PROGRAM OUTLINE

Insulator (Heat and Frost)
INSULATOR (HEAT AND FROST)
HARMONIZED PROGRAM OUTLINE

APPROVED BY INDUSTRY
SEPTEMBER 2018

BASED ON
RSOS 2017

Developed by
Industry Training Authority
Province of British Columbia
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Section 1
INTRODUCTION

Insulator (Heat and Frost)
Foreword

This revised Insulator (Heat and Frost) Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the Insulator (Heat and Frost) Red Seal Occupational Standard (2017) and British Columbia industry and instructor Subject Matter Experts.

Practical instruction by demonstration and student participation should be integrated with classroom sessions. Safe working practices, even though not always specified in each operation or topic, are an implied part of the program and should be stressed throughout the apprenticeship.

This Program Outline includes a list of recommended reference textbooks that are available to support the learning objectives and the minimum shop requirements needed to support instruction.

Competencies are to be evaluated through the use of written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines for more details.

Achievement Criteria are included for those competencies that require a practical assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner’s ability to apply theory to practice. It is important that these performances be observable and measureable and that they reflect the skills spelled out in the competency as those required of a competent journeyperson. The conditions under which these performances will be observed and measured must be clear to the learner as well as the criteria by which the learner will be evaluated. The learner must also be given the level of expectation of success.

The performance spelled out in the Achievement Criteria is a suggested performance and is not meant to stifle flexibility of delivery. Training providers are welcome to substitute other practical performances that measure similar skills and attainment of the competency. Multiple performances may also be used to replace individual performances where appropriate.

SAFETY ADVISORY

Be advised that references to the WorkSafeBC safety regulations contained within these materials do not/may not reflect the most recent Occupational Health and Safety Regulation (the current Standards and Regulation in BC can be obtained on the following website: http://www.worksafebc.com. Please note that it is always the responsibility of any person using these materials to inform him/herself about the Occupational Health and Safety Regulation pertaining to his/her work.
Acknowledgements

Industry and Instructor Subject Matter Experts retained to assist in the development of Program Outline content:

- Bob Barter, Insulators Local 118
- Al Carpenter, Insulators Local 118
- Ken Jakobsson, Insulators Local 118

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry and instructor representatives appointed to identify the training requirements of the Insulator (Heat and Frost) trade.
# How to Use this Document

This Program Outline has been developed for the use of individuals from several different audiences. The table below describes how each section can be used by each intended audience.

<table>
<thead>
<tr>
<th>Section</th>
<th>Training Providers</th>
<th>Employers/ Sponsors</th>
<th>Apprentices</th>
<th>Challengers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Program Credentialing Model</td>
<td>Communicate program length and structure, and all pathways to completion</td>
<td>Understand the length and structure of the program</td>
<td>Understand the length and structure of the program, and pathway to completion</td>
<td>Understand challenger pathway to Certificate of Qualification</td>
</tr>
<tr>
<td>OAC</td>
<td>Communicate the competencies that industry has defined as representing the scope of the occupation</td>
<td>Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification</td>
<td>View the competencies they will achieve as a result of program completion</td>
<td>Understand the competencies they must demonstrate in order to challenge the program</td>
</tr>
<tr>
<td>Training Topics and Suggested Time Allocation</td>
<td>Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application</td>
<td>Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application</td>
<td>Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application</td>
<td>Understand the relative weightings of competencies of the occupation on which assessment is based</td>
</tr>
<tr>
<td>Program Content</td>
<td>Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measurable achievement criteria for objectives with a practical component</td>
<td>Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice</td>
<td>Provides detailed information on program content and performance expectations for demonstrating competency</td>
<td>Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels</td>
</tr>
</tbody>
</table>
## Introduction

<table>
<thead>
<tr>
<th>Section</th>
<th>Training Providers</th>
<th>Employers/Sponsors</th>
<th>Apprentices</th>
<th>Challengers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Training Provider Standards</strong></td>
<td>Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program</td>
<td>Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own</td>
<td>Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors</td>
<td>Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment</td>
</tr>
</tbody>
</table>

### Appendix – Glossary of Acronyms

Defines program specific acronyms
Section 2

PROGRAM OVERVIEW

Insulator (Heat and Frost)
**Program Credentialing Model**

C of Q = Certificate of Qualification  
C of A = Certificate of Apprenticeship  
WBT = Work-Based Training

**Insulator (Heat and Frost) Level 4**  
Technical Training: 120 hours  
Work-Based Training: 6,660 hours total  
Interprovincial Red Seal Exam

**Insulator (Heat and Frost) Level 3**  
Technical Training: 120 hours  
Work-Based Training: Accumulate hours

**Insulator (Heat and Frost) Level 2**  
Technical Training: 150 hours  
Work-Based Training: Accumulate hours

**Insulator (Heat and Frost) Level 1**  
Technical Training: 150 hours  
Work-Based Training: Accumulate hours

**APPRENTICESHIP - DIRECT ENTRY**

---

**CROSS-PROGRAM CREDITS**  
*Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program*

None
**Occupational Analysis Chart**

**INSULATOR (HEAT AND FROST)**

**Occupation Description:** Insulators (Heat and Frost) work with different kinds of insulating materials 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 materials to the required dimensions. They then apply, install, repair and maintain insulating materials to mechanical systems, such as piping, tanks, vessels, and HVAC systems. Insulated surfaces may be finished with materials such as plastics, aluminum, galvanized steel and coated steel, stainless steel, canvas, mastics or finishing cement. Insulators (Heat and Frost) also lay out and fabricate components on-site, or remove and/or encapsulate old insulation. Removing materials such as asbestos, ceramic fibers and lead is also part of the trade. Insulators (Heat and Frost) also spray insulating materials and install fireproofing and fire stop systems. Insulators (Heat and Frost) work in commercial and industrial settings, such as gas plants, refineries, hospitals, schools, and convention centres.

### PERFORM SAFETY-RELATED FUNCTIONS

<table>
<thead>
<tr>
<th>A</th>
<th>Use personal protective equipment (PPE) and safety equipment</th>
<th>Maintain safe work environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>1</td>
<td>A2</td>
</tr>
</tbody>
</table>

### USE AND MAINTAIN TOOLS AND EQUIPMENT

<table>
<thead>
<tr>
<th>B</th>
<th>Use tools and equipment</th>
<th>Use access equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>B1</td>
<td>1</td>
<td>B2</td>
</tr>
</tbody>
</table>

### ORGANIZE WORK

<table>
<thead>
<tr>
<th>C</th>
<th>Perform task scheduling</th>
<th>Organize materials on site</th>
</tr>
</thead>
<tbody>
<tr>
<td>C1</td>
<td>1</td>
<td>C2</td>
</tr>
</tbody>
</table>

### USE COMMUNICATION AND MENTORING TECHNIQUES

<table>
<thead>
<tr>
<th>D</th>
<th>Use communication techniques</th>
<th>Use mentoring techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>1</td>
<td>D2</td>
</tr>
</tbody>
</table>
### Program Overview

**Perform Routine Trade Practices**

- **E1** Perform measurements and calculations
- **E2** Interpret specifications and drawings
- **E3** Prepare substrates
- **E4** Select materials
- **E5** Perform layout

**Insulate Piping and Fittings**

- **F1** Install insulation on piping, fittings and hangers
- **F2** Apply vapour barriers on piping and fittings
- **F3** Install cladding, jacketing and finishes on piping and fittings

**Insulate Tanks, Vessels and Equipment**

- **G1** Install insulation on tanks, vessels and equipment
- **G2** Apply vapour barriers on tanks, vessels and equipment
- **G3** Install cladding, jacketing and finishes on tanks, vessels and equipment

**Insulate Plumbing and Mechanical Piping Systems**

- **H1** Install insulation on plumbing and mechanical piping systems
- **H2** Apply vapour barrier on insulated plumbing and mechanical piping systems
- **H3** Install cladding, jacketing and finishes on insulated plumbing and mechanical piping systems

**Insulate Mechanical Ducting**

- **I1** Install insulation on mechanical ducting
- **I2** Install vapour barrier on insulated mechanical ducting
- **I3** Install cladding, jacketing and finishes on insulated mechanical ducting

**Insulate Mechanical Equipment**

- **J1** Install insulation on mechanical equipment
- **J2** Apply vapour barrier on insulated mechanical equipment
## HARMONIZED PROGRAM OUTLINE
### Program Overview

<table>
<thead>
<tr>
<th>Category</th>
<th>Task Description</th>
<th>Subtasks</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INSTALL FIRE STOP SYSTEMS</strong></td>
<td>Identify approved fire stop system</td>
<td>K1 1 4 K2</td>
</tr>
<tr>
<td></td>
<td>Apply fire stop materials to architectural, structural, mechanical and electrical components</td>
<td></td>
</tr>
<tr>
<td><strong>INSULATE FOR SOUNDPROOFING</strong></td>
<td>Insulate piping and equipment for soundproofing</td>
<td>L1 2 L2</td>
</tr>
<tr>
<td></td>
<td>Install acoustic assemblies for soundproofing</td>
<td></td>
</tr>
<tr>
<td><strong>INSTALL REMOVABLE COVERS</strong></td>
<td>Fabricate removable covers</td>
<td>M1 3 4 M2</td>
</tr>
<tr>
<td></td>
<td>Fasten removable covers</td>
<td></td>
</tr>
<tr>
<td><strong>INSTALL UNDERGROUND INSULATING SYSTEMS</strong></td>
<td>Install pipe insulation to underground systems</td>
<td>N1 2 N2</td>
</tr>
<tr>
<td></td>
<td>Install pour-in-place and spray-on insulation to underground systems</td>
<td></td>
</tr>
<tr>
<td><strong>SPRAY SEALERS, COATINGS AND SPRAY-ON INSULATION</strong></td>
<td>Prepare materials, equipment, surrounding work area and substrate for spraying</td>
<td>O1 2 O2</td>
</tr>
<tr>
<td></td>
<td>Apply reinforcing materials, spray insulation, coatings and sealers</td>
<td></td>
</tr>
<tr>
<td><strong>INSTALL FIREPROOFING</strong></td>
<td>Apply fireproofing to architectural, structural, mechanical and electrical components</td>
<td>P1 1 P2</td>
</tr>
<tr>
<td></td>
<td>Apply protective covering to fireproofing materials</td>
<td></td>
</tr>
</tbody>
</table>
### INSTALL INSULATION FOR REFRACTORY SYSTEMS

<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q1</td>
<td>Apply insulation on refractory systems</td>
<td></td>
</tr>
<tr>
<td>Q2</td>
<td>Install reflective systems</td>
<td></td>
</tr>
<tr>
<td>Q3</td>
<td>Install cladding, jacketing and finishes on refractory systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

### INSTALL INSULATION FOR CRYOGENIC SYSTEMS

<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td>Apply insulation on cryogenic systems</td>
<td></td>
</tr>
<tr>
<td>R2</td>
<td>Apply vapour barriers to insulated components of cryogenic systems</td>
<td></td>
</tr>
<tr>
<td>R3</td>
<td>Install cladding, jacketing and finishes on cryogenic systems</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
</tr>
</tbody>
</table>

### INSULATE FOR MARINE APPLICATIONS

<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>Insulate bulkheads, deckheads and hulls</td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>Install cladding, jacketing and finishes on marine applications</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
</tr>
</tbody>
</table>

### PERFORM ASBESTOS ABATEMENT

<table>
<thead>
<tr>
<th></th>
<th>Activity</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>Prepare for asbestos abatement</td>
<td></td>
</tr>
<tr>
<td>T2</td>
<td>Remove asbestos</td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>Maintain asbestos</td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>Perform lead abatement and mould remediation</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
</tbody>
</table>
# Training Topics and Suggested Time Allocation: Level 1

**INSULATOR (HEAT AND FROST) – LEVEL 1**

<table>
<thead>
<tr>
<th>Line</th>
<th>Topic</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line A</td>
<td><strong>PERFORM SAFETY-RELATED FUNCTIONS</strong></td>
<td>3%</td>
<td>60%</td>
<td>40%</td>
<td>100%</td>
</tr>
<tr>
<td>A1</td>
<td>Use personal protective equipment (PPE) and safety equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>Maintain safe work environment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line B</td>
<td><strong>USE AND MAINTAIN TOOLS AND EQUIPMENT</strong></td>
<td>3%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>B1</td>
<td>Use tools and equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>Use access equipment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line C</td>
<td><strong>ORGANIZE WORK</strong></td>
<td>3%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>C1</td>
<td>Perform task scheduling</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>C2</td>
<td>Organize materials on site</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line D</td>
<td><strong>USE COMMUNICATION AND MENTORING TECHNIQUES</strong></td>
<td>4%</td>
<td>60%</td>
<td>40%</td>
<td>100%</td>
</tr>
<tr>
<td>D1</td>
<td>Use communication techniques</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line E</td>
<td><strong>PERFORM ROUTINE TRADE PRACTICES</strong></td>
<td>31%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>E1</td>
<td>Perform measurements and calculations</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Prepare substrates</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E4</td>
<td>Select materials</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E5</td>
<td>Perform layout</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line F</td>
<td><strong>INSULATE PIPING AND FITTINGS</strong></td>
<td>21%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>F1</td>
<td>Install insulation on piping, fittings and hangers</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>F2</td>
<td>Apply vapour barriers on piping and fittings</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line H</td>
<td><strong>INSULATE PLUMBING AND MECHANICAL PIPING SYSTEMS</strong></td>
<td>20%</td>
<td>25%</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>H1</td>
<td>Install insulation on plumbing and mechanical piping systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>H2</td>
<td>Apply vapour barrier on insulated plumbing and mechanical piping systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line K</td>
<td><strong>INSTALL FIRE STOP SYSTEMS</strong></td>
<td>5%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>K1</td>
<td>Identify approved fire stop system</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>K2</td>
<td>Apply fire stop materials to architectural, structural, mechanical and electrical components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Line P</td>
<td><strong>INSTALL FIREPROOFING</strong></td>
<td>4%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>P1</td>
<td>Apply fireproofing to architectural, structural, mechanical and electrical components</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**HARMONIZED PROGRAM OUTLINE**

Program Overview

Insulator (Heat and Frost) Industry Training Authority

Harmonized Program Outline

09/18
## Program Overview

### Insulator (Heat and Frost) Industry Training Authority

<table>
<thead>
<tr>
<th>Line</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>T1</td>
<td>6%</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>T2</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T3</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>T4</td>
<td>✔️</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Total Percentage for Insulator (Heat and Frost) Level 1** 100%
## Training Topics and Suggested Time Allocation: Level 2

**INSULATOR (HEAT AND FROST)– LEVEL 2**

<table>
<thead>
<tr>
<th><strong>Line</strong></th>
<th><strong>Training Topic</strong></th>
<th><strong>% of Time Allocated to:</strong></th>
<th>% of Time</th>
<th><strong>Theory</strong></th>
<th><strong>Practical</strong></th>
<th><strong>Total</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Line E</strong></td>
<td><strong>PERFORM ROUTINE TRADE PRACTICES</strong></td>
<td></td>
<td>11%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>E1</td>
<td>Perform measurements and calculations</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>Interpret specifications and drawings</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>E3</td>
<td>Prepare substrates</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E4</td>
<td>Select materials</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>E5</td>
<td>Perform layout</td>
<td></td>
<td>✓</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td><strong>Line G</strong></td>
<td><strong>INSULATE TANKS, VESSELS AND EQUIPMENT</strong></td>
<td></td>
<td>22%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>G1</td>
<td>Install insulation on tanks, vessels and equipment</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>G2</td>
<td>Apply vapour barriers on tanks, vessels and equipment</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Line H</strong></td>
<td><strong>INSULATE PLUMBING AND MECHANICAL PIPING SYSTEMS</strong></td>
<td></td>
<td>1%</td>
<td>70%</td>
<td>30%</td>
<td>100%</td>
</tr>
<tr>
<td>H1</td>
<td>Install cladding, jacketing and finishes on insulated plumbing and mechanical piping systems</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Line I</strong></td>
<td><strong>INSULATE MECHANICAL DUCTING</strong></td>
<td></td>
<td>20%</td>
<td>25%</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>I1</td>
<td>Install insulation on mechanical ducting</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I2</td>
<td>Install vapour barrier on insulated mechanical ducting</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Line J</strong></td>
<td><strong>INSULATE MECHANICAL EQUIPMENT</strong></td>
<td></td>
<td>20%</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
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<tr>
<td>J1</td>
<td>Install insulation on mechanical equipment</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>J2</td>
<td>Apply vapour barrier on insulated mechanical equipment</td>
<td></td>
<td>✓</td>
<td>✓</td>
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<tr>
<td><strong>Line L</strong></td>
<td><strong>INSULATE FOR SOUNDPROOFING</strong></td>
<td></td>
<td>1%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>L1</td>
<td>Insulate piping and equipment for soundproofing</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>L2</td>
<td>Install acoustic assemblies for soundproofing</td>
<td></td>
<td>✓</td>
<td></td>
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</tr>
<tr>
<td><strong>Line N</strong></td>
<td><strong>INSTALL UNDERGROUND INSULATING SYSTEMS</strong></td>
<td></td>
<td>3%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>N1</td>
<td>Install pipe insulation to underground systems</td>
<td></td>
<td>✓</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>N2</td>
<td>Install pour-in-place and spray-on insulation to underground systems</td>
<td></td>
<td>✓</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Line O</strong></td>
<td><strong>SPRAY SEALERS, COATINGS AND SPRAY-ON INSULATION</strong></td>
<td></td>
<td>3%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>O1</td>
<td>Prepare materials, equipment, surrounding work area and substrate for spraying</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>O2</td>
<td>Apply reinforcing materials, spray insulation, coatings and sealers</td>
<td></td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Line Q</strong></td>
<td><strong>INSTALL INSULATION FOR REFRACTORY SYSTEMS</strong></td>
<td></td>
<td>5%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
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HARMONIZED PROGRAM OUTLINE
Program Overview
## Program Overview

### % of Time Allocated to:

<table>
<thead>
<tr>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
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<tbody>
<tr>
<td>14%</td>
<td>40%</td>
<td>60%</td>
<td>100%</td>
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</tbody>
</table>

| Q1 | Apply insulation on refractory systems | ✓ |
| Q2 | Install reflective systems | ✓ |
| Q3 | Install cladding, jacketing and finishes on refractory systems | ✓ |

#### Line R

**INSTALL INSULATION FOR CRYOGENIC SYSTEMS**

<table>
<thead>
<tr>
<th>Line R</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
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<tr>
<td>R1</td>
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<td>✓</td>
<td>✓</td>
<td>100%</td>
</tr>
<tr>
<td>R2</td>
<td></td>
<td>✓</td>
<td>✓</td>
<td>100%</td>
</tr>
<tr>
<td>R3</td>
<td></td>
<td>✓</td>
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**Total Percentage for Insulator (Heat and Frost) Level 2**

<table>
<thead>
<tr>
<th>Total Percentage for Insulator (Heat and Frost) Level 2</th>
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</tr>
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## Training Topics and Suggested Time Allocation: Level 3

### INSULATOR (HEAT AND FROST)– LEVEL 3

<table>
<thead>
<tr>
<th>Line</th>
<th>Topic</th>
<th>% of Time</th>
<th>Theory</th>
<th>Practical</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>E1</td>
<td>Perform measurements and calculations</td>
<td>25%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
</tr>
<tr>
<td>E2</td>
<td>Interpret specifications and drawings</td>
<td>30%</td>
<td>✓</td>
<td>✓</td>
<td></td>
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<tr>
<td>E4</td>
<td>Select materials</td>
<td>70%</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>E5</td>
<td>Perform layout</td>
<td>100%</td>
<td>✓</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>F3</td>
<td>Insulate piping and fittings</td>
<td>25%</td>
<td>25%</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>G3</td>
<td>Insulate tanks, vessels and equipment</td>
<td>27%</td>
<td>25%</td>
<td>75%</td>
<td>100%</td>
</tr>
<tr>
<td>I3</td>
<td>Insulate mechanical ducting</td>
<td>17%</td>
<td>50%</td>
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<td>100%</td>
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<tr>
<td>M1</td>
<td>Fabricate removable covers</td>
<td>4%</td>
<td>30%</td>
<td>70%</td>
<td>100%</td>
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<tr>
<td>M2</td>
<td>Fasten removable covers</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>S1</td>
<td>Insulate bulkheads, deckheads and hulls</td>
<td>2%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
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<tr>
<td>S2</td>
<td>Install cladding, jacketing and finishes on marine applications</td>
<td>✓</td>
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### Total Percentage for Insulator (Heat and Frost) Level 3

100%
# Training Topics and Suggested Time Allocation: Level 4

## INSULATOR (HEAT AND FROST)– LEVEL 4

<table>
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<tr>
<th>Line</th>
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<tr>
<td>D</td>
<td>USE COMMUNICATION AND MENTORING TECHNIQUES</td>
<td>5%</td>
<td>80%</td>
<td>20%</td>
<td>100%</td>
</tr>
<tr>
<td>D2</td>
<td>Use mentoring techniques</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>E</td>
<td>PERFORM ROUTINE TRADE PRACTICES</td>
<td>63%</td>
<td>70%</td>
<td>30%</td>
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<tr>
<td>E1</td>
<td>Perform measurements and calculations</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>E2</td>
<td>Interpret specifications and drawings</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>K</td>
<td>INSTALL FIRE STOP SYSTEMS</td>
<td>5%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
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<tr>
<td>K1</td>
<td>Identify approved fire stop system</td>
<td>✓</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>INSTALL REMOVABLE COVERS</td>
<td>22%</td>
<td>20%</td>
<td>80%</td>
<td>100%</td>
</tr>
<tr>
<td>M1</td>
<td>Fabricate removable covers</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>Fasten removable covers</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>P</td>
<td>INSTALL FIREPROOFING</td>
<td>5%</td>
<td>100%</td>
<td>0%</td>
<td>100%</td>
</tr>
<tr>
<td>P2</td>
<td>Apply protective covering to fireproofing materials</td>
<td>✓</td>
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**Total Percentage for Insulator (Heat and Frost) Level 4** 100%
Section 3
PROGRAM CONTENT

Insulator (Heat and Frost)
Level 1

Insulator (Heat and Frost)
Line (GAC): A PERFORM SAFETY-RELATED FUNCTIONS
Competency: A1 Use personal protective equipment (PPE) and safety equipment

Objectives
To be competent in this area, the individual must be able to:
- Use PPE and safety equipment.
- Identify, remove and dispose defective PPE and safety equipment.

LEARNING TASKS

1. Use PPE
   - Hearing protection
   - Safety footwear
   - Eye protection
   - Hard hats
   - Respiratory protection
   - Protective clothing
   - Fall protection
   - Face shields
   - Hand protection
   - Limitations of PPE
   - Identification, removal and disposal of defective PPE

2. Use safety equipment
   - Showers
   - Eye washes
   - Fall protection
   - Antidotes for gas, acids and chemicals
   - Gloves specific to job
   - Welding screens
   - First aid kit
   - Identification, removal and disposal of defective safety equipment
Line (GAC): A PERFORM SAFETY-RELATED FUNCTIONS
Competency: A2 Maintain safe work environment

Objectives
To be competent in this area, the individual must be able to:
• Maintain safe work environment.

LEARNING TASKS
1. Locate and comply with all regulations

CONTENT
• Regulations
  o WorkSafeBC
  o Employer
  o Site-specific
• Employee and employer rights and responsibilities
• Work permits for hot work
• Chemical and biological substances
• Substance specific requirements
• Noise, vibration, radiation and temperature
• Confined spaces
• De-energization and lockout
• Fall protection
• Tools, machinery and equipment
• Ladders, scaffolds and temporary work platforms
• Cranes and hoists
• Rigging
• Mobile equipment
• Transportation of workers
• Traffic control
• Communication with general contractor’s traffic control
• Electrical safety

2. Follow Workplace Hazardous Materials Information System (WHMIS) regulations

• Training requirements
• Hazardous materials classifications
• Safety Data Sheets (SDS)
• Symbols
• Labels

3. Identify potential causes of accidents

• Horseplay
• Alcohol
## LEARNING TASKS

### CONTENT

- Drugs
- State of mind
- Non-compliance with safety regulations
- Improper selection and/or use of tools
- Electrical hazards
- Fire hazards
- Sharp objects
- Insufficient light in work area
- Poor housekeeping practices
- Improper training

4. **Use safe work habits**

- Field Level Risk Assessment (FLRA)
  - Confirming location of
    - Fire escape route
    - Fire fighting equipment
    - Muster stations
  - Safety and information meetings
  - Good housekeeping practices
    - Clean work area
    - Removal of debris
    - Storage of materials
    - Posting of signs where needed
    - Roping off/barricading where needed

5. **Follow lockout/tagout procedures**

- WorkSafeBC Regulation
- Importance and purpose of tagging out electrical equipment
- Rules for removal of tags
- Results of misuse of tags
- Worker responsibilities
- Removal of locks

6. **Describe the hazards of solvents and adhesives**

- Vapours
- Fire
- Explosion
- Respiratory
- Skin and eye damage
- Use in confined spaces

7. **Describe safety precautions for using adhesives, solvents and thinners**

- Manufacturer’s recommendations
- SDS
- Data Sheet
- Using PPE
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○ Eye</td>
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<tr>
<td></td>
<td>○ Hand</td>
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<tr>
<td></td>
<td>○ Face</td>
</tr>
<tr>
<td></td>
<td>○ Respiratory</td>
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</table>
Line (GAC): B USE AND MAINTAIN TOOLS AND EQUIPMENT
Competency: B1 Use tools and equipment

Objectives
To be competent in this area, the individual must be able to:
• Select and use hand tools.
• Select and use measuring and layout tools.
• Select and use power tools.

LEARNING TASKS
1. Use hand tools

CONTENT
• Cutting
  o Aviation snips
  o Scissors
  o Knives
    - Elastomeric foam
    - Serrated knife for fiberglass and mineral fibre
    - Utility knife for plastic and paper
    - Boning knife for calcium silicate
  o Saws
    - Keyhole
    - Pruner
• Forming
  o Combination machines
  o Shears
  o Rollers
  o Brakes
• Fabricating and installing
  o Hammers
  o Screwdrivers
  o Levels
  o Chalk line
  o Vice grips
  o End cutters (nippers)
  o Stapling
  o Banding
  o Crimping tool
  o Slicks and trowels
LEARNING TASKS

2. Use measuring and layout tools

   • Types
     o Measuring
       – Tape measures
       – Circumference rule
       – Folding rulers
     o Layout
       – Awl
       – Squares
       – Dividers and callipers
       – Trammel point
       – Compass
       – Chalk line

   • Selection
     o Commercial/Institutional
     o Industrial

   • Maintenance/disposal
     o Sharpening
     o Lubrication

   • Storage

3. Use power tools

   • Safe work procedures (SWP)

   • Types
     o Cutting
       – Nibblers
       – Shears
LEARNING TASKS

CONTENT

− Band saws
− Splitters
− Circular saws
  o Forming
    − Lock formers
  o Fabricating
    − Sewing machines
    − Power shears
− Selection
  o Commercial/Institutional
  o Industrial
− Maintenance/disposal
  o Sharpening
  o Lubrication
− Storage
Line (GAC): B USE AND MAINTAIN TOOLS AND EQUIPMENT
Competency: B2 Use access equipment

Objectives
To be competent in this area, the individual must be able to:
- Use ladders and platforms.
- Tie knots and hitches.

LEARNING TASKS

1. Describe ladders
   - Types
     - Straight and extension
     - Platform
     - Step
     - Specialty, i.e. combination
   - Uses
   - Advantages and disadvantages

2. Use ladders
   - Safety regulations
   - Safe erection and work procedures
     - Transporting
     - Securing and lashing
     - Power line hazard
     - Over-reaching hazard

3. Describe platform scaffolds
   - Types
     - Single and multiple plank
     - Rigid platform
     - Ladder and plank
   - Uses
   - Safety factors
   - Components
     - Assembly locks
     - Wheel locks
     - Guard rails
     - Braces
     - Plank cleats
     - Levellers
     - Outriggers

4. Use platform scaffolds
   - Power line hazard
   - Inspection
   - Safety factors
   - Solid footing
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
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<tr>
<td>5. Describe suspended work platforms</td>
<td>• Safe erection and work procedures</td>
</tr>
<tr>
<td></td>
<td>• Suspension methods</td>
</tr>
<tr>
<td></td>
<td>• Types</td>
</tr>
<tr>
<td></td>
<td>o Swing stage</td>
</tr>
<tr>
<td></td>
<td>• Rope access technician (RAT)</td>
</tr>
<tr>
<td></td>
<td>• Uses</td>
</tr>
<tr>
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<td>• Advantages and disadvantages</td>
</tr>
<tr>
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<td>• Safety factors</td>
</tr>
<tr>
<td></td>
<td>• Safe erection and work procedures</td>
</tr>
<tr>
<td></td>
<td>• Training requirements</td>
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<tr>
<td>6. Describe aerial work platforms</td>
<td>• Scissor lifts</td>
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<tr>
<td></td>
<td>• Boom lifts</td>
</tr>
<tr>
<td></td>
<td>• Safety</td>
</tr>
<tr>
<td></td>
<td>• Training requirements</td>
</tr>
<tr>
<td>7. Describe fibre ropes</td>
<td>• Types</td>
</tr>
<tr>
<td></td>
<td>• Strengths</td>
</tr>
<tr>
<td></td>
<td>• Composition</td>
</tr>
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<td>• Characteristics</td>
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<td>• Care</td>
</tr>
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<td>• Quality</td>
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<td>8. Tie knots and hitches</td>
<td>• Protection of materials and equipment from rope cuts and marks</td>
</tr>
<tr>
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<td>• Types and purposes of knots and hitches</td>
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<tr>
<td></td>
<td>o Bowline</td>
</tr>
<tr>
<td></td>
<td>o Half hitch</td>
</tr>
<tr>
<td></td>
<td>o Timber hitch with half-hitch</td>
</tr>
<tr>
<td></td>
<td>o Bowline on a bight</td>
</tr>
<tr>
<td></td>
<td>• Maintenance and storage</td>
</tr>
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</table>
Line (GAC): C ORGANIZE WORK
Competency: C1 Perform task scheduling

Objectives
To be competent in this area, the individual must be able to:
• Assess and prioritize tasks.
• Perform task scheduling.

LEARNING TASKS
1. Organize and prioritize daily tasks
   • Job schedule
   • Availability of released work
   • Receiving and storage of materials
   • Material estimation/requirements
   • Tools and equipment required

2. Determine work remaining
   • Scheduling
   • Deficiencies
   • Change orders
   • Site meetings
   • Foremen’s meetings
   • Safety meetings
   • Mechanical contractors

3. Coordinate work tasks with other trades
Line (GAC): C ORGANIZE WORK
Competency: C2 Organize materials on site

Objectives
To be competent in this area, the individual must be able to:
• Organize materials for work tasks.

LEARNING TASKS

1. Sort and place materials
   • Specifications
   • Size and thickness
   • Ascending or descending order of size
   • Type (copper vs. iron)
   • Labels facing out
   • Inventory check

2. Store and secure materials
   • Identifying location
   • Communication with general contractor for storage location
   • Protection
   • Moisture
   • Mechanical damage
   • Elevating materials

3. Dispose of waste materials
   • Leadership in Energy and Environmental Design (LEED) requirements
   • Recycling
   • Sorting
Line (GAC): D  USE COMMUNICATION AND MENTORING TECHNIQUES
Competency: D1 Use communication techniques

Objectives
To be competent in this area, the individual must be able to:
• Use communication techniques.

LEARNING TASKS
1. Use good communication with other trades

2. Demonstrate communication practices with individuals or in a group

3. Listen using active listening practices

4. Receive and respond to feedback on work

5. Explain and provide feedback

6. Participate in safety and information meetings

7. Participate in ongoing training and learning opportunities

8. Tailor communication style to different audiences

CONTENT
• Following and coordinating specifications
• Hot spots
• Restricted access
• Verbal vs. non verbal
• Questioning to improve communication
• Clarifying instructions
• Repeating back what was said
• Corrective measures for substandard work
• Avoiding defensiveness
• Taking responsibility
• Case studies
• Relationships
• Role playing
• Job site specific
• Tool box talks
• Apprenticeship training
• Vendor training
• Conferences
• Union training/upgrading
• Employer safety training
• Employers
• Contractors
• Suppliers
**Line (GAC):** E   **PERFORM ROUTINE TRADE PRACTICES**

**Competency:** E1 Perform measurements and calculations

### Objectives
To be competent in this area, the individual must be able to:
- Take and record field measurements.
- Calculate area, circumference and perimeter.

### LEARNING TASKS

<table>
<thead>
<tr>
<th>TASK</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Use basic math | - Addition, subtraction, division, multiplication  
- Whole numbers  
- Fractions and decimals  
- Fractions to decimals  
- Decimals to fractions  
- Square root |
| 2. Calculate linear measurement | - Imperial and metric systems  
- Conversion formulas |
| 3. Calculate area, circumference and perimeter of two-dimensional shapes | - Arcs  
- Circles  
- Squares  
- Rectangles  
- Ellipses  
- Triangles |
| 4. Use Pythagorean theorem | - $a^2 + b^2 = c^2$  
- Calculation of sides of triangles  
- Angles of a triangle  
- Use of right angle triangles |
| 5. Describe angular measurement | - Degrees  
- Minutes  
- Seconds |
| 6. Use trade related metric and imperial units | - Definitions  
- Derived units  
- Abbreviations  
- Common multiples and sub-multiples  
- Volume  
- Temperature  
- Celsius |
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<th>LEARNING TASKS</th>
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<td>7. Take field measurements using tools</td>
<td>• Kelvin</td>
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<td>• Derived units with special names</td>
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<td>• Field sketches</td>
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<td>• Pictures</td>
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</table>
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E3 Prepare substrates

Objectives
To be competent in this area, the individual must be able to:
• Prepare substrate for insulation.

LEARNING TASKS
1. Describe substrate considerations
   • Free of foreign matter
   • Expansion and contraction
   • Primed piping systems
   • X-ray piping
   • Sealing HVAC systems

2. Describe corrosion
   • Types
     o Atmospheric
     o Electrolytic and galvanic
     o Chemical
   • Removal

3. Prepare surfaces for adhesive application
   • Preparation requirements specific to adhesive and surface
   • Cleaning methods
   • Surface contaminants
     o Oil and grease
     o Water, ice or snow
     o Dust and dirt
     o Paint or mastics
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Line (GAC): E  PERFORM ROUTINE TRADE PRACTICES

Competency: E4  Select materials

**Objectives**
To be competent in this area, the individual must be able to:
- Select materials for industrial applications.
- Select materials for commercial applications.

**LEARNING TASKS**
1. Describe properties of insulation materials
   - Abrasion resistance
   - Alkalinity or acidity
   - Breaking load
   - Capillarity
   - Chemical reactions
   - Coefficient of expansion
   - Combustibility
   - Flash point
   - Flame spread
   - Smoke index
   - Melting point
   - Density
   - Shrinkage
   - Thermal conductivity
   - Thermal expansion
   - Vapour migration
   - Water absorption
   - Adhesion
   - Compaction and recovery

2. Describe types of materials
   - Flexible and rigid
   - Metals
   - Glass (fibres)
   - Plastic (jacketing, extruded foam)
   - Cements
   - Mastics
   - Mineral fibre
   - Laminates
   - Polyurethane
   - Loose fill
   - Aluminum silicate fibre
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LEARNING TASKS

CONTENT

3. Describe insulation factors

- Perlite
- Vermiculite
- Mineral fibres
- Cellular glass
- Granular hydro carbons
- Spray
- Cellulose
- Ceramic fibre
- Chemical component foam

- Density
- Thermal conductivity (K-factor)
- Thermal resistance (R-factor)
- Latent heat
- Sensible heat
- Co-efficient of expansion
- Specific heat capacity
- Moisture content
- Permeability
- Heat capacity

4. Describe adhesives

- Safety hazards
- Properties
- Resistance to water, acids and chemicals
- Flexibility in relation to bonded surfaces
- Open time
- Vapour contamination and leaching to food products

- Types
  - Contact
  - Non-contact
  - Fibrous
  - Lagging
  - Paste

- Application methods
  - Brush
  - Spray

- Importance of keeping containers sealed
  - Preventing evaporation of solvents
  - Preventing contamination of
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<td>- Accessories</td>
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LEARNING TASKS

CONTENT

- Bevels
- Clips
- End caps
- Pan outs
- Corner bead
- Expanded metal lath
- Glass fibre cloth
- Road mesh
- Check wire
- Tapes
- Stainless steel mesh
- Saddles for pipe hangers
- Fasteners
  - Adhesives
  - Band and seals
  - Staples
  - Stick clips (pins)
  - Welded pins and studs
  - Tapes
  - Wires
  - Twine
  - Skewers
  - Hog rings
  - Miracle hangers

Achievement Criteria

Performance  The learner will determine insulation required for piping.

Conditions  The learner will be given
- Instructions
- Task

Criteria  The learner will be evaluated on
- Safety
- Material selection
Line (GAC):  E  PERFORM ROUTINE TRADE PRACTICES  
Competency:  E5  Perform layout

Objectives
To be competent in this area, the individual must be able to:
• Perform layout for bevel, end cap, pan out, gored elbow and 45 degree stove pipe.

LEARNING TASKS
1. Perform basic geometric construction
   • Bisect and trisect circles
   • Bisect angles
   • Ruler method for dividing a straight line into equal segments

2. Perform pattern development for basic fittings
   • Basic fittings
     o Bevel
     o End cap
     o Pan out
     o Gored elbow
     o 45 degree stove pipe
   • Tools and equipment
     o Drafting table
     o Pencils and erasers
     o Rulers
     o Squares
     o Compass
     o Dividers
     o Mitre chart
   • Determining correct layout for task
   • Methods
     o Parallel
     o Triangulation
     o Radial

3. Perform layout for basic fittings
   • Allowances
     o Hems
     o Lap
     o Bead
     o Crimping
     o Tabs

4. Create template
   • Materials
     o Cardboard
     o Metal
     o Polyvinyl chloride (PVC)
LEARNING TASKS

CONTENT
• Cutting

Achievement Criteria

Performance  The learner will lay out and create template for basic fittings.

Conditions  The learner will be given
• Drawings
• Tools and equipment
• Materials
• Project specifications

Criteria  The learner will be evaluated on
• Safety
• Accuracy
• Quality
• Completion within specified time
Line (GAC): F INSULATE PIPING AND FITTINGS

Competency: F1 Install insulation on piping, fittings and hangers

Objectives
To be competent in this area, the individual must be able to:
• Install insulation on piping systems in industrial applications.

LEARNING TASKS

1. Describe piping and fittings in industrial applications
   • Process pipe
   • Steam pipe
   • Condensate

2. Describe insulation considerations
   • Confirming piping is ready for insulation
   • Selection of
     o Materials
     o Accessories
     o Tools for application
   • Filling all voids with insulations
   • Use of completely dry insulation

3. Cut straight insulation
   • Specifications
   • Staggered joint method

4. Fabricate pipe fittings
   • Elbow
   • Tee
   • Bevel
   • Mitre

5. Secure insulation
   • Bands and clips
   • Stainless steel wire
   • Fiber reinforced tape

Achievement Criteria
Performance The learner will apply insulation on piping.
Conditions The learner will be given
• Tools and equipment
• Materials
• Project specifications
Criteria The learner will be evaluated on
• Safety
• Shop practices
• Quality of application
• Following specifications
• Completion within time limits
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Line (GAC): F INSULATE PIPING AND FITTINGS

Competency: F2 Apply vapour barriers on piping and fittings

Objectives
To be competent in this area, the individual must be able to:

- Select, install and seal vapour barriers to pipe insulation.

LEARNING TASKS CONTENT
1. Describe vapour barriers

- Locations of use
  - Cold water
  - Chilled systems

- Purposes and importance
  - Prevention of condensation
  - Prevention of ice build up
  - Corrosion protection
  - Maintenance of integrity of insulation systems

- Types
  - Integral to insulation vs. cut and applied
  - All-service jacket (ASJ) / Peel and stick
  - Mastics and glass fabric
  - PVC
  - Metals
  - Laminates

- Fasteners
- Adhesive tapes
- Sealants

2. Finish vapour barrier

- Selection
- Application of adhesive tapes
- Application of mastics
- Bevels
- Tees
- Hangers
- Elbows

3. Apply finish to piping

- Types
  - Paper (ASJ)
  - Canvas
  - Metal
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LEARNING TASKS

CONTENT
• Measuring
• Cutting
• Installation
  o Sealing
  o Tape
  o Mastic
  o Caulking
  o Watershed

Achievement Criteria
Performance The learner will install and seal vapour barriers to pipe insulation.

Conditions The learner will be given
• Tools and materials
• Instructions and specifications

Criteria The learner will be evaluated on
• Safety
• Shop practices
• Quality of application
• Following specifications
• Completion within time limits
Line (GAC): H INSULATE PLUMBING AND MECHANICAL PIPING SYSTEMS

Competency: H1 Install insulation on plumbing and mechanical piping systems

Objectives
To be competent in this area, the individual must be able to:
• Apply insulation to pipes on commercial applications.

LEARNING TASKS
1. Describe piping and fittings in commercial applications
   • Domestic hot and cold
   • Return
   • Chilled water
   • Rain water leader

2. Cut preformed and flexible pipe insulation
   • Project specifications
   • Accommodating hangers and valves

3. Fabricate pipe fittings
   • Cutting
     o Mitres
     o Tees
     o Elbows
     o Valves
     o Strainers
   • Peel and stick
   • Tape and filament tape
   • Adhesives
   • Staples

4. Secure insulation pipe fittings

Achievement Criteria
Performance The learner will apply insulation to pipes on a commercial application.
Conditions The learner will be given
   • Tools and equipment
   • Materials
   • Project specifications

Criteria The learner will be evaluated on
   • Safety
   • Shop practices
   • Quality of application
   • Following specifications
   • Completion within time limits
**Line (GAC):** H INSULATE PLUMBING AND MECHANICAL PIPING SYSTEMS

**Competency:** H2 Apply vapour barrier on insulated plumbing and mechanical piping systems

### Objectives

To be competent in this area, the individual must be able to:
- Apply vapour barrier to insulated pipes on commercial applications.

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<td></td>
<td>- Mastic</td>
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<td></td>
<td>- Caulking</td>
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</tbody>
</table>

### Achievement Criteria

**Performance**  The learner will apply vapour barrier to small bore piping.

**Conditions**  The learner will be given
- Tools and equipment
- Materials
- Project specifications

**Criteria**  The learner will be evaluated on
- Safety
- Shop practices
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- Quality of application
- Following specifications
- Completion within time limits
Line (GAC):  K  INSTALL FIRE STOP SYSTEMS
Competency:  K1  Identify approved fire stop system

Objectives
To be competent in this area, the individual must be able to:
• Describe fire stopping systems and their applications.

LEARNING TASKS
1. Describe fire stopping and smoke sealing
   - Importance of fire stopping and smoke sealing
   - Purposes of installations
   - Importance of approved installations in specifications
   - Terms
     - Fire prevention
     - Fire suppressing
     - Smoke sealing
     - Fire protection

2. Describe standards related to fire stopping and smoke seal installations
   - American Standard for Testing Materials (ASTM) E84 flame rating
   - ASTM E84 smoke development
   - ASTM E119 floor test and hose stream
   - F rating (flame)
   - T rating (temperature transfer)
   - FT rating (flame and temperature transfer)
   - Underwriters Laboratories of Canada (ULC) rating

3. Describe types of fire stopping materials
   - Types
     - Boards
     - Fillers
     - Foams
     - Putty
     - Caulk
     - Silicones
     - Firebrick
     - Ceramic cloth
     - Grouts
     - Damming materials
   - Properties
     - Intumescent
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LEARNING TASKS

4. Describe locations and types of penetrations

CONTENT
- Fire walls
- Industrial and commercial buildings
- Conduits and cable trays
- Pipe chases and pipe sleeves
- Ductwork and shafts

- Endothermic
- Non-burnable
- Cure time
- Flash point
- Application temperature
- Shelf life
- Mixing methods
- Snap time
Line (GAC): K INSTALL FIRE STOP SYSTEMS
Competency: K2 Apply fire stop materials to architectural, structural, mechanical and electrical components

Objectives
To be competent in this area, the individual must be able to:
• Describe applying fire stop materials and sealants.

LEARNING TASKS

1. Describe calculating materials required
   • Quantities
   • Avoiding waste

2. Describe preparation of materials
   • Manufacturer’s specifications
   • Donuts
   • Preparation
     o Flooding with self-levelling
     o Measuring diameter of penetration
     o Cutting
     o Placing in hole
     o Sealants

3. Describe application of fire stop
   • Preparation of substrate
   • Damming
   • Temporary form installation
   • Housekeeping
   • Procedures for removing all forming and masking materials
   • Worksite cleanup and debris removal
   • Tool cleanup and storage

4. Describe inspection process
   • Jurisdiction having authority (JHA)
   • Owner’s representative
   • General contractor
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Line (GAC): P  INSTALL FIREPROOFING
Competency: P1  Apply fireproofing to architectural, structural, mechanical and electrical components

Objectives
To be competent in this area, the individual must be able to:
- Describe selection of fireproofing system.
- Describe fireproofing of structural steel components.

LEARNING TASKS

1. Describe fireproofing structural steel components
   - Legs on vessels
   - Beams
   - Skirts
   - Hangers

2. Describe fireproofing electrical components
   - Cable trays
   - Conduits

3. Describe selection and application of materials
   - Job specifications
   - Materials selection
   - Composite sheets
     - Endothermic
     - Intumescent
   - Cementitious fireproofing materials
     - Corner beads
     - Laths
     - Weep holes
     - Specialty caulking
   - Ceramic blankets
   - Bands
   - Application methods
     - Trowel
     - Stuff
     - Wrap
     - Spray
**Line (GAC):** T  **PERFORM ASBESTOS ABATEMENT**  
**Competency:** T1 Prepare for asbestos abatement

### Objectives
To be competent in this area, the individual must be able to:
- Determine required PPE for asbestos-containing materials (ACM) abatement.
- Describe preparation of site for removal and containment of ACM.
- Describe building temporary enclosure.

### LEARNING TASKS

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</table>
| 1. Determine required PPE for ACM abatement                                 | • Regulations<br>• Risk assessment<br>• Determination of contamination<br>• Classifications of ACM abatement<br>  
  o Low  
  o Moderate  
  o High  
  • Types of PPE<br>  
  o Respirators<br>  
    - Supplied air  
    - Self contained breathing apparatus  
    - Air purifying equipment  
    - Powered air purifying equipment  
    - Face masks and filters<br>  
  o Suits  
  o Masks  
  o Foot coverings  
  o Disposable coveralls, boots and gloves |
| 2. Describe retrieving sample of ACM for testing                            | • Role and responsibilities<br>  
  o WorkSafe BC  
  o Employer  
  o Employee  
  • Training and designation  
  • Written procedures  
  • Accessories<br>  
  o Sampling tools  
  o Wash bucket  
  o Rags |
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<td>Back up unit</td>
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</table>
Line (GAC): T PERFORM ASBESTOS ABATEMENT
Competency: T2 Remove asbestos

Objectives
To be competent in this area, the individual must be able to:
• Describe removal and disposal of ACM.
• Describe decontamination of area and equipment.

LEARNING TASKS

1. Describe removing ACM
   • Regulations
   • Amended water
   • Wet removal (no dry removal)
   • Placing materials in labeled bags
   • Washing bags
   • Glove bagging

2. Describe disposal of ACM
   • Placing clean bag in second bag
   • Sealing bag (goose neck)
   • Clear line of sight for transporting bags
   • Intermediate storage location
   • Manifest (documentation)
   • Landfill

3. Describe decontamination of area and equipment
   • Wet cleaning all surfaces inside enclosure
   • Decontamination or disposal of tools and equipment
   • Spray encapsulant
   • Air clearance
   • Preparation of negative air units for transport
   • Removal and disposal of enclosure
Line (GAC): T PERFORM ASBESTOS ABATEMENT
Competency: T3 Maintain asbestos

Objectives
To be competent in this area, the individual must be able to:
• Describe encapsulation of ACM.
• Describe enclosure of ACM.

LEARNING TASKS
1. Describe encapsulation of ACM

CONTENT
• Use of penetrating sealants
• Use of bridging sealants
• Effect of sealants on fire ratings
• SWP

2. Describe enclosure of ACM

CONTENT
• Mastics
• Glass fabric
• Canvas
• Metal
• Vinyl covering
• SWP
Line (GAC): T PERFORM ASBESTOS ABATEMENT
Competency: T4 Perform lead abatement and mould remediation

Objectives
To be competent in this area, the individual must be able to:
• Describe lead abatement.
• Describe mould remediation.

LEARNING TASKS

1. Describe lead and mould and their health effects

   • Locations
   • Properties
     o How contaminants enter and affect the body
     o How lead affects children and pregnancy
     o Lead levels in the body
   • Signs and symptoms of lead poisoning
     o Brain disorders
     o Brain and nerve problems
     o Blood pressure
     o Kidney problems
     o Reproductive problems
     o Decreased red blood cells (anemia)
     o Slower reflexes
   • Signs and symptoms of mould exposure
     o Runny nose
     o Asthma-like symptoms
     o Rash

2. Determine required PPE for lead abatement and mould remediation

   • Regulations
   • Risk assessment
   • Determination of contamination
   • Types of PPE
     o Respirators
       - Supplied air
       - Self contained breathing apparatus
       - Air purifying equipment
       - Powered air purifying equipment
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
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<tbody>
<tr>
<td></td>
<td>Face masks and filters</td>
</tr>
<tr>
<td></td>
<td>- Suits</td>
</tr>
<tr>
<td></td>
<td>- Masks</td>
</tr>
<tr>
<td></td>
<td>- Foot coverings</td>
</tr>
<tr>
<td></td>
<td>- Disposable coveralls, boots and gloves</td>
</tr>
<tr>
<td>3. Describe lead abatement</td>
<td>- Sampling</td>
</tr>
<tr>
<td></td>
<td>- Removal</td>
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<td></td>
<td>- Decontamination</td>
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<td>- Disposal</td>
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<tr>
<td>4. Describe mould remediation</td>
<td>- Sampling</td>
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<tr>
<td></td>
<td>- Encapsulation</td>
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<td>- Remediation</td>
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<tr>
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<td>- Decontamination</td>
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<td></td>
<td>- Disposal</td>
</tr>
</tbody>
</table>
Level 2

Insulator (Heat and Frost)
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E1 Perform measurements and calculations

Objectives
To be competent in this area, the individual must be able to:
• Calculate area and volumes of geometric shapes.
• Calculate mitred elbows.
• Calculate length of a side of triangles.
• Estimate materials.

LEARNING TASKS

1. Calculate area and volume of geometric shapes
   • Cylinders
   • Spheres
   • Cones
   • Pyramids
   • Frustum

2. Calculate mitred elbows
   • Heel
   • Throat
   • (CLR +/- 1/2 OD of insulation)1.57+ number of mitres

3. Estimate material
   • Square footage of
     o Duct wrap
     o Rigid board
     o Canvas
     o Metal
     o Banding
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E2 Interpret specifications and drawings

Objectives
To be competent in this area, the individual must be able to:
• Draft geometric shapes.

LEARNING TASKS
1. Draft geometric shapes

CONTENT
• Cylinders
• Elbows
• Tees
• Bevel

Achievement Criteria
Performance The learner will draft geometric shapes for layout.
Conditions The learner will be given
• Materials and drafting equipment
• Project specifications
Criteria The learner will be evaluated on
• Quality
• Accuracy of layout
HARMONIZED PROGRAM OUTLINE
Program Content
Level 2

Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E3 Prepare substrates

Objectives
To be competent in this area, the individual must be able to:
• Prepare substrate for equipment and ducts.
• Perform pin welding.

LEARNING TASKS

1. Determine the condition of the substrate
   • Scaling
   • Chemical cleaning
   • Sand blasting

2. Describe portable pin welding machines
   • Purpose
   • Characteristics
   • Operating procedures
   • Types and sizes of machines
   • Power source

3. Describe anchors
   • Purpose
     o Securing insulation
     o Securing jacketing
   • Size
   • Types
     o Eyelet
     o Bolts
     o Studs and pins

4. Use pin welder
   • Safety hazards
   • Fire hazards
   • Electrical shock
   • Permits
   • Placing and spacing of pins
   • Settings
   • Storage and maintenance
   • Troubleshooting
     o Type of substrate
     o Condition of substrate
     o Incorrect setting
     o Insufficient pre-setting time
     o Improper ground
     o Loose connections
# HARMONIZED PROGRAM OUTLINE

## Program Content

### Level 2

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>○ Insufficient power</td>
</tr>
</tbody>
</table>

**Achievement Criteria**

**Performance**  The learner will pin weld to ducting.

**Conditions**  The learner will be given

- Tools and equipment
- Materials
- Project specifications

**Criteria**  The learner will be evaluated on

- Safety
- Shop practices
- Quality of application
- Following specifications
- Completion within time limits
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E4 Select materials

Objectives
To be competent in this area, the individual must be able to:
• Select materials and accessories for industrial equipment.

LEARNING TASKS
1. Describe insulation for industrial equipment
   • Boilers
   • Breeching
   • De-aerators
   • Induction (ID) fans
   • Precipitators
   • Tanks and vessels

2. Determine components requiring insulation
   • Specifications
   • Drawings
   • Material take off

3. Determine materials and accessories required
   • Factors for determining materials
     o Temperature of process equipment
     o Location
   • Banding
   • Wire
   • Elbows
   • Poultry net
   • Cladding
   • Accessories
     o Clips
     o Expanded metal lath
     o Glass fibre cloth
     o Road mesh
     o Check wire
     o Tapes
     o Stainless steel mesh
   • Fasteners
     o Band and seals
     o Welded pins and studs
     o Tapes
     o Wires
HARMONIZED PROGRAM OUTLINE
Program Content
Level 2

Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E5 Perform layout

Objectives
To be competent in this area, the individual must be able to:
• Perform layout for non-metallic cladding on tanks, vessels and equipment.

LEARNING TASKS
1. Describe cladding on tanks, vessels and equipment in commercial applications
   • Specifications and drawings
   • Types of cladding
     o PVC
     o Marine cloth
     o Elastomeric

2. Describe accessories and attachments
   • Tacs
   • Adhesives
   • Contact
   • Welding
   • Lagging
   • Vinyl tape

3. Describe layout procedures for cladding on tanks, vessels and equipment
   • Establishing starting point
     o Bottom end cap if specified
   • Caulking
   • Beauty rings

4. Use layout tools
   • Creating templates
   • T-squares
   • Set squares
   • Trammel points
   • Dividers
   • 100 ft. tape (circumference tape)
   • Pencils and drafting pens

Achievement Criteria
Performance The learner will fabricate a template for finishes.
Conditions The learner will be given
• Materials and drafting equipment
• Project specifications
Criteria The learner will be evaluated on
• Quality
• Accuracy of layout
• Completion within time limit
Line (GAC): G INSULATE TANKS, VESSELS AND EQUIPMENT
Competency: G1 Install insulation on tanks, vessels and equipment

Objectives
To be competent in this area, the individual must be able to:
• Fabricate and apply insulation to tanks and vessels.

LEARNING TASKS
1. Measure and cut insulation
   - Establishing starting point
   - Cutting and scoring to fit

2. Apply insulation using fasteners
   - Staggering first and subsequent layers
   - Stand up/lay down
   - Squaring to object
   - Avoiding material waste
   - Housekeeping
   - Securing insulation with bands
   - Using corner bead to protect or enhance corners
   - Installing chokers
   - Ensuring access to bolts and welds
   - Reverse bevels
   - Flashing

Achievement Criteria
Performance The learner will fabricate and install insulation to tanks.
Conditions The learner will be given
• Tools and equipment
• Materials
• Project specifications
Criteria The learner will be evaluated on
• Safety
• Shop practices
• Quality of application
• Following specifications
• Completion within time limits
Line (GAC): G INSULATE TANKS, VESSELS AND EQUIPMENT
Competency: G2 Apply vapour barriers on tanks, vessels and equipment

Objectives
To be competent in this area, the individual must be able to:
• Install vapour barrier on tanks.

LEARNING TASKS
1. Install vapour barrier on tanks

CONTENT
• Types
  o Integral vapour barrier
  o Foil skrim (FSK) tank wrap
  o Blue skin
  o PVC
  o Metal
• Taping
• Sealing
• Mastic

Achievement Criteria
Performance The learner will install FSK laminate over insulation on a tank.
Conditions The learner will be given
• Tools and equipment
• Materials
• Project specifications
Criteria The learner will be evaluated on
• Safety
• Shop practices
• Quality of application
• Following specifications
• Completion within time limits
Line (GAC): H

INSULATE PLUMBING AND MECHANICAL PIPING SYSTEMS

Competency: H3 Install cladding, jacketing and finishes on insulated plumbing and mechanical piping systems

Objectives
To be competent in this area, the individual must be able to:
- Describe the installation of cladding, jacketing and finishes on commercial mechanical systems.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe cladding, jacketing and finishes | • Types of finishes  
  o PVC  
  o Canvas  
  o Marine cloth  
• Accessories  
  o PVC elbows  
  o Tees  
  o Victaulic fittings  
• Lagging adhesives  
  o Tacks  
  o Vinyl tape  
  o Welded adhesives |

| 2. Describe installation of cladding, jacketing and finishes on commercial mechanical systems | • Layout  
• Cutting  
• Shaping |
Line (GAC):  I  INSULATE MECHANICAL DUCTING  
Competency:  I1  Install insulation on mechanical ducting

Objectives
To be competent in this area, the individual must be able to:
• Fabricate and install insulation on mechanical ducting.

LEARNING TASKS

1. Describe mechanical ducting
   • Commercial
     o Dual systems
       - Air conditioning
       - Heat
         o Tempered air/recirculated air
         o Plenums
         o Fans
     • Industrial
       o Breeching
       o ID fans

2. Describe insulation used on mechanical ducting
   • Rigid
   • Flexible
   • Duct liner
   • Acoustic
   • Fiberglass
   • Elastomeric foam
   • Mineral fibre board
   • Expanded metal lath
   • Ceramic fibre

3. Install insulation on mechanical ducting
   • Manufacturers’ specifications
   • Job specifications
   • Exposed and concealed
   • Fabrication and fitting techniques
     o Elbows
     o Corners
     o Branches
     o Lap for flex
   • Mechanical fasteners
     o Staples
     o Pins and clips
     o Studs
LEARNING TASKS

CONTENT

- Stand offs
- String
- Tape
- Adhesives
- Corner bead for exposed insulation
- Housekeeping
  - Avoiding waste
  - Keeping work area clean and tidy
  - Removal of waste from internal insulated ducts

Achievement Criteria

Performance  The learner will fabricate and attach insulation for a mechanical ducting system.

Conditions  The learner will be given
  - Tools and equipment
  - Materials
  - Project specifications

Criteria  The learner will be evaluated on
  - Safety
  - Housekeeping
  - Quality
  - Completion within specified time
Line (GAC): I INSULATE MECHANICAL DUCTING
Competency: I2 Install vapour barrier on insulated mechanical ducting

Objectives
To be competent in this area, the individual must be able to:
• Identify areas requiring vapour barrier.
• Describe finishing vapour barrier on mechanical ducting.

LEARNING TASKS
1. Describe finishing vapour barrier

CONTENT
• Required vs. integral vapour barrier
• Heat seal penetrations with tape
• Tape clips
Line (GAC): J  INSULATE MECHANICAL EQUIPMENT
Competency: J1  Install insulation on mechanical equipment

Objectives
To be competent in this area, the individual must be able to:
• Install insulation on mechanical equipment.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe mechanical equipment | • Pumps  
• Turbines  
• Boilers  
• Heat exchangers  
• Precipitators  
• Chillers  
• Condensers |
| 2. Describe insulation used on mechanical equipment | • Rigid  
• Flexible  
• Duct liner  
• Acoustic  
• Fiberglass  
• Elastomeric foam  
• Mineral fibre board  
• Ceramic fibre  
• Cellular glass |
| 3. Install insulation on mechanical equipment | • Manufacturer’s specifications  
• Specific job requirements  
• Work procedures  
  ○ Fitting techniques  
  ○ Avoiding damage to vapour barrier  
• Housekeeping  
  ○ Avoiding waste  
  ○ Keeping work area clean and tidy |

Achievement Criteria
Performance  The learner will apply insulation to mechanical equipment.
Conditions  The learner will be given
• Tools and equipment
• Materials
• Project specifications

Criteria The learner will be evaluated on
• Safety
• Housekeeping
• Quality
• Completion within specified time
Line (GAC): J INSULATE MECHANICAL EQUIPMENT
Competency: J2 Apply vapour barrier on insulated mechanical equipment

Objectives
To be competent in this area, the individual must be able to:
• Identify areas requiring vapour barrier.
• Describe installing vapour barrier on mechanical equipment.

LEARNING TASKS
1. Describe installing vapour barrier

CONTENT
• Commercial and industrial
• Required vs. integral vapour barrier
• Vapour barriers
  o Mastics
  o Reinforced foil flame retardant kraft (RFFRK)
  o ASJ
• Heat seal penetrations with tape
• Tape clips
• Corner bead to protect or enhance corners
Line (GAC): L INSULATE FOR SOUNDPROOFING
Competency: L1 Insulate piping and equipment for soundproofing

Objectives
To be competent in this area, the individual must be able to:
• Describe soundproofing methods and materials for piping and equipment.

LEARNING TASKS
CONTENT
1. Describe sound attenuation
   • Decibels
   • Controlling sound transmission

2. Describe piping systems
   • Commercial applications
   • Recording studios
   • Movie theatres
   • Hotels
   • Mechanical rooms
   • Natural gas lines
   • Sanitary
   • Rain water
   • High pressure steam
   • Process piping

3. Describe equipment and mechanical systems
   • Turbines
   • Co-generation buildings
   • Duct work
   • Plenums

4. Describe soundproofing materials
   • Soundproofing materials
     o Fiberglass
     o Mineral fibre
     o Barium wrap
     o Stand offs
     o Acoustic liner
   • Fasteners
     o Pins and clips
     o Banding
     o Adhesives

5. Describe installing soundproofing on piping and equipment systems
   • Cutting rigid and flexible material
   • Air space
   • Staggering
   • Filling voids
   • Encapsulating
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Sealing</td>
<td>• Sealing</td>
</tr>
<tr>
<td>Finishing and jacketing</td>
<td>• Finishing and jacketing</td>
</tr>
<tr>
<td></td>
<td>o Glass fabric</td>
</tr>
<tr>
<td></td>
<td>o Perforated metal</td>
</tr>
</tbody>
</table>
Line (GAC): L INSULATE FOR SOUNDPROOFING
Competency: L2 Install acoustic assemblies for soundproofing

Objectives
To be competent in this area, the individual must be able to:
• Describe acoustic assemblies.

LEARNING TASKS
1. Describe acoustic linings for wall and ceiling assemblies

2. Describe materials used for wall and ceiling installations
• Mineral wool
• Mineral fibre
• Acoustic duct liner
• Fiberglass

3. Describe fabrication of wall and ceiling installations
• Cutting and fitting materials to panels/walls
• Sealing raw edges
• Sealing clips

CONTENT
• Jurisdictional variations of work
• Wall and ceiling assemblies
• Lining plenums
• Mechanical rooms ceilings
• Mineral wool
• Mineral fibre
• Acoustic duct liner
• Fiberglass
• Cutting and fitting materials to panels/walls
• Sealing raw edges
• Sealing clips
Line (GAC): N

INSTALL UNDERGROUND INSULATING SYSTEMS

Competency: N1 Install pipe insulation to underground systems

Objectives

To be competent in this area, the individual must be able to:

- Describe installing pipe insulation to underground systems.

LEARNING TASKS

1. Describe underground systems

2. Describe insulation materials used in underground systems

3. Describe installing pipe insulation to underground systems

CONTENT

- Hot work
- Cold work
- Tunnels
- Trenches
- Vaults
- Insulation
  - Cellular glass
  - Mineral fibre
  - Nano-like materials
- Vapour barrier
  - Jacketing
  - Asphalt-reinforced
  - Metal
  - Blue skin
- Accessories
  - Banding
  - Wire
  - Caulking
  - Tape
- Vault vs. trenching
- Attaching
- Securing
- Sealing/cladding
Line (GAC): N  INSTALL UNDERGROUND INSULATING SYSTEMS
Competency: N2  Install pour-in-place and spray-on insulation to underground systems

Objectives
To be competent in this area, the individual must be able to:
• Describe pour-in-place insulation for underground systems.

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<thead>
<tr>
<th>LEARNING TASKS</th>
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</thead>
<tbody>
<tr>
<td>1. Describe pour-in-place and spray-on insulation</td>
<td>• Gilsonite</td>
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<td>• Hydrophobic</td>
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<tr>
<td></td>
<td>• Perlite</td>
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<td></td>
<td>• Fiberglass</td>
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<tr>
<td>2. Describe installing pour-in-place and spray-on insulation</td>
<td>• Specifications</td>
</tr>
<tr>
<td></td>
<td>o Thickness of material</td>
</tr>
<tr>
<td></td>
<td>o Type of material</td>
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<tr>
<td></td>
<td>o Grade of material</td>
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<tr>
<td></td>
<td>o Density</td>
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<tr>
<td></td>
<td>• Coordination with other trades</td>
</tr>
<tr>
<td></td>
<td>• Clearance for expansion joints</td>
</tr>
<tr>
<td></td>
<td>• Treated timbers for pipe supports</td>
</tr>
<tr>
<td></td>
<td>• Formwork</td>
</tr>
<tr>
<td></td>
<td>• Lining with poly sheets</td>
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<tr>
<td></td>
<td>• Pouring materials in place</td>
</tr>
<tr>
<td></td>
<td>• Agitation (compaction)</td>
</tr>
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<td></td>
<td>• Capping with sand</td>
</tr>
</tbody>
</table>
Line (GAC): O SPRAY SEALERS, COATINGS AND SPRAY-ON INSULATION

Competency: O1 Prepare materials, equipment, surrounding work area and substrate for spraying

Objectives
To be competent in this area, the individual must be able to:
• Describe preparing materials, equipment, surrounding work area and substrate for spraying.

LEARNING TASKS
1. Describe spraying equipment
   • Air spray systems
   • Airless spray systems
   • Guns
   • Hoses
   • Heaters
   • Pumps
   • Compressors
   • Mixers
   • Hoppers
   • Air blowers for ventilation
   • Troubleshooting spray system
     o Interrupted material supply
     o Power failures
     o Plugged hoses and nozzles
     o Poor application pattern
     o Damaged tips

2. Describe spray materials
   • Foams
   • Primers
   • Coatings
   • Mastics
   • Fibres
   • Solvents
   • Sealers
   • Cleaners
   • Adhesives
   • Urethanes
   • Cellulose fibres
   • Insulation values

3. Describe preparing surfaces to be sprayed and adjacent areas
   • Protection of equipment and facilities
     o Masking and taping of adjacent
<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>4. Describe preparing work area</td>
<td>areas</td>
</tr>
<tr>
<td>5. Describe housekeeping</td>
<td></td>
</tr>
</tbody>
</table>

- **Cleanliness and texture of substrate**
  - Cleaning materials
  - Tri-sodium phosphate (TSP)
  - Solvents
  - Priming surface where necessary

- **Mixing facilities**
- **Availability of air, heat, ventilation and water**
- **Electrical supply**
- **Isolating work area**
  - Signage

- **Clean up and storage of spray equipment**
- **Clean up and removal of debris from worksite**
- **Masking materials, dismantling and removal**
- **Protective gear and machines**
HARMONIZED PROGRAM OUTLINE
Program Content
Level 2

Line (GAC): O SPRAY SEALERS, COATINGS AND SPRAY-ON INSULATION
Competency: O2 Apply reinforcing materials, spray insulation, coatings and sealers

Objectives
To be competent in this area, the individual must be able to:
• Describe methods of applying reinforcing materials, spray insulation, coatings and sealers.

LEARNING TASKS
1. Describe installing reinforcing materials
   • Layout of anchors
   • Fastening and securing anchors
   • Attaching reinforcing materials to anchors

2. Describe spray insulation, coatings and sealers
   • Considerations to follow when spraying
     o Environmental
     o Drying between coats
     o Number of coats
     o Curing time of material
     o Textures of sprayed surface
     o Shrinkage of sprayed materials
     o Density of materials
   • Mastics
   • Sealers
   • Urethane
   • Cellulose
   • Mineral fibre
   • Knocking down/tamping
Line (GAC): Q INSTALL INSULATION FOR REFRACTORY SYSTEMS
Competency: Q1 Apply insulation on refractory systems

Objectives
To be competent in this area, the individual must be able to:
- Describe application of insulation in refractory applications.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe refractory systems | - Above 815°C/1500°F  
- Kilns  
- Steam drum  
- Furnaces |
| 2. Describe insulation used on refractory systems | - Specifications  
- Castable  
- Mortars  
- High temperature cements  
- Calcium silicate  
- Ceramic fibre  
- Insulation support rings |
| 3. Describe installing insulation on refractory systems | - Specifications  
- Fittings  
- Avoiding thermal bridging  
- Creating air space  
- Multi-layer application  
- Expansion joints  
- Staggered joints (100%)  
- Cushioning blankets  
- Accessories  
  - Studs  
  - Lath  
  - Banding  
  - Poultry mesh  
- Finishing  
  - Cement  
  - Castable |
Line (GAC): Q INSTALL INSULATION FOR REFRACTORY SYSTEMS
Competency: Q2 Install reflective systems

Objectives
To be competent in this area, the individual must be able to:
• Describe installing reflective systems.

LEARNING TASKS
1. Describe reflective systems
   • Nuclear applications
   • Cryogenics
   • Refractory systems
   • Air space
   • Reflecting heat back into the source
   • Multi-layers of overlapped, reflective sheets
   • Hermetically sealed casing
   • Removable

2. Describe installing reflective systems
   • Specifications
   • Stand offs
   • Integrated latches
   • Stainless welding
   • Field modifications for pan outs
Line (GAC): Q INSTALL INSULATION FOR REFRACTORY SYSTEMS
Competency: Q3 Install cladding, jacketing and finishes on refractory systems

Objectives
To be competent in this area, the individual must be able to:
• Describe installing cladding, jacketing and finishes on refractory systems.

LEARNING TASKS
1. Describe cladding, jacketing and finishes used on refractory systems

    • Metal
    • Aluminum
    • Stainless steel
    • Vinyl
    • Fibreglass cloth
    • Silicone cloth
    • Stainless steel mesh

2. Describe installing cladding, jacketing and finishes on refractory systems

    • Cutting
    • Rolling
    • Fabricating boxes
    • Fabricating high temperature pads
    • Sealing
    • Lagging adhesives
Line (GAC): R INSTALL INSULATION FOR CRYOGENIC SYSTEMS
Competency: R1 Apply insulation on cryogenic systems

**Objectives**
To be competent in this area, the individual must be able to:
- Insulate cryogenic systems.

**LEARNING TASKS**

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe cryogenic systems</td>
<td>- Below -101°C/-150°F</td>
</tr>
<tr>
<td></td>
<td>- Liquified natural gas (LNG) storage vessels</td>
</tr>
<tr>
<td></td>
<td>- LNG process piping</td>
</tr>
<tr>
<td></td>
<td>- Liquid nitrogen piping</td>
</tr>
<tr>
<td>2. Describe materials used to insulate cryogenic systems</td>
<td>- Insulation</td>
</tr>
<tr>
<td></td>
<td>- Cellular glass</td>
</tr>
<tr>
<td></td>
<td>- Polyurethane</td>
</tr>
<tr>
<td></td>
<td>- Styrofoam</td>
</tr>
<tr>
<td></td>
<td>- Perlite</td>
</tr>
<tr>
<td></td>
<td>- Elastomeric foam</td>
</tr>
<tr>
<td></td>
<td>- Oil free mineral wool</td>
</tr>
<tr>
<td></td>
<td>- Mastic</td>
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<tr>
<td></td>
<td>- Fasteners</td>
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<td></td>
<td>- Tapes</td>
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<td>- Banding</td>
</tr>
<tr>
<td></td>
<td>- Wire (over tape)</td>
</tr>
<tr>
<td>3. Install insulation on cryogenic systems</td>
<td>- Manufacturers’ specifications</td>
</tr>
<tr>
<td></td>
<td>- Pour-in-place</td>
</tr>
<tr>
<td></td>
<td>- Compaction (agitation)</td>
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<tr>
<td></td>
<td>- Multi-layer application</td>
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<tr>
<td></td>
<td>- Taping first layer</td>
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<td></td>
<td>- Buttering outer layer</td>
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<tr>
<td></td>
<td>- 100% broken joint method</td>
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<tr>
<td></td>
<td>- Contraction joints</td>
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<tr>
<td></td>
<td>- Vapour damming</td>
</tr>
<tr>
<td></td>
<td>- Tightening banding</td>
</tr>
<tr>
<td></td>
<td>- Tightness of joints</td>
</tr>
<tr>
<td></td>
<td>- Oversize hangers</td>
</tr>
<tr>
<td></td>
<td>- Insulation support rings</td>
</tr>
</tbody>
</table>
**Achievement Criteria**

**Performance**  The learner will insulate a multi-layer cryogenic piping system.

**Conditions**  The learner will be given
- Tools and equipment
- Materials
- Project specifications

**Criteria**  The learner will be evaluated on
- Safety
- Shop practices
- Quality of application
- Following specifications
- Completion within time limits
Line (GAC): R INSTALL INSULATION FOR CRYOGENIC SYSTEMS
Competency: R2 Apply vapour barriers to insulated components of cryogenic systems

Objectives
To be competent in this area, the individual must be able to:
• Install vapour barriers on cryogenic systems.

LEARNING TASKS
1. Describe vapour barriers
   • Films
   • Laminates
   • Metals
   • Mastics
   • Sealants

2. Install vapour barriers on cryogenic systems
   • Measuring material including lap
   • Cutting material to accommodate fittings
   • Wrap around piping system
   • Taping and sealing all joints to ensure 100% vapour barrier

Achievement Criteria
Performance The learner will install vapour barrier to cryogenic piping system.
Conditions The learner will be given
• Tools and equipment
• Materials
• Project specifications
Criteria The learner will be evaluated on
• Safety
• Shop practices
• Quality of application
• Following specifications
• Completion within time limits
Objectives

To be competent in this area, the individual must be able to:

- Install cladding, jacketing and finishes on cryogenic systems.

LEARNING TASKS

1. Describe cladding, jacketing and finishes used on cryogenic systems
   - PVC
   - Metal
   - Non-hardening sealer
   - Mastic
   - Glass fabric

2. Install cladding, jacketing and finishes on cryogenic systems
   - Measuring
   - Layout
   - Fabrication
   - Installation
   - Fasteners
   - Banding
   - Avoiding screws and rivets
   - Adhesives
   - Vinyl tape

Achievement Criteria

Performance
The learner will fabricate and attach cladding to a cryogenic system.

Conditions
The learner will be given
- Tools and equipment
- Materials
- Project specifications

Criteria
The learner will be evaluated on
- Safety
- Shop practices
- Quality of application
- Following specifications
- Completion within time limits
Level 3

Insulator (Heat and Frost)
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E1 Perform measurements and calculations

Objectives
To be competent in this area, the individual must be able to:
- Use trigonometry to find angles and sides of triangles.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Describe trigonometry terms | • Pythagorean theorem  
  o The law of right angle triangles  
  o Hypotenuse  
  o Opposite side  
  o Adjacent side |
| 2. Describe trigonometry functions | • Sine  
  • Cosine  
  • Tangent |
| 3. Use trigonometry to solve problems | • Length of the side of a triangle given one angle and the length of one side  
  • Rise of an elbow  
  • Reducers  
  • Square to round  
  • Round to square  
  • Offset  
  • Concentric |
| 4. Calculate slant heights for reducers and transitions for cladding using trigonometry | |
**Line (GAC):** E PERFORM ROUTINE TRADE PRACTICES  
**Competency:** E2 Interpret specifications and drawings

### Objectives
To be competent in this area, the individual must be able to:
- Use shop drawings and specifications to select materials and accessories for a shop project.

### LEARNING TASKS
<table>
<thead>
<tr>
<th>CONTENT</th>
<th>LEARNING TASKS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Describe project drawings</td>
<td>Types of drawings</td>
</tr>
<tr>
<td></td>
<td>o Spool</td>
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<tr>
<td></td>
<td>o Equipment</td>
</tr>
<tr>
<td></td>
<td>o Isometric</td>
</tr>
<tr>
<td>2. Describe project specifications</td>
<td>Manufacturer’s</td>
</tr>
<tr>
<td>3. Interpret specifications to select materials for finishing</td>
<td>BC Insulation Contractors Association (BCICA)</td>
</tr>
<tr>
<td>4. Use project drawings and specifications to complete a project</td>
<td>Type of insulation required</td>
</tr>
<tr>
<td></td>
<td>Type of finish required</td>
</tr>
<tr>
<td></td>
<td>Identification of materials and accessories required</td>
</tr>
<tr>
<td></td>
<td>Method of application</td>
</tr>
</tbody>
</table>

### Achievement Criteria
- **Performance**
  The learner will use project drawings and specification to select materials and accessories for a shop project.
- **Conditions**
  The learner will be given
  - Tools and materials
  - Project drawings and specifications
- **Criteria**
  The learner will be evaluated on
  - Safety
  - Shop practices
  - Following specifications and shop drawings
  - Completion within time limits
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E4 Select materials

Objectives
To be competent in this area, the individual must be able to:
• Describe selecting finishes.

LEARNING TASKS
1. Describe factors to be considered in the selection and application of finishes
   • Environmental conditions
   • Preventing mechanical abuse
   • Characteristics and shape of surface
   • Expansion and contraction
   • Location of project
2. Describe type of finishes
   • Aluminum
     o Smooth
     o Embossed
     o Corrugated
   • Self-adhering jacketing (VentureClad)
   • Stainless steel
     o Smooth
     o Corrugated
3. Describe considerations related to selecting and applying finishes
   • Access to task
   • Lap location
   • Damage to insulation, vapour barrier or adjacent equipments
   • Effects of using dissimilar metals
   • Checking dimensions to avoid waste
   • Good housekeeping
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES

Competency: E5 Perform layout

Objectives
To be competent in this area, the individual must be able to:
• Perform layout for cladding in industrial applications.

LEARNING TASKS
1. Describe cladding on industrial applications on tanks, vessels, equipment and piping systems
   • Specifications and drawings
   • Types of cladding
     o Stainless steel corrugated
     o Aluminum corrugated sheets
     o Flat sheets

2. Describe accessories and attachments
   • Banding
   • Springs
   • S and U clips
   • Screws or rivets
   • Flashings
   • Chokers
   • Establishing
     o First row
     o Starting point
     o Bottom end cap if specified
     o Band spacing
     o Screw spacing
     o Caulking
     o Beauty rings

3. Describe layout procedures for cladding on tanks, vessels and piping
   • Fabricating templates
   • T-squares
   • Set squares
   • Trammel points
   • Dividers
   • 100 ft. tape (circumference tape)
   • Pencils and drafting pens

4. Use layout tools to fabricating a template

Achievement Criteria
Performance The learner will fabricate a template for cladding in an industrial application.
Conditions The learner will be given...
HARMONIZED PROGRAM OUTLINE
Program Content
Level 3

- Materials and drafting equipment
- Project specifications

Criteria

<table>
<thead>
<tr>
<th>The learner will be evaluated on</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality</td>
</tr>
<tr>
<td>Accuracy of layout</td>
</tr>
<tr>
<td>Completion within time limit</td>
</tr>
</tbody>
</table>
HARMONIZED PROGRAM OUTLINE
Program Content
Level 3

Line (GAC): F INSULATE PIPING AND FITTINGS

Competency: F3 Install cladding, jacketing and finishes on piping and fittings

Objectives
To be competent in this area, the individual must be able to:
• Install cladding and finishes on piping and fittings on industrial applications.

LEARNING TASKS
1. Describe procedures used to install cladding on piping and fittings on industrial applications
   CONTENT
   • Types of fittings
     o Elbows
     o Tees
     o Transitions
     oReducers
     o End caps
   • Attachments
     o Bands
     o Clips
     o Screws
     o Rivets
     o Wire
     o S and U clips

2. Fabricate cladding for piping and fittings on industrial applications
   CONTENT
   • Accuracy of measurements
   • Field drawings
   • Specifications
   • Layout
     o Allowances
       – Hems
       – Laps
       – Beads
     o Cutting
     o Forming
     o Rolling
     o Beading
     o Crimping
     o Breaking
       – Square to rounds
       – Safety edges
       – Hems

3. Install cladding on piping and fittings on industrial applications
   CONTENT
   • Test fit
   • Field modifications
## LEARNING TASKS

<table>
<thead>
<tr>
<th>CONTENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Overlapping</td>
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<tr>
<td>• Watershed</td>
</tr>
<tr>
<td>• Banding</td>
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<tr>
<td>• Screwing</td>
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<tr>
<td>• Riveting</td>
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<tr>
<td>• Caulking</td>
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<tr>
<td>• Clean up</td>
</tr>
</tbody>
</table>

## Achievement Criteria

<table>
<thead>
<tr>
<th>Performance</th>
<th>The learner will install cladding and fittings to piping.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>The learner will be given</td>
</tr>
<tr>
<td></td>
<td>• Tools and equipment</td>
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<tr>
<td></td>
<td>• Materials</td>
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<tr>
<td></td>
<td>• Project specifications</td>
</tr>
<tr>
<td>Criteria</td>
<td>The learner will be evaluated on</td>
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<tr>
<td></td>
<td>• Safety</td>
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<tr>
<td></td>
<td>• Shop practices</td>
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<tr>
<td></td>
<td>• Quality of application</td>
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<tr>
<td></td>
<td>• Following specifications</td>
</tr>
<tr>
<td></td>
<td>• Completion within time limits</td>
</tr>
</tbody>
</table>
Line (GAC): G  INSULATE TANKS, VESSELS AND EQUIPMENT
Competency: G3  Install cladding, jacketing and finishes on tanks, vessels and equipment

Objectives
To be competent in this area, the individual must be able to:
•  Install cladding and finishes on tanks, vessels and equipment.

LEARNING TASKS
1. Describe procedures used to install cladding on tanks, vessels and equipment
   •  Types of tanks
     o  Hot water
     o  Spherical
     o  Elliptical
     o  Flat
     o  Horizontal
     o  Vertical
   •  Types of equipment
     o  ID fans
     o  Furnaces
     o  Breechings
     o  Boilers
     o  Heat exchangers
   •  Types of attachments
     o  Bands
     o  Clips
     o  Screws
     o  Rivets
     o  Wire
     o  S and U clips
   •  Spacing and location of anchors and attachments

2. Fabricate cladding for tanks, vessels and equipment
   •  Accuracy of measurements
   •  Field drawings
   •  Specifications
   •  Layout
     o  Allowances
       –  Hems
       –  Laps
     o  Beads
   •  Cutting
   •  Forming
**LEARNING TASKS**

**CONTENT**
- Rolling
- Beading
- Crimping
- Breaking
- Square to rounds
- Safety edges
- Hems
- Test fit
- Field modifications
- Overlapping
- Watershed
- Banding
- Screwing
- Riveting
- Caulking
- Clean up

3. Install cladding on tanks, vessels and equipment

**Achievement Criteria**

**Performance**  The learner will install cladding and fittings to tanks, vessels and equipment.

**Conditions**  The learner will be given
- Tools and equipment
- Materials
- Project specifications

**Criteria**  The learner will be evaluated on
- Safety
- Shop practices
- Quality of application
- Following specifications
- Completion within time limits
Line (GAC): I INSULATE MECHANICAL DUCTING

Competency: I3 Install cladding, jacketing and finishes on insulated mechanical ducting

Objectives

To be competent in this area, the individual must be able to:

• Install cladding and finishes on insulated mechanical ducting.

LEARNING TASKS

1. Describe procedures used to install cladding on mechanical ducting

   • Types of mechanical ducting
     - Breeching
     - Supply air
     - Conditioned air
     - Outside air
     - Exhaust
   - Types of attachments
     - Bands
     - Clips
     - Tacs
     - Screws
     - Rivets
     - Wire
     - S and U clips
   - Spacing and location of anchors and attachments

2. Fabricate cladding for mechanical ducting

   • Accuracy of measurements
   • Field drawings
   • Specifications
   • Layout
     - Allowances
       - Hems
       - Laps
       - Beads

   • Cutting
   • Forming
   • Rolling
   • Beading
   • Crimping
   • Breaking
     • Square to rounds
     • Safety edges

CONTENT

- Types of mechanical ducting
- Types of attachments
- Spacing and location of anchors and attachments
LEARNING TASKS

3. Install cladding on mechanical ducting

CONTENT

- Test fit
- Field modifications
- Overlapping
- Watershed
- Banding
- Screwing
- Riveting
- Caulking
- Clean up

Achievement Criteria

Performance
The learner will install cladding and fittings to mechanical ducting.

Conditions
The learner will be given
- Tools and equipment
- Materials
- Project specifications

Criteria
The learner will be evaluated on
- Safety
- Shop practices
- Quality of application
- Following specifications
- Completion within time limits
Line (GAC): M INSTALL REMOVABLE COVERS
Competency: M1 Fabricate removable covers

Objectives
To be competent in this area, the individual must be able to:
• Fabricate soft, removable covers.

LEARNING TASKS

1. Describe soft, removable covers
   • Types
   • Purpose
     o Reusable
     o Insulating
     o Personnel protection

2. Draw field sketches
   • Identifying equipment
   • Temperature range
   • Measurements

3. Layout covers
   • Fabric
     o Silicone cloth
     o Marine cloth
   • Insulation
     o Ceramic blanket
     o High density fiber glass
     o Temp mat
     o Mesh
     o Stainless steel
     o Monel
   • Allowances
     o Seams
     o Edges
   • Minimizing waste

4. Fabricate soft covers
   • Stitching (sewing)
   • Thread with stainless core
   • Stitch stapling
   • Stainless
   • Closed in
   • Hog rings
   • Types
     o Velcro
     o Lacing anchors

5. Attach mechanical fasteners
LEARNING TASKS

CONTENT

- Cord
- Wire
- D rings
- Pleating clips
- Attaching identification tags

Achievement Criteria

Performance  The learner will fabricate a removable, soft cover for a valve.

Conditions  The learner will be given

- Tools and equipment
- Materials
- Project specifications

Criteria  The learner will be evaluated on

- Safety
- Shop practices
- Quality of fabrication
- Following specifications
- Completion within time limits
Line (GAC): M INSTALL REMOVABLE COVERS
Competency: M2 Fasten removable covers

Objectives
To be competent in this area, the individual must be able to:
• Install soft, removable covers.

LEARNING TASKS
1. Fit cover
   • Fitting to object
   • Adjustments

2. Secure cover
   • Accessories
     o Wire
     o Banding

Achievement Criteria
Performance The learner will install soft, removable covers.
Conditions The learner will be given
   • Tools and equipment
   • Materials
   • Project specifications
Criteria The learner will be evaluated on
   • Safety
   • Shop practices
   • Quality of installation
   • Following specifications
   • Completion within time limits
Line (GAC): S INSULATE FOR MARINE APPLICATIONS
Competency: S1 Insulate bulkheads, deckheads and hulls

Objectives
To be competent in this area, the individual must be able to:
• Describe insulation for marine applications.

LEARNING TASKS
1. Describe insulation for marine applications

CONTENT
• Areas requiring insulation
  o Bulkheads
  o Deckheads
  o Hulls
• Purposes
  o Thermal
  o Fire prevention
  o Noise suppression
• Confined space hazard
• Materials and associated hazards
  o Mineral fibre
  o Fibreglass
  o FSK - faced insulation
  o FSK tape
  o Barium sheets
  o Lead paint (retrofits)
• Insulation application sequence
  o Multiple layers
  o Panning out for components
  o Pin and clip fastening systems
  o Customizing insulation boards
  o Taping
Line (GAC): S INSULATE FOR MARINE APPLICATIONS
Competency: S2 Install cladding, jacketing and finishes on marine applications

Objectives
To be competent in this area, the individual must be able to:
• Describe installation of cladding, jacketing and finishes on marine applications.

LEARNING TASKS
1. Describe installation of finishes on marine applications

CONTENT
• Finish materials
  o Perforated metal
  o RFFRK
  o Fabric finish system
  o Aluminum and steel
• Measuring, fabricating and attaching sheets of perforated metal
• Dome caps
• Rivets
• Screws
• Lagging adhesives
• Flashings
• Taping and heat sealing all joints and penetrations
• Field modifications
• Steel jacketing around life boat drops
Level 4

Insulator (Heat and Frost)
Line (GAC): D 
Competency: D2 Use mentoring techniques

Objectives
To be competent in this area, the individual must be able to:
• Describe mentoring techniques.

LEARNING TASKS
1. Describe mentoring techniques

CONTENT
• Teaching methods
  o Case studies
  o Explaining objective
  o Feedback
  o Demonstrating
  o Encouragement
  o Providing practice and feedback
    – Guided
    – Limited independence
    – Full independence
  o Assessment

• Personal responsibilities and attitudes
  o Working safely
  o Accepting constructive feedback
  o Respect for authority
  o Asking questions
  o Stewardship of materials, tools and property
  o Time management and punctuality
  o Efficient work practices

• Learning needs
  o Learning disabilities
  o Learning preferences
  o Language proficiencies
HARMONIZED PROGRAM OUTLINE
Program Content
Level 4

Line (GAC): E PERFORM ROUTINE TRADE PRACTICES
Competency: E1 Perform measurements and calculations

Objectives
To be competent in this area, the individual must be able to:
• Take and record complex field measurements.
• Calculate and record material requirements.

LEARNING TASKS
1. Take complex field measurements
   • Equipment types
     o Tank heads
     o Cylinders
     o Pumps
     o Vessels
     o Boilers
     o Breeching
     o ID fans
     o Piping systems
   • Tools
     o Plumb bob
     o Square
     o Laser
     o Tape
     o Chalk line
     o Circumference rules
   • Accuracy
   • Recording of measurements
   • Field sketches
   • Pictures

2. Calculate material requirements
   • Formulas
   • Calculators
   • Vendor charts
   • Cut and roll
   • Elbow
   • Waste allowance
   • Material order sheet

Achievement Criteria
Performance The learner will take complex field measurements and calculate material requirements.
Conditions The learner will be given
• Tools and equipment
• Materials
• Project specifications and drawings

Criteria The learner will be evaluated on
• Accuracy of material take offs
• Completion within time limits
Line (GAC): E PERFORM ROUTINE TRADE PRACTICES

Competency: E2 Interpret specifications and drawings

Objectives
To be competent in this area, the individual must be able to:
- Interpret specifications and drawings.
- Sketch pictorial drawings from a given view.
- Perform take offs of pipings and fittings from drawings.

LEARNING TASKS

1. Describe types of facilities represented in drawings
   - Refineries
   - Chemical plants
   - Pulp mills
   - Power boilers
   - Marine
   - Hospitals
   - Schools
   - Office buildings
   - Mines

2. Describe blueprints
   - Types
     - Mechanical
       - Heat tracing
     - Plumbing
     - Architectural
   - Symbols
   - Nomenclature
   - Abbreviations
   - Scope
   - Views
     - Isometric
     - Elevation
     - Plan
     - Sections
     - Details
   - Flow sheets
   - Revisions
   - Change order
   - Contemplated change notes
   - Scope

3. Describe specifications

CONTENT

Insulator (Heat and Frost)
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LEARNING TASKS

CONTENT

• BCICA
• Piping
• Ducting
• Equipment
• Fire stop
• ACM
• Adendums
• Thermal Insulation Association of Canada (TIAC) Best Practices
• Manufacturers’ specifications
• American National Standards Institute (ANSI)
• Increased thicknesses in commercial applications
• ASTM
• Client specifications
  o Schedules, start and finish time tables
• Standards
• General clauses
• List of materials
• Notes

4. Describe the purpose of sectional views
   • Large scale elevation details
   • Cutting planes
   • Section lines

5. Use elevation and sectional drawings
   • Number and height of floors
   • Roof height and shape
   • Elevation of pipes, ducts and equipment in relation to floor level
   • Difference of directional view (north, south, east and west)

6. Describe relationship between elevation and floor plan
   • Scale
   • Shape of building
   • Arrangement of rooms
   • Shape and size of rooms
   • Location and size of elevators, stairs and hallways
   • Location, shape and size of mechanical equipment

7. Sketch orthographics
   • Top projection
   • Front projection
LEARNING TASKS

8. Sketch pictorial drawings from an orthographic projection

9. Perform take offs using drawings

CONTENT

• Side or end projection
• Use of metric and Imperial scale rulers
• Oblique
• Isometric
• Perspective
• Equipment for take offs
  o Drawings
  o Scale ruler
  o Compass
  o Take off sheets
• Square footage of materials
• Piping systems
  o Types
    − Copper
    − Steel
    − Hot/cold
    − Process
    − Steam
  o Lineal feet
  o Sizes
    − Pipes
    − Elbows
    − Tees
    − Unions
• Fitting inventory
• Types
• Sizes
• Quantities

Achievement Criteria 1

Performance The learner will sketch pictorial drawings from a given view.

Conditions The learner will be given
• Tools and equipment
• Materials
• Drawings

Criteria The learner will be evaluated on
• Accuracy
• Completed within specified time
Achievement Criteria 2

Performance  The learner will perform take offs of pipings and fittings from drawings.

Conditions  The learner will be given
- Tools and equipment
- Materials
- Project specifications and drawings

Criteria  The learner will be evaluated on
- Accuracy of take off
- Following specifications
- Completion within time limits
Line (GAC): K INSTALL FIRE STOP SYSTEMS
Competency: K1 Identify approved fire stop system

Objectives
To be competent in this area, the individual must be able to:
• Use manufacturer’s systems manuals to identify approved fire stop system.

LEARNING TASKS
1. Use manufacturer’s systems manual

CONTENT
• Identification of all penetrations
  o Wall or floor
  o Pipe
  o Cable
  o Tray
  o Duct
• Fire rated shaft
• Curtain walls
• Identification of fire stop system
  o 3M
  o Hilti
  o Self-seal
  o Fire Master
HARMONIZED PROGRAM OUTLINE
Program Content
Level 4

Line (GAC): M INSTALL REMOVABLE COVERS
Competency: M1 Fabricate removable covers

Objectives
To be competent in this area, the individual must be able to:
• Layout, fabricate and insulate hard, removable covers.

LEARNING TASKS

1. Describe hard, removable covers
   • Types
   • Locations
     o Cold work
     o Hot work
   • Purpose
     o Reusable
     o Insulating
     o Preventing ice formation
     o Personnel protection
     o Resistance to mechanical damage

2. Draw field sketches
   • Identifying equipment
   • Temperature range
   • Measurements

3. Layout covers
   • Metal
   • Stainless steel
   • Aluminum
   • Insulation
     o Ceramic blanket
     o Fiber glass
     o Mineral fiber
     o Cellular glass
     o Urethane
     o Perforated metal liner
   • Allowances
     o Seams
     o Edges
     o Machine
       – Lock formed
       – Easy edger
   • Single, double and lap
   • Metal breaking order
LEARNING TASKS

4. Fabricate hard covers
   • Rivets
   • Screws
   • Handles

5. Attach mechanical fasteners
   • Identification tags
   • Latches
   • Adjustable latches

Achievement Criteria 1

Performance  The learner will fabricate and insulate a hard, removable cover.

Conditions  The learner will be given
   • Tools and equipment
   • Materials
   • Project specifications

Criteria  The learner will be evaluated on
   • Safety
   • Shop practices
   • Quality of fabrication
   • Following specifications
   • Completion within time limits

Achievement Criteria 2

Performance  The learner will fabricate and install a removable, soft elbow cover.

Conditions  The learner will be given
   • Tools and equipment
   • Materials
   • Project specifications

Criteria  The learner will be evaluated on
   • Safety
   • Shop practices
   • Quality of fabrication
   • Following specifications
   • Completion within time limits
Line (GAC): M  INSTALL REMOVABLE COVERS

Competency: M2  Fasten removable covers

Objectives
To be competent in this area, the individual must be able to:
- Install hard, removable covers.

<table>
<thead>
<tr>
<th>LEARNING TASKS</th>
<th>CONTENT</th>
</tr>
</thead>
</table>
| 1. Fit cover   | • Cutting for penetrations  
                 • Fitting to valve or flange  
                 • Adjustments |
| 2. Secure cover| • Accessories  
                 • Suitcase latches  
                 • Banding |

Achievement Criteria
Performance  The learner will install hard, removable covers.
Conditions  The learner will be given
- Tools and equipment  
- Materials  
- Project specifications
Criteria  The learner will be evaluated on
- Safety  
- Shop practices  
- Quality of installation  
- Following specifications  
- Completion within time limits
Line (GAC): P  INSTALL FIREPROOFING
Competency: P2  Apply protective covering to fireproofing materials

Objectives
To be competent in this area, the individual must be able to:
• Describe applying protective coverings to fireproofing materials.

LEARNING TASKS
1. Describe protective coverings

2. Describe applying protective coverings

CONTENT
• Two part epoxy sealant (carboline)
• Hazards
• Fabricated metal covers
• Manufacturer’s specifications
  o Mixing
• Drop sheets for containment of product
• Application methods for carboline
  o Brushing
  o Rolling
• Application methods for metal covers
  o Banding
  o Rivets
  o Screws
  o Wire
Section 4

ASSESSMENT GUIDELINES
## Assessment Guidelines – Level 1

### Level 1 Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>LINE</th>
<th>SUBJECT COMPETENCIES</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Perform Safety Related Functions</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>B</td>
<td>Use and Maintain Tools and Equipment</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>C</td>
<td>Organize Work</td>
<td>10%</td>
<td>0%</td>
</tr>
<tr>
<td>D</td>
<td>Use Communication and Mentoring Techniques</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>E</td>
<td>Perform Routine Trade Practices</td>
<td>12%</td>
<td>30%</td>
</tr>
<tr>
<td>F</td>
<td>Insulate Piping and Fittings</td>
<td>12%</td>
<td>35%</td>
</tr>
<tr>
<td>H</td>
<td>Insulate Plumbing and Mechanical Piping Systems</td>
<td>28%</td>
<td>35%</td>
</tr>
<tr>
<td>K</td>
<td>Install Fire Stop Systems</td>
<td>8%</td>
<td>0%</td>
</tr>
<tr>
<td>P</td>
<td>Install Fireproofing</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>T</td>
<td>Perform Asbestos Abatement</td>
<td>2%</td>
<td>0%</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>100%</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

### In-school theory / practical subject competency weighting

- **50%** theory
- **50%** practical

### Final in-school mark

Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Insulator (Heat and Frost) Standardized Level Exam (SLE).

### In-school mark

Combined theory and practical marks (final in-school mark) multiplied by 80%.

### Standardized Level Exam (SLE) mark

The exam mark is multiplied by 20%.

### Final Level Mark

Combined in-class mark (80%) and SLE mark (20%)
Note: Development of SLEs will begin in 2018. When launched, SLEs will be a completion requirement. An Official Program Standard Notification (OPSN) will announce the launch of the SLEs. Until launched, an apprentice’s final level marks will be based solely on the in-school mark.
## Assessment Guidelines – Level 2

Level 2 Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>LINE</th>
<th>SUBJECT COMPETENCIES</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Perform Routine Trade Practices</td>
<td>8%</td>
<td>20%</td>
</tr>
<tr>
<td>G</td>
<td>Insulate Tanks, Vessels and Equipment</td>
<td>25%</td>
<td>30%</td>
</tr>
<tr>
<td>H</td>
<td>Insulate Plumbing and Mechanical Piping Systems</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>I</td>
<td>Insulate Mechanical Ducting</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>J</td>
<td>Insulate Mechanical Equipment</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>L</td>
<td>Insulate for Soundproofing</td>
<td>20%</td>
<td>15%</td>
</tr>
<tr>
<td>N</td>
<td>Install Underground Insulating Systems</td>
<td>5%</td>
<td>0%</td>
</tr>
<tr>
<td>O</td>
<td>Spray Sealers, Coating and Spray-on Insulation</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>Q</td>
<td>Install Insulation for Refractory Systems</td>
<td>3%</td>
<td>0%</td>
</tr>
<tr>
<td>R</td>
<td>Install Insulation for Cryogenic Systems</td>
<td>10%</td>
<td>20%</td>
</tr>
</tbody>
</table>

**Total** 100% 100%

### In-school theory / practical subject competency weighting

<table>
<thead>
<tr>
<th>Theory</th>
<th>Practical</th>
</tr>
</thead>
<tbody>
<tr>
<td>50%</td>
<td>50%</td>
</tr>
</tbody>
</table>

### Final in-school mark

Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Insulator (Heat and Frost) Standardized Level Exam (SLE).

**IN-SCHOOL %**

### In-school mark

Combined theory and practical marks (final in-school mark) multiplied by 80%.

**80%**

### Standardized Level Exam (SLE) mark

The exam mark is multiplied by 20%.

**20%**

### Final Level Mark

Combined in-class mark (80%) and SLE mark (20%).

**FINAL %**
Note: Development of SLEs will begin in 2018. When launched, SLEs will be a completion requirement. An Official Program Standard Notification (OPSN) will announce the launch of the SLEs. Until launched, an apprentice’s final level marks will be based solely on the in-school mark.
Assessment Guidelines – Level 3

Level 3 Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>LINE</th>
<th>SUBJECT COMPETENCIES</th>
<th>THEORY WEIGHTING</th>
<th>PRACTICAL WEIGHTING</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Perform Routine Trade Practices</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>F</td>
<td>Insulate Piping and Fittings</td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>G</td>
<td>Insulate Tanks, Vessels and Equipment</td>
<td>20%</td>
<td>27%</td>
</tr>
<tr>
<td>I</td>
<td>Insulate Mechanical Ducting</td>
<td>15%</td>
<td>21%</td>
</tr>
<tr>
<td>M</td>
<td>Install Removable Covers</td>
<td>10%</td>
<td>10%</td>
</tr>
<tr>
<td>S</td>
<td>Insulate for Marine Applications</td>
<td>5%</td>
<td>0%</td>
</tr>
</tbody>
</table>

**Total** 100% 100%

In-school theory / practical subject competency weighting 40% 60%

**Final in-school mark**
Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Insulator (Heat and Frost) Standardized Level Exam (SLE).

**In-school mark**
Combined theory and practical marks (final in-school mark) multiplied by 80%

**Standardized Level Exam (SLE) mark**
The exam mark is multiplied by 20%

**Final Level Mark**
Combined in-class mark (80%) and SLE mark (20%)

**Note**: Development of SLEs will begin in 2018. When launched, SLEs will be a completion requirement. An Official Program Standard Notification (OPSN) will announce the launch of the SLEs. Until launched, an apprentice’s final level marks will be based solely on the in-school mark.
Assessment Guidelines – Level 4

Level 4 Grading Sheet: Subject Competency and Weightings

<table>
<thead>
<tr>
<th>PROGRAM: IN-SCHOOL TRAINING:</th>
<th>INSULATOR (HEAT AND FROST) LEVEL 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>LINE</td>
<td>SUBJECT COMPETENCIES</td>
</tr>
<tr>
<td>D</td>
<td>Use Communication and Mentoring Techniques</td>
</tr>
<tr>
<td>E</td>
<td>Perform Routine Trade Practices</td>
</tr>
<tr>
<td>K</td>
<td>Install Fire Stop Systems</td>
</tr>
<tr>
<td>M</td>
<td>Install Removable Covers</td>
</tr>
<tr>
<td>P</td>
<td>Install Fireproofing</td>
</tr>
</tbody>
</table>

| Total | 100% | 100% |

In-school theory / practical subject competency weighting

| 60% | 40% |

Final in-school mark

Apprentices must achieve a minimum 70% as the final in-school percentage score to be eligible to write the Interprovincial Red Seal exam.

IN-SCHOOL %

All apprentices who complete Level 4 of the Insulator (Heat and Frost) program with a FINAL level percentage score of 70% or greater will write the Interprovincial Red Seal examination as their final assessment.

A minimum percentage score of 70% on the examination is required for a pass.
Section 5

TRAINING PROVIDER STANDARDS
Facility Requirements

Classroom Area

- Minimum 30 square feet per student (accommodates drafting tables)
- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Meets applicable municipal zoning bylaws for technical instruction and education facilities
- Overhead and multimedia projectors with a projection screen
- Whiteboard with marking pens and erasers
- Lighting controls to allow easy visibility of the projection screen while allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/air conditioning for comfort all year round
- In-room temperature control to ensure comfortable room temperature
- Acoustics in the room must allow students to hear the instructor
- 1 drafting table per student

Shop Area

- Minimum 7000 square feet of shop area including a tool crib and work stations.
- 12 foot ceiling height
- Adequate heating, lighting and ventilation
- Refuse and recycling bins for used shop materials
- First-aid facilities
- Portable fire extinguishers as per WorkSafeBC requirements
- Posted evacuation plans
- Eye wash stations
- 1 work table per 2 students

Lab Requirements

- None

Student Facilities

- Adequate eating area as per WorkSafeBC requirements (4.84 OHS Regulations)
- Adequate washroom facilities as per WorkSafeBC requirements (4.85 OHS Regulation)
- Personal storage lockers

Instructor’s Office Space

- None

Other

- Desk and filing space
- Computer
- Phone
Tools and Equipment

Shop Equipment

**Required**

- Bar folder
- Brake (finger/pan)
- Circular saw
- Combination machine
- Drills (cordless and electric)
- Easy edge machine
- Extension cords
- Foot operated shears (guillotine)
- Grinders
- Hand saw
- HEPA (high efficiency particulate air) vacuum

**Recommended**

- Blow torch
- Electric shears
- Powder-actuated tools
- Slitter

Shop (Facility) Tools

**Standard Tools**

- Aviation snips (M1, M2, M3)
- Band tensioner
- Band tensioners
- Brooms
- Bungee cords
- Caulking gun
- Clamps
- End nippers
- Flare staple gun
- Hammer (sheet metal)
- Hog ring pliers
- Knife and sheath
- Lagging brush
- Paint brush
- Paint roller
- Pliers

- Rasp
- Rivet gun
- Rubber bands
- Saws (keyhole and hand)
- Scissors
- Scraper
- Scratch awl
- Screwdrivers
- Sealer
- Shears
- Shovel
- Slicks
- Squares
- Staple gun
- Thermometer
- Thickness gauge
HARMONIZED PROGRAM OUTLINE
Training Provider Standards
Section 5

Student Equipment (supplied by school)

Required

Layout Equipment
- Calculator
- Carpenter's square
- Chalk line
- Circumference rule
- Clamps
- Compass
- Dividers
- Felt pens
- Levels

Spray Equipment
- None

Access Equipment
- Ladders
- Scaffolding

Personal Protective and Safety Equipment
- Eye wash station
- Face shields
- Fall arrest equipment
- Fire extinguisher
- Gloves

Recommended
- None

Student Tools (supplied by student)

Required
- Safety boots
- Safety glasses
- Hard hats

Recommended
- Coveralls
Reference Materials

Required Reference Materials
• N/A

Recommended Resources
• N/A

Suggested Texts
• N/A
Instructor Requirements

Occupation Qualification
The instructor must possess:

- B.C. Certificate of Qualification with a Red Seal Endorsement, or
- Certificate of Qualification from another Canadian jurisdiction with Red Seal Endorsement.

Work Experience

- A minimum of 5 years’ experience working in the industry as a journeyperson.

Instructional Experience and Education

It is preferred that the instructor also possesses one of the following:

- An Instructors Diploma or equivalent
- A Bachelor’s Degree in Education
- A Master’s Degree in Education
Appendices
Appendix A
Acronyms and Abbreviations

ACM  Asbestos-containing materials
AHJ  Authority having jurisdiction
ANSI  American National Standards Institute
ASJ  All-service jacket
ASTM  American Standard for Testing Materials
BCICA  British Columbia Insulation Contractors Association
FLRA  Field Level Risk Assessment
FSK  Foil skrim
GFCI  Ground-fault circuit interrupter
HEPA  High efficiency particulate air
HVAC  Heating, ventilation and air conditioning
ID  Induction
JHA  Jurisdiction having authority
LEED  Leadership in Energy and Environmental Design
LNG  Liquified natural gas
NOP  Notice of Project
PPE  Personal protective equipment
PVC  Polyvinyl chloride
RAT  Rope access technician
RFFRK  Reinforced foil flame retardant kraft
SDS  Safety Data Sheets (formerly Material Safety Data Sheets)
SWP  Safe work procedures
TIAC  Thermal Insulation Association of Canada
TSP  Tri-sodium phosphate
ULC  Underwriters Laboratories of Canada
WHMIS  Workplace Hazardous Materials Information System
Industry and Instructor Subject Matter Experts retained to assist in the development of the Program Outline (2012):

- Lee Loftus  
  Insulators, Local 118
- Ken Jakobssen  
  Insulators, Local 118