
A-4.01 Uses communication techniques

Mentoring Techniques
A-4.02 Uses mentoring techniques

Routine Trade Practices
A-5.01 Performs measurements and calculations
A-5.03 Prepares substrates

Routine Trade Practices
A-5.01 Performs measurements and calculations
A-5.02 Interprets specifications and drawings (Introduction)
A-5.03 Prepares substrates

Routine Trade Practices
A-5.01 Performs measurements and calculations
A-5.02 Interprets specifications and drawings

Routine Trade Practices
A-5.01 Performs measurements and calculations
A-5.02 Interprets specifications and drawings

Preparation for Industrial Applications
B-6.01 Selects materials for industrial applications
B-6.02 Performs layout for industrial applications

Preparation for Industrial Applications
B-6.01 Selects materials for industrial applications
B-6.02 Performs layout for industrial applications

Preparation for Industrial Applications
B-6.01 Selects materials for industrial applications
B-6.02 Performs layout for industrial applications

Preparation for Industrial Applications
B-6.01 Selects materials for industrial applications
B-6.02 Performs layout for industrial applications

Piping and Fitting Insulation
B-7.01 Installs insulation on piping, fittings and hangers
B-7.02 Applies vapour barriers on piping and fittings

Piping and Fitting Insulation
B-7.03 Installs cladding, jacketing and finishes on piping and fittings

Piping and Fitting Insulation
B-7.03 Installs cladding, jacketing and finishes on piping and fittings

Tank, Vessel and Equipment Insulation
B-8.01 Installs insulation on tanks, vessels and equipment
B-8.02 Applies vapour barriers on tanks, vessels and equipment

Tank, Vessel and Equipment Insulation
B-8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment

Preparation for Commercial Applications
C-9.01 Selects materials for commercial applications
C-9.02 Performs layout for commercial applications

Preparation for Commercial Applications
C-9.01 Selects materials for commercial applications
C-9.02 Performs layout for commercial applications

Preparation for Commercial Applications
C-9.02 Performs layout for commercial applications

Plumbing and Mechanical Piping System Insulation
C-10.01 Installs insulation on plumbing and mechanical piping systems
C-10.02 Applies vapour barriers on insulated plumbing and mechanical piping systems

Plumbing and Mechanical Piping System Insulation
C-10.03 Installs cladding, jacketing and finishes on insulated plumbing and mechanical piping systems

Mechanical Ducting Insulation
C-11.01 Installs insulation on mechanical ducting
C-11.02 Installs vapour barrier on insulated mechanical ducting

Mechanical Ducting Insulation
C-11.03 Installs cladding, jacketing and finishes on insulated mechanical ducting

Mechanical Equipment Insulation
C-12.01 Installs insulation on mechanical equipment
C-12.02 Applies vapour barriers on insulated mechanical equipment

Mechanical Equipment Insulation
C-12.03 Installs cladding, jacketing and finishes on insulated mechanical equipment

Fire Stop System Installation
D-13.01 Identifies approved fire stop system
D-13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components

Fire Stop System Installation
D-13.01 Identifies approved fire stop system
D-13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components

Soundproofing Insulation
D-14.01 Insulates piping for soundproofing
D-14.02 Insulates turbines, equipment and mechanical systems for soundproofing
D-14.03 Fabricates acoustic panels
D-14.04 Installs acoustic panels to ceilings and walls

Removable Cover Installation (soft cover)
D-15.01 Fabricates removable covers
D-15.02 Fastens removable covers

Removable Cover Installation (soft cover)
D-15.01 Fabricates removable covers
D-15.02 Fastens removable covers

Underground Insulating System Installation
D-16.01 Installs pipe insulation to underground systems
D-16.02 Installs pour-in-place and spray-on insulation to underground systems

Sealers, Coatings and Spray-on Insulation
E-17.01 Protects surrounding work area for spraying
E-17.02 Prepares material, equipment and substrate for spraying
E-17.03 Installs reinforcing material for spraying
E-17.04 Applies spray-on insulation, coatings, and sealers

Fireproofing Installation
E-18.01 Applies fireproofing to architectural, structural, mechanical and electrical components

Fireproofing Installation
E-18.02 Applies protective covering to fireproofing materials

Insulation Systems for Refractory Application
E-19.01 Applies insulation to refractory systems
E-19.02 Installs reflective systems
E-19.03 Installs cladding, jacketing and finishes to refractory systems

Insulation Systems for Cryogenic Application
E-20.01 Applies insulation to cryogenic systems
E-20.02 Applies vapour barriers to insulated components of cryogenic systems
E-20.03 Installs cladding, jacketing and finishes to cryogenic systems

Marine Applications
E-21.01 Insulates bulkheads, deckheads and hulls
E-21.02 Installs cladding, jacketing, and finishes on marine applications

Preparation for Asbestos Abatement
F-22.01 Determines required PPE for asbestos abatement
F-22.02 Retrieves sample of asbestos for testing
F-22.03 Determines scope of work
F-22.04 Prepares site for removal and containment of asbestos
F-22.05 Builds temporary enclosure

Asbestos - Removal
F-23.01 Removes asbestos
F-23.02 Disposes of asbestos materials
F-23.03 Performs decontamination of area and equipment

Asbestos - Maintenance and Repair

F-24.01 Encapsulates asbestos

F-24.02 Encloses asbestos

Lead Abatement and Mould Remediation

F-25.01 Performs lead abatement

F-25.02 Performs mould remediation

MAJOR WORK ACTIVITY A
Performs Routine Occupational Skills

TASK A-1 Performs safety-related functions

TASK DESCRIPTOR
Insulators (heat and frost) use and maintain personal protective equipment (PPE) and safety equipment. Maintaining a safe work environment is crucial.

A-1.01 Uses personal protective equipment (PPE) and safety equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.01.01P	select ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are selected according to project requirements and limitations of ***PPE*** and ***safety equipment***
A-1.01.02P	inspect and ensure ***PPE*** and ***safety equipment*** are in good working condition before each use	***PPE*** and ***safety equipment*** are inspected and in good working condition before each use
A-1.01.03P	verify ***PPE*** has been cleaned before each use	***PPE*** is cleaned before each use
A-1.01.04P	remove and report unsafe, worn, damaged or defective ***PPE*** and ***safety equipment***	unsafe, worn, damaged or defective ***PPE*** and ***safety equipment*** are reported and removed from service
A-1.01.05P	inspect and perform a positive and negative field test before wearing a respirator	respirator is inspected, and positive and negative field tests are performed before each use
A-1.01.06P	ensure fit test is up-to-date to accommodate changes in ***face structure***	fit test is up-to-date to accommodate changes in ***face structure***
A-1.01.07P	adjust ***PPE***	***PPE*** is adjusted to ensure coverage and protection
A-1.01.08P	store ***PPE*** and ***safety equipment***	***PPE*** and ***safety equipment*** are stored in designated area according to ***specifications***

RANGE OF VARIABLES

PPE includes: eye protection, gloves, boots, respirators, hearing protection, fall protection equipment, hard hats, wristlets, coveralls (for additional PPE, see Appendix B)

safety equipment includes: warning tapes, first aid kits, eye wash stations, fire extinguishers (for additional safety equipment, see Appendix B)

face structure includes: facial hair, weight change, broken nose, abscessed tooth, plastic surgery

specifications include: manufacturers', Canadian Standards Association (CSA), company policies, jurisdictional, safety certifications

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.01.01L	demonstrate knowledge of ***PPE*** and ***safety equipment***, their applications, maintenance and procedures for use	identify types of ***PPE*** and describe their applications and procedures for use
		identify types of ***safety equipment*** and describe their applications and procedures for use
		identify the procedures used to inspect, maintain and store ***PPE*** and ***safety equipment***
A-1.01.02L	demonstrate knowledge of regulations pertaining to ***PPE*** and ***safety equipment***	identify jurisdictional health and safety acts and regulations pertaining to ***PPE*** and ***safety equipment***

RANGE OF VARIABLES

PPE includes: eye protection, gloves, boots, respirators, hearing protection, fall protection equipment, hard hats, wristlets, coveralls (for additional PPE, see Appendix B)

safety equipment includes: warning tapes, first aid kits, eye wash stations, fire extinguishers (for additional safety equipment, see Appendix B)

A-1.02 Maintains safe work environment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-1.02.01P	verify ***work permits***	***work permits*** required for the project are verified
A-1.02.02P	perform a field-level risk assessment of worksite for ***hazards*** and locate emergency eye wash, first aid stations, fire extinguishers, escape plan and muster points	field-level risk assessment of worksite is performed to identify ***hazards*** and locate emergency eye wash, first aid stations, fire extinguishers, escape plan and muster points are located
A-1.02.03P	remove or mitigate ***hazards***	***hazards*** are removed or mitigated according to field level risk assessment
A-1.02.04P	report ***hazards***, near misses and incidents immediately	***hazards***, near misses and incidents are reported immediately to supervisor
A-1.02.05P	lock out and tag out machinery, equipment and process	machinery, equipment and process are locked out and tagged out to de-energize system according to ***company policies and procedures***
A-1.02.06P	comply with all ***regulations, policies and procedures*** in the workplace	***regulations, policies and procedures*** are complied with
A-1.02.07P	set up and remove ***barriers***	***barriers*** are set up to cordon off work area and removed upon completion of work according to jurisdictional authority and project requirements

RANGE OF VARIABLES

work permits include: confined space, hot work, safe work, cold work, blanket (general access)

hazards include: pinch points, tripping hazards, chemical hazards, electric shock hazards, burn hazards, noise hazards, height hazards, respiratory hazards, environmental hazards

company policies and procedures include: evacuation routes, muster stations, warning signals, incident procedures, emergency phone numbers, location of safety equipment, lock-out procedures

regulations, policies and procedures include: housekeeping, emergency and evacuation, disposal of materials, muster station, fire watch and man watch requirements, safe work practices and procedures, jurisdictional health and safety acts and regulations

barriers include: “caution” tape, “do not enter” tape, “asbestos” tape

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-1.02.01L	demonstrate knowledge of safe work practices	identify ***hazards*** and describe safe work practices
		identify ***company policies and procedures*** pertaining to safe work practices
		describe ***safety watch*** requirements
		identify company or site-specific safety ***training requirements***
		describe housekeeping practices related to safe work practices
A-1.02.02L	demonstrate knowledge of regulations pertaining to safety	identify required ***work permits***
		identify and implement jurisdictional health and safety acts and regulations pertaining to safe work practices

RANGE OF VARIABLES

hazards include: pinch points, tripping hazards, chemical hazards, electric shock hazards, burn hazards, noise hazards, height hazards, respiratory hazards, environmental hazards

company policies and procedures include: evacuation routes, muster stations, warning signals, incident procedures, emergency phone numbers, location of safety equipment, lock-out procedures

safety watch includes: fire watch, man watch

training requirements include: fall protection, confined space entry, asbestos awareness, Workplace Hazardous Materials Information System (WHMIS), H_2S awareness, rigging and hoisting, lift training, lock-out procedures

work permits include: confined space, hot work, safe work, cold work, blanket (general access)

TASK A-2 Uses and maintains tools and equipment

TASK DESCRIPTOR

Insulators (heat and frost) use and maintain tools and equipment in a safe and proper manner. They use access equipment according to the task at hand.

A-2.01 Uses tools and equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.01.01P	maintain tools and equipment	tools and equipment are inspected for damage and wear
A-2.01.02P	recognize, replace and report worn, damaged or defective tools and equipment	worn, damaged or defective tools and equipment are reported and replaced according to manufacturers' specifications, site-specific requirements and company policies
A-2.01.03P	clean and lubricate tools and equipment	tools and equipment are cleaned and lubricated according to manufacturers' specifications
A-2.01.04P	sharpen tools	tools are sharpened according to tool characteristics
A-2.01.05P	organize and store tools and equipment	tools and equipment are organized and stored to protect them from the elements and ensure easy retrieval
A-2.01.06P	select tools and equipment for project	tools and equipment are selected and used according to their intended design

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

RANGE OF VARIABLES

hazards include: electrical shock, loose clothing or long hair, jewellery, cuts, punctures, pinches

A-2.02 Uses access equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-2.02.01P	select ***access equipment***	***access equipment*** is selected according to project requirements
A-2.02.02P	identify and avoid ***hazards***	***hazards*** are identified and avoided
A-2.02.03P	check and ensure scaffolding tag has been updated	scaffolding tag is updated according to company policies and jurisdictional regulations
A-2.02.04P	set up ***access equipment***	***access equipment*** is set up according to company policies and manufacturers' specifications
A-2.02.05P	conduct inspection of ***access equipment***	inspection of ***access equipment*** is conducted according to safety checklist for ***defects***
A-2.02.06P	operate ***access equipment***	***access equipment*** is operated according to manufacturers' specifications and jurisdictional regulations regarding operation and training
A-2.02.07P	take down, organize and store ***access equipment***	***access equipment*** is taken down, organized and stored in pre-designated area according to manufacturers' specifications

RANGE OF VARIABLES

access equipment includes: step ladders, extension ladders, aerial platforms, scissor lifts, crane baskets, scaffolding, rope access equipment

hazards include: overhead obstructions, environmental conditions, falls, pinch points, dropped objects

defects include: leaking fluids, stress cracks in hoses, metal stress, broken or cracked rungs, worn tires, electronic defects

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-2.02.01L	demonstrate knowledge of ***access equipment***, their applications, maintenance and procedures for use	identify types of ***access equipment***, and describe their application and procedures for use
		identify ***hazards*** and describe safe work practices pertaining to the use of ***access equipment***
		implement codes and regulations pertaining to the use of ***access equipment***
		describe the procedures used to inspect and maintain ***access equipment***
		identify jurisdictional regulations, limitations and training requirements for ***access equipment***
		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: step ladders, extension ladders, aerial platforms, scissor lifts, crane baskets, scaffolding, rope access equipment

hazards include: overhead obstructions, environmental conditions, falls, pinch points, dropped objects

TASK A-3 Organizes work

TASK DESCRIPTOR

Insulators (heat and frost) plan their daily tasks according to the project specifications. They organize the materials, tools and equipment for storage and easy retrieval.

A-3.01 Performs task scheduling

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.01.01P	organize and prioritize daily tasks	daily tasks are organized and prioritized according to ***factors***
A-3.01.02P	determine work effort remaining	remaining work effort is determined according to project requirements
A-3.01.03P	coordinate work tasks with other trades	work tasks are coordinated with other trades
A-3.01.04P	determine tools and equipment required	tools and equipment are determined according to project requirements and availability

RANGE OF VARIABLES

factors include: project requirements, safety considerations, field-level risk assessments, contractors' requirements, environmental conditions, work in progress (WIP) log

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.01.01L	demonstrate knowledge of the procedures to plan and schedule tasks	identify ***factors*** to consider when planning and scheduling daily tasks
		identify sequence of task activities
		describe procedures for coordinating work tasks with other trades
		identify work order, work release and safe work permit procedures
		identify types, sizes and amounts of materials required for each project

RANGE OF VARIABLES

factors include: project requirements, safety considerations, field-level risk assessments, contractors' requirements, environmental conditions, work in progress (WIP) log

A-3.02 Organizes materials on site

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-3.02.01P	sort and place materials	materials are sorted and placed according to ***factors***
A-3.02.02P	store and secure materials	materials are stored and secured in designated areas considering ***factors***
A-3.02.03P	dispose of waste materials	waste materials are disposed of according to project requirements

RANGE OF VARIABLES

factors include: requirements of daily tasks, environmental factors, sequence of retrieval, weight

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-3.02.01L	demonstrate knowledge of procedures used to organize materials on site	identify designated areas for storage of materials
		identify designated areas for disposal of waste materials
		identify ***factors*** to consider for storing materials and describe ***storage procedures***
		describe procedures used to secure materials
		describe procedures used to dispose of waste materials

RANGE OF VARIABLES

factors include: requirements of daily tasks, environmental factors, sequence of retrieval, weight
storage procedures include: labels facing out and stacked by size/sequence, materials off the ground and protected from the elements

TASK A-4 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 the activities related to communication in the workplace and mentoring skills.

A-4.01 Uses communication techniques

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.01.01P	demonstrate communication practices with individuals or in a group	instructions and messages are understood by all parties involved in communication
A-4.01.02P	listen using ***active listening*** practices	steps of ***active listening*** are utilized
A-4.01.03P	receive and respond to feedback on work	response to feedback indicates understanding and corrective measures are taken
A-4.01.04P	explain and provide feedback	explanation and feedback is provided and task is carried out as directed
A-4.01.05P	use questioning to improve communication	questions are used to enhance understanding, on-the-job training and goal setting
A-4.01.06P	participate in safety and information meetings	meetings are attended, information is relayed to the workforce, and is understood and applied
A-4.01.07P	participate in ongoing training and learning opportunities	ongoing training and learning opportunities are taken
A-4.01.08P	tailor communication style to ***different audiences***	communication style is adapted to ***different audiences***

RANGE OF VARIABLES

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

different audiences include: generational, customers, peers, regional, cultural

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.01.06L	demonstrate knowledge of trade terminology	define terminology used in the trade
A-4.01.06L	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, authorities having jurisdiction, manufacturers

sources of information include: regulations, codes, occupational health and safety requirements, jurisdictional requirements, prints, drawings, specifications, company and client documentation

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

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-4.02 Uses mentoring techniques

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-4.02.01P	identify and communicate learning objective and point of lesson	apprentice or learner can explain the objective and point of the lesson
A-4.02.02P	link lesson to other lessons and the job	lesson order and unplanned learning opportunities are defined
A-4.02.03P	demonstrate performance of a skill to an apprentice or learner	***steps required to demonstrate a skill*** are performed
A-4.02.04P	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-4.02.05P	assess apprentice or learner's ability to perform tasks with increasing independence	performance of apprentice or learner improves with practice to a point where skill can be done with little supervision
A-4.02.06P	give supportive and corrective feedback	apprentice or learner adopts best practice after having been given supportive or corrective feedback
A-4.02.07P	support apprentices in pursuing technical training opportunities	technical training is completed within timeframe prescribed by apprenticeship authority
A-4.02.08P	support equity group apprentices	workplace is harassment and discrimination-free
A-4.02.09P	implement probationary period to assess suitability to the trade	commitment is demonstrated and more suitable career options are suggested if required

RANGE OF VARIABLES

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

practice conditions mean: guided, limited independence, full independence

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-4.02.01L	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 ***learning styles***
		identify different ***learning needs*** and strategies to meet them
		identify ***strategies to assist in learning a skill***
A-4.02.02L	demonstrate knowledge of ***strategies for teaching*** workplace skills	identify different roles played by a workplace mentor
		describe ***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 to different situations

RANGE OF VARIABLES

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

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

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 mature and patient, providing feedback

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

TASK A-5 Performs routine trade practices

TASK DESCRIPTOR

Insulators (heat and frost) interpret specifications and drawings to understand the project requirements. They calculate measurements and prepare substrates.

A-5.01 Performs measurements and calculations

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.01.01P	take field measurements using ***tools***	field measurements are taken using ***tools*** according to field installation
A-5.01.02P	calculate layout dimensions of ***components***	layout dimensions of ***components*** are calculated using ***formulas***

RANGE OF VARIABLES

tools include: measuring tapes, chalk lines, squares, straight edges, trammel points, levels

components include: insulation, protective finishes, cladding/jacketing, removable covers, insulation blankets

formulas include: surface area, volume, circumference, diameter, radius

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.01.01L	demonstrate knowledge of measurements and calculations	identify mathematical ***formulas*** for calculating dimensions of ***components***
		identify imperial and metric systems and the conversion from one to the other

RANGE OF VARIABLES

formulas include: surface area, volume, circumference, diameter, radius

components include: insulation, protective finishes, cladding/jacketing, removable covers, insulation blankets

A-5.02 Interprets specifications and drawings

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.02.01P	read drawings and specifications for ***factors***	drawings and specifications are read for ***factors***
A-5.02.02P	identify ***symbols*** and abbreviations found on drawings	***symbols*** and abbreviations found on drawings are identified
A-5.02.03P	determine actual dimensions	actual dimensions are determined using ***tools***
A-5.02.04P	identify ***specifications***	***specifications*** are interpreted and applied

RANGE OF VARIABLES

factors include: directional orientation, location, line numbers, footage, number of fittings, thickness of insulation, types of insulation

symbols include: valves, fittings, tees, welds, flanges, unions, elbows, equipment, temperature range, heat trace, change in direction

tools include: tri-scale, electronic measuring tool, highlighters, digital scale measurer

specifications include: type of insulation, thickness, jacketing, fasteners, vapour barrier, omittances, band spacing, types of coating, types of sealants, scope of work

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.02.01L	demonstrate knowledge of ***specifications***, ***types of drawings*** and ***drawing components***	identify ***specifications*** and ***types of drawings***, their application and procedures for use
		identify ***symbols*** and abbreviations found on ***types of drawings***
		identify ***drawing components***
		interpret and apply findings from ***specifications*** and ***types of drawings***

RANGE OF VARIABLES

specifications include: type of insulation, thickness, jacketing, fasteners, vapour barrier, omittances, band spacing, types of coating, types of sealants, scope of work

types of drawings include: civil, architectural, structural, mechanical, electrical, process, isometric

drawing components include: scales, details, legends, elevations, notes

symbols include: valves, fittings, tees, welds, flanges, unions, elbows, equipment, temperature range, heat trace, change in direction

A-5.03 Prepares substrates

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
A-5.03.01P	prepare substrate using ***tools and equipment***	substrate is prepared using ***tools and equipment*** to ensure insulation system can be installed according to ***specifications***
A-5.03.02P	remove ***contaminants*** from surface	***contaminants*** are removed from surface using ***tools and equipment***
A-5.03.03P	grind, pin and weld substrate	substrate is ground, pinned and welded according to ***specifications***
A-5.03.04P	paint substrate around welded pins	substrate around welded pins is painted to prevent corrosion according to project ***specifications***

RANGE OF VARIABLES

tools and equipment include: wire brush, scraper, knife, welder
specifications include: project requirements, manufacturers', engineered
contaminants include: sealant, debris, oil, corrosion

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
A-5.03.01L	demonstrate knowledge of substrates and the procedures used to prepare them for installation of insulation	identify types of ***substrate material***, and the methods used to prepare them
		identify compatibility of insulating material and substrate based on ***factors***
		identify types of protrusions, penetrations and irregularities in the substrate
		describe substrate preparation techniques for installation of insulation

RANGE OF VARIABLES

substrate material includes: steel, copper, galvanized metal, iron, stainless steel, glass, plastic, fibreglass, aluminum
factors include: temperature ranges, age, environment, oxidization, chemical corrosion

MAJOR WORK ACTIVITY B
Performs Industrial Applications

TASK B-6 Prepares for installation of insulation in industrial applications

TASK DESCRIPTOR

Insulators (heat and frost) prepare for installing insulation by selecting materials for use depending on the application. They develop a layout, which ensures proper fit and ease of installation.

B-6.01 Selects materials for industrial applications

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-6.01.01P	determine the various components that require insulation	components that require insulation are determined according to project specifications
B-6.01.02P	determine types, sizes and thickness of insulation	types, sizes and thickness of insulation are determined according to specifications, temperature range, mechanical use and equipment size
B-6.01.03P	determine required materials	materials are determined according to specifications or to match existing work or surfaces on renovation and maintenance work
B-6.01.04P	determine types and sizes of cladding	types and sizes of cladding are determined according to ***factors***
B-6.01.05P	calculate amount of insulation and cladding required	amount of insulation and cladding required is calculated to ensure adequate supply and reduce waste
B-6.01.06P	determine fastening system	fastening system is determined according to type of installation and according to specifications

RANGE OF VARIABLES

factors include: reaction to the environment and other materials that are in contact with the cladding, finished size of insulation, specifications

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-6.01.01L	demonstrate knowledge of material selection for industrial applications	identify types of materials, their application and procedures for use
		locate information pertaining to materials in drawings or specifications
		identify the ***factors*** to consider for selecting cladding

RANGE OF VARIABLES

factors include: reaction to the environment and other materials that are in contact with the cladding, finished size of insulation, specifications

B-6.02 Performs layout for industrial applications

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-6.02.01P	draw field sketches	field sketches are drawn based on installation requirements
B-6.02.02P	set up work area	work area is set up large enough to accommodate ***layout***
B-6.02.03P	calculate ***machinery allowances***	***machinery allowances*** are calculated to ensure coverage
B-6.02.04P	develop ***layout***	***layout*** is developed using ***layout tools*** according to calculated dimensions
B-6.02.05P	mark ***layout***	***layout*** is marked using ***layout tools*** to transfer measurements to template
B-6.02.06P	create template	template is created by cutting out ***layout***

RANGE OF VARIABLES

layout includes: gores, head segments, transitions, tees, flashing, end caps
machinery allowances include: laps, lock-formed seams, easy edges, combination machine (bead and crimp)
layout tools include: dividers, squares, tape measures, calculators, scratch awls, markers, trammel points

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-6.02.01L	demonstrate knowledge of ***layout*** procedures for industrial applications	identify ***layout tools*** and their procedures for use
		explain calculation used to develop a ***layout***
		describe procedures used to perform a ***layout*** for industrial applications

RANGE OF VARIABLES

layout includes: gores, head segments, transitions, tees, flashing, end caps
layout tools include: dividers, squares, tape measures, calculators, scratch awls, markers, trammel points

TASK B-7 Insulates piping and fittings

TASK DESCRIPTOR

Insulators (heat and frost) insulate piping and fittings to prevent thermal transmission and to provide personnel protection. Proper fit of insulation around pipes, fittings and hangers is essential to the safe, efficient and cost-effective operation of the industrial process.

B-7.01 Installs insulation on piping, fittings and hangers

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

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.01.01P	cut insulation	insulation is cut according to measurements and hanger accommodation
B-7.01.02P	fabricate pipe ***fittings***	pipe ***fittings*** are fabricated by measuring, cutting and assembling according to project specifications
B-7.01.03P	secure insulation	insulation and pipe ***fittings*** are secured using ***fasteners*** and according to ***factors***

RANGE OF VARIABLES

fittings include: valves, tees, transitions, elbows
fasteners include: wire, bands, adhesive, tape
factors include: insulation type, thermal expansion, mechanical vibration, project specifications

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-7.01.01L	demonstrate knowledge of procedures used to install insulation on ***piping***, ***fittings*** and ***hangers***	identify types of ***piping, fittings***, ***hangers*** and application of ***pipe insulation***
		identify ***specifications*** and describe their application to the installation of insulation
		describe the ***results of poor fitting pipe insulation***
		describe insulation application techniques
		identify fastening devices and techniques

	describe expansion and contraction joint fabrication
	describe the procedures used to install insulation on ***piping, fittings***, ***hangers***

RANGE OF VARIABLES

piping includes: stainless, copper, iron, plastic, fibreglass

fittings include: valves, tees, transitions, elbows

hangers include: shoes, sleeves, clevises

pipe insulation includes: fibreglass, calcium silicate, cellular glass, urethane, mineral fibre, elastomeric foam

specifications include: scope of work, operating temperature, insulation thickness and requirements

results of poor fitting pipe insulation include: energy loss, frost build up, personal injury (burns from excess heat or frost)

B-7.02 Applies vapour barrier on piping and fittings

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

SKILLS

	Performance Criteria	Evidence of Attainment
B-7.02.01P	measure and cut vapour barrier	vapour barrier is measured and cut using ***tools*** according to size of insulation
B-7.02.02P	wrap insulated pipe	insulated pipe is wrapped with vapour barrier material, while accommodating for hangers, valves and elbows
B-7.02.03P	apply adhesives and tapes to seams and joints	adhesives and tapes are applied to seams and joints to ensure integrity of the vapour barrier according to ***specifications***
B-7.02.04P	trowel, spray or brush vapour barrier onto insulation	vapour barrier is trowelled, sprayed or brushed onto insulation according to ***specifications*** ensuring the integrity of the seal

RANGE OF VARIABLES

tools include: tape measures, knives, scissors, snips, trowels, sprayers

specifications include: manufacturers', engineered, jurisdictional, Thermal Insulation Association of Canada (TIAC) Best Practices Guide, Underwriters Laboratories of Canada (ULC), CSA

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.02.01L	demonstrate knowledge of vapour barriers, their application and the procedures used for installation	identify types of vapour barriers and describe their characteristics and applications
		describe the importance of vapour barriers on piping and fittings
		identify types of adhesives and their applications
		describe the procedures used to install vapour barriers on piping and fittings
		identify fastening devices and techniques

B-7.03 Installs cladding, jacketing and finishes on piping and fittings

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-7.03.01P	cut and shape ***cladding, jacketing and finishes***	***cladding, jacketing and finishes*** are cut and shaped to fit the installed insulation using ***tools and equipment***
B-7.03.02P	secure ***cladding, jacketing and finishes*** to installed insulation	***cladding, jacketing and finishes*** are secured to installed insulation using fasteners
B-7.03.03P	apply and shape cement	cement is applied and shaped to match contour of the pipe
B-7.03.04P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, polyvinyl chloride (PVC), cements, galvanized steel, mastic, reinforced asphalt-based membrane, mass-loaded vinyl (MLV) (barium-impregnated material), self-adhering jacketing tape, weatherproof membranes

tools and equipment include: combination machine, rollers, snips, band tensioners, crimper, sheet metal brake, trowels

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-7.03.01L	demonstrate knowledge of ***cladding, jacketing and finishes***, their purpose and application	identify types of ***cladding, jacketing and finishes***, and describe their characteristics and applications
		identify ***fasteners*** and their characteristics and applications
B-7.03.02L	demonstrate knowledge of procedures used to install ***cladding, jacketing and finishes*** on insulated piping and ***fittings***	describe procedures used to install ***cladding, jacketing and finishes*** on insulated piping and ***fittings***

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, polyvinyl chloride (PVC), cements, galvanized steel, mastic, reinforced asphalt-based membrane, mass-loaded vinyl (MLV) (barium-impregnated material), self-adhering jacketing tape, weatherproof membranes

fasteners include: screws, banding, PVC glue, tacks, tape, rivets

fittings include: tees, transitions, elbows, end caps

TASK B-8 Insulates tanks, vessels and equipment

TASK DESCRIPTOR

Insulators (heat and frost) insulate tanks, vessels and equipment, including instrumentation, to regulate temperature and prevent condensation. Tanks include crude oil, liquefied natural gas and asphalt tanks. Vessels are pressurized and include desalters, aerators and crackers. Equipment includes boilers, pumps, reactors and columns/towers.

B-8.01 Installs insulation on tanks, vessels and equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-8.01.01P	determine dimensions	dimensions are determined by field measuring or referencing ***drawings***
B-8.01.02P	cut insulation	insulation is cut according to measurements and protrusions using ***fabricating tools***
B-8.01.03P	fabricate ***components***	***components*** are fabricated by measuring and cutting using ***fabricating tools*** according to project ***specifications***

B-8.01.04P	apply insulation with ***fasteners***	insulation is applied using ***fastening tools*** and ***fasteners*** according to ***factors***
B-8.01.05P	assemble ***components*** on large scale equipment	***components*** are assembled on large scale equipment using temporary holding devices to hold insulation in place then secured using ***fastening tools*** and ***fasteners*** ensuring adequate support

RANGE OF VARIABLES

drawings include: blueprints, isometrics, detailed drawings, elevation
fabricating tools include: hand saws, band saws, knives, dividers, tape measures
components include: head segments, manways, supports, expansion (slip) joints
specifications include: location of pins and studs, types and spacing of banding, expansion springs
fasteners include: chokers, bands, adhesives, tapes, pins, clips
fastening tools include: end nippers, band tensioners, crimpers, temporary holding devices (rubber bands, bungee cords, inner tube, rope)
factors include: insulation type, thermal expansion, mechanical vibration, project specifications

KNOWLEDGE		
	Learning Outcomes	**Learning Objectives**
B-8.01.01L	demonstrate knowledge of insulating ***tanks***, ***vessels*** and ***equipment***	identify ***types of insulation***
		identify types of ***tanks, vessels*** and ***equipment*** that require insulation
		identify hazards associated with various ***types of insulation***
		apply basic geometry related to insulating ***tanks***, ***vessels*** and ***equipment***
		explain ***tank***, ***vessel*** and ***equipment*** expansion and contraction
B-8.01.02L	demonstrate knowledge of procedures used to install insulation on ***tanks***, ***vessels*** and ***equipment***	describe procedures used to install insulation on ***tanks***, ***vessels*** and ***equipment***
		identify ***specifications*** related to installing insulation on ***tanks***, ***vessels*** and ***equipment***

RANGE OF VARIABLES

tanks include: crude oil, liquefied natural gas, asphalt tanks
vessels include: desalters, aerators, crackers, exchangers
equipment includes: boilers, pumps, turbines
types of insulation include: fibreglass, cellular glass, mineral fibre, calcium silicate, urethane, nano-like technology
specifications include: location of pins and studs, types and spacing of banding, expansion springs

B-8.02 Applies vapour barrier on tanks, vessels and equipment

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

SKILLS

	Performance Criteria	Evidence of Attainment
B-8.02.01P	measure and cut ***vapour barrier***	***vapour barrier*** is measured and cut using ***tools*** according to size of insulation to fit ***vapour barrier*** over top of insulation
B-8.02.02P	wrap ***vapour barrier*** around insulation and apply adhesive	***vapour barrier*** is wrapped around insulation and adhesive is applied according to ***specifications***
B-8.02.03P	trowel and brush ***vapour barrier*** onto insulation	***vapour barrier*** is trowelled and brushed onto insulation according to application while ensuring the integrity of the seal
B-8.02.04P	tape seams of insulation	seams of insulation are taped according to ***specifications***

RANGE OF VARIABLES

vapour barrier includes: mastics, all service jacket (ASJ), foil scrim kraft (FSK), reinforced foil flame retardant kraft (RFFRK), blue skin, pitt wrap

tools include: tape measures, knives, scissors, trowels, brushes

specifications include: manufacturers', engineered, jurisdictional, TIAC Best Practices Guide, ULC, CSA

KNOWLEDGE

	Learning Outcomes	Learning Objectives
B-8.02.01L	demonstrate knowledge of ***vapour barriers***, their application and the procedures used for installation	identify types of ***vapour barriers*** and their applications
		identify types of adhesives and their applications
		describe ***vapour barrier*** installation techniques
		apply basic geometry related to the installation of ***vapour barriers*** on tanks, vessels and equipment

RANGE OF VARIABLES

vapour barrier includes: mastics, all service jacket (ASJ), foil scrim kraft (FSK), reinforced foil flame retardant kraft (RFFRK), blue skin, pitt wrap

B-8.03 Installs cladding, jacketing and finishes on tanks, vessels and equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
B-8.03.01P	fabricate ***components***	***components*** are fabricated to fit the installed insulation using ***tools and equipment***
B-8.03.02P	cut ***cladding, jacketing and finishes***	***cladding, jacketing and finishes*** are cut to fit the installed insulation using ***tools and equipment***
B-8.03.03P	secure ***cladding, jacketing and finishes*** to installed insulation	***cladding, jacketing and finishes*** are secured to installed insulation using ***fasteners***
B-8.03.04P	install ***components***	***components*** are installed to insulation using ***fasteners***
B-8.03.05P	apply and shape cement	cement is applied and shaped to match contour of the ***tanks, vessels*** *and* ***equipment***
B-8.03.06P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

components include: head segments, rings, transitions, end caps, laterals, flashing, inspection port

tools and equipment include: combination machine, rollers, snips, band tensioners, crimper, easy edger, lock former, dividers, trammel points, sheet metal brake

cladding, jacketing and finishes include: stainless steel, aluminum, PVC, cements, weatherproof membranes

fasteners include: screws, banding, PVC glue, tacks, tape, rivets, temporary holding devices, expansion springs, S-clips, belt loops

tanks include: crude oil, liquefied natural gas, asphalt tanks

vessels include: desalters, aerators, crackers

equipment includes: boilers, pumps, turbines

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
B-8.03.01L	demonstrate knowledge of ***cladding, jacketing and finishes***, their purpose and application	identify types of ***cladding, jacketing and finishes***, and describe their properties and applications
		identify ***fasteners*** and their characteristics and applications
B-8.03.02L	demonstrate knowledge of procedures to install ***components*** on ***tanks, vessels*** *and* ***equipment***	describe procedures to install ***components*** on ***tanks, vessels*** *and* ***equipment***

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, PVC, cements, weatherproof membranes

fasteners include: screws, banding, PVC glue, tacks, tape, rivets, temporary holding devices, expansion springs, S-clips, belt loops

components include: head segments, rings, transitions, end caps, laterals, flashing, inspection port

tanks include: crude oil, liquefied natural gas, asphalt tanks

vessels include: desalters, aerators, crackers

equipment include: boilers, pumps, turbines

MAJOR WORK ACTIVITY C
Performs Commercial Applications

TASK C-9 Prepares for installation of insulation in commercial applications

TASK DESCRIPTOR

Commercial systems are insulated for a variety of reasons such as condensation prevention, energy savings, personnel protection or soundproofing. Therefore, knowledge of the different insulating materials and their applications is important to achieve the desired result.

Commercial systems incorporate a variety of irregular-shaped components such as pipes, ducts and equipment; therefore, it is important for the insulator (heat and frost) to perform layout for different patterns.

C-9.01 Selects materials for commercial applications

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-9.01.01P	determine the various components of plumbing and mechanical systems that require insulation	various components of plumbing and mechanical systems that require insulation are determined according to project ***specifications***
C-9.01.02P	determine type, location and size of insulation ***materials*** required	type and size of insulation is determined depending on temperature range, mechanical use and equipment size; ***materials*** required are determined to match existing work or surfaces on renovation and maintenance work according to ***specifications***
C-9.01.03P	calculate the amount of ***materials*** needed to accomplish project	amount of ***materials*** needed to accomplish project are calculated according to blueprints, ***specifications*** and site conditions

RANGE OF VARIABLES

specifications include: manufacturers', engineered, jurisdictional, TIAC Best Practices Guide, ULC, CSA, supervisory personnel and other associated trades

materials include: insulation, cladding, jacketing and finishes, fittings, vapour barriers, soundproofing materials, fasteners, sealants

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-9.01.01L	demonstrate knowledge of material selection for commercial applications	identify ***types of insulation***, their commercial applications and procedures for use
		identify types of ***cladding, jacketing and finishes***, their commercial applications and procedures for use
		identify types of ***vapour barriers***, their commercial applications and describe their importance and procedures for use
		identify hazards of ***materials*** and locations as they pertain to selecting materials for commercial applications
		apply basic geometry related to material selection for commercial applications

RANGE OF VARIABLES

types of insulation include: preformed pipe covering, fibreglass (rigid board, flexible blankets/batts), mineral fibre, elastomeric foam, insulation cement

cladding, jacketing and finishes include: PVC, stainless steel, aluminum, canvas, weatherproof membranes

vapour barriers include: RFFRK, FSK facing, mastics, ASJ, membrane barriers, films

materials include: insulation, cladding, jacketing and finishes, fittings, vapour barriers, soundproofing materials, fasteners, sealants

C-9.02 Performs layout for commercial applications

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-9.02.01P	set up work area	work area is set up large enough to accommodate layout
C-9.02.02P	develop patterns for ***components***	patterns are developed for ***components*** using ***layout tools*** based on calculated dimensions

C-9.02.03P	mark layout	layout is marked using ***layout tools*** to transfer measurements to materials
C-9.02.04P	create template	template is created by cutting out layout

RANGE OF VARIABLES

components include: tees, valves, elbows, laterals, square to round, gores, reducers

layout tools include: dividers, squares, tape measures, calculators, knives, aviation snips, notchers, scratch awls, markers, trammel points

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-9.02.01L	demonstrate knowledge of procedures used to lay out ***materials*** for commercial applications	identify ***materials*** to be laid out for commercial applications
		identify ***types of insulation***, their commercial applications and procedures for use
		identify types of ***cladding, jacketing and finishes***, their commercial applications and procedures for use
		identify types of ***vapour barriers***, their commercial applications and describe their importance and procedures for use
		apply basic geometry related to layout of materials for commercial applications
		describe procedures used to develop patterns for ***components***
		describe procedures used to lay out ***materials*** for commercial applications

RANGE OF VARIABLES

materials include: insulation; cladding, jacketing and finishes, fittings, vapour barriers, soundproofing materials, fasteners, sealants

types of insulation include: preformed pipe covering, fibreglass (rigid board, flexible blankets/batts), mineral fibre, elastomeric foam, insulation cement

cladding, jacketing and finishes include: PVC, stainless steel, aluminum, canvas

vapour barriers include: RFFRK, ASJ, PMC (Protective & Marine Coatings), FSK, mastics

components include: tees, valves, elbows, laterals, square to round, gores, reducers

TASK C-10 Insulates plumbing and mechanical piping systems

TASK DESCRIPTOR

Insulators (heat and frost) insulate plumbing systems such as domestic hot and cold water, rainwater leaders and vent piping. Mechanical piping systems include steam, condensate, heating lines and chilled water. They are insulated for thermal, freeze protection and condensation as well as for personnel safety.

C-10.01 Installs insulation on plumbing and mechanical piping systems

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

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.01.01P	cut pre-formed and flexible insulation	pre-formed and flexible insulation is cut according to measurements to accommodate hangers, valves and elbows
C-10.01.02P	fabricate pipe fittings	pipe fittings are fabricated by measuring, cutting and assembling according to project specifications
C-10.01.03P	secure insulation to piping systems	insulation is secured to piping systems using ***fasteners*** according to ***specifications***

RANGE OF VARIABLES

fasteners include: self-seal laps, tape, wire, banding, staples, adhesives
specifications include: engineered, manufacturers', jurisdictional, TIAC Best Practices Guide

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.01.01L	demonstrate knowledge of procedures used to install insulation on ***plumbing*** and ***mechanical piping systems***	identify ***plumbing systems***, their characteristics and insulation requirements
		identify ***mechanical piping systems***, their characteristics and insulation requirements
		identify pre-formed products, their application and procedures for use

	identify fastening devices and techniques
	describe the procedures used to install insulation on ***plumbing*** and ***mechanical piping systems***

RANGE OF VARIABLES

plumbing systems include: hot, cold, recirculation water, rainwater leaders, vent piping, sanitary drains
mechanical piping systems include: heating, chilled water, refrigeration

C-10.02 Applies vapour barrier on insulated plumbing and mechanical piping systems

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

SKILLS

	Performance Criteria	Evidence of Attainment
C-10.02.01P	measure and cut vapour barrier material	vapour barrier material is measured and cut using ***tools***
C-10.02.02P	wrap insulated pipe	insulated pipe is wrapped while accommodating for hangers, valves and elbows
C-10.02.03P	apply adhesives and tapes to seams and joints	adhesives and tapes are applied to seams and joints to ensure integrity of the seal
C-10.02.04P	trowel, spray or brush vapour barrier onto insulation	vapour barrier is trowelled, sprayed or brushed onto insulation according to ***specifications*** ensuring the integrity of the seal

RANGE OF VARIABLES

tools include: knives, scissors, snips, brushes, trowels
specifications include: engineered, manufacturers', TIAC Best Practices Guide, jurisdictional

KNOWLEDGE

	Learning Outcomes	Learning Objectives
C-10.02.01L	demonstrate knowledge of ***vapour barriers***, their characteristics and applications and the procedures used for installation	identify types of ***vapour barriers*** and describe their characteristics and applications
		describe the importance of vapour barriers on plumbing and mechanical piping systems
		identify ***plumbing systems*** and describe their characteristics

	identify ***mechanical piping systems*** and describe their characteristics
	describe the procedures used to install vapour barriers on ***plumbing*** and ***mechanical piping systems***
	identify types of adhesives and their applications
	identify fastening devices and techniques

RANGE OF VARIABLES

vapour barriers include: ASJ, RFFRK, PMC, mastics
plumbing systems include: hot, cold, recirculation water, rainwater leaders, vent piping, sanitary drains
mechanical piping systems include: heating, chilled water, refrigeration, glycol

C-10.03 Installs cladding, jacketing and finishes on insulated plumbing and mechanical piping systems

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-10.03.01P	cut and shape ***cladding, jacketing and finishes***	***cladding, jacketing and finishes*** are cut and shaped to fit the installed insulation using ***tools and equipment***
C-10.03.02P	secure ***cladding, jacketing and finishes*** to installed insulation	***cladding, jacketing and finishes*** are secured to installed insulation using ***fasteners***
C-10.03.03P	apply and shape cement	cement is applied and shaped to match contour of the pipe as required
C-10.03.04P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

cladding, jacketing and finishes include: ASJ, stainless steel, aluminum, PVC, canvas, lagging, foil scrim kraft (foil skin), cements
tools and equipment include: combination machine (beaders/crimpers), rollers, snips, trowels, tape measures
fasteners include: lagging, screws, banding, PVC welding adhesives, tacks, tape, rivets

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-10.03.01L	demonstrate knowledge of ***cladding, jacketing and finishes***, their purpose and applications	identify types of ***cladding, jacketing and finishes***, and describe their characteristics and applications
		identify ***fasteners*** and describe their characteristics and applications
		identify ***plumbing systems*** and describe their characteristics
		identify ***mechanical piping systems*** and describe their characteristics
C-10.03.02L	demonstrate knowledge of ***procedures*** used to install ***cladding, jacketing and finishes*** on insulated ***plumbing*** and ***mechanical piping systems***	describe ***procedures*** used to install ***cladding, jacketing and finishes*** on insulated ***plumbing*** and ***mechanical piping systems***

RANGE OF VARIABLES

cladding, jacketing and finishes include: ASJ, stainless steel, aluminum, PVC, canvas, lagging, foil scrim kraft (foil skin), cements
fasteners include: lagging, screws, banding, PVC welding adhesives, tacks, tape, rivets
plumbing systems include: hot, cold, recirculation water, rainwater leaders, vent piping, sanitary drains
mechanical piping systems include: heating, chilled water, refrigeration
procedures include: watershed, lap placement, fastening

TASK C-11 Insulates mechanical ducting

TASK DESCRIPTOR

Insulators (heat and frost) insulate mechanical ducting used in heating, venting and air conditioning (HVAC) systems for thermal and acoustic applications and to prevent condensation. Application of a vapour barrier is critical in air conditioning systems.

C-11.01 Installs insulation on mechanical ducting

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.01.01P	cut rigid or flexible ***insulation***	rigid or flexible ***insulation*** is cut according to measurements to accommodate hangers, reducers, transitions, tees and elbows
C-11.01.02P	score rigid ***insulation***	rigid ***insulation*** is scored to allow for bends and curves in ducting
C-11.01.03P	secure rigid or flexible ***insulation*** to mechanical ducting	rigid or flexible ***insulation*** is secured to mechanical ducting using ***fasteners*** and adhesives

RANGE OF VARIABLES

insulation includes: fibreglass (rigid board, flexible blankets/batts), elastomeric foam
fasteners include: pins, clips, foil tape, banding, staples, wire, adhesives

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.01.01L	demonstrate knowledge of installing ***insulation*** on ***mechanical ducting systems***	identify types of ***insulation***, their characteristics and applications
		identify ***mechanical ducting systems***, their characteristics and ***insulation*** requirements
		identify fastening devices and techniques
C-11.01.02L	demonstrate knowledge of the procedures used to install ***insulation*** on ***mechanical ducting systems***	describe the procedures used to install ***insulation*** on ***mechanical ducting systems***

RANGE OF VARIABLES

insulation includes: fibreglass (rigid board, flexible blankets/batts), elastomeric foam
mechanical ducting systems include: conditioned air, outside air, heat, exhaust

C-11.02 Applies vapour barrier on insulated mechanical ducting

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.02.01P	cut ***vapour barrier*** material	***vapour barrier*** material is cut as required
C-11.02.02P	wrap insulated duct	insulated duct is wrapped with ***vapour barrier*** material while accommodating for hangers, transitions, reducers, tees and elbows
C-11.02.03P	apply adhesives and tape to seams and joints	adhesives and tape are applied to seams and joints to ensure integrity of the seal according to ***specifications***
C-11.02.04P	create ***vapour barrier***	***vapour barrier*** is created by rolling, brushing, trowelling and spraying mastics, adhesives and coatings according to ***specifications***

RANGE OF VARIABLES

vapour barriers include: ASJ, RFFRK, tar paper, mastics, weatherproof membranes
specifications include: engineered, manufacturers', jurisdictional, TIAC Best Practices Guide, ULC, CSA

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.02.01L	demonstrate knowledge of the application of ***vapour barrier*** on insulated mechanical ducting	identify types of ***vapour barriers*** and describe their characteristics and applications
		describe the importance of ***vapour barriers*** on mechanical ducting
		identify fastening devices and techniques
		describe procedures used to apply ***vapour barriers*** on insulated mechanical ducting
		identify ***vapour barrier*** requirements

RANGE OF VARIABLES

vapour barriers include: ASJ, RFFRK, tar paper, mastics, weatherproof membranes

C-11.03 Installs cladding, jacketing and finishes on insulated mechanical ducting

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-11.03.01P	cut and shape ***cladding, jacketing and finishes***	***cladding, jacketing and finishes*** are cut and shaped to fit the installed insulation using ***tools and equipment***
C-11.03.02P	secure ***cladding, jacketing and finishes*** to installed insulation	***cladding, jacketing and finishes*** are secured to installed insulation using ***fasteners***
C-11.03.03P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, PVC, canvas, weatherproof membranes

tools and equipment include: combination machine (beaders/crimpers), rollers, snips, sheet metal brake

fasteners include: lagging, screws, banding, PVC welding adhesive, tacks, tape, rivets

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-11.03.01L	demonstrate knowledge of ***cladding, jacketing and finishes***, their characteristics and applications	identify types of ***cladding, jacketing and finishes***, and describe their characteristics and applications
		identify ***fasteners*** and describe their characteristics and applications
		identify ***mechanical ducting systems*** and describe their characteristics
C-11.03.02L	demonstrate knowledge of ***procedures*** used to install ***cladding, jacketing and finishes*** on insulated ***mechanical ducting systems***	describe ***procedures*** used to install ***cladding, jacketing and finishes*** on insulated ***mechanical ducting systems***

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, PVC, canvas, weatherproof membranes
fasteners include: lagging, screws, banding, PVC welding adhesive, tacks, tape, rivets
mechanical ducting systems include: conditioned air, outside air, heat, exhaust
procedures include: watershed, lap placement, fastening, sealants

TASK C-12 Insulates mechanical equipment

TASK DESCRIPTOR

Insulators (heat and frost) insulate mechanical equipment used in mechanical systems for thermal and acoustic applications and to prevent condensation. Application of a vapour barrier is critical to chilled/cold work.

C-12.01 Installs insulation on mechanical equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.01.01P	cut rigid or flexible ***insulation***	rigid or flexible ***insulation*** is cut according to measurements to accommodate irregular surfaces, protrusions, penetrations and hangers
C-12.01.02P	cut lags and score rigid ***insulation***	lags are cut and rigid ***insulation*** is scored to allow for bends and curves in equipment
C-12.01.03P	secure rigid and flexible ***insulation*** to mechanical equipment	rigid and flexible ***insulation*** is secured to mechanical equipment using ***fasteners*** and adhesives according to ***specifications***

RANGE OF VARIABLES

insulation includes: fibreglass (rigid board, flexible blankets/batts), elastomeric foam, cellular glass (foam glass)
fasteners include: pins and clips, foil tape, banding, staples, wire, adhesives
specifications include: engineered, manufacturers', TIAC Best Practices Guide

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.01.01L	demonstrate knowledge of installing ***insulation*** on ***mechanical equipment***	identify types of ***insulation***, their characteristics and applications
		identify types of ***mechanical equipment***, their characteristics and ***insulation*** requirements
C-12.01.02L	demonstrate knowledge of procedures used to install ***insulation*** on ***mechanical equipment***	identify fastening devices and techniques
		describe the procedures used to install ***insulation*** on ***mechanical equipment***

RANGE OF VARIABLES

insulation includes: fibreglass (rigid board, flexible blankets/batts), elastomeric foam, cellular glass (foam glass)
mechanical equipment includes: pumps, fans, tanks, boilers, chillers, condensers, heat exchangers

C-12.02 Applies vapour barrier on insulated mechanical equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.02.01P	cut ***vapour barrier*** material	***vapour barrier*** material is cut as required
C-12.02.02P	wrap insulated equipment with ***vapour barrier*** material	insulated equipment is wrapped with ***vapour barrier*** material while accommodating for irregular shapes, protrusions, penetrations and hangers
C-12.02.03P	apply adhesives and tape to seams and joints	adhesives and tape are applied to seams and joints to ensure integrity of the seal according to ***specifications***
C-12.02.04P	create ***vapour barriers***	***vapour barriers*** are created by rolling, brushing, trowelling and spraying mastics, adhesives and coatings according to ***specifications***

RANGE OF VARIABLES

vapour barriers include: ASJ, RFFRK, tar paper, mastics, films, weatherproof membranes
specifications include: engineered, manufacturers', TIAC Best Practices Guide

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.02.01L	demonstrate knowledge of the application of ***vapour barrier*** on insulated mechanical equipment	identify types of ***vapour barriers*** and describe their importance, characteristics and ***applications***
		identify fastening devices and techniques
		describe procedures used to apply ***vapour barriers*** on insulated mechanical equipment
		identify ***vapour barrier*** requirements

RANGE OF VARIABLES

vapour barriers include: ASJ, RFFRK, tar paper, mastics, films, weatherproof membranes
applications include: sprayed, trowelled, brushed, wrapped

C-12.03 Installs cladding, jacketing and finishes on insulated mechanical equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
C-12.03.01P	cut and shape ***cladding, jacketing and finishes***	***cladding, jacketing and finishes*** are cut and shaped to fit installed insulation using ***tools and equipment***
C-12.03.02P	secure ***cladding, jacketing and finishes*** to installed insulation	***cladding, jacketing and finishes*** are secured to installed insulation using ***fasteners*** and according to ***specifications***
C-12.03.03P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, PVC, canvas, mastic, weatherproof membranes
tools and equipment include: combination machine (beaders/crimpers), snips, lockformer, sheet metal brakes, banding equipment, brushes, rollers, trowels
fasteners include: lagging, screws, banding, PVC welding adhesive, tacks, tape, rivets
specifications include: engineered, manufacturers', TIAC Best Practices Guide

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
C-12.03.01L	demonstrate knowledge of ***cladding, jacketing and finishes***, their characteristics and applications	identify types of ***cladding, jacketing and finishes***, and describe their characteristics and applications
C-12.03.02L	demonstrate knowledge of ***procedures*** used to install ***cladding, jacketing and finishes*** on insulated mechanical equipment	identify ***fasteners*** and describe their characteristics and applications
		describe ***procedures*** used to install ***cladding, jacketing and finishes*** on insulated mechanical equipment

RANGE OF VARIABLES

cladding, jacketing and finishes include: stainless steel, aluminum, PVC, canvas, mastic, weatherproof membranes

procedures include: watershed, lap placement, fastening, sealants

fasteners include: lagging, screws, banding, PVC welding adhesive, tacks, tape, rivets

MAJOR WORK ACTIVITY D

Performs Applications Common to Industrial and Commercial Systems

TASK D-13 Installs fire stop systems

TASK DESCRIPTOR

Fire stopping is designed to compartmentalize fire to one area so that it is easily contained for protection of life, safety and property. It is applied to the structure, building and structural penetrations. It acts as a smoke seal to prevent noxious fumes and smoke from spreading to adjacent areas. All fire stop systems must be installed according to the manufacturer-specific techniques and training requirements.

D-13.01 Identifies approved fire stop system

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-13.01.01P	identify fire rating of structures and the ***materials*** they are made of	fire rating is identified according to drawings and specifications
D-13.01.02P	identify the ***penetrating components*** and their characteristics	***penetrating components*** are identified according to drawings and specifications
D-13.01.03P	take ***measurements*** of annular space	***measurements*** are taken and noted
D-13.01.04P	refer to system guidelines to select fire stop system	fire stop system is appropriate for application according to drawings, specifications and manufacturers' system specifications

RANGE OF VARIABLES

materials include: wood, concrete, steel, drywall, brick, stone

penetrating components include: pipes, duct systems, wall, roof and floor joints, electrical conduit, wires and trays

measurements include: depth, width, length, volume

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.01.01L	demonstrate knowledge of fire stop systems for architectural, structural, mechanical and electrical components	describe purpose and reasons for different types of fire stop applications
		identify ***measurements*** and calculations required for fire stop systems
		identify regulations pertaining to fire stop system installation
		identify types of ***fire stop materials*** used in fire stop systems

RANGE OF VARIABLES

measurements include: depth, width, length, volume

fire stop materials include: caulking, wrap strips, intumescent boards and collars, bricks, pillows, putty, mortar, mineral fiber, foams, cement

D-13.02 Applies fire stop materials to architectural, structural, mechanical and electrical components

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-13.02.01P	calculate materials needed	materials needed are calculated according to ULC fire stop system specifications
D-13.02.02P	mix materials	materials are mixed according to manufacturers' specifications
D-13.02.03P	fill ***voids*** with ***damming materials***	***voids*** are filled with ***damming materials***
D-13.02.04P	wrap, stuff, spray or trowel ***fire stop material*** around architectural, structural, mechanical, and electrical components	***fire stop material*** is wrapped, stuffed, sprayed or trowelled around architectural, structural, mechanical, and electrical components according to material type and substrate, and ULC fire stop system specifications
D-13.02.05P	cut materials	materials are cut using ***cutting tools***
D-13.02.06P	fasten ***fire stop materials***	***fire stop materials*** are fastened using ***tools***
D-13.02.07P	arrange for inspection and verification of fire stops	fire stops are inspected and verified as required by jurisdictional authority

RANGE OF VARIABLES

voids include: abutments, joints, wall and floor penetrations

damming materials include: mineral fiber, ceramic fibre, backer rod

fire stop materials include: caulking, wrap strips, intumescent boards and collars, bricks, pillows, putty, mortar, mineral fiber, foams, cement

cutting tools include: saws, snips, knives

tools include: band tensioners, powder-actuated tools, drills, pin welders, caulking guns, trowels

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-13.02.01L	demonstrate knowledge of applying ***fire stop materials*** to architectural, structural, mechanical, and electrical components	describe purpose and reasons for different types of fire stop applications
		calculate material requirements for fire stop systems
		identify regulations pertaining to fire stop system installation
		identify types of ***fire stop materials***
		describe material application techniques
		identify types of ***cutting tools*** used to cut materials
		identify types of ***tools*** used to fasten materials

RANGE OF VARIABLES

fire stop materials include: caulking, wrap strips, intumescent boards and collars, bricks, pillows, putty, mortar, mineral fiber, foams, cement

cutting tools include: saws, snips, knives

tools include: band tensioners, powder-actuated tools, drills, pin welders, caulking guns, trowels

TASK D-14 Insulates for soundproofing

TASK DESCRIPTOR

Insulation is often applied to industrial/commercial systems solely for the purpose of sound attenuation. Industrial applications include mechanical rooms, piping, turbines, natural gas lines and pumps. Commercial soundproofing applications include recording studios, movie theatres, hotels and mechanical rooms.

D-14.01 Insulates piping for soundproofing

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

SKILLS

	Performance Criteria	Evidence of Attainment
D-14.01.01P	select ***sound deadening materials***	***sound deadening materials*** are selected according to application and service temperatures
D-14.01.02P	cut pre-formed and flexible insulation	pre-formed and flexible insulation is cut according to measurements to accommodate hangers, valves and elbows
D-14.01.03P	secure insulation to piping system	insulation is secured to piping system using ***fasteners***
D-14.01.04P	wrap or cover insulated pipe with ***sound deadening materials***	insulated pipe is covered with ***sound deadening materials*** according to manufacturers' specifications
D-14.01.05P	apply ***finish material***	***finish material*** is applied according to manufacturers' specifications

RANGE OF VARIABLES

sound deadening materials include: lead sheeting, MLV (barium-impregnated material), rigid board, flexible acoustic liners

fasteners include: self-seal laps, tape, wire, banding, staples

finish material includes: aluminum, stainless steel, PVC

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-14.01.01L	demonstrate knowledge of insulating piping for soundproofing and their installation procedures	identify reasons for soundproofing piping
		identify types of piping requiring soundproofing
		identify types of ***sound deadening materials***, their characteristics and applications
		identify types of ***fasteners***, their characteristics and applications
		describe the procedures used to apply ***finish material***

RANGE OF VARIABLES

sound deadening materials include: lead sheeting, MLV (barium-impregnated material), rigid board, flexible acoustic liners
fasteners include: self-seal laps, tape, wire, banding, staples
finish material includes: aluminum, stainless steel, PVC

D-14.02 Insulates turbines, equipment and mechanical systems for soundproofing

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

SKILLS

	Performance Criteria	Evidence of Attainment
D-14.02.01P	select ***sound deadening materials*** and fasteners	***sound deadening materials*** and fasteners are selected according to application and service temperatures
D-14.02.02P	cut rigid or flexible insulation	rigid or flexible insulation is cut according to measurements to fit irregular shapes of turbines and equipment and to fit inside ductwork and plenums
D-14.02.03P	install and secure ***sound deadening materials***	***sound deadening materials*** are installed and secured to wrap or cover insulated turbines and equipment, and to fit inside ductwork and plenums
D-14.02.04P	seal seams with mastic and fabric	seams are sealed with mastic and fabric to ensure material integrity
D-14.02.05P	apply ***finishes***	***finishes*** are applied

RANGE OF VARIABLES

sound deadening materials include: lead sheeting, MLV (barium-impregnated material), rigid board, flexible acoustic liners
finishes include: aluminum, cement, fibreglass cloth with adhesive, mastic

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-14.02.01L	demonstrate knowledge of insulating turbines, equipment and mechanical systems for soundproofing and their installation procedures	identify reasons for soundproofing turbines, equipment and mechanical systems
		describe measuring techniques for installing soundproofing
		describe ***methods*** used to secure insulation

	identify types of ***sound deadening materials***, their characteristics and applications
	identify types of ***finishes***, their characteristics and applications
	describe the procedures used to install soundproofing on turbines, equipment and mechanical systems

RANGE OF VARIABLES

methods include: pin welding, banding, wiring, using hexagonal wire mesh
sound deadening materials include: lead sheeting, MLV (barium-impregnated material), rigid board, flexible acoustic liners
finishes include: aluminum, cement, fibreglass cloth with adhesive, mastic

D-14.03 Fabricates acoustic panels (Not Common Core)

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

SKILLS

	Performance Criteria	Evidence of Attainment
D-14.03.01P	build support structure for panelling	support structure for panelling is built according to building codes and manufacturers' specifications
D-14.03.02P	fill and fasten ***acoustic material*** to the support structure	***acoustic material*** is filled and fastened to the support structure according to manufacturers' specifications
D-14.03.03P	finish panel	panel is finished using ***materials*** according to specifications

RANGE OF VARIABLES

acoustic materials include: mineral wool, mineral fiber, acoustic duct liner, urethane
materials include: vinyls, fabrics, adhesives, perforated metals

KNOWLEDGE

	Learning Outcomes	Learning Objectives
D-14.03.01L	demonstrate knowledge of acoustic panels, their applications and the procedures used to fabricate them	describe the properties of ***acoustic materials***
		describe the ***materials*** and procedures used to fabricate acoustic panels

RANGE OF VARIABLES

acoustic materials include: mineral wool, mineral fiber, acoustic duct liner, urethane
materials include: vinyls, fabrics, adhesives, perforated metals

D-14.04 Installs acoustic panels to ceilings and walls (Not Common Core)

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-14.04.01P	secure acoustic panels to walls and ceilings	acoustic panels are secured to walls and ceilings with ***fasteners***
D-14.04.02P	suspend acoustic panels from walls and ceilings	acoustic panels are suspended from walls and ceilings with hangers, leaving air spaces, according to project and manufacturers' specifications

RANGE OF VARIABLES

fasteners include: pins, adhesives, perforated hangers

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-14.04.01L	demonstrate knowledge of acoustic panels, their applications and installation procedures	identify types of ***fasteners***, their characteristics and applications
		describe the procedures used to install acoustic panels

RANGE OF VARIABLES

fasteners include: pins, adhesives, perforated hangers

TASK D-15 Installs removable covers

TASK DESCRIPTOR

Removable covers are used to minimize heat loss and protect personnel. They also provide fast and easy access to fittings and equipment for maintenance or inspection. Insulators (heat and frost) are responsible for the layout and fabrication of the covers, usually in a shop environment. They must also fit and fasten the covers in the field.

D-15.01 Fabricates removable covers

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.01.01P	draw field sketches	field sketches are drawn according to type of installation
D-15.01.02P	lay out covers	covers are laid out making allowances for laps, lock-formed seams and easy edges, using ***layout tools***
D-15.01.03P	fabricate soft covers	soft covers are fabricated using ***tools***
D-15.01.04P	install ***fastening devices for soft covers***	***fastening devices for soft covers*** are installed according to site specifications
D-15.01.05P	fabricate hard covers	hard covers are fabricated using ***tools***
D-15.01.06P	cut, install, secure and seal insulation in removable covers	insulation is cut, installed, secured and sealed in removable covers according to site specifications
D-15.01.07P	install ***fastening devices for hard covers***	***fastening devices for hard covers*** are installed according to site specifications

RANGE OF VARIABLES

layout tools include: dividers, scratch awls, levels, tape measures, trammel points, squares

tools used to fabricate soft covers include: C-ring pliers, stitch staplers, sewing machines, shears

fastening devices used for soft covers include: lacing anchors, D-rings, hook and loop, draw strings or wire

tools used to fabricate hard covers include: sheet metal brake, lockformer, easy edgers, hand and power tools

fastening devices used for hard covers include: rivets, suitcase latches, screws, hinges, banding

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.01.01L	demonstrate knowledge of removable covers, their applications and the procedures used to fabricate them	identify types of ***layout tools*** used to lay out removable covers
		identify types of ***tools used to fabricate soft covers***
		identify types of ***tools used to fabricate hard covers***
		perform measurements and calculations for materials used to create drawings and fabricate removable covers
		identify types of ***fastening devices used for soft covers***
		identify types of ***fastening devices used for hard covers***
		describe the procedures used to install fastening devices

RANGE OF VARIABLES

layout tools include: dividers, scratch awls, levels, tape measures, trammel points, squares
tools used to fabricate soft covers include: C-ring pliers, stitch staplers, sewing machines, shears
tools used to fabricate hard covers include: sheet metal brake, lockformer, easy edgers, hand and power tools
fastening devices used for soft covers include: lacing anchors, D-rings, hook and loop, draw strings or wire
fastening devices used for hard covers include: rivets, suitcase latches, screws, hinges, banding

D-15.02 Fastens removable covers

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-15.02.01P	fit covers in the field	covers are fit in the field on equipment and fittings
D-15.02.02P	secure covers	covers are secured using ***fastening devices***

RANGE OF VARIABLES

fastening devices include: lacing anchors, hook and loop, draw strings or wire, suitcase latches, banding

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-15.02.01L	demonstrate knowledge of removable covers, their applications and the procedures used to fasten them	describe procedures used to fit covers to equipment and fittings
		identify types of ***fastening devices*** used to secure covers
		describe the procedures used to install ***fastening devices***

RANGE OF VARIABLES

fastening devices include: lacing anchors, hook and loop, draw strings or wire, suitcase latches, banding

TASK D-16 Installs underground insulating systems

TASK DESCRIPTOR

Underground systems are used for convenience and aesthetics, and to transfer products for heating and process piping. Insulators (heat and frost) use various methods to insulate the piping.

D-16.01 Installs pipe insulation to underground systems

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-16.01.01P	cut pre-formed and flexible insulation	pre-formed and flexible insulation is cut according to measurements to accommodate pipe supports, valves and elbows using ***tools and equipment***
D-16.01.02P	secure ***pipe insulation*** to piping system	insulation is secured to piping system using ***fasteners*** according to manufacturers' specifications
D-16.01.03P	apply ***protective membranes***	***protective membranes*** are applied to keep out moisture and dirt according to manufacturers' specifications

RANGE OF VARIABLES

tools and equipment include: saws, tape measures, torches, knives, end nippers
pipe insulation includes: cellular glass, urethane, nano-like materials
fasteners include: self-seal laps, tape, wire, banding
protective membranes include: asphalt-based membrane, fibreglass cloth, resin, mastic

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-16.01.01L	demonstrate knowledge of insulating piping in underground systems and the installation procedures	identify types of ***pipe insulation***, their characteristics and applications
		identify types of ***protective membranes*** for underground systems
		explain expansion and contraction of pipe
		identify hazards and describe procedures for working in confined spaces

RANGE OF VARIABLES

pipe insulation includes: cellular glass, urethane, nano-like materials
protective membranes include: asphalt-based membrane, fibreglass cloth, resin, mastic

D-16.02 Installs pour-in-place and spray-on insulation to underground systems

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
D-16.02.01P	identify product for installation	product is identified according to specifications
D-16.02.02P	calculate volume of insulation required	volume of insulation is calculated according to specifications
D-16.02.03P	build trench box	trench box is built to contain amount of insulation to be poured or sprayed in
D-16.02.04P	apply polyethylene film to forms in trench	polyethylene film is applied to forms in trench
D-16.02.05P	apply insulation to expansion joint	insulation is applied to expansion joint according to specifications
D-16.02.06P	fill trench with ***pour-in-place*** or spray-on insulation	trench is filled to density according to manufacturers' specifications

D-16.02.07P	compact insulation	insulation is compacted as required by manufacturers' specifications using vibration and compaction equipment
D-16.02.08P	apply polyethylene film above insulation	polyethylene film and their empty bags are applied above insulation to protect it from intrusions
D-16.02.09P	coordinate backfill of trench	trench is backfilled with layer of sand to protect insulation from intrusions

RANGE OF VARIABLES

pour-in-place insulation include: diatomaceous earth, polystyrene beads, perlite, hydrophobic pourable insulation

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
D-16.02.01L	demonstrate knowledge of ***pour-in-place insulation*** for underground systems and the procedures used for its installation	identify types of ***pour-in-place insulation***
		describe trenching and formwork requirements related to installing ***pour-in-place insulation*** to underground systems
		identify ***hazards*** associated with working in trenches
		identify application methods for insulation (***pour-in-place*** or spray-on)

RANGE OF VARIABLES

pour-in-place insulation include: diatomaceous earth, polystyrene beads, perlite, hydrophobic pourable insulation

hazards include: cave-ins, gases, limited access/egress

MAJOR WORK ACTIVITY E
Performs Specialized Applications

TASK E-17 Sprays sealers, coatings and spray-on insulation

TASK DESCRIPTOR
Spray-on insulation can be used for a variety of purposes including thermal integrity, fire protection and soundproofing. Preparation of materials and the surrounding work area must be done before spraying begins.

E-17.01 Protects surrounding work area for spraying

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-17.01.01P	cover air vents, piping, electrical panels and trays, and finished products	air vents, piping, electrical panels and trays, and finished products are covered to prevent overspray
E-17.01.02P	overlap and tape ***protective sheeting***	***protective sheeting*** is overlapped and taped to secure according to normal trade practices and specifications

RANGE OF VARIABLES
protective sheeting includes: drop cloths, polyethylene

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-17.01.01L	demonstrate knowledge of protecting work area for spraying sealers, coatings and spray-on insulation	identify types of ***protective sheeting*** used to protect surfaces
		identify types of ***tapes and adhesives***

RANGE OF VARIABLES
protective sheeting includes: drop cloths, polyethylene

tapes and adhesives include: duct tape, tuck tape, masking tape, spray glue contact adhesive, brush-on adhesive

E-17.02 Prepares material, equipment and substrate for spraying

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.02.01P	assemble ***spray equipment***	***spray equipment*** is assembled according to manufacturers' specifications
E-17.02.02P	inspect substrate	substrate is inspected for readiness considering ***factors***
E-17.02.03P	clean and prime substrate	substrate is cleaned and primed to ensure adhesion of spray ***materials*** and prevention of corrosion
E-17.02.04P	mix ***materials*** and load hoppers	***materials*** are mixed and hoppers are loaded according to manufacturers' specifications

RANGE OF VARIABLES

spray equipment includes: airless, two-part guns, hoppers, spray dispenser
factors include: temperature, deficiencies, cleanliness
materials include: polyurethane, cellulose fibre, sealants, coatings, mastics

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-17.02.01L	demonstrate knowledge of preparing material, equipment and substrate for spraying	identify types of ***spray equipment***
		describe procedures used to assemble/disassemble ***spray equipment***
		identify ***factors*** to consider when inspecting substrate
		identify types of ***cleaners*** used to clean substrate
		identify types of ***materials*** used to spray

RANGE OF VARIABLES

spray equipment includes: airless, two-part guns, hoppers, spray dispenser
factors include: temperature, deficiencies, cleanliness
cleaners include: soap and water, tri-sodium phosphate (TSP), methyl ethyl ketone (MEK), methyl hydrate
materials include: polyurethane, cellulose fibre, sealants, coatings, mastics

E-17.03 Installs reinforcing material for spraying

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.03.01P	lay out anchor points	anchor points are laid out in order to fasten ***reinforcing materials*** in place and maintain uniformity according to specifications
E-17.03.02P	fasten and secure anchors	anchors are secured using ***fastening techniques***
E-17.03.03P	attach ***reinforcing materials*** to anchors	***reinforcing materials*** are attached to anchors using ***fasteners***

RANGE OF VARIABLES

reinforcing materials include: glass fabric, poultry wire, expanded metal lath
fastening techniques include: pin welding, bonding, self-adhering
fasteners include: wires, clips/washers, bolts

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-17.03.01L	demonstrate knowledge of installing ***reinforcing materials*** for spraying	describe procedures used to perform a layout
		explain calculation used to develop a layout
		describe ***fastening techniques*** used to secure anchors
		describe procedures used to attach ***reinforcing materials*** to anchors

RANGE OF VARIABLES

reinforcing materials include: glass fabric, poultry wire, expanded metal lath
fastening techniques include: pin welding, bonding, self-adhering

E-17.04 Applies spray-on insulation, coatings and sealers

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-17.04.01P	operate ***spray equipment***	***spray equipment*** is operated according to manufacturers' specifications
E-17.04.02P	spray material evenly applying multiple layers	material is evenly sprayed and multiple layers are applied to achieve thickness according to project specifications and manufacturers' specifications
E-17.04.03P	apply patch coats	patch coats are applied to cover deficiencies
E-17.04.04P	knock down/tamp cellulose fibre	cellulose fibre is knocked down/tamped to required density according to project specifications
E-17.04.05P	apply sealers over sprayed insulation	sprayed insulation is sealed according to manufacturers' specifications
E-17.04.06P	clean area after spraying	area is cleaned using ***techniques***

RANGE OF VARIABLES

spray equipment includes: airless, two-part guns, hoppers, spray dispenser
techniques include: removing overspray, removing protective sheeting, sweeping

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-17.04.01L	demonstrate knowledge of applying spray-on insulation, coatings and sealers	identify types of ***spray equipment*** and their procedures for use
		describe material application techniques

RANGE OF VARIABLES

spray equipment includes: airless, two-part guns, hoppers, spray dispenser

TASK E-18 Installs fireproofing

TASK DESCRIPTOR

Fireproofing is applied to structural components such as beams, shafts and decking to prolong the steel's integrity during fire. Additional training may be required.

E-18.01 Applies fireproofing to architectural, structural, mechanical and electrical components

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-18.01.01P	calculate materials needed	materials needed are calculated according to fireproof system specifications
E-18.01.02P	prepare ***fireproofing materials***	***fireproofing materials*** are prepared according to manufacturers' specifications
E-18.01.03P	fill ***voids*** with ***damming materials***	***voids*** are filled with ***damming materials*** according to manufacturers' specifications
E-18.01.04P	wrap, stuff, spray or trowel material around architectural, structural, mechanical and electrical components	material is wrapped, stuffed, sprayed or trowelled around architectural, structural, mechanical and electrical components according to material type and manufacturers' specifications
E-18.01.05P	cut materials	materials are cut using ***cutting tools*** according to manufacturers' specifications
E-18.01.06P	fasten ***fireproofing materials***	***fireproofing materials*** are fastened using ***tools*** according to manufacturers' specifications
E-18.01.07P	re-establish worksite to original condition	worksite is re-established to original condition
E-18.01.08P	arrange for inspection and verification of fireproofing	fireproofing is inspected and verified as required by jurisdictional authority

RANGE OF VARIABLES

fireproofing materials include: fibre, intumescent wrap, endothermic wrap, cementitious fireproofing material, ceramic blanket, intumescent spray

voids include: abutments, joints, wall and floor penetrations

damming materials include: mineral wool, fibreglass

cutting tools include: saws, snips, knives

tools include: band tensioners, powder-actuated tools, drills, pin welders

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-18.01.01L	demonstrate knowledge of applying fireproofing to architectural, structural, mechanical and electrical components	identify types of materials used in fireproof systems
		describe material application techniques
		identify types of ***cutting tools*** used to cut materials
		identify types of ***tools*** used to fasten materials

RANGE OF VARIABLES

cutting tools include: saws, snips, knives
tools include: band tensioners, powder-actuated tools, drills, pin welders

E-18.02 Applies protective covering to fireproofing materials

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-18.02.01P	cut, fabricate or spray protective covering	protective covering is cut, fabricated or sprayed according to project and manufacturers' specifications
E-18.02.02P	apply protective covering over fireproof material	protective covering is applied over fireproof material using ***fasteners*** according to project and manufacturers' specifications
E-18.02.03P	seal seams	seams are sealed using specified sealants according to project and manufacturers' specifications

RANGE OF VARIABLES

fasteners include: screws, rivets, adhesives, banding

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-18.02.01L	demonstrate knowledge of protective fireproofing materials	identify types of protective covering used to protect fireproofing materials
		describe procedures used to cut protective coverings

	describe procedures used to fabricate protective coverings
	describe procedures used to spray protective coverings
	identify types of ***fasteners*** used to fasten protective coverings

RANGE OF VARIABLES

fasteners include: screws, rivets, adhesives, banding

TASK E-19 Installs insulation for refractory systems

TASK DESCRIPTOR

Insulators (heat and frost) apply insulating materials in refractory (above +815°C/1500°F) applications. The insulation must be properly installed in order to prevent heat loss. Proper fitting insulation in multi-layer refractory applications is crucial to prevent burns and system failure.

E-19.01 Applies insulation to refractory systems

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-19.01.01P	cut ***refractory insulation***	***refractory insulation*** is cut according to project specifications
E-19.01.02P	install cushioning blankets	cushioning blankets are installed to reduce thermal shock and allow for expansion according to project specifications
E-19.01.03P	install insulation with staggered joints	insulation is installed with 100 percent staggered joints to improve efficiency of installation
E-19.01.04P	fasten insulation	insulation is fastened using wire and/or banding

E-19.01.05P	build expansion joints at specified intervals	expansion joints are built at specified intervals using slip joints and different densities of insulation according to project specifications
E-19.01.06P	trowel refractory cement onto inside walls of boilers, incinerators and crucibles	refractory cement is trowelled onto inside walls of boilers, incinerators and crucibles according to specifications

RANGE OF VARIABLES

refractory insulation includes: castable, mortars, high-temperature cements, calcium silicate, ceramic fibre

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-19.01.01L	demonstrate knowledge of insulating refractory systems	identify types of ***refractory insulation***
		explain temperature range of refractory application
		explain expansion and contraction of joints pertaining to refractory systems
E-19.01.02L	demonstrate knowledge of ***procedures*** used to install insulation on refractory systems	describe ***procedures*** used to install insulation on refractory systems
		explain the procedures for elimination of thermal shock

RANGE OF VARIABLES

refractory insulation includes: castable, mortars, high-temperature cements, calcium silicate, ceramic fibre

procedures include: trowelling, pouring, spraying, multi-layer application

E-19.02 Installs reflective systems

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-19.02.01P	provide air space	air space is provided to substrate according to ***specifications***
E-19.02.02P	install ***reflective material*** and insulation to ***components*** using ***fasteners***	***reflective material*** and insulation are installed to ***components*** using ***fasteners*** according to ***specifications***

RANGE OF VARIABLES

specifications include: manufacturers', engineered
reflective material includes: impregnated high-temperature reflective fabrics, stainless steel
components include: high-temperature piping, precipitators, steam drum
fasteners include: latches, wire, screws, rivets, banding, pins, j-hooks

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-19.02.01L	demonstrate knowledge of reflective systems, their applications and the procedures used to install them	identify types of ***reflective material***, their characteristics and applications
		describe the procedures used to install ***reflective material*** using ***fasteners***

RANGE OF VARIABLES

reflective material includes: impregnated high-temperature reflective fabrics, stainless steel
fasteners include: latches, wire, screws, rivets, banding, pins, j-hooks

E-19.03 Installs cladding, jacketing and finishes to refractory systems

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-19.03.01P	cover insulated components with ***cladding, protective jacketing and finishes***	insulated components are covered with ***cladding, protective jacketing and finishes*** to protect from mechanical abuse, environmental conditions and to improve system efficiency according to project specifications
E-19.03.02P	secure ***cladding, protective jacketing and finishes***	***cladding, protective jacketing and finishes*** are secured using ***fasteners*** according to project specifications
E-19.03.03P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

cladding, protective jacketing and finishes include: aluminum, stainless steel, high-temperature (HT) cement, fibreglass cloth

fasteners include: screws, banding, adhesives, rivets, latches

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-19.03.01L	demonstrate knowledge of procedures used to install ***cladding, protective jacketing and finishes*** to refractory systems	identify types of ***cladding, protective jacketing and finishes***
		describe procedures used to install ***cladding, protective jacketing and finishes*** to refractory systems

RANGE OF VARIABLES

cladding, protective jacketing and finishes include: aluminum, stainless steel, high-temperature (HT) cement, fibreglass cloth

TASK E-20 Installs insulation for cryogenic systems

TASK DESCRIPTOR

Insulators (heat and frost) apply insulating materials in cryogenic (below -101°C/-150°F) applications. The insulation must be properly installed in order to prevent thermal exchange. Proper fitting insulation in cryogenic applications is crucial to prevent ice build-up and system failure.

E-20.01 Applies insulation to cryogenic systems

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-20.01.01P	cut insulation for multi-layer applications	insulation is cut for multi-layer applications according to specifications
E-20.01.02P	install insulation with staggered joints	insulation is installed with 100 percent staggered joints to improve efficiency of installation
E-20.01.03P	apply non-setting mastic to the seams of outer layer of insulation	non-setting mastic is applied to the seams of outer layer of insulation to ensure integrity of the vapour barrier according to project specifications
E-20.01.04P	secure insulation	insulation is secured using ***fasteners***
E-20.01.05P	build contraction joints and vapour stops at specified intervals	contraction joints and vapour stops are built at specified intervals using slip joints and different densities of insulation according to specifications

RANGE OF VARIABLES

fasteners include: fibreglass tape, copper wire, banding, adhesive

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-20.01.01L	demonstrate knowledge of cryogenic insulation systems and their applications	identify ***types of insulation*** and their applications
		describe the temperature range of cryogenic applications

		describe the importance of accurate measurements in cryogenic applications
E-20.01.02L	demonstrate knowledge of the ***procedures*** used to apply insulation to cryogenic systems	describe ***procedures*** used to install insulation on cryogenic systems

RANGE OF VARIABLES

types of insulation include: cellular glass, polyurethane, nano-like technology, perlite, oil-free mineral wool

procedures include: pouring, spraying, wrapping, multi-layer application

E-20.02 Applies vapour barrier to insulated components of cryogenic systems

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-20.02.01P	cut ***vapour barrier material***	***vapour barrier material*** is cut according to specifications
E-20.02.02P	wrap insulated pipe with ***vapour barrier material***	insulated pipe is wrapped with ***vapour barrier material***, while accommodating for hangers, valves and elbows
E-20.02.03P	apply adhesives and tape to seams and joints	adhesives and tape are applied to seams and joints to ensure integrity of the seal
E-20.02.04P	complete application of vapour barrier	vapour barrier application is completed by using ***methods*** according to project specifications

RANGE OF VARIABLES

vapour barrier material includes: films, laminates, metals, mastics, sealants

methods using: applying mastics, applying adhesives, applying tapes

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-20.02.01L	demonstrate knowledge of the application of vapour barrier on insulated ***components*** of cryogenic systems	identify types of ***vapour barrier material*** and describe their importance, characteristics and applications
		describe the importance of accurate measurements in cryogenic applications

E-20.02.02L	demonstrate knowledge of the procedures used to apply vapour barrier on insulated ***components*** of cryogenic systems	identify vapour barrier requirements
		describe ***methods*** used to apply ***vapour barrier material*** on insulated ***components*** of cryogenic systems

RANGE OF VARIABLES

components include: pipes, equipment, vessels, tanks
vapour barrier material includes: films, laminates, metals, mastics, sealants
methods using: applying mastics, applying adhesives, applying tapes

E-20.03 Installs cladding, jacketing and finishes to cryogenic systems

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-20.03.01P	cover insulated components in cryogenic applications with ***cladding, protective jacketing and finishes***	insulated components in cryogenic applications are covered with ***cladding, protective jacketing and finishes*** to provide protection of insulation system
E-20.03.02P	secure ***cladding, protective jacketing and finishes***	***cladding, protective jacketing and finishes*** are secured using ***fasteners***
E-20.03.03P	apply sealant to seams	sealant is applied to seams as required according to project specifications

RANGE OF VARIABLES

cladding, protective jacketing and finishes include: aluminum, stainless steel, PVC, mastic
fasteners include: banding, adhesives, latches

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-20.03.01L	demonstrate knowledge of the procedures used to install ***cladding, protective jacketing and finishes*** to cryogenic systems	identify types of ***cladding, protective jacketing and finishes***
		describe procedures used to install ***cladding, protective jacketing and finishes*** to cryogenic systems
		identify types of ***fasteners*** used to install ***cladding, protective jacketing and finishes*** to cryogenic systems

RANGE OF VARIABLES

cladding, protective jacketing and finishes include: aluminum, stainless steel, PVC, mastic
fasteners include: banding, adhesives, latches

TASK E-21 Insulates for marine applications (Not Common Core)

TASK DESCRIPTOR

Bulkheads, deckheads and hulls in marine applications may be insulated for thermal integrity, fire proofing and noise attenuation. Insulators (heat and frost) also work on piping, ducting, fire stopping and exhaust pipes on marine applications. The activities covered in this task are those unique to marine applications.

E-21.01 Insulates bulkheads, deckheads and hulls (Not Common Core)

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
E-21.01.01P	apply welded pins to bulkheads, deckheads and stiffeners	welded pins are applied to bulkheads, deckheads and stiffeners according to project specifications
E-21.01.02P	apply z-bar to stiffeners	z-bar is applied to stiffeners for fireproofing bulkheads using powder-actuated tools according to project specifications

E-21.01.03P	cut insulation	insulation is cut using ***cutting tools*** according to measurements, penetrations, protrusions and irregular shapes to accommodate insulation
E-21.01.04P	apply and position insulation	insulation is applied and positioned according to measurements, penetrations, protrusions and irregular shapes
E-21.01.05P	secure insulation with ***fasteners*** on pins	insulation is secured with ***fasteners*** on pins according to insulation type, thermal expansion, mechanical vibration and project specifications
E-21.01.06P	seal seams and clips with tape	seams and clips are sealed with tape according to project and manufacturers' specifications
E-21.01.07P	install and secure wire mesh or perforated metal over insulation	wire mesh or perforated metal is installed and secured over insulation using ***fasteners*** according to project specifications

RANGE OF VARIABLES

cutting tools include: hand saws, knives
fasteners include: dome caps, washers, speed clip

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
E-21.01.01L	demonstrate knowledge of insulating bulkheads, deckheads and hulls	identify types of ***cutting tools*** and procedures used to cut insulation
		define terminology related to marine applications
		identify ***specifications*** related to marine applications
		describe procedures used to fasten insulation
		describe procedures used to fasten wire mesh
		identify ***fire-rated systems*** used to fireproof bulkheads, deckheads and hulls

RANGE OF VARIABLES

cutting tools include: hand saws, knives
specifications include: coast guard, project, manufacturers', ULC
fire-rated systems include: A60, A90, H120

E-21.02 Installs cladding, jacketing and finishes on marine applications (Not Common Core)

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

SKILLS

	Performance Criteria	Evidence of Attainment
E-21.02.01P	apply fibreglass cloth to deckhead and bulkhead insulation	fibreglass cloth is applied to deckhead and bulkhead insulation
E-21.02.02P	apply top coat of lagging adhesive to fibreglass cloth	top coat of lagging adhesive is applied to fibreglass cloth to seal pores
E-21.02.03P	apply protective perforated metal finish over insulation and secure with ***fasteners***	protective perforated metal finish is applied over insulation and secured with ***fasteners***
E-21.02.04P	install metal cladding over insulation and secure to z-bar with ***fasteners***	metal cladding is installed over insulation and secured to z-bar using ***fasteners*** according to project specifications

RANGE OF VARIABLES

fasteners include: dome caps, washers, clips, rivets, screws

KNOWLEDGE

	Learning Outcomes	Learning Objectives
E-21.02.01L	demonstrate knowledge of the procedures used to install ***cladding, protective jacketing and finishes*** on marine applications	identify types of ***cladding, protective jacketing and finishes*** on marine applications
		describe procedures used to install ***cladding, protective jacketing and finishes*** on marine applications
		identify types of ***fasteners*** used to install ***cladding, protective jacketing and finishes*** on marine applications

RANGE OF VARIABLES

cladding, protective jacketing and finishes include: stainless steel, aluminum, fibreglass cloth
fasteners include: dome caps, washers, clips, rivets, screws

MAJOR WORK ACTIVITY F

Performs Asbestos, Lead and Mould Abatement

TASK F-22 Prepares for asbestos abatement

TASK DESCRIPTOR

Because of the severe health risks associated with asbestos-related products, any potential for airborne contamination must be mitigated. Extreme precautions must be taken in preparation for removal or encapsulation of asbestos.

F-22.01 Determines required personal protective equipment (PPE) for asbestos abatement

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-22.01.01P	determine level of risk	level of risk is determined according to the ***classification of asbestos abatement***
F-22.01.02P	select ***PPE***	***PPE*** is selected according to the ***classification of asbestos abatement***

RANGE OF VARIABLES

classifications of asbestos abatement are: type I, II, III; low, moderate, high
PPE includes: respirators, disposable coveralls, gloves, disposable booties, eye protection

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-22.01.01L	demonstrate knowledge of ***PPE*** used for asbestos abatement, their applications and procedures for use	identify ***classifications of asbestos abatement***
		identify types of ***PPE*** used for asbestos abatement
		describe applications and limitations of ***PPE*** used for asbestos abatement

		identify decontamination requirements for ***PPE*** used with asbestos abatement
		identify storage, cleaning and maintenance for ***PPE***
F-22.01.02L	demonstrate knowledge of regulations pertaining to asbestos abatement	identify and implement the health and safety ***regulations*** and responsibilities with respect to asbestos abatement
		identify and implement the health and safety ***regulations*** and responsibilities with respect to the use of ***PPE*** for asbestos abatement

RANGE OF VARIABLES

PPE includes: respirators, disposable coveralls, gloves, disposable booties, eye protection
classifications of asbestos abatement are: type I, II, III; low, moderate, high
regulations include: Occupational Health and Safety (OH&S), WHMIS, jurisdictional

F-22.02 Retrieves sample of asbestos for testing

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

SKILLS

	Performance Criteria	Evidence of Attainment
F-22.02.01P	treat all bulk samples as positive for asbestos until proven otherwise	all bulk samples are treated as positive for asbestos until proven otherwise
F-22.02.02P	isolate area from public access while taking sample	area is isolated from public access while taking sample
F-22.02.03P	take sample	sample is taken using ***sampling tools*** while minimizing disturbance to the substance to avoid making the asbestos friable
F-22.02.04P	document ***sampling information***	***sampling information*** is documented according to laboratory specifications and jurisdictional regulations
F-22.02.05P	identify and apply temporary seal	temporary seal is identified and applied to encapsulate location from where sample was taken

RANGE OF VARIABLES

sampling tools include: glove bags, hand tools, spray bottle with amended water, sample bag
sampling information includes: date and time taken, line number, who took the sample, location, chain of evidence

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-22.02.01L	demonstrate knowledge of retrieving sample of asbestos	identify ***materials used for temporary enclosures***
		identify types of ***temporary enclosures***
		identify types of containment devices for asbestos samples
		identify ***sampling information*** required to document sample
		identify the types of asbestos and their characteristics
		identify procedures for collection of samples
F-22.02.02L	demonstrate knowledge of ***regulations*** pertaining to asbestos abatement	identify and implement the health and safety ***regulations*** and responsibilities with respect to the removal of asbestos and containment sites
		describe personal health and medical issues relating to asbestos

RANGE OF VARIABLES

materials used for temporary enclosures include: studs and polyethylene, control cubes
temporary enclosures include: glove bags, barriers, hoarding
sampling information includes: date and time taken, line number, who took the sample, location, chain of evidence
regulations include: OH&S, WHMIS, jurisdictional

F-22.03 Determines scope of work

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-22.03.01P	determine amount of asbestos to be removed, enclosed or encapsulated	amount of asbestos to be removed, enclosed or encapsulated is determined according to sample results and project scope
F-22.03.02P	assess level of risk	level of risk is assessed according to the ***classification of asbestos abatement***
F-22.03.03P	select ***materials*** required for abatement	***materials*** required for abatement are selected according to type and form of asbestos application

F-22.03.04P	select ***tools and safety equipment*** required for abatement	***tools and safety equipment*** are selected according to type and form of asbestos application
F-22.03.05P	determine disposal method of contaminated waste	disposal method of contaminated waste is determined according to environmental and jurisdictional regulations

RANGE OF VARIABLES

classifications of asbestos abatement are: type I, II, III; low, moderate, high

materials include: polyethylene, studs, tape, adhesive, fasteners

tools and safety equipment include: manometer, aviation snips, negative air machines, glove bags, High Efficiency Particulate Air (HEPA) vacuum, fall protection equipment, PPE

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-22.03.01L	demonstrate knowledge of determining scope of work required for asbestos abatement	identify ***classifications of asbestos abatement***
		identify ***materials*** required for abatement
		identify ***tools and safety equipment*** required for abatement
F-22.03.02L	demonstrate knowledge of ***regulations*** pertaining to asbestos abatement	identify and implement the health and safety ***regulations*** and responsibilities with respect to the disposal of asbestos and ***other products***

RANGE OF VARIABLES

classifications of asbestos abatement are: type I, II, III; low, moderate, high

materials include: polyethylene, studs, tape, adhesive, fasteners

tools and safety equipment include: manometer, aviation snips, negative air machines, glove bags, High Efficiency Particulate Air (HEPA) vacuum, fall protection equipment, PPE

regulations include: OH&S, WHMIS, jurisdictional

other products include: disposable coveralls, filters, gloves, rags

F-22.04 Prepares site for removal and containment of asbestos

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

SKILLS

	Performance Criteria	Evidence of Attainment
F-22.04.01P	determine requirements for decontamination	requirements for decontamination are determined according to type of removal
F-22.04.02P	segregate area	area is segregated using asbestos signage at all access points pertaining to asbestos removal type
F-22.04.03P	pre-clean work area	work area is pre-cleaned according to ***regulations*** and type of removal
F-22.04.04P	plan access routes for disposal	access routes for disposal are planned considering ***factors***
F-22.04.05P	locate requirements for decontamination for high risk removals	requirements for decontamination are located for high risk removals according to ***regulations***
F-22.04.06P	display documentation of hazard assessment	documentation of hazard assessment is displayed according to ***regulations***

RANGE OF VARIABLES

regulations include: OH&S, WHMIS, jurisdictional
factors include: clean and clear line of sight, shortest distance possible

KNOWLEDGE

	Learning Outcomes	Learning Objectives
F-22.04.01L	demonstrate knowledge of preparing site for removal and containment of asbestos	identify ***regulations*** pertaining to the requirements for decontamination
		describe the procedures used to secure work area
F-22.04.02L	demonstrate knowledge of ***regulations*** pertaining to the removal and containment of asbestos	identify and implement the ***regulations*** and responsibilities with respect to the removal and containment of asbestos

RANGE OF VARIABLES

regulations include: OH&S, WHMIS, jurisdictional

F-22.05 Builds temporary enclosure

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-22.05.01P	construct sealed containment area	sealed containment area is constructed using ***materials***
F-22.05.02P	set up ground-fault circuit interrupter (GFCI) panel	GFCI panel is set up for power supply to temporary lighting, negative air machine and hot water tanks
F-22.05.03P	maintain decontamination facilities	decontamination facilities are maintained by keeping the area clean, monitoring and maintenance
F-22.05.04P	determine location of negative air machines and establish levels	location of negative air machine is determined and levels are established according to jurisdictional regulations
F-22.05.05P	ensure there is a backup negative air machine in case of failure	backup negative air machine is present and in working order

RANGE OF VARIABLES

materials include: polyethylene, studs, tape, adhesives, fasteners

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-22.05.01L	demonstrate knowledge of building temporary enclosure	identify ***materials*** used to construct containment area
		identify types of ***temporary enclosures***
		identify equipment used in asbestos abatement
		determine required number of negative air machines and their locations
F-22.05.02L	demonstrate knowledge of electrical safety pertaining to asbestos abatement	identify electrical safety risks
F-22.05.03L	demonstrate knowledge of ***regulations*** pertaining to the containment of asbestos	identify and implement ***regulations*** and responsibilities with respect to the containment of asbestos

RANGE OF VARIABLES

materials include: polyethylene, studs, tape, adhesives, fasteners
temporary enclosures include: glove bags, barriers, hoarding
regulations include: OH&S, WHMIS, jurisdictional

TASK F-23 Performs asbestos removal procedures

TASK DESCRIPTOR

Asbestos must be removed with extreme caution and according to regulations.

F-23.01 Removes asbestos

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-23.01.01P	wet and wash down asbestos-related products with amended water	asbestos-related products are wetted and washed down with amended water using an airless sprayer so asbestos is not friable
F-23.01.02P	use glove bags or enclosure	glove bags or enclosure are used to allow removal of the asbestos with ***tools*** according to ***regulations***
F-23.01.03P	maintain negative air pressure according to ***regulations***	negative air pressure is maintained from operation and continuous monitoring and maintenance
F-23.01.04P	maintain asbestos removal equipment	asbestos removal equipment is maintained by changing filters
F-23.01.05P	place asbestos in double bags and seal the bags	asbestos is placed in bags according to double bag procedures, labelled and sealed by goosenecking and taping

RANGE OF VARIABLES

tools include: HEPA vacuum, hoses, wire brushes, scrapers, knives, snips, airless spray machines, shovels, brooms
regulations include: OH&S, WHMIS, jurisdictional

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-23.01.01L	demonstrate knowledge of procedures used for removing asbestos	describe methods used for asbestos removal
		identify types of ***tools*** and equipment used for asbestos removal
		describe method used to take an air sample
		describe procedures used for hot and cold removal
F-23.01.02L	demonstrate knowledge of ***regulations*** pertaining to the removal of asbestos	identify and implement the ***regulations*** and responsibilities with respect to the removal of asbestos

RANGE OF VARIABLES

tools include: HEPA vacuum, hoses, wire brushes, scrapers, knives, snips, airless spray machines, shovels, brooms

regulations include: OH&S, WHMIS, jurisdictional

F-23.02 Disposes of asbestos materials

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-23.02.01P	decontaminate bags of asbestos	bags of asbestos are decontaminated in preparation for disposal and transport
F-23.02.02P	carry bags of asbestos using a clean and clear line of sight to designated area	bags of asbestos are carried to designated area according to ***regulations***
F-23.02.03P	verify vehicle transporting asbestos has warning placards	vehicle transporting asbestos has warning placards posted according to jurisdictional regulations
F-23.02.04P	transport bags of asbestos to disposal location	bags of asbestos are transported to disposal location according to ***regulations***
F-23.02.05P	unload bags of asbestos at disposal location	bags of asbestos are unloaded at disposal location according to facility safe work practice

RANGE OF VARIABLES

regulations include: OH&S, WHMIS, jurisdictional

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-23.02.01L	demonstrate knowledge of procedures used for disposal of asbestos	describe methods used for disposal of asbestos
		identify precautions required for removal
F-23.02.02L	demonstrate knowledge of ***regulations*** pertaining to the disposal of asbestos	identify and implement the ***regulations*** and responsibilities with respect to the disposal of asbestos

RANGE OF VARIABLES

regulations include: OH&S, WHMIS, jurisdictional

F-23.03 Performs decontamination of area and equipment

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-23.03.01P	wet down asbestos-related products with amended water	asbestos-related products are wetted with amended water to ensure there is no friable asbestos
F-23.03.02P	apply encapsulant to site and area after removal of asbestos	encapsulant is applied to site and area after removal of asbestos using ***tools and equipment***
F-23.03.03P	wash down and clean ***tools and equipment*** with amended water	***tools and equipment*** are washed down and cleaned with amended water before removal from the site
F-23.03.04P	follow personnel decontamination procedures	personnel decontamination procedures are followed according to classification of asbestos abatement
F-23.03.05P	remove and dispose of temporary enclosures	temporary enclosures are removed and disposed of according to ***regulations***
F-23.03.06P	re-establish site to original condition	site is re-established to original condition

RANGE OF VARIABLES

tools and equipment include: airless sprayer, pump sprayer, shower system, waste water filter system, disposal bags, HEPA vacuum

regulations include: OH&S, WHMIS, jurisdictional

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-23.03.01L	demonstrate knowledge of procedures used for decontaminating area and equipment	describe procedures used to decontaminate area
		describe procedures used to decontaminate equipment
		describe procedures used to decontaminate personnel
		describe method used to take an air sample
F-23.03.02L	demonstrate knowledge of ***regulations*** pertaining to the decontamination of area and equipment	identify and implement the ***regulations*** and responsibilities with respect to the decontamination of area and equipment

RANGE OF VARIABLES

regulations include: OH&S, WHMIS, jurisdictional

TASK F-24 Performs maintenance and repair

TASK DESCRIPTOR

If asbestos is deemed to be encapsulated or enclosed, the asbestos must be contained so that the fibres do not become friable. Enclosing asbestos involves boxing it in with material such as metal or drywall. Encapsulating the asbestos entails applying variations of penetrating sealants, sprays, jacketing or lagging canvas to asbestos to prevent airborne contaminants.

F-24.01 Encapsulates asbestos

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-24.01.01P	select ***encapsulant materials***	***encapsulant materials*** are selected according to task at hand
F-24.01.02P	prepare encapsulant	encapsulant is prepared according to manufacturers' specifications

F-24.01.03P	apply encapsulant	encapsulant is applied according to manufacturers' specifications using ***tools and equipment***
F-24.01.04P	label encapsulated area with asbestos warning label	encapsulated area is labelled with asbestos warning label

RANGE OF VARIABLES

encapsulant materials include: mastic, jacketing, sealants, coatings
tools and equipment include: airless sprayer, brush, cutting tools, trowels

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-24.01.01L	demonstrate knowledge of procedures used to encapsulate asbestos	identify situations that require encapsulating asbestos
		identify types of ***encapsulant materials***
		identify types of ***tools and equipment*** used to apply ***encapsulant materials***
		describe procedures used to apply ***encapsulant materials***
F-24.01.02L	demonstrate knowledge of ***regulations*** pertaining to the encapsulation of asbestos	identify and implement the ***regulations*** and responsibilities with respect to the encapsulation of asbestos
		explain the purpose of labelling encapsulated area with asbestos warning

RANGE OF VARIABLES

encapsulant materials include: mastic, jacketing, sealants, coatings
tools and equipment include: airless sprayer, brush, cutting tools, trowels
regulations include: OH&S, WHMIS, jurisdictional

F-24.02 Encloses asbestos

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-24.02.01P	determine ***method of repair***	***method of repair*** is determined according to ***factors***
F-24.02.02P	design and build permanent enclosure around asbestos	permanent enclosure around asbestos is designed and built using ***materials***

F-24.02.03P	seal all seams	seams are sealed to ensure the enclosure is air tight
F-24.02.04P	verify enclosure is structurally sound	enclosure is structurally sound according to good building practices
F-24.02.05P	label enclosure with asbestos warning labels and post warnings at all entries	enclosure is labelled with asbestos warning labels and warnings are posted at all entries according to ***regulations***

RANGE OF VARIABLES

method of repair includes: boxing, covering, taping
factors include: type of asbestos, abatement classification, size of project
materials include: drywall, plywood, aluminum, studs, fasteners
regulations include: OH&S, WHMIS, jurisdictional

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-24.02.01L	demonstrate knowledge of procedures used to enclose asbestos	identify situations that require enclosing asbestos
		determine ***method of repair*** based on ***factors***
		identify types of ***materials*** used to build enclosure around asbestos
F-24.02.02L	demonstrate knowledge of ***regulations*** pertaining to the enclosure of asbestos	identify and implement the ***regulations*** and responsibilities with respect to the enclosure of asbestos
		explain the purpose of labelling enclosure with asbestos warning

RANGE OF VARIABLES

method of repair includes: boxing, covering, taping
factors include: type of asbestos, abatement classification, size of project
materials include: drywall, plywood, aluminum, studs, fasteners
regulations include: OH&S, WHMIS, jurisdictional

TASK F-25 Performs lead abatement and mould remediation

TASK DESCRIPTOR

There are known health risks associated with products that contain lead or are contaminated with mould. Extra precautions must be taken in lead abatement and mould remediation.

F-25.01 Performs lead abatement

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-25.01.01P	arrange for identification of lead and content	lead and content are identified by third party in parts per million
F-25.01.02P	identify the scope of lead abatement and disturbance	scope of lead and abatement and disturbance are identified according to project scope
F-25.01.03P	identify ***PPE***	***PPE*** is identified according to task at hand
F-25.01.04P	remove identified lead	lead is removed according to jurisdictional guidelines
F-25.01.05P	complete lead disposal	lead disposal is completed according to jurisdictional guidelines
F-25.01.06P	test area to ensure successful lead abatement	air or contact sampling is completed and measured to ensure successful lead abatement according to jurisdictional guidelines
F-25.01.07P	re-establish worksite to original condition	worksite is re-established to original condition

RANGE OF VARIABLES

PPE includes: respirators and filters, gloves, disposable coveralls, booties

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-25.01.01L	demonstrate knowledge of lead, its health risks and abatement procedures	identify lead and its health risks
		identify health and safety exposure limits
		identify jurisdictional guidelines
		identify lead abatement procedures

F-25.02 Performs mould remediation

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

	SKILLS	
	Performance Criteria	**Evidence of Attainment**
F-25.02.01P	arrange for identification of mould and type	mould and type are identified by third party
F-25.02.02P	identify scope of mould remediation and/or clean-up	scope of mould remediation and/or clean-up are identified
F-25.02.03P	identify ***PPE***	***PPE*** is identified based on scope of mould remediation and/or clean-up
F-25.02.04P	perform mould remediation	mould remediation is performed according to jurisdictional guidelines
F-25.02.05P	complete mould disposal	mould disposal is completed according to jurisdictional guidelines
F-25.02.06P	test area to ensure successful mould remediation	samples are completed and measured to jurisdictional guidelines to ensure successful mould remediation
F-25.02.07P	encapsulate porous ***substrate***	porous ***substrate*** is encapsulated
F-25.02.08P	re-establish worksite to original condition	worksite is re-established to original condition

RANGE OF VARIABLES

PPE includes: respirators, rubber gloves, disposable coveralls, rubber boots
substrates include: drywall, wood, canvas, insulation, concrete, soil

	KNOWLEDGE	
	Learning Outcomes	**Learning Objectives**
F-25.02.01L	demonstrate knowledge of mould remediation, its health risks and procedures for remediation	identify mould remediation and its health risks
		identify health and safety exposure limits
		identify jurisdictional guidelines
		identify mould remediation procedures
		identify environment and ***substrates*** that support mould growth

RANGE OF VARIABLES

substrates include: drywall, wood, canvas, insulation, concrete, soil

APPENDIX A
ACRONYMS

ASJ	all service jacket
CAD	computer assisted drawing
CNC	Computer Numerical Control
CSA	Canadian Standards Association
FSK	foil scrim kraft
GFCI	ground-fault circuit interrupter
HEPA	high efficiency particulate air
HT	high-temperature
HVAC	heating, venting and air conditioning
LEED	Leadership in Energy and Environmental Design
MEK	methyl ethyl ketone
MLV	mass-loaded vinyl
OH&S	Occupational Health and Safety
PMC	Protective & Marine Coatings
PPE	personal protective equipment
PVC	polyvinyl chloride
RFFRK	reinforced foil flame retardant kraft
TIAC	Thermal Insulation Association of Canada
TSP	trisodium phosphate
ULC	Underwriters Laboratories of Canada
VOC	volatile organic compound
WHMIS	Workplace Hazardous Materials Information System
WIP	work in progress

APPENDIX B
TOOLS AND EQUIPMENT

Hand Tools / Outils à main

aviation snips (M1, M2, M3)	cisailles de type aviation (M1, M2, M3)
band tensioners (ratchet, pistol, jacks, sealers, tighteners)	tendeurs de bandes (rochet, pistolet, crics, produits d'étanchéité, tendeurs)
brooms	balais
bull snips	cisailles à long manche
bungee cords	tendeurs élastiques
caulking guns	pistolets à calfeutrer
chisels	burins
clamps	brides
duck bill pliers (hand brakes, folding pliers)	pinces à bec-de-canard (sertisseuses manuelles droites, pinces plieuses)
end nippers	pinces coupantes en bout
foam guns	pistolets à mousse
hammers	marteaux
hog ring pliers/C-ring pliers	pinces pour anneau ouvert
knives and sheaths	couteaux et étuis
levels	niveaux
locking pliers	pinces-étaux
notchers	encocheuses
paint brushes	pinceaux
paint rollers	rouleaux à peinture
pliers	pinces
rakes	râteaux
rasps	râpes
rivet guns	pistolets à riveter
rubber bands	bande de caoutchouc
saws (keyhole and hand)	scies (à lame étroite et à main)
scissors	ciseaux
scrapers	grattoirs
scratch awls	pointes à tracer
screwdrivers	tournevis
shovels	pelles
staple guns (flare, standard, hammer)	pistolets agrafeurs (pneumatique, standard, marteau agrafeur)
tape measure	ruban à mesurer
thickness gauges	jauges d'épaisseur
tie-down straps	sangles
tool pouches	porte-outils
trowels (pointer and flat)	truelles (pointues et plates)
whitney punch	emporte-pièce
wire brush	brosse métallique

Power Tools / Outils mécaniques

circular saws	scies circulaires
drills (cordless and electric)	perceuses (électriques avec et sans fil)
extension cords	rallonges électriques
grinders	meuleuses
jig saws	scies sauteuses
mitre saws	scies à onglets
mixers (paddle/aerator drills)	mélangeurs (à palettes de mélange, à aérateur)
nibblers	grignoteuse
pin guns	pistolets de soudage de goujons
pin welders	soudeuses à tiges de métal
pneumatic tools	outils pneumatiques
powder-actuated tools	outils à charge explosive
pump sprayers	pulvérisateurs à pompe
stud guns	machines à goujons
stud welders	soudeuses de goujons
torches (roofing, tiger)	chalumeaux (toitures, buses)

Equipment / Équipement

band cutting machines	machines à couper les bandes
band saws	scies à ruban
brakes	plieuses de feuilles
electric combination machines	machines à former universelles électriques
electric rollers	rouleaux électriques
electric shears	cisailles électriques
foot operated shears (guillotine)	cisailles à pédale (guillotine)
High Efficiency Particulate Air (HEPA) vacuum	aspirateur à filtre HEPA
lock formers	machines à former des agrafes
manual combination machines (beader/crimper)	machines à former universelles manuelles (machine à boudiner et à sertir)
manual easy edgers	machines à finir les bords manuelles
manual roller (slip, non-slip)	rouleau manuel (à glissement, antidérapant)
mixers (hopper, cement)	mélangeurs (trémie, à ciment)
negative air machines	appareil à air négatif
safety edge machines (seamers, bar folders)	machines à façonner les bords de sécurité (sertisseuses, barres à souder)
sewing machines	machines à coudre
slitters	refendeuses en long

Layout Equipment / Outils de traçage

calculators	calculatrices
chalk lines	cordeaux à craie
circumference rule	règle de circonférence
circumference tape	ruban circonférentiel
compasses	compas
dividers	compas à pointes sèches
felt pens	crayons-feutres
levels	niveaux
mitre charts	tableaux des segments
trammel points	pointes de compas à verge

Spray Equipment / Équipement de pulvérisation

airless sprayers	pistolets-pulvérisateurs sans air
froth packs	mousse d'étanchéité Froth-Pak
hopper guns	pistolets à trémie
hoses	tuyaux flexibles
nozzles	becs
spray pumps	pompes de pulvérisation
sprayers	pulvérisateurs
tip cleaners	nettoyeurs de buse

Access Equipment / Équipement d'accès

aerial lifts	nacelles élévatrices
aerial platforms	plateformes élévatrices
garage creepers	sommiers roulants
ladders	échelles
rope access	accès par corde
scaffolding	échafaudage
scissor lifts	plateformes élévatrices à ciseaux
swing stages	échafaudages volants

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

chemical suits	combinaisons chimiques
disposable booties	couvre-chaussures jetables
disposable masks	masques jetables
disposable, impervious coveralls	combinaisons imperméables jetables
eye protection (goggles, safety glasses)	protecteurs oculaires (lunettes-masque, lunettes de sécurité)
eye wash stations	douches oculaires
face shields	écrans faciaux
fall arrest equipment	équipement de protection antichute
fire and chemical resistant coveralls	combinaisons résistantes au feu et aux produits chimiques
first aid kits	trousses de premiers soins
gloves	gants
hard hats	casques de sécurité
hearing protection	protecteurs d'oreilles
heat stress aids	trousses de contrainte thermique
knee pads	genouillères
radiation protection suits	combinaisons de protection contre les rayonnements
reflective vests	gilets à bandes réflectrices
respirators and filters	appareils respiratoires et filtres
safety boots	bottes de sécurité
traction aids	dispositifs d'adhérence
travel restraint equipment	équipement de restriction des déplacements
warning tapes	rubans de signalisation
wet bulb thermometers	thermomètres à bulbe humide
wristlets	serre-poignets

APPENDIX C
GLOSSARY / GLOSSAIRE

abatement	to become less severe or widespread; in this analysis, refers to asbestos, lead removal, enclosure or encapsulation in order to minimize health risks	**désamiantage**	action de réduire la quantité d'amiante; dans la présente norme, ce terme se rapporte à l'enlèvement, au confinement et à l'encapsulage de l'amiante pour en réduire les risques pour la santé
acoustic	sound absorption	**acoustique**	absorption sonore
amended water	water to which a surfactant (wetting agent) has been added to increase the ability to penetrate the asbestos insulation	**eau contenant un surfactant**	eau dans laquelle un surfactant (agent mouillant) a été ajouté pour augmenter la capacité à pénétrer l'isolant d'amiante
barium-impregnated material	dense material used in soundproofing	**matériau imprégné de baryum**	matériau dense utilisé en insonorisation
bulkhead	any vertical partition separating compartments on a ship	**cloison**	toute séparation verticale servant à diviser les compartiments d'un navire
cladding	covering applied to insulation as a protective or decorative cover	**revêtement**	gaine posée sur l'isolant pour le couvrir (protection ou décoration)
deckhead	under side of a ship's deck viewed from below the ceiling	**plafond (maritime)**	sous-face d'un pont d'un navire vue d'en dessous
encapsulate	applying sealants or sprays to prevent airborne contaminants	**encapsuler**	appliquer des scellants ou des produits à vaporiser pour éviter les contaminants atmosphériques
enclose	to box in, using materials such as metal or drywall	**confiner**	murer avec du matériel comme du métal ou des plaques de plâtre
fire stopping	compartmentalizing to prevent spread of smoke, gases and fire	**coupe-feu**	qualité de ce qui empêche la propagation de la fumée et du feu
fireproofing	protecting material from burning	**ignifugation**	traitement qui vise à protéger le matériau contre le feu

foil scrim kraft (foil skin)	layered reinforcing consisting of a outer aluminium foil with fibreglass scrim (fibres) in the centre and an inner layer of kraft paper; it is applied to the insulation and comes in rolls to tape seams in insulation	**papier métallisé (pellicule en aluminium)**	renfort stratifié dont l'extérieur est composé d'un papier en aluminium, le centre d'armure de fibre de verre et la couche intérieure de papier kraft; on l'applique à l'isolant; le produit se vend en rouleau et sert à coller les joints du matériau isolant
goosenecking	fastening a garbage bag then folding the top down over itself and fastening again, resembling the shape of a goose's neck	**pratiquer un nœud en « col de cygne »**	attacher fermement un sac à ordures, puis replier sur elle-même la partie du haut vers le bas et attacher fermement de nouveau; le nœud formé a la forme d'un col de cygne
gores	pieces of flat jacketing material fabricated to cover an elbow part or head segment of the insulation system	**goussets**	pièces de matériau plat de chemisage faites pour recouvrir un coude ou un segment de tête du système d'isolation
head segments	pieces of insulation material fabricated to cover a dome shape part of the insulation system	**segment de tête**	pièces de matériau isolant faites pour recouvrir une forme en coupole du système d'isolation
lags	mitred sections of flat insulating material cut to form a specific shape	**segments isolants**	sections à onglet de matériau isolant qui sont coupées de façon à obtenir une forme spécifique
plenum	enclosed portion of a structure designed to allow air movement	**plénum**	partie fermée d'une structure conçue pour le mouvement de l'air
remediation	to become less severe or widespread; in this analysis, refers to mould removal, enclosure or encapsulation in order to minimize health risks	**élimination**	rendre la propagation moins importante ou la limiter; dans cette norme, il est question de l'enlèvement, du confinement ou de l'encapsulage de la moisissure afin de minimiser les risques pour la santé
soundproofing	sound damping or deadening	**insonorisation**	amortissement ou absorption du son
stud and rail	fastening system for insulation and cladding on equipment such as tanks and boilers	**goujon et traverse**	système de fixation de l'isolant et du revêtement sur de l'équipement comme des réservoirs et des chaudières
vessel	pressurized container such as propane tanks, exchangers, cylinder tanks	**récipient**	contenant sous pression comme les réservoirs de propane, les échangeurs, les bouteilles, les réservoirs

watershed	installation or fabrication technique used to prevent water entering into the insulation	**imperméabilisation**	technique de pose ou de façonnage utilisée pour empêcher l’eau de pénétrer dans l’isolant