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# Plan of Training

## Insulator (Heat and Frost)



**Government of Newfoundland and Labrador**  
**Department of Advanced Education and Skills**  
**Apprenticeship and Trades Certification Division**

**June 2013**

# PLAN OF TRAINING

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Approved by:

A handwritten signature in black ink, appearing to read "Pauline" or "Pauline B. F. B. B." followed by a horizontal line.

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Chairperson, Provincial Apprenticeship and Certification Board

Date: \_\_\_\_\_

## Plan of Training – Insulator (Heat and Frost)

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### Preface

This Apprenticeship Standard is based on the 2012 edition of the National Occupational Analysis for the Insulator (Heat and Frost).

This document describes the curriculum content for the Insulator (Heat and Frost) apprenticeship training program and outlines each of the technical training units necessary for the completion of apprenticeship.

### Acknowledgements

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Matthew Walsh

Gary Young

Robert Hunt

Without their dedication to quality apprenticeship training, this document could not have been produced.

A sincere thank you is offered to everyone involved.

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## A. Profile Chart

Common Occupational Skills			
AM1100 Math Essentials	HF1120 Jobsite Safety	AM1200 Insulator Math Fundamentals	HF1102 Hand and Power Tools
HF1110 Shop Tools and Equipment	HF1205 Insulation Materials	HF1202 Insulation Practices	HF1255 Asbestos Awareness
HF1270 Blueprint Reading, Part I	HF2510 Bevels and End Caps	HF4040 Transitions and Reducers	CM2160 Communication Essentials
HF3270 Blueprint Reading, Part II	HF1270 Blueprint Reading, Part I		
Industrial Application			
HF1151 Insulation Principles	HF1205 Insulation Materials	HF1221 Introduction to Pipe and Pipe Systems	HF1231 Installing Pipe Insulation
HF2280 Introduction to Foam insulation	HF4000 Insulating Breeching, Flues and Precipitators	HF3340 Insulation Methods (Cylinders and Heads)	HF3350 Finishing Methods
HF4010 Introduction to Cryogenic Work	HF4020 Insulating Cryogenic Systems	HF2380 Insulate Underground Pipe	HF2400 Parallel Line Development
HF2410 Radial Line Development	HF2000 Triangulation	HF4040 Transitions and Reducers	HF4050 Tank Heads
HF4060 Gores	HF2510 Bevels and End Caps		

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Commercial Application			
HF1151 Insulation Principles	HF1205 Insulation Materials	HF1202 Insulation Practices	HF2300 Air Handling System Components
HF4040 Transitions and Reducers	HF4050 Tank Heads	HF1310 Blanket Insulation	HF1321 Fibrous Board Insulation
HF4000 Insulating Breeching, Flues and Precipitators	HF3350 Finishing Methods		
Common Applications			
HF4000 Insulating Breeching, Flues and Precipitators	HF4010 Introduction to Cryogenic Work	HF4020 Insulating Cryogenic Systems	HF2280 Introduction to Foam Insulation
HF2380 Insulate Underground Pipe	HF1151 Insulation Principles	HF3350 Finishing Methods	HF2000 Triangulation
HF2400 Parallel Line Development	HF2410 Radial Line Development	HF4050 Tank Heads	
Distinctive Applications			
HF3010 Firestopping	HF1205 Insulation Materials	HF3000 Marine Insulation	
Asbestos Abatement			
HF1255 Asbestos Awareness			

## B. NOA Comparison Table

2012 NOA Tasks and sub-task		2013 Plan of Training	
Task 1 - Uses and maintains tools and equipment.			
1.01	Maintains tools and equipment.	HF1102	Hand and Power Tools
		HF1110	Shop Tools and Equipment
1.02	Uses access equipment.	HF1202	Insulation Practices
		HF1102	Hand and Power Tools
		HF1120	Job Site Safety
Task 2 - Performs safety-related functions.			
2.01	Uses personal protective equipment (PPE) and safety equipment.	HF1102	Hand and Power Tools
		HF1255	Asbestos Awareness
		Taught throughout all courses.	
2.02	Maintains safe work environment.	HF1120	Job Site Safety
		Taught throughout all courses.	
Task 3 – Organizes work.			
3.01	Performs task scheduling.	CM2160	Communication Essentials
		SD1760	Workplace Essentials
3.02	Organizes material on site.	HF1205	Insulation Materials
		HF1202	Insulation Practices
		HF1151	Insulation Principles
Task 4 - Performs routine trade practices.			
4.01	Performs measurements and calculations.	HF1102	Hand and Power Tools
		AM1100	Math Essentials
		HF3340	Insulating Methods(Cylinders and Heads)(Math)
		AM1200	Insulator Math Fundamentals
4.02	Interprets specifications and drawings.	HF1270	Blueprint Reading, Part I
		HF3270	Blueprint Reading, Part II
4.03	Prepares substrates.	HF3340	Insulating Methods(Cylinders and Heads)(Math)
		HF3010	Firestopping
4.04	Applies sealants.	HF3340	Insulating Methods(Cylinders and Heads)(Math)
		HF3010	Firestopping

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2012 NOA Tasks and sub-task		2013 Plan of Training	
Task 5- Prepares for installation of insulation in Industrial applications.			
5.01	Selects materials for industrial applications.	HF1151	Insulation Principles
		HF3350	Finishing Methods
		HF2510	Bevels and End-Caps
		HF2380	Insulate Underground Pipe
5.02	Performs layout for industrial applications.	HF4000	Insulating Breeching, Flues and Precipitators
		HF4050	Tank Heads
		HF4030	Tees and Valves
		HF4060	Gores
Task 6- Insulates piping and fittings			
6.01	Installs insulation on piping, fittings and hangers.	HF1221	Introduction to Pipe and Pipe systems
		HF1231	Installing Pipe Insulation
		HF1151	Insulation Principles
		HF3350	Finishing Methods
		HF2510	Bevels and End-Caps
		HF2380	Insulate Underground Pipe
6.02	Applies vapour barrier on piping and fittings.	HF4010	Introduction to Cryogenic Work
		HF4020	Insulating Cryogenic Systems
Task – 7 Insulates tanks, vessels and equipment.			
7.01	Installs insulation on tanks, vessels and equipment.	HF1221	Introduction to Pipe and Pipe Systems
		HF4000	Insulating Breeching, Flues and Precipitators
		HF3340	Insulating Methods (Cylinders and Heads)
		HF2510	Bevels and End Caps
		HF4040	Transitions and Reducers
7.02	Applies vapour barrier on tanks, vessels and equipment.	HF2300	Air Handling System Components

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2012 NOA Tasks and sub-task		2013 Plan of Training	
<b>Task 8 – Installs protective cladding.</b>			
8.01	Fabricates cladding components.	HF3350	Finishing Methods
		HF2400	Parallel Line Development
8.02	Assembles cladding components.	HF2410	Radial Line Development
		HF2000	Triangulation
		HF4050	Tank Heads
8.03	Fastens cladding components.	HF2510	Bevels and End Caps
		HF3350	Finishing Methods
		HF4030	Tees and Valves
		HF3000	Marine insulation
		HF4050	Tank Heads
		HF4060	Gores
<b>Task 9- Prepares for installation of insulation in commercial applications.</b>			
9.01	Selects materials for commercial applications.	HF1205	Insulation Materials
		HF1202	Insulation Practices
		HF4030	Tees and Valves
		HF3340	Insulating Methods (Cylinders and Heads) (Math)
9.02	Performs layout for commercial applications.	HF3340	Insulating Methods (Cylinders and Heads) (Math)
		HF4060	Gores
		HF4050	Tank Heads
		HF2510	Bevels and End-Caps
<b>Task 10 - Insulates plumbing systems and mechanical piping.</b>			
10.01	Installs insulation on plumbing systems and mechanical piping.	HF1202	Insulation Practices
10.02	Applies vapour barrier on insulated plumbing systems and mechanical piping.	HF1202	Insulation Practices
10.03	Installs protective finishes on insulated plumbing systems and mechanical piping.	HF1205	Insulation Materials
		HF3350	Finishing Methods

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2012 NOA Tasks and sub-task		2013 Plan of Training	
<b>Task 11 - Insulates mechanical ducting.</b>			
11.01	Installs insulation on mechanical ducting.	HF1310	Blanket Insulation
		HF1321	Fibrous Board Insulation
		HF2300	Air Handling System Components
11.02	Applies vapour barrier on insulated mechanical ducting.	HF1310	Blanket Insulation
		HF1321	Fibrous Board Insulation
		HF2300	Air Handling System Components
11.03	Installs protective finishes on Insulated mechanical ducting.	HF1205	Insulation Materials
		HF3350	Finishing Methods
<b>Task 12 - Insulates mechanical equipment.</b>			
12.01	Installs insulation on mechanical equipment.	HF1151	Insulation Principles
		HF1202	Insulation Practices
		HF1321	Fibrous Board Insulation
		HF4000	Insulating Breeching, flues and Precipitators
		HF4050	Tank Heads
		HF2510	Bevels and End Caps
		HF4040	Transitions and Reducers
12.02	Applies vapour barrier on insulated mechanical equipment.	HF1151	Insulation Principles
		HF1202	Insulation Practices
		HF1321	Fibrous Board Insulation
		HF4000	Insulating Breeching, flues and Precipitators
		HF4050	Tank Heads
		HF2510	Bevels and End Caps
		HF4040	Transitions and Reducers
12.03	Installs protective finishes on Insulated mechanical equipment.	HF1205	Insulation Materials
		HF3350	Finishing Methods

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2012 NOA Tasks and sub-task		2013 Plan of Training	
Task 13 - Installs insulation systems for refractory and cryogenic applications.			
13.01	Applies insulation to refractory systems.	HF4000	Insulating Breeching, Flues and Precipitators
13.02	Applies insulation to cryogenic systems.	HF4010	Introduction to Cryogenic Work
		HF4020	Insulating Cryogenic Systems
13.03	Applies vapour barrier to insulated components of cryogenic systems.	HF4010	Introduction to Cryogenic Work
		HF4020	Insulating Cryogenic Systems
13.04	Installs reflective and protective jacketing.	HF4010	Introduction to Cryogenic Work
		HF4020	Insulating Cryogenic Systems
Task 14 - Installs underground insulating systems.			
14.01	Installs pipe insulation to underground systems.	HF2280	Introduction to Foam Insulation
		HF2380	Insulate Underground Piping
14.02	Installs pour-in-place insulation to underground systems.	HF2280	Introduction to Foam Insulation
		HF2380	Insulate Underground Piping
Task 15– Insulates for soundproofing.			
15.01	Insulates piping for soundproofing.	HF1151	Insulation Principles
15.02	Insulates turbines and equipment for soundproofing.	HF1151	Insulation Principles
15.03	Insulates mechanical systems for soundproofing.	HF1151	Insulation Principles
15.04	Fabricates acoustic panels.	HF1151	Insulation Principles
15.05	Installs acoustic panels to ceilings and walls.	HF1151	Insulation Principles

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2012 NOA Tasks and sub-task		2013 Plan of Training	
Task 16 - Installs removable covers.			
16.01	Fabricates removable covers.	HF3350	Finishing Methods
		HF2400	Parallel Line Development
		HF2410	Radial Line Development
		HF2000	Triangulation
		HF4050	Tank Heads
16.02	Fastens removable covers.	HF3350	Finishing Methods
		HF2400	Parallel Line Development
		HF2410	Radial Line Development
		HF2000	Triangulation
		HF4050	Tank Heads
Task 17 – Prepares for asbestos abatement			
17.01	Protects surrounding work area for spraying.	HF3010	Firestopping
17.02	Prepares material, equipment and substrate for spraying.	HF3010	Firestopping
17.03	Installs reinforcing material for spraying.	HF3010	Firestopping
17.04	Applies spray insulation, coatings, and sealers.	HF3010	Firestopping
Task 18 - Installs firestop systems			
18.01	Applies fire stop materials to structural, electrical and Mechanical components.	HF3010	Firestopping
18.02	Protects fire stop materials.	HF3010	Firestopping
Task 19 - Installs fireproofing.			
19.01	Applies fireproofing to structural, electrical and mechanical components.	HF3010	Firestopping
19.02	Protects fireproofing materials.	HF3010	Firestopping

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2012 NOA Tasks and sub-task		2013 Plan of Training	
Task 20 - Insulates for Marine applications. (NOT COMMON CORE)			
20.01	Insulates bulkheads, deckheads and hulls. (NOT COMMON CORE)	HF1205	Insulation Materials
		HF3000	Marine Insulation
20.02	Installs finish material on Marine applications. (NOT COMMON CORE)	HF1205	Insulation Materials
		HF3000	Marine Insulation
Task 21 - Prepares for asbestos abatement.			
21.01	Determines required personal protective equipment (PPE) for asbestos abatement.	HF1255	Asbestos Awareness
21.02	Retrieves sample of asbestos for testing.	HF1255	Asbestos Awareness
21.03	Determines scope of work.	HF1255	Asbestos Awareness
21.04	Prepares site for removal and containment of asbestos.	HF1255	Asbestos Awareness
21.05	Builds temporary enclosure.	HF1255	Asbestos Awareness
Task 22 - Performs asbestos removal procedures.			
22.01	Removes asbestos.	HF1255	Asbestos Awareness
22.02	Disposes of asbestos materials.	HF1255	Asbestos Awareness
22.03	Performs decontamination of area and equipment.	HF1255	Asbestos Awareness
Task 23 - Performs maintenance repair.			
23.01	Encapsulates asbestos	HF1255	Asbestos Awareness
23.02	Encloses asbestos	HF1255	Asbestos Awareness

## C. Program Structure

For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.

The order of course delivery within each block can be determined by the educational agency, as long as pre-requisite conditions are satisfied.

Upon completion of an entry level program, individuals may be required to complete other certifications (employer or job site specific) in order to gain employment.

<b>Block I</b>			
<b>NL Course No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-requisites</b>
TS1510	Occupational Health and Safety	6	None
TS1520	WHIMIS	6	None
TS1530	Standard First Aid	14	None
AM1100	Math Essentials	30	None
AM1200	Insulator Math Fundamentals	30	AM1100
HF1120	Job Site Safety	15	None
HF1102	Hand and Power Tools	12	HF1120
HF1110	Shop Tools and Equipment	15	HF1102
HF1151	Insulation Principles	12	HF1110; AM1200
HF1205	Insulation Materials	12	HF1110; AM1200
HF1202	Insulation Practices	12	HF1110; AM1200
HF1221	Introduction to Pipe and Piping Systems	12	HF1110; AM1200
HF1310	Blanket Insulation	15	HF1110; AM1200
HF1321	Fibrous Board Insulation	19	HF1110; AM1200
HF1231	Installing Pipe Insulation	90	HF1110; AM1200
HF1240	Hot Work Practices	20	HF1110
HF1255	Asbestos Awareness	30	HF1110
HF1270	Blueprint Reading – Part I	30	HF1110; AM1200

<b>Block I</b>			
<b>NL Course No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-requisites</b>
AP1101	Introduction to Apprenticeship	15	None
CM2160	Communication Essentials	45	None
SD1760	Workplace Essentials	45	None
MC1060	Computer Essentials	15	None
<b>Block 1 Total:</b>		<b>500</b>	

**\*A student who can meet the mathematics requirement through an ACUPLACER® test may be exempted from AM1100 - Math Essentials. Please check with your training institution.**

**Required Work Experience**

<b>Block II</b>			
<b>NL Course No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-requisites</b>
HF2300	Air Handling System Components	12	Block I
HF2280	Introduction to Foam Insulation	12	Block I
HF1290	Installation of Flexible Foam Insulation	30	Block I
HF2380	Insulate Underground Pipe	30	Block I
HF2000	Triangulation	18	Block I
HF2400	Parallel Line Development	24	Block I
HF2410	Radial Line Development	24	Block I
HF2510	Bevels and End-Caps	30	Block I
<b>Block 2 Total:</b>		<b>180</b>	

**Required Work Experience**

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<b>Block III</b>			
<b>NL Course No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-requisites</b>
HF3340	Insulating Methods (Cylinders and Heads) (Math)	36	Block II
HF3350	Finishing Methods	36	Block II
HF3270	Blueprint Reading – Part II	42	Block II
HF3000	Marine Insulation	36	Block II
HF3010	Firestopping	30	Block II
<b>Block 3 Total:</b>		<b>180</b>	

**Required Work Experience**

<b>Block IV</b>			
<b>NL Course No.</b>	<b>Course Name</b>	<b>Hours</b>	<b>Pre-requisites</b>
HF4000	Insulating Breeching, Flues and Precipitators	12	Block III
HF4010	Introduction to Cryogenic Work	12	Block III
HF4020	Insulating Cryogenic Systems	24	Block III
HF4030	Tees and Valves	36	Block III
HF4040	Transitions and Reducers	36	Block III
HF4050	Tank Heads	24	Block III
HF4060	Gores	36	Block III
<b>Block 2 Total:</b>		<b>180</b>	

**Total Course Credit Hours** **1040**

## **BLOCK I**

### TS1510 Occupational Health and Safety

#### **Learning Outcomes:**

- Demonstrate knowledge of interpreting the Occupational Health and Safety Act, laws and regulations.
- Demonstrate knowledge of understanding the designated responsibilities within the laws and regulations such as the right to refuse dangerous work; and the importance of reporting accidents.
- Demonstrate knowledge of how to prevent accidents and illnesses.
- Demonstrate knowledge of how to improve health and safety conditions in the workplace.

**Duration:** 6 Hours

**Pre-requisite(s):** None

#### **Objectives and Content:**

1. Interpret the Occupational Health and Safety Act laws and regulations.
  - i. explain the scope of the act
    - application of the Act
    - Federal/Provincial jurisdictions
    - Canada Labour Code
    - rules and regulations
    - private home application
    - conformity of the Crown by the Act
2. Explain responsibilities under the Act and Regulations.
  - i. duties of employer, owner, contractors, sub-contractors, employees, and suppliers
3. Explain the purpose of joint health and safety committees.
  - i. formation of committee
  - ii. functions of committee

- iii. legislated rights
- iv. health and safety representation
- v. reporting endangerment to health
- vi. appropriate remedial action
- vii. investigation of endangerment
- viii. committee recommendation
- ix. employer's responsibility in taking remedial action

4. Examine right to refuse dangerous work.

- i. reasonable grounds for refusal
- ii. reporting endangerment to health
- iii. appropriate remedial action
- iv. investigation of endangerment
- v. committee recommendation
- vi. employer's responsibility to take appropriate remedial action
- vii. action taken when employee does not have reasonable grounds for refusing dangerous work
- viii. employee's rights
- ix. assigning another employee to perform duties
- x. temporary reassignment of employee to perform other duties
- xi. collective agreement influences
- xii. wages and benefits

5. State examples of work situations where one might refuse work.

6. Describe discriminatory action.

- i. Definition
- ii. filing a complaint procedure
- iii. allocated period of time a complaint can be filed with the Commission
- iv. duties of an arbitrator under the Labour Relations Act
- v. order in writing inclusion
- vi. report to commission allocated period of time to request arbitrator to deal with the matter of the request
- vii. notice of application
- viii. failure to comply with the terms of an order
- ix. order filed in the court

7. Explain duties of commission officers.

- i. powers and duties of officers

- ii. procedure for examinations and inspections
- iii. orders given by officers orally or in writing
- iv. specifications of an order given by an officer to owner of the place of employment, employer, contractor, sub-contractor, employee, or supplier
- v. service of an order
- vi. prohibition of persons towards an officer in the exercise of his/her power or duties
- vii. rescinding of an order
- viii. posting a copy of the order
- ix. illegal removal of an order

8. Interpret appeals of others.

- i. allocated period of time for appeal of an order
- ii. person who may appeal order
- iii. action taken by commission when person involved does not comply with the order
- iv. enforcement of the order
- v. notice of application
- vi. rules of court

9. Explain the process for reporting of accidents.

- i. application of act
- ii. report procedure
- iii. reporting notification of injury
- iv. reporting accidental explosion or exposure
- v. posting of act and regulations

**Practical Requirements:**

1. Conduct an interview with someone in your occupation on two or more aspects of the act and report results.
2. Conduct a safety inspection of shop area.

**TS1520      Workplace Hazardous Materials Information System (WHMIS)**

**Learning Outcomes:**

- Demonstrate knowledge of interpreting and applying the Workplace Hazardous Materials Information System (WHMIS) regulation under the Occupational Health and Safety Act.

**Duration:**            6 Hours

**Pre-requisite(s):**    None

**Objectives and Content:**

1. Define WHMIS safety.
  - i. rational and key elements
  - ii. history and development of WHMIS
  - iii. WHMIS legislation
  - iv. WHMIS implementation program
  - v. definitions of legal and technical terms
2. Examine hazard identification and ingredient disclosure.
  - i. prohibited, restricted and controlled products
  - ii. classification and the application of WHMIS information requirements
  - iii. responsibilities for classification
    - the supplier
    - the employer
    - the worker - Classification: rules and criteria
    - information on classification
    - classes, divisions and subdivision in WHMIS
    - general rules for classification
    - class A - compressed gases
    - class B - flammable and combustible materials
    - class C - oxidizing material
    - class D - poisonous and infectious material
    - class E - corrosive material
    - class F - dangerously reactive material

- iv. products excluded from the application of WHMIS legislation
  - consumer products
  - explosives
  - cosmetics, drugs, foods and devices
  - pest control products
  - radioactive prescribed substances
  - wood or products made of wood
  - manufactured articles
  - tobacco or products of tobacco
  - hazardous wastes
  - products handled or transported pursuant to the Transportation of Dangerous Goods (TDG) Act
- v. comparison of classification systems – WHMIS and TDG
- vi. general comparison of classification categories
- vii. detailed comparison of classified criteria

3. Explain labeling and other forms of warning.

- i. definition of a WHMIS label
  - supplier label
  - workplace label
  - other means of identification
- ii. responsibility for labels
  - supplier responsibility
  - employer responsibility
  - worker responsibility
- iii. introduce label content, design and location
  - supplier labels
  - workplace labels
  - other means of identification

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4. Introduce material safety data sheets (MSDS).
  - i. definition of a material safety data sheet
  - ii. purpose of the data sheet
  - iii. responsibility for the production and availability of data sheets
    - supplier responsibility
    - employer responsibility
    - workers responsibility

### **Practical Requirements:**

1. Locate WHMIS label and interpret the information displayed.
2. Locate a MSDS sheet for a product used in the workplace and determine what personal protective equipment and other precautions are required when handling this product.

TS1530      Standard First Aid

**Learning Outcomes:**

- Demonstrate knowledge of recognizing situations requiring emergency action
- Demonstrate knowledge of making appropriate decisions concerning first aid

**Duration:**      14 Hours

**Pre-requisite(s):**      None

**Objectives and Content:**

1.      Complete a St. John Ambulance or Canadian Red Cross Standard First Aid Certificate course.

## AM1100 Math Essentials

**Note:** It is recommended that AM1100 be delivered in the first semester of the Entry Level training program.

### **Learning Outcomes:**

- Demonstrate knowledge of the numeracy skills required to begin the 2<sup>nd</sup> level math course.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of mathematical principles in trade problem solving situations.
- Demonstrate the ability to solve simple mathematical word problems.

**Duration:** 30 Hours

**Pre-Requisite(s):** None

### **Objectives and Content:**

*Wherever possible, the instructor should use trade specific examples to reinforce the course objectives*

1. Use multiplication tables from memory.
2. Perform whole number operations.
  - i. read, write, count, round off, add, subtract, multiply and divide whole numbers
3. Apply the order of operations in math problems.
4. Perform fraction and mixed number operations.
  - i. read, write, add, subtract, multiply and divide fractions

5. Perform decimal operations.
  - i. read, write, round off, add, subtract, multiply and divide decimals
6. Perform percent/decimal/fraction conversion and comparison.
  - i. convert between fractions, decimals and percents
7. Perform percentage operations.
  - i. read and write percentages
  - ii. calculate base, rates and percentages
8. Perform ratio and proportion operations.
  - i. use a ratio comparing two quantities with the same units
  - ii. use a proportion comparing two ratios
9. Use the imperial measurement system in math problems.
  - i. identify units of measurement for:
    - length
    - mass
    - area
    - volume
    - capacity
10. Use the metric measurement system in math problems.
  - i. identify units of measurement for:
    - length
    - mass
    - area
    - volume
    - capacity

**Practical Requirements:**

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

## AM1200 Insulator Math Fundamentals

### **Learning Outcomes:**

- Demonstrate knowledge of mathematical concepts in the performance of trade practices.
- Demonstrate knowledge of mathematics as a critical element of the trade environment.
- Demonstrate knowledge of solving mathematical word problems.
- Demonstrate knowledge of mathematical principles for the purposes of problem solving, job and materials estimation, measurement, calculation, system conversion, diagram interpretation and scale conversions, formulae calculations, and geometric applications.

**Duration:** 30 Hours

**Pre-Requisite(s):** AM1100

### **Objectives and Content:**

*The instructor is required to use trade specific examples to reinforce the course objectives.*

1. Employ percent/decimal/fraction conversion and comparison in trade specific situations.
2. Apply ratios and proportions to trade specific problems.
3. Use the Imperial Measurement system in trade specific applications.
4. Use the Metric Measurement system in trade specific applications.
5. Complete Imperial/Metric conversions in trade specific situations.
  - i. convert between imperial and metric measurements
  - ii. convert to another unit within the same measurement system

6. Manipulate formulas using cross multiplication, dividing throughout, elimination, and substitution to solve trade specific problems, such as:
  - i. right angle triangles
  - ii. area
  - iii. volume
  - iv. perimeter
7. Perform calculations involving geometry that are relevant to the trade, such as:
  - i. angle calculations
  - ii. circle calculations
8. Use practical math skills to complete administrative trade tasks.
  - i. material estimation
  - ii. material costing
  - iii. time & labour estimates
  - iv. taxes & surcharges
  - v. markup & projecting revenue

**Practical Requirements:**

1. To emphasize or further develop specific knowledge objectives, students will be asked to complete practical demonstrations which confirm proper application of mathematical theory to job skills.

Note:

This course has been designated as NON-TRANSFERABLE to other trades programs, and NOT ELIGIBLE FOR PRIOR LEARNING ASSESSMENT. Students completing training in this trade program are required to complete this math course.

**HF1120     Job Site Safety**

**Learning Outcomes:**

- Demonstrate knowledge of safety equipment, its applications, maintenance and procedures for use.
- Demonstrate knowledge of safe work practices.
- Demonstrate knowledge of regulatory requirements pertaining to safety.

**Duration:**            9Hours

**Pre-requisite(s):**    None

**Objectives and Content:**

1. Identify types of personal protective equipment (PPE) and clothing and describe their applications, limitations and procedures for use.
2. Describe the procedures used to care for, maintain and store PPE.
3. Identify hazards and describe safe work practices.
  - i. personal
  - ii. workplace
  - iii. tag out/lockout
  - iv. confined space
  - v. trenches
  - vi. fire
  - vii. fall protection
  - viii. environment
  - ix. pre job safety analysis

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4. Identify and describe workplace safety and health regulations and certification requirements.
  - i. federal
  - ii. provincial/territorial

### **Practical Requirements**

None

## HF1102 Hand and Power Tools

### **Learning Outcomes:**

- Demonstrate knowledge of basic hand and power tools (heat and frost).
- Demonstrate knowledge of the use of hand and power tools.

**Duration:** 12Hours

**Pre-Requisites:** HF1120

### **Objectives and Content:**

1. Describe general safety requirements for use of hand and power tools
2. Identify common hand tools.
  - i. hammers
  - ii. screw drivers
  - iii. pliers and wire cutters
  - iv. levels
  - v. squares
  - vi. measuring tools
  - vii. clamps and temporary holding devices
  - viii. saws
  - ix. banding gear
  - x. sheet metal shears
  - xi. dividers
  - xii. knives
  - xiii. calipers
  - xiv. thickness gauge
3. Describe the procedures to use and maintain various hand tools.

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4. Identify common power tools.
  - i. drills and drill bits
  - ii. saws
  - iii. hand grinder
  - iv. stud and pin welder
5. Describe the procedures to use and maintain power tools.
6. Identify safety consideration when using hand and power tools.
7. Describe the procedures to use and maintain spray equipment.
8. Describe the procedures to use and maintain personal protective and safety equipment.
  - i. glasses, gloves, boots, hearing protection, hard hats

### **Practical Requirements:**

1. Use and maintain various types of hand tools.
2. Use and maintain various types of power tools

## HF1110    Shop Tools and Equipment

### **Learning Outcomes:**

- Demonstrate knowledge of shop tools and equipment.
- Demonstrate knowledge of the use of shop tools and equipment.
- Demonstrate knowledge of maintaining shop tools and equipment.

**Duration:**            15Hours

**Pre-Requisites:**      HF1102

### **Objectives and Content:**

1. Describe safety precautions to be considered when working with shop tools and equipment.
2. Identify various shop tools and equipment.
  - i. lock former
  - ii. EZ edger
  - iii. combination machine (Beader/Crimper)
  - iv. sheet metal break
  - v. metal shear
  - vi. metal roller
  - vii. band saw
  - viii. pedestal grinder
  - ix. bar folder
3. Describe the procedures to operate shop tools and equipment.
4. Identify maintenance procedures for shop tools and equipment.

### **Practical Requirements:**

1. Use and maintain various shop tools and equipment.

## HF1151     Insulation Principles

### **Learning Outcomes:**

- Demonstrate knowledge of insulating principles.
- Demonstrate knowledge of systems requiring insulation.

**Duration:**            12Hours

**Pre-Requisites:**     HF1110; AM1200

### **Objectives and Content:**

1. Define terminology relating to the insulating occupation.
  - i. heat related terms
  - ii. cold related terms
  - iii. thermal temperature range
2. Describe the principles and function of insulation.
3. Identify the factors to be considered in selection of insulation.
  - i. insulating ability
  - ii. temperature
    - ambient temperature
    - service temperature
  - iii. location
  - iv. durability
  - v. compatibility
  - vi. cost
4. Identify the various systems requiring insulation.
  - i. commercial
    - plumbing
      - domestic hot and cold water lines
      - roof drains
    - heating
      - boiler
      - piping

- vessels
- chilled water lines
- ducts
- emergency generators
- refrigeration
- ii. industrial
  - process piping systems
  - large and small vessels
  - boilers
  - breaching
  - stacks
  - precipitators
  - tanks
- ii. soundproofing
  - types of soundproofing installations
    - piping,
    - turbines,
    - equipment
    - plenums
    - ducting
    - acoustic panels (ceilings and walls)
  - basics of sound transmission
  - types of insulation materials
  - types of jacketing
  - installation methods

**Practical Requirements:**

None

## HF1205     Insulation Materials

### **Learning Outcomes:**

- Demonstrate knowledge of insulation materials and accessories
- Demonstrate knowledge of procedures for installing insulator materials and accessories.

**Duration:**            12Hours

**Pre-Requisites:**      HF1110; AM1200

### **Objectives and Content:**

1. Identify insulation materials and their characteristics.
  - i. composition
    - fibrous
    - cellular
    - granular
  - ii. configurations
  - iii. characteristics
  - iv. temperature range
    - upper limit
    - lower limit
2. Identify application materials and where they are used.
  - i. wires
  - ii. bands
  - iii. adhesives
  - iv. tape
  - v. screws
  - vi. rivets
  - vii. tacks
  - viii. hog rings
  - ix. pins and clips
  - x. studs

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3. Identify covering, finishes and sealants used in insulating.
  - i. bore coatings
  - ii. adhesives
  - iii. mastics
  - iv. reinforcement materials
  - v. cements
  - vi. jacketing materials
  - i. protectors
  - ii. identify mixing procedures for;
    - adhesives
    - powders
4. Identify the procedures for handling, storing and distributing insulation materials.
  - i. delivery
  - ii. stacking
  - iii. storage
  - iv. moving materials
  - v. proper housekeeping procedures
5. Describe insulation certification for marine applications.

### **Practical Requirements:**

None

## HF1202     Insulation Practices

### **Learning Outcomes:**

- Demonstrate knowledge of basic procedures for insulating at various temperature ranges.
- Demonstrate knowledge of identify various types of access equipment.

**Duration:**            12

**Pre-Requisites:**      HF1110; AM1200

### **Objectives and Content:**

1. Trade communications.
  - i. terminology
  - ii. verbal and written communication
  - iii. coordination with other trades
  - iv. participation in safety and information meetings
2. Describe the types, uses and safety considerations of access equipment.
  - i. ladder
  - ii. scaffolding
  - iii. serial lifts
  - iv. swing stages
3. Describe the basic procedures involved in insulating.
  - i. moderate temperature
  - ii. hot temperature
  - iii. cold
    - low temperature
    - vapor barrier

### **Practical Requirements:**

None

## HF1221 Introduction to Pipe and Piping Systems

### **Learning Outcomes:**

- Demonstrate knowledge of piping systems that require insulating.

**Duration:** 12Hours

**Pre-Requisites:** HF1110; AM1200

### **Objectives and Content:**

1. Identify the types and sizes of pipes and their characteristics.
  - i. types of pipe tracing
    - heat traced piping
    - steam traced piping
    - non traced piping
    - electric traced piping
  - ii. thermal expansion of pipe for hot systems
  - iii. pipe construction material
    - iron
    - copper
    - stainless steel/specialty alloys
    - plastic
2. Identify the components of a piping system.
  - i. straight thermal piping
  - ii. joints
  - iii. irregular surfaces
    - connectors
    - valves
    - fittings

- iv. hangers
  - clevis hanger
  - pipe shoe on roller support
  - contact hangers

**Practical Requirements:**

None

## HF1310      Blanket Insulation

### **Learning Outcomes:**

- Demonstrate knowledge of procedures for installing blanket insulation.
- Demonstrate knowledge of using blanket insulation.

**Duration:**            15Hours

**Pre-Requisites:**      HF1110; AM1200

### **Objectives and Content:**

1.      Describe the procedures for measuring and cutting fibrous blanket.
  - i.      calculate perimeter or circumference of duct
  - ii.     make allowances for insulation thickness
  - iii.    add for overlap
2.      Describe the procedures used to apply blanket duct insulation.
  - i.      application methods
    - straight duct
    - duct bends
    - elbow on round duct
    - reducers
  - ii.     fastening methods
3.      Describe the procedures of sealing to provide vapor barrier.

### **Practical Requirements:**

1.      Apply blanket insulation to duct bends, elbows, reducers and hangers.

## HF1321 Fibrous Board Insulation

### **Learning Outcomes:**

- Demonstrate knowledge of procedures for installing fibrous board insulation on ductwork and associated equipment.
- Demonstrate knowledge of procedures for installing fibrous board insulation on vessels.

**Duration:** 19Hours

**Pre-Requisites:** HF1110; AM1200

### **Objectives and Content:**

1. Describe the procedures for measuring and cutting fibrous board and associated equipment.
  - i. measure duct and make allowances for thickness of insulation
  - ii. cut to leave little waste
  - iii. kerfing or v-groove tool
2. Describe the procedures used to install board insulation on rectangular duct and associated equipment.
  - i. fastening procedures
  - ii. applying insulation to elbows
  - iii. applying insulation to standing ribs and stiffeners
3. Describe the procedures used to install board insulation on round or oval duct.
  - i. placement and cutting of v-grooves
  - ii. calculating circumference of insulated duct
  - iii. cutting mitre segments for elbows
4. Describe the procedures used to seal fiberglass board.
5. Describe the procedures used to install fibrous board on vessels/tanks.

**Practical Requirements:**

1. Install fibrous board insulation on duct work.
2. Install fibrous board insulation on a vessel.

## HF1231     Installing Pipe Insulation

### **Learning Outcomes:**

- Demonstrate knowledge of the procedures to install pipe insulation.
- Demonstrate knowledge of various types and uses of pipe insulation.

**Duration:**            90Hours

**Pre-requisites:**       HF1110; AM1200

### **Objectives and Content:**

1. Perform the Math calculations related to Installing Pipe Insulation.
2. Describe the procedures for installing plain insulation (no jacketing) on a straight run of pipe.
  - i. hot piping systems
  - ii. install with tape, wire or bands
  - iii. establish stagger pattern
3. Describe the procedure used to apply fiberglass insulation with all service jacket (ASJ).
  - i. butt strips
  - ii. staples
  - iii. self sealing lap (SSL)
4. Describe the procedures for trimming insulation.
  - i. pipe welds
  - ii. bevel for flanged fittings
5. Describe the procedures for insulating at hangers.
  - i. contact hangers
  - ii. clevis hangers
  - iii. pipe shoe on roller supports
  - iv. anchors

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6. Describe the procedures for insulating pipe fittings, valves and flanges.
  - i. factory molded or machined
  - ii. mitered segments
    - long and short radius elbows
    - determine size and number of miters
    - methods of measuring and cutting miter
    - methods of attaching miter sections
  - iii. built up insulation covers
    - blanket
    - cement
    - soft cover
  - iv. insulating at Tees @ 90°
    - equal
    - unequal
  - v. insulating laterals
    - equal
    - unequal
  - vi. in-line flanges
  - vii. insulating valves
    - body
    - bonnet
  - viii. insulating reducer
    - concentric
    - eccentric
7. Describe the procedures to finish insulated pipe.
  - i. unjacketed
  - ii. cloth jacketing or reinforced mastic (canvas)
  - iii. plastic jacketing
  - iv. metal jacketing
  - v. cement finish jacketing

**Practical Requirements:**

1. Insulate pipe and various fittings using fibreglass insulation.
2. Insulate pipe and various fittings using mineral wool.
3. Insulate pipe and various fittings using calcium silicate.

## HF1240 Hot Work Practices

### **Learning Outcomes:**

- Demonstrate knowledge of hot work environments.
- Demonstrate knowledge of procedures to work safely in hot work environment.

**Duration:** 20 Hours

**Pre-Requisites:** HF1110

### **Objectives and Content:**

1. Define “hot work” and its relation to the insulator occupation.
2. Describe the health effects that can result when working in hot work environments.
  - i. body’s ability to cool itself
    - blood circulation
    - sweating
  - ii. effect of hot work on the body’s cooling system
    - metabolic heat
  - iii. heat disorders
    - symptoms
    - treatments
3. Describe the procedures to prevent heat disorders when working in hot work environments.
  - i. workplace prevention
    - hot work supervisor
    - schedules
    - worker’s records
  - ii. monitoring hot work areas
    - wet bulb globe thermometer
    - determine stay times
    - acclimatization

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- iii. personal prevention
  - knowledge of personal medical/work history
  - knowledge of personal limits
- 4. Identify site setup methods.
  - i. hot work conditions
    - setting up a workplace
    - proper steps
      - posting signs
      - shutting off ventilation system
      - shutting off electricity
    - correct procedure bringing in
      - extension cords
      - scaffolds
      - large equipment
    - how to
      - build a decontamination unit
      - hook up negative air machines
- 5. Identify personal protective clothing.
  - i. special protective clothing
    - hot work areas
    - cooling suits
    - ice vests
    - flame retardant
- 6. Identify fire protection techniques.
  - i. fires on a hot work site
    - proper prevention measures
    - high temperatures create dangerous atmosphere
    - flammable materials
    - fire extinguishers
    - log book
    - emergency exits
    - emergency phone numbers
    - preplanned escape plan

### **Practical Requirements:**

None

## HF1255 Asbestos Awareness

### **Learning Outcomes:**

- Demonstrate knowledge of asbestos types.
- Demonstrate knowledge of procedures to work safely with asbestos.
- Demonstrate knowledge of procedures used to remove asbestos.
- Demonstrate knowledge of the use of Personal Protection Equipment.

**Duration:** 30Hours

**Pre-requisites:** HF1110

### **Objectives and Content:**

1. Identify the types of asbestos and their characteristics.
  - i. dangers of asbestos
    - why asbestos is dangerous
    - when asbestos is dangerous
  - ii. possible locations of asbestos
  - iii. safe identification of asbestos
    - bulk samples
    - lab reports
  - iv. other safety issues relating to asbestos removal
    - heat
    - chemicals
    - electric shock
    - fire
    - tight places
    - scaffolds and ladders
    - slipping and tripping
2. Describe personal health and medical issues relating to asbestos.
  - i. symptoms and effects of asbestos on the body
    - latency period (how long it takes to get sick from exposure)
    - amount of asbestos that can cause illness
  - ii. functions of the human respiratory system
  - iii. effects of smoking in relation to asbestos exposure

- iv. medical exams for workers exposed to asbestos
  - timing and frequency of exams
  - what should be included in the medical exam
  - keeping records of medical exams
    - employee
    - employer
    - physician
3. Identify types of personal protective equipment used in asbestos work.
  - i. respirators
  - ii. disposable suits
  - iii. boots (rubber)
  - iv. specialty Personal Protection Equipment for hot work
4. Identify the types of respirators used on asbestos abatement.
  - i. Air Purifying Respirator (APR)
  - ii. Supplied Air Respirator (SAR)
5. Describe the procedures used to ensure use of a respirator is possible.
  - i. tests to ensure proper fit
    - qualitative test
    - quantitative test
    - negative pressure and positive pressure test
6. Describe the procedures used to determine which respirator is suitable for the job.
  - i. protection factor of respirator
  - ii. maximum use level (MUL)
7. Describe the procedures used to inspect, care for and maintain respirators.
8. Identify equipment used in asbestos abatement.
  - i. negative air machine
    - purpose
    - function
    - determining volume of air required
    - calculating number of machines required
  - ii. High Efficiency Particulate Air (HEPA Vacs)
    - HEPA filters on power tools
    - HEPA filters in vacuum cleaners

9. Describe the procedures used to control asbestos.
  - i. enclosure
  - ii. encapsulation
  - iii. repair
  - iv. removal
  - v. operations and maintenance program
10. Describe the procedures to set-up for asbestos abatement.
  - i. air sampling before set-up
  - ii. Personal Protective Equipment required
  - iii. pre-cleaning work area
  - iv. posting of signs
  - v. electrical and ventilation shut-down
  - vi. moving in large equipment
  - vii. set-up of De-con Unit
  - viii. containing work area
    - critical barriers
  - ix. entering and exiting work area
    - pre-planned escape route
  - x. placement and hook-up of negative air machines
  - xi. identification of possible changes required for set-up in hot work area
    - fire and heat resistant material
    - increased number of negative air machines
11. Describe methods used for removing asbestos.
  - i. air sampling during removal
    - area sampling
    - personal air monitoring
  - ii. removing asbestos from walls, ceilings and pipes
    - keeping out of the air
    - keeping asbestos wet
  - iii. variations to normal procedures for hot work removal
    - dry removal
    - special tools
    - vacuum loaders
    - bagging of asbestos waste

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12. Describe the procedures for clean-up and disposal of asbestos.
  - i. bagging of asbestos waste
    - type of bag
    - proper loading
  - ii. cleaning work area
    - spray lock down
    - take down poly
    - dispose with other asbestos containing materials
    - waste load out
  - iii. disposal of asbestos waste once it leaves the job site
    - air-tight containers
    - properly labeled
    - approved sanitary land fill
  - iv. air sampling upon job completion
    - aggressive air sampling
    - clearance air test
13. Describe removal procedures for maintenance related (small) jobs.
  - i. mini enclosure
  - ii. glove bags

### **Practical Requirements:**

None

## HF1270 Blueprint Reading - Part I

### **Learning Outcomes:**

- Demonstrate knowledge of the ability to read basic information from blueprints or drawings.
- Demonstrate knowledge of how to interpret basic information from blueprints or drawings.
- Demonstrate knowledge of preparing basic drawings and diagrams.

**Duraton:** 30Hours

**Pre-Requisites:** HF1110; AM1200

### **Objectives and Content:**

1. Identify and describe the components of a blueprint or drawing.
  - i. title block
  - ii. name
  - iii. address
  - iv. date
  - v. material
  - vi. system
  - vii. view
  - viii. measurements
  - ix. orientation
  - x. north
  - xi. elevation orientation
2. Identify and describe basic architectural symbols.
  - i. earth
  - ii. concrete
  - iii. block
  - iv. metal
  - v. structural steel
  - vi. wood
  - vii. gyproc over wood
  - viii. insulation

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- ix. windows, doors
3. Identify and describe different projections and drawings.
  - i. orthographic projections
    - multi-view
  - ii. pictorial drawings
    - perspective drawings
    - oblique drawings
    - isometric drawings
  - iii. general arrangements
  - iv. plot plans
4. Identify and describe different types of elevation views and details.
  - i. elevations
  - ii. sections and details
5. Describe the procedures used to determine measurements from scaled drawings.
  - i. the alphabet of lines
    - center line
    - hidden line
    - cutting plane line
    - break line
    - dimension line
    - extension line
    - object line
    - leader line
  - ii. scaling a dimension
    - scales
      - ratios
      - imperial/metric scales
      - using a scale

### **Practical Requirements:**

1. Interpret and sketch basic drawings and diagrams.

## AP1101 Introduction to Apprenticeship

### **Learning Outcomes:**

- Demonstrate knowledge of how to become a registered apprentice.
- Demonstrate knowledge of the steps to complete an apprenticeship program.
- Demonstrate knowledge of various stakeholders in the apprenticeship process.
- Demonstrate knowledge of the Red Seal Program.

**Duration:** 15 Hours

**Pre-Requisite(s):** None

### **Objectives and Content:**

1. Define the following terms:
  - i. apprenticeship
  - ii. apprentice vs. registered apprentice
  - iii. Journeyperson vs. Certified Journeyperson
  - iv. Certificate of Apprenticeship
  - v. Certificate of Qualification
  - vi. Recognition of Prior Learning
  - vii. dual certification
2. Explain the apprenticeship system in Newfoundland and Labrador and the roles and responsibilities of those involved.
  - i. registered apprentice
  - ii. training institution
  - iii. employer
  - iv. Journeyperson
  - v. Department of Advanced Education and Skills
    - Industrial Training Section
    - Standards and Curriculum Section
  - vi. Provincial Trade Advisory Committees
  - vii. Provincial Apprenticeship and Certification Board

3. Identify the Conditions Governing Apprenticeship.
4. Describe the training and educational requirements.
  - i. pre-employment (entry level) training
  - ii. block release
  - iii. on-the-job
5. Explain the steps in the registered apprenticeship process.
  - i. criteria for eligibility
    - entrance requirements as per Conditions of Apprenticeship
    - employment
  - ii. registration process
    - application requirements
  - iii. Memorandum of Understanding
    - probation period
    - cancellation
  - iv. Record of Occupational Progress (Logbook)
    - signing off skills
    - recording hours
    - updating PDO on progress
  - v. class calls
    - schedule
    - EI Eligibility
    - Direct Entry
    - advanced level
  - vi. Block Exams
  - vii. progression
    - schedule
    - wage rates
  - viii. cancellation of apprenticeship
  - ix. Practical Examinations
  - x. Provincial and Interprovincial examinations
  - xi. certification
    - Certification of Apprenticeship
    - Certification of Qualification
    - Provincial certification
    - Interprovincial Red Seal endorsement

6. Explain the Interprovincial Standards Red Seal Program.
  - i. designated Red Seal trade
  - ii. the National Occupational Analysis (NOA)
  - iii. Interprovincial (IP) Red Seal Endorsement Examination
  - iv. relationship of NOA to IP Examination
  - v. qualification recognition and mobility
7. Identify the current financial incentives available to apprentices.
8. Explain the NL apprenticeship and trades certification division's out-of- province apprenticeship policy.

**Practical Requirements:**

1. Use the Provincial Apprenticeship and Trades Certification web site at [www.gov.nl.ca/app](http://www.gov.nl.ca/app) to:
  - i. locate, download, and complete the Application for Apprenticeship and Memorandum of Understanding (MOU)
  - ii. locate, download, and complete the Out of Province registration forms
    - Application for Apprenticeship (out of province)
    - Letter of Understanding (LOU)
    - Acceptance of Conditions Letter
  - iii. locate, download, and complete the Work Experience Credits form
  - iv. identify the locations of all Industrial Training offices
  - v. locate and review the following learning resources relevant to the trade:
    - Study Guide
    - Exam Preparation Guide
    - Plan of Training
2. Use a logbook for this trade to:
  - i. identify the hours for the trade (in-school and on-the-job)
  - ii. identify the number of blocks
  - iii. identify the courses in each block
  - iv. identify the workplace skills to be completed and verified

3. Use the Red Seal Web site, <http://www.red-seal.ca> to retrieve the National Occupational Analyses (NOA) for this trade.
  - i. identify the following components of the NOA:
    - Trends
    - Scope
    - Key Competencies
    - Blocks
    - Tasks
    - Subtasks
    - Pie Charts
    - Table of Specifications

## CM2160 Communication Essentials

### **Learning Outcomes:**

- Demonstrate knowledge of the importance of well-developed writing skills in the workplace and in career development.
- Demonstrate knowledge of the purpose of various types of workplace correspondence.
- Demonstrate knowledge of the principles of effective workplace writing.
- Demonstrate knowledge of standard formats for letters and memos.
- Demonstrate knowledge of principles related to writing effective letters and memos.
- Demonstrate the ability to prepare and deliver an oral presentation.
- Demonstrate knowledge of the importance of effective interpersonal skills in the workplace.

**Duration:** 45 Hours

**Pre-Requisite(s):** None

### **Objectives and Content:**

*Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.*

1. Identify the principles for writing clear, concise, complete sentences and paragraphs which adhere to the conventions of grammar, punctuation, and mechanics.
2. Identify the principles of effective workplace writing.
  - i. describe the value of well-developed writing skills to career success
  - ii. discuss the importance of tone, and language or word choice in workplace communication, regardless of the circumstances
  - iii. demonstrate an awareness of cultural differences when preparing workplace correspondence
  - iv. describe the writing process as it applies to workplace communication
    - planning
    - writing

- editing/revising
- v. identify the parts of a business letter and memo, and when each should be used in the workplace
- vi. identify the standard formats for business letters and memos
- vii. identify guidelines for writing sample letters and memos which convey:
  - acknowledgment
  - routine request
  - routine response
  - complaint
  - refusal
  - persuasive request
  - letters of appeal

3. Identify types of informal workplace documents.

- i. identify types & purposes of reports
  - incident
  - process
  - progress
- ii. identify common trade specific forms
- iii. describe primary and secondary methods used to gather information
- iv. discuss the importance of accuracy and completeness in reports and forms

4. Identify the elements of presentations used in the workplace.

- i. identify presentation types
  - impromptu
  - informative
  - demonstration
  - persuasive
- ii. identify the components of an effective presentation
  - eye contact
  - body language
  - vocal qualities
  - audience analysis
  - multimedia tools
  - keeping on topic

5. Demonstrate an understanding of interpersonal communications in the workplace.
  - i. identify listening techniques
  - ii. demonstrate an understanding of group dynamics
  - iii. describe the importance of contributing information and expertise in the workplace
  - iv. describe the importance of respectful and open communication in the workplace
  - v. identify methods to accept and provide feedback in a constructive and considerate manner
  - vi. explain the role of conflict in a group to reach solutions
6. Identify acceptable workplace uses of communication technologies.
  - i. cell / Smart Phone etiquette
  - ii. voice mail
  - iii. e-mail
  - iv. teleconferencing / videoconferencing for meetings and interviews
  - v. social networking
  - vi. other emerging technologies

**Practical Requirements:**

1. Write well-developed, coherent, unified paragraphs.
2. Write sample letters and memos.
3. Write one short informal report.
4. Complete a selection of at least 3 trade-related forms.
5. Deliver an effective oral presentation.

## SD1760      Workplace Essentials

Note: It is recommended that SD1760 be delivered in the second half of the Entry Level training program.

### **Learning Outcomes:**

- Demonstrate knowledge of workplace essentials in the areas of meetings, unions, workers compensation, workers' rights, and human rights.
- Demonstrate knowledge of good customer service practices.
- Demonstrate knowledge of effective job search techniques.

**Duration:**            45 Hours

**Pre-Requisite(s):**    None

### **Objectives and Content:**

*Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.*

1. Identify common practices related to workplace meetings.
  - i. identify and discuss meeting format and preparation required for a meeting
  - ii. explain the purpose of an agenda
  - iii. explain the expected roles, responsibilities, and etiquette of meeting participants
2. Define unions and identify their role in the workplace.
  - i. identify the purpose of unions
  - ii. identify a common union structure
  - iii. identify the function of unions in this trade

3. Demonstrate an understanding of the Worker's Compensation process.
  - i. describe the aims, objectives, regulations and benefits of the Workplace Health, Safety and Compensation Commission
  - ii. explain the role of the Workers Advisor
  - iii. explain the internal review process
4. Demonstrate an understanding of workers' rights.
  - i. define labour standards
  - ii. identify regulations, including:
    - hours of work & overtime
    - termination of employment
    - minimum wages & allowable deductions
    - statutory holidays, vacation time, and vacation pay
5. Demonstrate an understanding of Human Rights issues.
  - i. examine the Human Rights Code and explain the role of the Human Rights Commission
  - ii. define harassment in various forms and identify strategies for prevention
    - direct
    - systemic
    - adverse effect
  - iii. identify gender and stereotyping issues in the workplace
  - iv. define basic concepts and terms related to workplace diversity including age, race, culture, religion, socio-economic status, and sexual orientation
6. Demonstrate an understanding of quality customer service.
  - i. explain why quality service is important
  - ii. identify barriers to quality customer service
  - iii. identify customer needs & common methods for meeting them
  - iv. identify and discuss the characteristics & importance of a positive attitude
  - v. identify the importance of demonstrating good communication skills including body language, listening, questioning, and when using electronic communication devices
  - vi. identify techniques for interacting with challenging customers to address complaints and resolve conflict

7. Demonstrate an understanding of effective job search techniques.
  - i. identify and explain employment trends, opportunities, and sources of employment
  - ii. identify and discuss essential skills for the trades as outlined by Human Resources and Skills Development Canada
  - iii. review job ads and identify the importance of fitting qualifications to job requirements
  - iv. identify the characteristics of effective resumes, the types of resumes, and principles of resume formatting
  - v. identify the characteristics of an effective cover letter
  - vi. identify the components of a portfolio, and discuss the value of establishing and maintaining a personal portfolio
  - vii. identify the common characteristics of the job interview process:
    - pre-interview preparation
    - interview conduct
    - post-interview follow up

**Practical Requirements:**

1. Create a resume.
2. Create a cover letter.
3. Participate in a mock job interview.

## MC1060 Computer Essentials

### **Learning Outcomes:**

- Demonstrate knowledge of computer systems and their operation.
- Demonstrate knowledge of popular software packages and their applications.
- Demonstrate knowledge of security issues related to computers.

**Duration:** 15 Hours

**Pre-Requisite(s):** None

### **Objectives and Content:**

*Wherever possible, the instructor is expected to use trade specific examples to reinforce the course objectives.*

1. Identify the major external components of a microcomputer system.
  - i. input devices
  - ii. output devices
  - iii. central control unit
2. Use operating system software.
  - i. start and quit a program
  - ii. use the help function
  - iii. use the find function
  - iv. maximize and minimize a window
  - v. use the task bar
  - vi. adjust desktop settings such as screen savers, screen resolution, and backgrounds
  - vii. shut down a computer

3. Perform file management commands.
  - i. create folders
  - ii. copy files and folders
  - iii. move files and folders
  - iv. rename files and folders
  - v. delete files and folders
4. Use word processing software to create documents.
  - i. enter text
  - ii. indent and tab text
  - iii. change text attributes (bold, underline, font, etc.)
  - iv. change layout format (margins, alignment, line spacing)
  - v. spell check and proofread
  - vi. edit text
  - vii. save document
  - viii. print document
  - ix. close document
  - x. retrieve documents
5. Use spreadsheet software to create spreadsheets.
  - i. enter data in cells
  - ii. create formulas to add, subtract, multiply and divide
  - iii. save spreadsheet
  - iv. print spreadsheet
  - v. close spreadsheet
  - vi. retrieve spreadsheet
6. Access the Internet.
  - i. access websites using the world wide web(www)
  - ii. identify examples of web browsers
  - iii. use search engines with common searching techniques
  - iv. describe security issues

7. Use electronic mail.

- i. describe e-mail etiquette
  - grammar and punctuation
  - privacy and legal issues when sharing and forwarding e-mail
  - work appropriate content
  - awareness of employer policies
- ii. manage e-mail using the inbox, sent, and deleted folders
- iii. send an e-mail message with attachment(s)
- iv. print e-mail

**Practical Requirements:**

None

## **BLOCK II**

### **HF2300 Air Handling System Components**

#### **Learning Outcomes:**

- Demonstrate knowledge of air handling systems and components related to the Insulator occupation.

**Duration:** 12Hours

**Pre-Requisites:** Block I

#### **Objectives and Content:**

1. Identify the various types of air handling systems and their applications.
2. Identify and describe components of an air handling system (HVAC).
  - i. fresh air intake
  - ii. supply air
  - iii. return air
  - iv. relief air
  - v. exhaust air
  - vi. main (trunk)
  - vii. riser
  - viii. branch
  - ix. run-out
  - x. diffuser

#### **Practical Requirements:**

None

## HF2280      Introduction to Foam Insulation

### **Learning Outcomes:**

- Demonstrate knowledge of the characteristics of foam insulation
- Demonstrate knowledge of applications of foam insulation

**Duration:**            12Hours

**Pre-Requisites:**      Block I

### **Objectives and Content:**

1. Identify the characteristics and applications of elastomeric foam insulation.
2. Identify and describe the forms of foam insulation.
  - i. pipe
  - ii. sheet
  - iii. rolls
3. Identify types and characteristics of adhesives used on flexible foam insulation.
  - i. contact type
  - ii. safe use
    - flammable when wet

### **Practical Requirements:**

None

## HF1290 Installation of Flexible Foam Insulation

### **Learning Outcomes:**

- Demonstrate knowledge of procedures used to install flexible foam insulation and its accessories.
- Demonstrate knowledge of the use of flexible foam insulation.

**Duration:** 30 Hours

**Pre-requisites:** Block I

### **Objectives and Content:**

1. Describe the procedures used to install flexible foam insulation using the slip on insulation method.
  - i. insulating pipe fittings
    - tees
    - ells
2. Describe the procedures used to insulate screwed fittings.
3. Describe the procedures used to apply slit tubes.
4. Describe the procedures used to create fitting covers from pipe insulation.
  - i. single miter (stove pipe) fitting covers.
    - sweated joints
    - screwed joints
  - ii. sleeve types fitting covers
    - 90° ells
    - cross fittings
    - 45° ells
    - laterals
    - tees and valves
5. Describe the procedures used to create and apply sheet fabricated fitting covers.
  - i. lay-out short and long radius ells
    - use manufacturer's templates (available for most common fittings)

- use charts for measurements
    - take measurements from pipe
  - ii. apply fitting cover to short and long radius ells
    - before or after adjacent pipe insulation
  - iii. fabricate flanged valve covers
    - donuts
    - build out valve body
    - measure flange circumference
    - measure and cut insulation to fit valve body
    - measure and cut insulation to fit bonnet
- 6. Describe the procedures used to install flexible foam insulation at hangers.
  - i. high density inserts
  - ii. metal shields
  - iii. vapor barrier
- 7. Describe the procedures used to install flexible foam sheets to ductwork and equipment.
  - i. determine cut sizes
  - ii. apply adhesive to both surfaces
  - iii. use compression joints for butt joints
  - iv. standing seams
  - v. apply protective coatings

**Practical Requirements:**

1. Install flexible foam insulation to piping and various pieces of equipment.

## HF2380     Insulate Underground Pipe

### **Learning Outcomes:**

- Demonstrate knowledge of procedures used to insulate, seal, and finish underground piping.
- Demonstrate knowledge of the use insulation for underground piping.

**Duration:**            30Hours

**Pre-Requisites:**      Block I

### **Objectives and Content:**

1.     Describe the procedures used to insulate underground piping using pipe covering.
  - i.       application procedures
  - ii.      insulating connectors
2.     Describe the procedures used to seal and finish underground piping.
  - i.       lines
    - reinforced laminated asphalt based jacket
    - primer and membrane
    - polyethylene film
  - ii.      connectors

### **Practical Requirements:**

1.     Apply insulation to piping in preparation for underground installation.

## HF2000     Triangulation

### **Learning Outcomes:**

- Demonstrate knowledge of triangulation.
- Demonstrate knowledge of types of applicable layouts.
- Demonstrate knowledge of procedures used to perform triangulation.

**Duration:**            18Hours

**Pre-Requisites:**      Block I

### **Objectives and Content:**

1.     Perform the Math Calculations related to Introduction to Triangulation.
2.     Describe triangulation.
3.     Describe the procedures for triangulation.
  - i.     true length lines
  - ii.    Pythagorean theorem
4.     Identify the basic geometry skills required for triangulation.
5.     Identify the necessary view of object required for triangulation.
6.     Identify the types of layouts that can be produced by triangulation.

### **Practical Requirements:**

1.     Perform triangulation layout.

## HF2400      Parallel Line Development

### **Learning Outcomes:**

- Demonstrate knowledge of parallel line development.
- Demonstrate knowledge of types of applicable layouts.
- Demonstrate knowledge of procedures used to perform parallel line development.

**Duration:**            24Hours

**Pre-Requisites:**      Block I

### **Objectives and Content:**

1.      Perform the Math Calculations related to Introduction to Parallel Line Development.
2.      Describe parallel line development.
3.      Describe the procedures for parallel line development.
4.      Identify the basic geometry skills required for parallel line development.
5.      Identify the necessary views of object required for parallel line development.
6.      Identify the types of layout that can be produced by parallel line development.

### **Practical Requirements:**

1.      Perform basic parallel line development.

## HF2410 Radial Line Development

### **Learning Outcomes:**

- Demonstrate knowledge of radial line development.
- Demonstrate knowledge of types of applicable layouts.
- Demonstrate knowledge of radial line development and describe procedures used.

**Duration:** 20Hours

**Pre-Requisites:** Block I

### **Objectives and Content:**

1. Perform the Math calculations related to Introduction to Radial Line Development.
2. Describe radial line development.
  - i. importance of the apex
3. Describe the procedures used for radial line development.
4. Identify the basic geometry skills required for radial line development.
5. Identify the necessary views of object required for radial line development.
6. Identify the types of layouts that can be produced by radial line development.

### **Practical Requirements:**

1. Perform basic radial line development.

## HF2510 Bevels and End Caps

### **Learning Outcomes:**

- Demonstrate knowledge of procedures used to layout and develop patterns for, bevels and end caps
- Demonstrate knowledge of patterns for bevels and end caps.

**Duration:** 25Hours

**Pre-Requisites:** Block I

### **Objectives and Content:**

1. Perform the Math calculations related to Introduction to Bevels and End Caps.
2. Describe the procedures used to produce layout for 45° bevel.
  - i. drawn with a series of concentric circles
  - ii. identify measurements required
  - iii. calculation of the size of material required for pattern layout
  - iv. allowances for bead and crimp
  - v. tools and equipment required to finish and apply the finished product to the insulated surface
3. Describe the procedures to clad the flange.
  - i. three partial patterns
  - ii. flange thickness
  - iii. edge covers
  - iv. adjoining pipe
  - v. demonstrate how to provide for water-shed
  - vi. tools and equipment required to finish and apply finished product to the insulated surface.
4. Describe the procedures to develop patterns for end-caps.
  - i. one piece end-cap
  - ii. two piece end-cap

**Practical Requirements:**

1. Make a pattern for bevels.
2. Develop patterns for end-caps.
  - i. one piece end-cap
  - ii. two piece end-cap
3. Install cladding with use of end-caps and or bevel.

## BLOCK III

### HF3340 Insulating Methods (Cylinders and Heads)

#### Learning Outcomes:

- Demonstrate knowledge of flexible insulation and rigid insulation.
- Demonstrate knowledge of procedures used to insulate tank heads and cylinders with rigid and flexible insulation.

**Duration:** 36 Hours

**Pre-Requisites:** Block II

#### Objectives and Content:

1. Describe the procedures used to insulate cylinders with rigid insulation.
  - i. measure and cut lags
    - calculate lag size
      - given diameter
      - given circumference
    - calculate bevel on lag
  - ii. score or kerf board insulation
  - iii. create expansion joints for hot work
  - iv. fastening insulation to substrate surface
  - v. temporary holding of materials
  - vi. cylinder legs or supports
  - vii. use of chokers
2. Describe the procedures used to insulate tank heads with rigid insulation.
  - i. types (shapes) of tank heads
  - ii. top heads
    - application of insulation to large and small heads
  - iii. bottom heads
    - chokers and pigtail wires
  - iv. on hot work
  - v. on cold work

3. Describe the procedures used to insulate cylinders with flexible fibrous insulation.
  - i. proper installation methods
  - ii. use of support bars on large diameter vessels
  - iii. insulating tank head with flexible fibrous insulation

**Practical Requirements:**

1. Apply flexible and rigid insulation to tank heads.

## HF3350 Finishing Methods

### **Learning Outcomes:**

- Demonstrate knowledge of the use of finishing materials on tank heads.
- Demonstrate knowledge of procedures used to apply finishes to tank heads and cylinders.

**Duration:** 36 Hours

**Pre-Requisites:** Block II

### **Objectives and Content:**

1. Describe the procedures used to finish heads.
  - i. apply canvass
  - ii. apply mastic
  - iii. apply metal gores
2. Describe the procedures used to finish bodies of cylinders.
  - i. apply canvass
  - ii. apply metal jacketing
  - iii. apply plastic jacketing

### **Practical Requirements:**

1. Apply finishing material to tank heads.

## HF3270 Blueprint Reading – Part II

### **Learning Outcomes:**

- Demonstrate knowledge of reading and interpreting information from related construction drawings.

Duration: 42 Hours

**Pre-requisites:** Block II

### **Objectives and Content:**

1. Demonstrate knowledge of reading, interpreting scale ruler and symbols in ledger.
2. Read architectural drawings.
  - i. architectural sheets
    - items of information
  - ii. architectural drawings
    - know way around
    - quickly find out general information about a new building
3. Read structural drawings.
  - i. use structural drawings
    - proper manner
    - find information
    - correctly interpret elevation markings
    - identify steel beams by codes
    - marked on structural drawings
4. Read plumbing drawings.
  - i. use plumbing drawings
  - ii. find necessary information
    - domestic water system
      - hot water
      - cold water
      - drainage

- sewer connections
- iii. read plumbing drawings to determine
  - lines that need to be insulated
  - line that do not need to be insulated
- 5. Read electrical drawings.
  - i. read electrical drawings to
    - find where the heat tracing is being used
  - ii. exhaust pipe on emergency generator to be insulated
    - carrying out asbestos abatement work
    - electrical drawings are used to
      - determine fixtures to be removed
      - power outlets to be located
- 6. Read mechanical drawings.
  - i. use mechanical drawings to find information on
    - insulation requirements of various sections of the HVAC system
    - what parts of that system require insulation to be installed
- 7. Ductwork drawings.
  - i. read drawings to find information regarding ductwork
- 8. Read pipe drawings.
  - i. read drawings to find information regarding piping
- 8. Estimate material quantities and sequence to accomplish jobs.

**Practical Requirements:**

1. Interpret and sketch drawings and diagrams.
2. Estimate materials required from a drawing.

## HF3000     Marine Insulation

### **Learning Outcomes:**

- Demonstrate knowledge of materials used for marine applications.
- Demonstrate knowledge of the procedures used to apply marine insulation on bulkheads, deckheads and hulls.
- Demonstrate knowledge of the procedures used to apply marine insulation on piping, ducting, fire stopping and exhaust pipes.

**Duration:**            36Hours

**Pre-Requisites:**    Block II

### **Objectives and Content:**

1. Identify safety hazards associated with marine applications.
2. Identify terminology associated with marine applications.
3. Identify various insulating materials used in marine applications.
  - i. mineral fibre
  - ii. fiberglass
  - iii. fabric-faced insulation
  - iv. polyimide foam
4. Describe pin and clip fastening systems
5. Describe multi-layer application of insulation.
6. Explain importance the sequence of application of insulation materials in marine applications.
7. Describe types of finish material their procedures for use and applications
  - i. perforated metal
  - ii. RFFRK
  - iii. fabric finish system
  - iv. aluminium
  - v. steel

8. Explain importance the sequence of application of finish materials in marine applications.
9. Explain stud and rail systems for installing finish material over insulation.

**Practical Requirements:**

1. Position and assemble components for fastening.
2. Fasten insulation with pins and clips, chokers and bands according to insulation type, thermal expansion, mechanical vibration and job specifications.
3. Apply tape to seam of fabric-faced board (navy board) and RFFRK to finish.
4. Wrap and fasten fibreglass cloth to piping using lagging.
5. Apply top coat of lagging to fibreglass cloth to seal pores.
6. Apply protective perforated metal finish over insulation.

## HF3010 Firestopping

### **Learning Outcomes:**

- Demonstrate knowledge types of firestopping materials.
- Demonstrate knowledge of the characteristics of firestopping materials.
- Demonstrate knowledge of procedures to install firestopping.

**Duration:** 30 Hours

**Pre-Requisites:** Block II

### **Objectives and Content:**

1. Explain the basics of firestopping.
  - i. introduction to firestopping
    - various definitions
    - process
    - approved
      - installations
      - materials
    - responsibilities of
      - stakeholders involved in the firestopping industry
2. Identify firestopping materials.
  - i. firestopping materials
    - different types
      - intumescent
      - endothermic material
      - silicones
      - grout
      - non-burnable materials
      - firestopping systems
3. Describe how to install firestopping.
  - i. install firestopping
    - methods
    - product information

- safety concerns during installation
- ii. installing damming materials
- iii. installing liquid foams
- iv. temporary forms
- v. placing the liquid
- vi. calculating volume to be filled
- vii. calculating amount of mix
- viii. installing intumescent materials
- ix. installing wrap strip
- x. installing aluminum tape
- xi. composite sheet
- xii. proper way to finish the job

4. Describe firestopping systems.

- i. various systems
- ii. methods to select proper system

5. Describe procedures related to spraying of thermal insulation, fire protection and soundproofing materials

- i. preparation of work area
- ii. equipment and materials used
  - sealants and coatings
  - insulations
- iii. spray techniques

**Practical Requirements:**

1. Apply firestopping materials to various penetrations.
  - i. piping
  - ii. cable trays
  - iii. ductwork
  - iv. floor and ceiling

## BLOCK IV

### HF4000 Insulating Breeching, Flues and Precipitators

#### Learning Outcomes:

- Demonstrate knowledge of procedures used to insulate breechings and the use of associated equipment.
- Demonstrate knowledge of the use of insulation on breaching.

**Duration:** 12Hours

**Pre-Requisites:** Block III

#### Objectives and Content:

1. Describe the procedures used to provide air space.
  - i. rectangular surface
  - ii. cylindrical surface
2. Describe the procedures to insulate round breechings.
  - i. apply blanket or rigid-wrap
    - using bands
    - using metal mesh blanket
3. Describe the procedures used to insulate rectangular breechings.
  - i. applying block insulation
  - ii. fastening methods
    - stand-offs
4. Describe the procedures for pin welding.
  - i. types of pin welders
    - capacitor discharge (CD)
    - stud weld
  - ii. types of pins and studs
  - iii. placement of pins
5. Describe the procedures used to finish ducts and breechings.
  - i. applying canvass

- ii. applying PVC
- iii. applying metal jacketing

6. Describe refractory systems.

- i. reflective, castable and cavity
- ii. temperature ranges
- iii. specifications
- iv. application methods
- v. expansion and contraction
- vi. thermal shock

**Practical Requirements:**

1. Apply insulation to a breeching.

## HF4010 Introduction to Cryogenic Work

### **Learning Outcomes:**

- Demonstrate knowledge of properties of cryogenic work.
- Demonstrate knowledge of types of insulation material used in cryogenic work.

**Duration:** 12Hours

**Pre-Requisites:** Block III

### **Objectives and Content:**

1. Define cryogenic work.
2. Explain the importance vapor pressure plays in cryogenic insulation work.
3. Identify the types of insulation material used in cryogenic temperature ranges.

### **Practical Requirements:**

None

## HF4020 Insulating Cryogenic Systems

### **Learning Outcomes:**

- Demonstrate knowledge of procedures used to insulate cryogenic systems.
- Demonstrate knowledge of the use of foam glass.

**Duration:** 24 Hours

**Pre-requisites:** Block III

### **Objectives and Content:**

1. Describe the procedures used to install cellular glass or rigid foam to pipes and equipment for cryogenic service.
  - i. all joints staggered
  - ii. applied in several layers
  - iii. sealing joints
  - iv. vapor stops
  - v. expansion/contraction joints
  - vi. at pipe supports and hangers
  - vii. external vapor barrier required
2. Describe the procedures used to insulate pipe connectors between prefabricated insulated pipe sections.
  - i. foam in place
    - calculate volume required
    - factor expansion rate of foam
    - snap time of foam product
    - forms required
    - methods to deliver foam
3. Describe the procedures to insulate pipe by foaming in place.
  - i. setting of forms
  - ii. delivery of foam product

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4. Describe the procedures used to insulate a tank shell using particulate insulation.
  - i. application of particulate
  - ii. sealing the vessel once insulation is in place
  
5. Describe the procedures used to insulate pipes or equipment by packing in mineral wool.
  - i. equipment or pipes encased in metal box
    - mineral wool packed to desired density

### **Practical Requirements:**

1. Apply foam glass insulation to piping, valves, and fittings.

## HF4030 Tees and Valves

### **Learning Outcomes:**

- Demonstrate knowledge of patterns for tees, valves, and elbows.
- Demonstrate knowledge of procedures used to develop patterns for tees, valves, and elbows.

**Duration:** 36 Hours

**Pre-Requisites:** Block III

### **Objectives and Content:**

1. Perform the Math calculations related to Introduction to Tees, Valves and Elbows.
2. Describe the procedures used to develop patterns for equal tee or valve.
  - i. layout template
  - ii. layout pattern for main or body
  - iii. layout pattern for branch or bonnet
  - iv. demonstrate how to provide for water-shed
3. Describe the procedures used to develop patterns for unequal tee or valve.
  - i. layout template
  - ii. layout pattern for main or body
  - iii. layout pattern for branch or bonnet
  - iv. demonstrate how to provide for water-shed

### **Practical Requirements:**

1. Make gore elbow, tee, and valves out of aluminum.

## HF4040      Transitions and Reducers

### **Learning Outcomes:**

- Demonstrate knowledge of patterns for transitions.
- Demonstrate knowledge of patterns for reducers.
- Demonstrate knowledge of procedures used to layout and develop patterns for transitions and reducers.

**Duration:**            25Hours

**Pre-Requisites:**      Block III

1. Perform the Math calculations related to Introduction to Transitions and Reducers.
2. Describe the procedures used to layout patterns for square to round or round to square transition.
  - i. using triangulation method of development
  - ii. using radial line development
  - iii. identify which views are required
  - iv. identify measurements required
  - v. calculation of the size of material required for pattern layout
  - vi. describe how to finish pattern for water-shed and adjoining pieces
  - vii. tools and equipment required to finish and apply the finish product to the insulated surface
3. Describe the procedures used to develop a pattern for a cylindrical reducer (concentric reducer).
  - i. identify measurement required
  - ii. calculation of the size of material required for pattern layout
  - iii. describe how to finish pattern for water-shed and adjoining pieces
  - iv. tools and equipment required to finish and apply the finished product to the insulated surface
4. Describe the procedures used to develop pattern for square to square concentric reducer.
  - i. identify measurements required
  - ii. calculation of the size of material required for pattern layout

- iii. describe how to finish pattern for water-shed and adjoining pieces
- iv. tools and equipment required to finish and apply the finished product to the insulated surface

5. Describe how to layout pattern for eccentric reducing reducers.

- i. using triangulation method of development
- ii. using radial line development
- iii. identify which views are required
- iv. identify measurements required
- v. calculation of the size of material required for pattern layout
- vi. describe how to finish pattern for water-shed and adjoining pieces
- vii. tools and equipment required to finish and apply the finish product to the insulated surface

**Practical Requirements:**

1. Make a pattern for reducers.
2. Make a pattern for transitions.

## HF4050      Tank Heads

### **Learning Outcomes:**

- Demonstrate knowledge of procedures used to layout patterns for tank heads.

**Duration:**            24Hours

**Pre-Requisites:**      Block III

### **Objectives and Content:**

1.      Describe the procedures used to layout pattern for tank heads.
2.      Explain the use of starter piece, center piece and anchor strips.
3.      Identify starter gore, closing gore, right and left gores.
4.      Explain the steps to do a snap line head gore.
  - i.      identify measurements required
  - ii.     transfer measurements to layout
  - iii.    allowance for bead and crimp
5.      Describe layout for flat or conical head gores.

### **Practical Requirements:**

1.      Make and apply gores to tank heads.

HF4060      Gores

**Learning Outcomes:**

- Demonstrate knowledge of patterns for short and long radius gores.
- Demonstrate knowledge of procedures used to develop patterns for short and long radius gores.
- Demonstrate knowledge of various types of elbows using gores, stovepipe and plug.

**Duration:**      36Hours

**Pre-Requisites:**      Block III

1. Perform the Math calculations related to elbows.
2. Describe the procedures used to develop patterns for long radius elbow.
  - i. use of mitre charts
  - ii. basic layout
    - radius of elbow
    - allowances for bead and crimp
  - iii. stretch out for gores
    - identify right and left gores
3. Describe the procedures to develop patterns for segmented (stove pipe) elbow.
  - i. basic layout
    - allowances for bead and crimp
  - ii. stretch out for gores
4. Describe the procedures to develop patterns for short radius elbow.
  - i. basic layout
    - radius of elbow
    - allowances for bead and crimp
  - ii. stretch out for gores
  - iii. layout of butterfly throat

**Practical Requirements:**

1. Fabricate a gore pattern.
2. Transfer gore pattern to cladding.
4. Cut out and roll for a left or right gore.
5. Apply gore to elbow.

## **D. Conditions Governing Apprenticeship Training**

### **1.0 General**

The following general conditions apply to all apprenticeship training programs approved by the Provincial Apprenticeship and Certification Board (PACB) in accordance with the *Apprenticeship Training and Certification Act* (1999). If an occupation requires additional conditions, these will be noted in the specific Plan of Training for the occupation. In no case should there be a conflict between these conditions and the additional requirements specified in a certain Plan of Training. All references to Memorandum of Understanding will also apply to Letter of Understanding (LOU) agreements.

### **2.0 Entrance Requirements**

2.1 Entry into the occupation as an apprentice requires:

Indenturing into the occupation by an employer who agrees to provide the appropriate training and work experiences as outlined in the Plan of Training.

2.2 Notwithstanding the above, each candidate must have successfully completed a high school program or equivalent, and in addition may be required to have completed certain academic subjects as specified in a particular Plan of Training. Mature students, at the discretion of the Director of Apprenticeship and Trades Certification, may be registered. A mature student is defined as one who has reached the age of 19 and who can demonstrate the ability and the interest to complete the requirements for certification.

2.3 At the discretion of the Director of Apprenticeship and Trades Certification, credit toward the apprenticeship program may be awarded to an apprentice for previous work experience and/or training as validated through prior learning assessment.

2.4 An Application for Apprenticeship form must be duly completed along with a Memorandum of Understanding as applicable to be indentured into an Apprenticeship. The Memorandum of Understanding must contain signatures of an authorized employer representative, the apprentice and an official representing the Provincial Apprenticeship and Certification Board to be valid.

2.5 A new Memorandum of Understanding must be completed for each change in an employer during the apprenticeship term.

### **3.0 Probationary Period**

The probationary period for each Memorandum of Understanding will be six months or 900 employment credit hours. Within that period the memorandum may be terminated by either party upon giving the other party and the PACB one week notice in writing.

### **4.0 Termination of a Memorandum of Understanding**

After the probationary period referred to in Section 3.0, the Memorandum of Understanding may be terminated by the PACB by mutual consent of the parties involved, or cancelled by the PACB for proper and sufficient cause in the opinion of the PACB, such as that stated in Section 14.

### **5.0 Apprenticeship Progression Schedule, Wage Rates and Advanced Training Criteria**

Progression Schedule, Wage Rate and Advanced Training Criteria are stated in the specific occupational Plan of Training for each designated apprenticeship occupation

## Progression Schedule

Insulator (Heat and Frost) - 7200 Hours			
APPRENTICESHIP LEVEL AND WAGES			
Year	Wage Rate At This Level	Requirements for progression to next level of apprenticeship	When requirements are met, the apprentice will progress to...
1 <sup>st</sup>	60 %	<ul style="list-style-type: none"> <li>▪ Completion of Block 1 training</li> <li>▪ Pass Block 1 exam</li> <li>▪ Minimum 1800 hours of combined relevant work experience and training</li> </ul>	2 <sup>nd</sup> Year
2 <sup>nd</sup>	70%	<ul style="list-style-type: none"> <li>▪ Completion of Block 2 training</li> <li>▪ Pass Block 2 exam</li> <li>▪ Minimum 3600 hours of combined relevant work experience and training</li> </ul>	3 <sup>rd</sup> Year
3rd	80%	<ul style="list-style-type: none"> <li>▪ Completion of Block 3 training</li> <li>▪ Minimum 5400 hours of combined relevant work experience and training</li> <li>▪ Sign-off of all workplace skills in apprentice logbook</li> <li>▪ Pass certification exam</li> </ul>	4 <sup>th</sup> Year
4 <sup>th</sup>	90%	<ul style="list-style-type: none"> <li>▪ Completion of Block 4 training</li> <li>▪ Minimum 7200 hours of combined relevant work experience and training</li> <li>▪ Sign-off of all workplace skills in apprentice logbook</li> <li>▪ Pass certification exam</li> </ul>	Journeyperson Certification
<p><b>Wage Rates</b></p> <ul style="list-style-type: none"> <li>▪ Rates are percentages of the prevailing journeyperson's wage rate in the place of employment of the apprentice.</li> <li>▪ Rates must not be less than the wage rate established by the Labour standards Act (1990), as now in force or as hereafter amended, or by other order, as amended from time to time replacing the first mentioned order.</li> <li>▪ Rates must not be less than the wage rate established by any collective agreement which may be in force at the apprentice's workplace.</li> <li>▪ Employers are free to pay wage rates above the minimums specified.</li> </ul> <p><b>Block Exams</b></p> <ul style="list-style-type: none"> <li>▪ This program may not currently contain block exams, in which case this requirement will be waived until such time as block exams are available.</li> </ul>			

## Plan of Training – Insulator (Heat and Frost)

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<b>Insulator (Heat and Frost) – 7200 Hours</b>		
<b>CLASS CALLS</b>		
Call Level	Requirements for Class Call	Hours awarded for In-School Training
Direct Entry Apprentice: PLA & / or Block 1	<ul style="list-style-type: none"><li>▪ Minimum of 1000 hours of relevant work experience and training</li><li>▪ Prior Learning Assessment (PLA) at designated college (if applicable)</li></ul>	To be determined by the number of courses completed after each class call
Block 2	<ul style="list-style-type: none"><li>▪ Minimum of 3600 hours of relevant work experience and training</li></ul>	180
Block 3	<ul style="list-style-type: none"><li>▪ Minimum of 5220 hours of relevant work experience and training</li></ul>	180
Block 4	<ul style="list-style-type: none"><li>▪ Minimum of 7020 hours of relevant work experience and training</li></ul>	180

**Direct Entry Apprentice:**

- Must complete Block 1 courses through PLA and / or in school training.
- Block 1 training is to be completed via class calls; up to 16 weeks of training per calendar year.
- Must attend in-school training until Block 1 is complete before attending Blocks 2 or higher.

**Class calls at Minimum Hours:**

- Class calls may not always occur at the minimum hours indicated. Some variation is permitted to allow for the availability of training resources and apprentices.

## **6.0 Tools**

Apprentices shall be required to obtain their own hand tools applicable for the designated occupation of registration or tools as specified by the PACB.

## **7.0 Periodic Examinations and Evaluation**

- 7.1 Every apprentice shall submit to such occupational tests and examinations as the PACB shall direct. If after such occupational tests and examinations the apprentice is found to be making unsatisfactory progress, his/her apprenticeship level and rate of wage shall not be advanced as provided in Section 5 until his/her progress is satisfactory to the Director of Apprenticeship and Trades Certification and his/her date of completion shall be deferred accordingly. Persistent failure to pass required tests shall be a cause for revocation of his/her Memorandum of Understanding.
- 7.2 Upon receipt of reports of accelerated progress of the apprentice, the PACB may shorten the term of apprenticeship and advance the date of completion accordingly.
- 7.3 For each and every course, a formal assessment is required for which 70% is the pass mark. A mark of 70% must be attained in both the theory examination and the practical project assignment, where applicable as documented on an official transcript.
- 7.4 Course credits may be granted through the use of a PACB approved matrix which identifies course equivalencies between designated trades and between current and historical Plans of Training for the same trade.

## **8.0 Granting of Certificates of Apprenticeship**

Upon the successful completion of apprenticeship, the PACB shall issue a Certificate of Apprenticeship.

## **9.0 Hours of Work**

Any hours employed in the performance of duties related to the designated occupation will be credited towards the completion of the term of apprenticeship. Appropriate documentation of these hours must be provided.

## **10.0 Copies of the Registration for Apprenticeship**

The Director of Apprenticeship and Trades Certification shall provide copies of the Registration for Apprenticeship form to all signatories to the document.

## **11.0 Ratio of Apprentices to Journeypersons**

Under normal practice, the ratio of apprentices to journeypersons shall not exceed two apprentices to every one journeyperson employed. Other ratio arrangements would be determined and approved by the PACB.

## **12.0 Relationship to a Collective Bargaining Agreement**

Where applicable in Section 5 of these conditions, Collective Agreements take precedence.

## **13.0 Amendments to a Plan of Apprenticeship Training**

A Plan of Training may be amended at any time by the PACB.

## **14.0 Employment, Re-Employment and Training Requirements**

- 14.1 The Plan of Training requires apprentices to regularly attend their place of employment.
- 14.2 The Plan of Training requires apprentices to attend training for that occupation as prescribed by the PACB.
- 14.3 Failure to comply with Sections 14.1 and/or 14.2 will result in cancellation of the Memorandum of Understanding. Apprentices may have their MOUs reinstated by the PACB but would be subject to a commitment to complete the entire program as outlined in the General Conditions of Apprenticeship. Permanent cancellation in the said occupation is the result of non-compliance.
- 14.4 Cancellation of the Memorandum of Understanding to challenge journeyperson examinations, if unsuccessful, would require an apprentice to serve a time penalty of two (2) years before reinstatement as an apprentice or qualifying to receive a class call to training as a registered Trade Qualifier. Cancellation must be mutually agreed upon by the employer and the apprentice.

- 14.5 An employer shall ensure that each apprentice is under the direct supervision of an approved journeyperson supervisor who is located at the same worksite as the apprentice, and that the apprentice is able to communicate with the journeyperson with respect to the task, activity or function that is being supervised.
- 14.6 Under the Plan of Training the employer is required to keep each apprentice employed as long as work is available, and if the apprentice is laid off due to lack of work, to give first opportunity to be hired before another is hired.
- 14.7 The employer will permit each apprentice to attend training programs as prescribed by the PACB.
- 14.8 Apprentices who cannot acquire all the workplace skills at their place of employment will have to be evaluated in a simulated work environment at a PACB authorized training institution and have sign-off done by instructors to meet the requirements for certification.

## **15.0 Appeals to Decisions Based on Conditions Governing Apprenticeship Training**

Persons wishing to appeal any decisions based on the above conditions must do so in writing to the Minister of Advanced Education and Skills within 30 days of the decision.

## **E. Requirements for Red Seal Endorsement**

1. Evidence the required work experiences outlined in this Plan of Training have been obtained. This evidence must be in a format clearly outlining the experiences and must be signed by an appropriate person or persons attesting that these experiences have been obtained to the level required.
2. Successful completion of all required courses in the program.
3. A combination of training from an approved training program and suitable work experience totaling 7200 hours.

**Or**

A total of 9000 hours of suitable work experience.

4. Completion of a National Red Seal examination, to be set at a place and time determined by the Apprenticeship and Trades Certification Division.

## **F. Roles and Responsibilities of Stakeholders in the Apprenticeship Process**

The apprenticeship process involves a number of stakeholders playing significant roles in the training of apprentices. This section outlines these roles and the responsibilities resulting from them.

### **The Apprentice:**

- completes all required technical training courses as approved by the PACB.
- finds appropriate employment.
- completes all required work experiences in combination with the required hours.
- ensures work experiences are well documented.
- approaches apprenticeship training with an attitude and commitment that fosters the qualities necessary for a successful career as a qualified journeyperson.
- obtains the required hand tools as specified by the PACB for each period of training of the apprenticeship program.

## **The Employer:**

- provides high quality work experiences in an environment conducive to learning.
- remunerates apprentices as set out in the Plan of Training or Collective Agreements.
- provides feedback to training institutions, Apprenticeship and Trades Certification Division and apprentices in an effort to establish a process of continuous quality improvement.
- where appropriate, releases apprentices for the purpose of returning to a training institution to complete the necessary technical courses.
- ensures work experiences of the apprentice are documented.
- ensures a certified journeyperson is currently on staff in the same trade area as the apprentice and whose certification is recognized by the NL Department of Advanced Education and Skills.

## **The Training Institution:**

- provides a high quality learning environment.
- provides the necessary student support services that will enhance an apprentice's ability to be successful.
- participates with other stakeholders in the continual updating of programs.