SKILLED TRADES BC

Program Outline

Architectural Sheet Metal Worker

The latest version of this document is available in PDF format on the SkilledTradesBC website
www.skilledtradesbc.ca

To order printed copies of Program Outlines
or learning resources (where available)
for BC trades contact:

Crown Publications, Queen's Printer
Web: www.crownpub.bc.ca
Email: crownpub@gov.bc.ca
Toll Free 1 800 663-6105

ARCHITECTURAL SHEET METAL WORKER

PROGRAM OUTLINE

APPROVED BY INDUSTRY

JUNE 2013

Developed by
SkilledTradesBC
Province of British Columbia

TABLE OF CONTENTS

Section 1

INTRODUCTION

Architectural Sheet Metal Worker

Foreword

This revised Architectural Sheet Metal Worker Program Outline is intended as a guide for instructors, apprentices, and employers of apprentices as well as for the use of industry organizations, regulatory bodies, and provincial and federal governments. It reflects updated standards based on the British Columbia industry and subject matter experts.

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

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

The Program Outline was prepared with the advice and assistance of the Architectural Sheet Metal Worker Review Committee and will form the basis for further updating of the British Columbia Architectural Sheet Metal Worker Program and learning resources on behalf of SkilledTradesBC.

Each competency is to be evaluated through the use of written examination in which the learner must achieve a minimum of 70% in order to receive a passing grade. The types of questions used on these exams must reflect the cognitive level indicated by the learning objectives and the learning tasks listed in the related competencies.

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

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

SAFETY ADVISORY

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

Acknowledgements

The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the BC Construction Industry Training Organization. Members include:

- Ian Ballam – Kerrian Metalhouse
- Shirley Caldwell – RCABC
- Mark Curtis – Sheet Metal Workers Local 276
- Connor Hofler – RCABC
- Judd Martell – SMWTCS
- Chris McBurney – Summit Steel
- Blake Merrick – Flynn Canada Ltd.
- Daryl Morrison – Lam Metals
- Shane Murphy – Crown Roofing
- Bob Pascuzzi – SMWTCS

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

- Jesse Cramp – Summit Steel
- Rick Conniff – Flynn Canada
- Bryan Hignell – Nelson Roofing
- Connor Hofler – RCABC
- Randy Kellen – Lam Metal
- Aaron Laplante – Flynn Canada
- Bob Pascuzzi – SMWTCS
- Ben Yanko – Kerrian Metalhouse

Facilitators:

- Laura Chaston – CITO

The SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Architectural Sheet Metal Worker occupation.

How to Use this Document

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

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Program Credentialing Model	Communicate program length and structure, and all pathways to completion	Understand the length and structure of the program	Understand the length and structure of the program, and pathway to completion	Understand challenger pathway to Certificate of Qualification
OAC	Communicate the competencies that industry has defined as representing the scope of the occupation	Understand the competencies that an apprentice is expected to demonstrate in order to achieve certification	View the competencies they will achieve as a result of program completion	Understand the competencies they must demonstrate in order to challenge the program
Training Topics and Suggested Time Allocation	Shows proportionate representation of general areas of competency (GACs) at each program level, the suggested proportion of time spent on each GAC, and percentage of time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the scope of competencies covered in the technical training, the suggested proportion of time spent on each GAC, and the percentage of that time spent on theory versus practical application	Understand the relative weightings of various competencies of the occupation on which assessment is based
Program Content	Defines the objectives, learning tasks, high level content that must be covered for each competency, as well as defining observable, measureable achievement criteria for objectives with a practical component	Identifies detailed program content and performance expectations for competencies with a practical component; may be used as a checklist prior to signing a recommendation for certification (RFC) for an apprentice	Provides detailed information on program content and performance expectations for demonstrating competency	Allows individual to check program content areas against their own knowledge and performance expectations against their own skill levels
Training Provider Standards	Defines the facility requirements, tools and equipment, reference materials (if any) and instructor requirements for the program	Identifies the tools and equipment an apprentice is expected to have access to; which are supplied by the training provider and which the student is expected to own	Provides information on the training facility, tools and equipment provided by the school and the student, reference materials they may be expected to acquire, and minimum qualification levels of program instructors	Identifies the tools and equipment a tradesperson is expected to be competent in using or operating; which may be used or provided in a practical assessment

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
Appendix – Glossary of Acronyms			Defines program specific acronyms	

Section 2

PROGRAM OVERVIEW

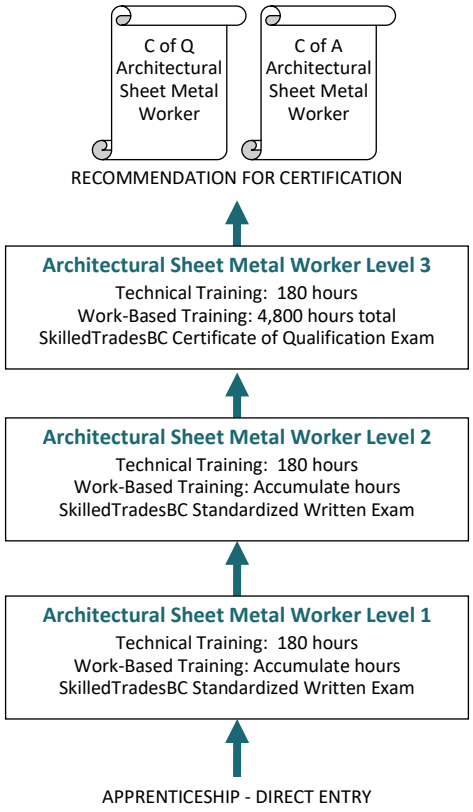
Architectural Sheet Metal Worker

Program Credentialing Model

Apprenticeship Pathway

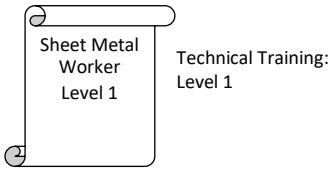
This graphic provides an overview of the Architectural Sheet Metal Worker apprenticeship pathway.

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



CROSS-PROGRAM CREDITS

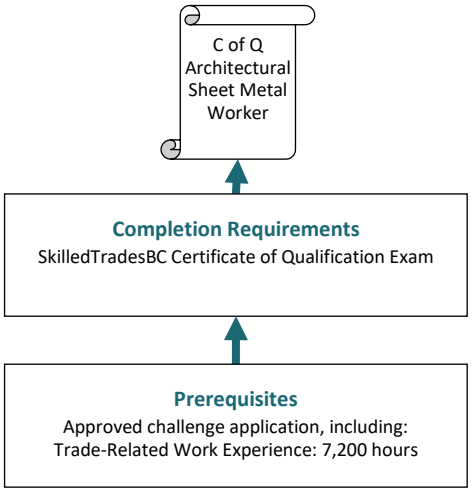
Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program



Challenge Pathway

This graphic provides an overview of the Architectural Sheet Metal Worker challenge pathway.

C of Q = Certificate of Qualification



CROSS-PROGRAM CREDITS

Individuals who hold the credentials listed below are entitled to receive partial credit toward the completion requirements of this program

None

Occupational Analysis Chart

ARCHITECTURAL SHEET METAL WORKER

Occupation Description: "Architectural Sheet Metal Worker" means a person who has the product knowledge and skills to prepare, repair and fabricate components for: metal roofs, metal walls and other exterior wall products, composite panels insulation, membranes and waterproofing, ventilators and curbs, flashings, gutters, downspouts, louvers, soffits, skylights and metal doors.

USE SAFE WORK PRACTICES **A**	Use Personal Protective Equipment A1	Use WorkSafeBC Regulations A2	Use WHMIS A3	Identify Hazards and Emergency Procedures A4	Select Fire Extinguishers A5	Complete Level 1 First Aid Certification A6
	1	1	1	1	1	1
USE TOOLS AND EQUIPMENT **B**	Use Hand Tools B1	Use Power Tools B2	Use Powder Actuated Tools B3	Use Shop Equipment B4	Use Ladders, Scaffolds and Platforms B5	Use Fasteners and Sealants B6
	1 2	1 2	1	1 2	1 2	1 2
ORGANIZE WORK **C**	Interpret Drawings and Specifications C1	Estimate Materials C2	Communicate with Others C3	Measure and Sketch Shop Project Components C4	Identify Metals and Properties C5	
	1 2 3	3	1 2 3	1 2 3	1 2 3	
USE TRADE MATH **D**	Use Basic Trade Math D1	Solve Problems Using Formulas D2	Solve Problems Using Pythagorean Theorem D3	Solve Problems Using Trigonometry D4		
	1 2 3	1 2 3	1 2 3	1 2 3		
EXAMINE SYSTEMS **E**	Identify Systems E1	Identify Support Structures E2	Identify Building Envelope E3	Examine Wall Systems E4	Examine Roof Systems E5	Examine Specialty Products E6
	1 2 3	1 2 3	1 2 3	1 3	1 2	1 2

	Examine Specialty System Components/ Accessories E7				
		2	3		
FABRICATE PRODUCTS AND COMPONENTS F	Seams, Locks, Edges and Joints F1	Fabricate Components F2			
	1 2 3	1 2 3			
INSTALL PRODUCTS G	Use Hoisting, Lifting and Rigging Equipment G1	Install Roofing and Wall Components G2	Prepare Substrate G3	Install Specialty Components G4	
	1 2	1 2 3	1 2 3	2 3	
LAYOUT AND DEVELOP PATTERNS H	Use Drafting Equipment for Geometric Construction H1	Draw Orthographic and Pictorial Drawings H2	Produce Patterns Using Parallel Line Development H3	Produce Patterns Using Radial Line Development H4	Produce Patterns Using Triangulation H5
	1	1 2 3	1 2 3	1 2 3	2 3
WELD AND SOLDER I	Cutting Techniques I1	Select and Use Welding Equipment for SMAW I2	Select and Use Welding Equipment for GMAW I3	Demonstrate Soldering Techniques I4	
	1 2 3	1 2	3	1 2 3	

Training Topics and Suggested Time Allocation Level 1

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line A	**USE SAFE WORK PRACTICES**	**8%**	**100%**	**0%**	**100%**
A1	Use Personal Protective Equipment		✓		
A2	Use WorkSafeBC Regulations		✓		
A3	Use WHMIS		✓		
A4	Identify Hazards and Emergency Procedures		✓		
A5	Select Fire Extinguishers		✓		
A6	Complete Level 1 First Aid Certification		✓		
Line B	**USE TOOLS AND EQUIPMENT**	**12%**	**100%**	**0%**	**100%**
B1	Use Hand Tools		✓		
B2	Use Power Tools		✓		
B3	Use Powder Actuated Tools		✓		
B4	Use Shop Equipment		✓		
B5	Use Ladders, Scaffolds and Platforms		✓		
B6	Use Fasteners and Sealants		✓		
Line C	**ORGANIZE WORK**	**5%**	**70%**	**30%**	**100%**
C1	Interpret Drawings and Specifications		✓		
C3	Communicate with Others		✓		
C4	Measure and Sketch Shop Project Components		✓	✓	
C5	Identify Metals and Properties		✓		
Line D	**USE TRADE MATH**	**9%**	**100%**	**0%**	**100%**
D1	Use Basic Trade Math		✓		
D2	Solve Problems Using Formulas		✓		
D3	Solve Problems Using Pythagorean Theorem		✓		
D4	Solve Problems Using Trigonometry		✓		
Line E	**EXAMINE SYSTEMS**	**10%**	**100%**	**0%**	**100%**
E1	Identify Systems		✓		
E2	Identify Support Structures		✓		
E3	Identify Building Envelope		✓		
E4	Examine Wall Systems		✓		
E5	Examine Roof Systems		✓		
E6	Examine Specialty Products		✓		
Line F	**FABRICATES PRODUCTS AND COMPONENTS**	**13%**	**15%**	**85%**	**100%**
F1	Seams, Locks, Edges and Joints		✓	✓	
F2	Fabricate Components		✓	✓	
Line G	**INSTALL PRODUCTS**	**20%**	**15%**	**85%**	**100%**
G1	Use Hoisting, Lifting and Rigging Equipment		✓		
G2	Install Roofing and Wall Components		✓	✓	
G3	Prepare Substrate		✓		

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line H	**LAYOUT AND DEVELOP PATTERNS**	**14%**	**50%**	**50%**	**100%**
H1	Use Drafting Equipment for Geometric Construction		✓		
H2	Draw Orthographic and Pictorial Drawings		✓	✓	
H3	Produce Patterns Using Parallel Line Development		✓	✓	
H4	Produce Patterns Using Radial Line Development		✓	✓	
Line I	**WELD AND SOLDER**	**9%**	**35%**	**65%**	**100%**
I1	Cutting Techniques		✓	✓	
I2	Select and Use Welding Equipment for SMAW		✓	✓	
I4	Demonstrate Soldering Techniques		✓	✓	
	Total Percentage for Architectural Sheet Metal Worker Level 1	**100%**			

Training Topics and Suggested Time Allocation Level 2

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line B	**USE TOOLS AND EQUIPMENT**	**5%**	**100%**	**0%**	**100%**
B1	Use Hand Tools		✓		
B2	Use Power Tools		✓		
B4	Use Shop Equipment		✓		
B5	Use Ladders, Scaffolds and Platforms		✓		
B6	Use Fasteners and Sealants		✓		
Line C	**ORGANIZE WORK**	**6%**	**65%**	**35%**	**100%**
C1	Interpret Drawings and Specifications		✓		
C3	Communicate with Others		✓		
C4	Measure and Sketch Shop Project Components		✓	✓	
C5	Identify Metals and Properties		✓		
Line D	**USE TRADE MATH**	**8%**	**100%**	**0%**	**100%**
D1	Use Basic Trade Math		✓		
D2	Solve Problems Using Formulas		✓		
D3	Solve Problems Using Pythagorean Theorem		✓		
D4	Solve Problems Using Trigonometry		✓		
Line E	**EXAMINE SYSTEMS**	**9%**	**100%**	**0%**	**100%**
E1	Identify Systems		✓		
E2	Identify Support Structures		✓		
E3	Identify Building Envelope		✓		
E5	Examine Roof Systems		✓		
E6	Examine Specialty Products		✓		
E7	Examine Specialty Components/Accessories		✓		
Line F	**FABRICATES PRODUCTS AND COMPONENTS**	**20%**	**15%**	**85%**	**100%**
F1	Seams, Locks, Edges and Joints		✓	✓	
F2	Fabricate Components		✓	✓	
Line G	**INSTALL PRODUCTS**	**28%**	**20%**	**80%**	**100%**
G1	Use Hoisting, Lifting and Rigging Equipment		✓		
G2	Install Roofing and Wall Components		✓	✓	
G3	Prepare Substrate		✓	✓	
G4	Install Specialty Components		✓	✓	
Line H	**LAYOUT AND DEVELOP PATTERNS**	**13%**	**20%**	**80%**	**100%**
H2	Draw Orthographic and Pictorial Drawings		✓	✓	
H3	Produce Patterns Using Parallel Line Development		✓	✓	
H4	Produce Patterns Using Radial Line Development		✓	✓	
H5	Produce Patterns Using Triangulation		✓	✓	

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line I	**WELD AND SOLDER**	**11%**	**25%**	**75%**	**100%**
I1	Cutting Techniques		✓		
I2	Select and Use Welding Equipment for SMAW		✓	✓	
I4	Demonstrate Soldering Techniques		✓	✓	
	Total Percentage for Architectural Sheet Metal Worker Level 2	**100%**			

Training Topics and Suggested Time Allocation Level 3

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line C	**ORGANIZE WORK**	**12%**	**80%**	**20%**	**100%**
C1	Interpret Drawings and Specifications		✓		
C2	Estimate Materials		✓	✓	
C3	Communicate with Others		✓		
C4	Measure and Sketch Shop Project Components		✓	✓	
C5	Identify Metals and Properties		✓		
Line D	**USE TRADE MATH**	**5%**	**100%**	**0%**	**100%**
D1	Use Basic Trade Math		✓		
D2	Solve Problems Using Formulas		✓		
D3	Solve Problems Using Pythagorean Theorem		✓		
D4	Solve Problems Using Trigonometry		✓		
Line E	**EXAMINE SYSTEMS**	**7%**	**100%**	**0%**	**100%**
E1	Identify Systems		✓		
E2	Identify Support Structures		✓		
E3	Identify Building Envelope		✓		
E4	Examine Wall Systems		✓		
E7	Examine Specialty System Components/Accessories		✓		
Line F	**FABRICATE PRODUCTS AND COMPONENTS**	**15%**	**15%**	**85%**	**100%**
F1	Seams, Locks, Edges and Joints		✓	✓	
F2	Fabricate Components		✓	✓	
Line G	**INSTALL PRODUCTS**	**34%**	**20%**	**80%**	**100%**
G2	Install Roofing and Wall Components		✓	✓	
G3	Prepare Substrate		✓	✓	
G4	Install Specialty Components		✓	✓	
Line H	**LAYOUT AND DEVELOP PATTERNS**	**15%**	**30%**	**70%**	**100%**
H2	Draw Orthographic and Pictorial Drawings		✓	✓	
H3	Produce Patterns Using Parallel Line Development		✓	✓	
H4	Produce Patterns Using Radial Line Development		✓	✓	
H5	Produce Patterns Using Triangulation		✓	✓	
Line I	**WELD AND SOLDER**	**12%**	**30%**	**70%**	**100%**
I1	Cutting Techniques		✓		
I3	Select and Use Welding Equipment for GMAW		✓	✓	
I4	Demonstrate Soldering Techniques		✓	✓	
	Total Percentage for Architectural Sheet Metal Worker Level 3	**100%**			

Section 3

PROGRAM CONTENT

Architectural Sheet Metal Worker

Level 1

Architectural Sheet Metal Worker

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A1 Use Personal Protective Equipment

Objectives

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

- Describe personal protective equipment.
- Demonstrate proper use of personal protective equipment.

LEARNING TASKS	CONTENT
1. Describe personal protective equipment	• Head protection • Foot protection • Eye protection • Ear protection • Respiratory protection • Fall protection • Hand protection • Knee protection • CSA Standards • WorkSafeBC Standards
2. Use personal protective equipment	• Use • Inspection • Maintenance • Storage

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A2 Use WorkSafeBC Regulations

Objectives

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

- Locate and apply WorkSafeBC and Occupational Health and Safety Regulations.

LEARNING TASKS	CONTENT
1. Define terms used in the Workers' Compensation Act	• Definitions, Section 1 of the Act
2. Describe the general duties of employers, employees and others	• Part 2, Division 3, Sections 115-124 of the Act
3. Describe the Workers' Compensation Act requirements for the reporting of accidents	• Part 1, Divison 5, Section 53 and 54 of the Act

4. Describe the "Core Requirements" of the Occupational Health and Safety Regulation	• Definitions
	• Application
	• Rights and Responsibilities
	  o Health and safety programs
	  – Construction Safety Officers (CSO) site safety precedence
	  o Investigations and reports
	  o Workplace inspections
	  o Right to refuse work
	• General Conditions
	  o Building and equipment safety
	  o Emergency preparedness
	  o Preventing violence
	  o Working alone
	  o Ergonomics
	  o Illumination
	  o Indoor air quality
	  o Smoking and lunchrooms
	• Confined Spaces
	  o Exit Strategy
	• Lockout Procedures

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A3 Use WHMIS

Objectives

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

- Describe the purpose of the Workplace Hazardous Materials Information System (WHMIS) Regulations.
- Explain the contents of Material Safety Data Sheets (MSDS)
- Explain the contents of a WHMIS label
- Apply WHMIS Regulations

LEARNING TASKS	CONTENT
1. State the legislation that requires suppliers of hazardous materials to provide MSDSs and label products as a condition of sale and importation	• Hazardous Product Act • Controlled Products Regulations • Ingredient Disclosure List • Hazardous Materials Information Review Act • Hazardous Materials Information Review Regulations
2. State the purpose of the Workplace Hazardous Materials Information System (WHMIS)	• Protection of Canadian workers from the adverse effects of hazardous materials through the provision of relevant information while minimizing the economic impact on industry and the disruption of trade • Recognition of rights o Workers o Employers o Suppliers o Regulators
3. Describe the key elements of WHMIS	• Material safety data sheets (MSDSs) • Labelling of containers of hazardous materials • Worker education programs
4. Describe the responsibilities of suppliers under WHMIS	• Provide: o MSDSs o Labels
5. Describe the responsibilities of employers under WHMIS	• Provide: o MSDSs o Labels o Work education programs in the workplace
6. Describe information to be disclosed on a MSDS	• Hazardous ingredients • Preparation information

LEARNING TASKS	CONTENT
	• Product information • Physical data • Fire or explosion • Reactivity data • Toxicological properties • Preventive measures • First-aid measures

7. Identify symbols found on WHMIS labels and their meaning	• Compressed gases
	• Flammable and combustible materials
	• Oxidizing materials
	• Poisonous and infectious materials
	  o Materials causing immediate and serious toxic effects
	  o Materials causing other toxic effects
	  o Biohazardous infectious materials
	• Corrosive materials
	• Dangerously reactive materials

8. Apply WHMIS regulations as they apply to hazardous materials used in the shop	• Use, storage and disposal

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A4 Identify Hazards and Emergency Procedures

Objectives

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

- Identify and describe workplace hazards.
- To locate and use emergency equipment.

LEARNING TASKS	CONTENT

1. Describe short term hazards	• Ladders
	• Scaffolds
	• Mobile work platforms
	• Working at elevations
	• Leading edge work
	• Electrical
	• Lockout procedures
	• Compressed gas
	• Explosive material (dust)
	• Working with other trades
	• Alcohol
	• Drugs
	• Fire
	• Field Level Risk Assessmet (FLRA)
	• Debris
	• Personal apparel
	  o Clothing
	  o Hair and beards
	  o Jewellery
	• Horseplay
	• Housekeeping
	• Respect for others safety
	• Constant awareness of surroundings
	• Working below grade
	• Control zone awareness
	  o Signage
	  o Tape
	• Site safety orientation

LEARNING TASKS	CONTENT

2. Describe long term hazards	• Back and knee injuries
	• Repetitive Strain Injuries
	  o Carpal tunnel
	• Respiratory disease
	  o Asbestos
	  o Silicosis

3. Describe safety precautions when working at elevations	• Wind • Floor openings • Guard rails • Safety lines • Weather • Stressed cables
4. Demonstrate emergency procedures	• First aid • Reporting • Response • Emergency shutoffs • Fire control systems • Eye wash facilities • Emergency exits • Emergency contact/phone numbers • Outside meeting place • Disaster meeting place

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A5 Select Fire Extinguishers

Objectives

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

- Describe fire prevention precautions and procedures.
- Select the appropriate fire extinguisher for each class of fire.

LEARNING TASKS	CONTENT
1. Describe the conditions necessary to support a fire	• Air • Fuel • Heat
2. Describe the fire classes	• Class A • Class B • Class C • Class D
3. Describe the kinds of fire extinguishers	• Water • Foam • CO2 • All purpose chemical • Halons • Extinguisher maintenance o Inspection • Proper use of portable fire extinguisher • Precautions • Hazards

4. Describe the use of fire extinguishers	• Extinguisher selection
	• P.A.S.S
	  o Pull
	  o Aim
	  o Squeeze
	  o Sweep

5. Describe procedures and equipment related to preventing, detecting and warning of fires	• Fire safety considerations • Storage of rags • Welding and cutting • Fire watch • Emergency action plan • Exit strategy • Fire extinguisher type and location • Fire safety check-list

Line (GAC): A USE SAFE WORK PRACTICES

Competency: A6 Complete Level 1 First Aid Certification

Objectives

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

- Attain Level 1 First Aid Training.

LEARNING TASKS	CONTENT
1. Attain Level 1 First Aid Certification	• Arrange with a qualified provider of First Aid Certification

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Use Hand Tools

Objectives

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

- Select hand tools appropriate to architectural sheet metal processes.
- Use and maintain hand tools.

LEARNING TASKS	CONTENT
1. Describe the use of hand tools	• Layout tools • Cutting tools • Forming tools • Clamping tools • Hammers • Measuring tools • Fastening • Care and maintenance. • **

**See Tools and Equipment list in Section 4

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B2 Use Power Tools

Objectives

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

- Describe the use of power tools.

LEARNING TASKS

1. Describe the use of power tools

CONTENT

- Safety
- Maintenance
- Types
  - Cutting
  - Seaming
  - Fastening
  - Drilling
- **

**See Tools and Equipment list in Section 4

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B3 Use Powder Actuated Tools

Objectives

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

- Describe the use of powder actuated tools.

LEARNING TASKS	CONTENT
1. Attain certification for powder actuated tools	• Arrange with a qualified provider for Powder Actuated Tool Certification

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B4 Use Shop Equipment

Objectives

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

- Describe the use of shop equipment.

LEARNING TASKS

1. Describe the use of shop equipment

CONTENT

- Safety
- Maintenance
- Types
- Cutting
  - Shear
  - Slitter
  - Notcher
  - Punching
  - Saws
  - Drilling
- Forming
  - Rotary
  - Hand brakes
  - Roll formers
  - Slip rolls
  - Bar folder
  - Stakes
- Spot welder
- Computer assisted
- **

**See Tools and Equipment list in Section 4

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B5 Use Ladders, Scaffolds and Platforms

Objectives

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

- Describe the procedure for working with ladders.
- Describe the erection requirements for scaffolds.
- Describe the use of swing staging.
- Demonstrate the use of swing staging.

LEARNING TASKS	CONTENT
1. Describe precautions and procedures for working with ladders	• Types • Set-up • Maintenance • WorkSafeBC Requirements • 3-point contact • Inspection

2. Describe the erection requirements for scaffolds	• Set-up
	• Maintenance
	• WorkSafeBC Requirements
	• Inspection
	• Types
	  o Rolling
	  o H-Frame
	  o Tube and Clamp

3. Describe the use of swing staging safety and training requirements as per WorkSafeBC	• WorkSafeBC Regulations
	• Inspection criteria
	• Manual must be available
	• Employer must keep records of
	  o Inspection
	  o Maintenance
	  o Repair
	  o Modification
	• All workers must be trained in the operation of swing staging prior to use

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B6 Use Fasteners and Sealants

Objectives

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

- Describe common fasteners.
- Describe common sealants.

LEARNING TASKS	CONTENT
1. Describe common fasteners	• Loads • General fasteners • Concrete anchors • Decking fasteners • Cladding fasteners • Roofing fasteners • Coatings

2. Describe common sealants	• Types of sealants
	  o Silicon
	  o Butyl
	  o Butyl tape
	  o Mastic
	  o Acrylic
	  o Polyurethane
	• Applications
	  o Joints
	  o Edges
	  o Reveals
	  o Penetrations
	  o Flashings
	• Manufacturers' recommendations for application

Line (GAC): C ORGANIZE WORK

Competency: C1 Interpret Drawings and Specifications

Objectives

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

- Describe the components for a set of shop drawings.

LEARNING TASKS	CONTENT
1. Describe the components of a set of shop drawings	• Lines • Symbols • Abbreviations • Required information • Scale • Title blocks • Dimensioning

Line (GAC): C ORGANIZE WORK

Competency: C3 Communicate with Others

Objectives

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

- Describe the components for a set of shop drawings.

LEARNING TASKS	CONTENT
1. Describe methods of communication	• Listening • Written • Drawings • Trade terminology
2. Describe personal conduct	• Team players • Working with other trades • Reporting protocol • Ethics • Interpersonal skills • Harrassment • General public

Line (GAC): C ORGANIZE WORK

Competency: C4 Measure and Sketch Shop Project Components

Objectives

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

- Produce a shop drawing.

LEARNING TASKS	CONTENT

1. Produce a shop drawing	• Determine pitch
	• Field measuring
	• Information required on a drawing
	• Measure and sketch
	  o Flashings
	  o Diverters
	  o Standing seam pan
	  o Roof jack
	  o Scupper

Achievement Criteria

Performance	The learner will produce a shop drawing.
Conditions	The learner will be given: • Tools • Materials • Project Information/Specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Accuracy • Proper dimensioning • Proper usage of lines • Proper information in title block

Line (GAC): C ORGANIZE WORK

Competency: C5 Identify Metals and Properties

Objectives

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

- Identify common metals and their properties.
- Identify considerations for the installation of metals.

LEARNING TASKS	CONTENT
1. Identify common metals	• Steel • Aluminum • Stainless steel • Copper • Zinc • Brass • Tin • Lead
2. Identify properties of common metals	• Gauges • Expansion and contraction • Coatings and/or finishes • Malleability • Ductility • Elasticity • Strength • Hardness • Durability • Temper • Ferrous • Non-ferrous • Alloys
3. Identify considerations for the installation of metals	• Electrolysis/Galavanic Action o Galvanic scale • Compatibility

Line (GAC): D USE TRADE MATH

Competency: D1 Use Basic Trade Math

Objectives

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

- Solve problems using linear measurement.

LEARNING TASKS	CONTENT
1. Describe basic trade math	• Imperial • Metric • Fractions • Decimals • Conversions • Percentages
2. Solve problems using basic trade math	• Imperial • Metric • Fractions • Decimals • Conversions • Percentages

Line (GAC): D USE TRADE MATH

Competency: D2 Solve Problems Using Formulas

Objectives

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

- Solve problems using formulas.

LEARNING TASKS	CONTENT
1. Describe math formulas using imperial and metric	• Perimeter • Areas • Volume o Liquid measure • Formula variations

2. Solve problems using math formulas	• Trade related math applications
	  o Perimeter
	  o Area
	  o Volume

Line (GAC): D USE TRADE MATH

Competency: D3 Solve Problems Using Pythagorean Theorem

Objectives

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

- Solve problems using Pythagorean Theorem.

LEARNING TASKS	CONTENT
1. Describe the Pythagorean Theorem	• Pythagorean Theorem
2. Solve problems using Pythagorean Theorem	• Formula variations • Slope claculations • Checking for square

Line (GAC): D USE TRADE MATH

Competency: D4 Solve Problems Using Trigonometry

Objectives

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

- Solve problems using trigonometry.

LEARNING TASKS	CONTENT
1. Examine trigonometry functions	• Tangent • Sine • Cosine
2. Use trigonometry functions	• Solve problems using trigonometry functions

Line (GAC): E EXAMINE SYSTEMS

Competency: E1 Identify Systems

Objectives

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

- Describe various decking, wall and roof systems.

LEARNING TASKS

1. Describe systems

CONTENT

- Decking
  - Materials
  - Flashings
  - Fastenings
  - Seismic requirements
  - Form work
  - Acoustic properties
  - Studs
- Wall and Roof
  - Materials
  - Flashings
  - Fastenings
  - Combined component systems

Line (GAC): E EXAMINE SYSTEMS

Competency: E2 Identify Support Structures

Objectives

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

- Identify structural steel supports.

LEARNING TASKS	CONTENT
1. Identify structural steel support	• Columns • Beams • Joists • Perlin • Trusses

Line (GAC): E EXAMINE SYSTEMS

Competency: E3 Identify Building Envelope

Objectives

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

- Describe building envelop requirements.
- Describe common building envelope systems and materials.

LEARNING TASKS	CONTENT

1. Describe the factors for building envelope	• Moisture control
	  o Capillary action
	  o Wind driven rain
	• Air movement
	• Pressure differentials
	• Temperature control
	  o Thermal bridging

2. Describe common building envelope systems	• Rainscreens • Water proof systems • Vapour barrier systems

3. Describe common building envelope materials	• Underlayment
	• Vapour barriers
	• Air barriers
	• Membrane systems
	  o Peel and stick
	  o Primers and adhesives
	  o Spray applied
	• Insulations

Line (GAC): E EXAMINE SYSTEMS

Competency: E4 Examine Wall Systems

Objectives

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

- Describe roll formed and milled cladding.
- Identify sub girt support systems.

LEARNING TASKS	CONTENT

1. Describe roll formed and milled cladding	• Trapezodial
	• Corrugated (Sinusodial)
	• Composite metal panel profile
	  o Insulated panels
	  o Cement based
	• Hidden fastener

2. Identify sub girt support systems	• Internal system support
	  o Hat-bar
	  o Z-bar
	  o J-channel
	  o Clips
	  o Thermal

Line (GAC): E EXAMINE SYSTEMS

Competency: E5 Examine Roof Systems

Objectives

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

- Describe types of roof structures and systems.
- Identify exterior finishes.
- Identify roof drainage components.

LEARNING TASKS	CONTENT
1. Describe types of roof structures	• Bermuda • Mansard • Dutch hip • Parapet • Gable end • Hip • Barrel

2. Describe types of roof systems	• Through fastener
	• Hidden fastener
	  o Clip
	  o Seamed
	  – Batten
	  – Flat
	  – Standing
	  – Single seam
	  – Double seam
	• Metal shingles
	  o Bermuda tiles
	  o Interlocking
	  o Deck tile
	  o Stamped
	  o Granulated coated
	• Insulated
	  o Pre-engineered
	• Structural spanning profiles

3. Identify types of exterior finishes	• Alu-zinc coating • Galvanized • Painted • PVC coated • Natural finishes

LEARNING TASKS	CONTENT
4. Identify roof drainage components	• Valley • Gutters • Down spouts • Leaders • Conductor heads • Scuppers • Sumps

Line (GAC): E EXAMINE SYSTEMS

Competency: E6 Examine Specialty Products

Objectives

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

- Describe specialty system components.

LEARNING TASKS	CONTENT

1. Describe specialty system components	• Scupper
	• Ventilators
	• Penetration
	  o Curbs
	  o Louvers
	  o Roof jacks
	• Flashing
	  o Through wall
	  o Base
	  o Counter
	  o Coping
	  o Step
	  o Hip
	  o Valley
	  o Ridge
	  o Fascia
	  o Gable
	  o Soffit
	  o Gravel stop
	  o Transitions
	  o Diverter
	  o Apron
	  o Cleat
	  o Roof to wall
	  o Saddle
	  o Hook strip
	  o Cricket
	  o Expansion joint

Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F1 Seams, Locks, Edges and Joints

Objectives

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

- Describe types of seams, locks, edges and joints.
- Calculate allowances.
- Fabricate seams, locks, edges and joints.

LEARNING TASKS	CONTENT
1. Describe types of seams	• Lap • Single • Double • Standing • Flat • Batten
2. Describe types of locks	• Dovetail • Coffin • Pittsburg
3. Describe types of edges	• Hemmed • Flanges
4. Describe types of joints	• Transverse • Loose lock expansion • Back-up with cover plate
5. Calculate allowances	• Seams • Locks • Edges • Joints
6. Fabricate	• Select appropriate tools • Select appropriate materials

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will fabricate seams, locks, edges and/or joints.
Conditions	The learner will be given: • Tools • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Accuracy/ Conformity to Project Specifications • Proper tools usage • Proper materials usage

Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F2 Fabricate Components

Objectives

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

- Describe components for a roof and wall system.
- Farbicate components for a roof and wall system.

LEARNING TASKS	CONTENT
1. Describe components for a roof and wall system	• Flashings • Panels • Roof jack • Scupper
2. Fabricate components for a roof and wall system	• Flashings • Panels • Roof jack • Scupper

Achievement Criteria

Performance: The learner will fabricate Flashings.

Conditions: The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Proper tools usage
- Proper materials usage

Achievement Criteria continued next page

Achievement Criteria

Performance The learner will fabricate Panels.

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Proper tools usage
- Proper materials usage

Achievement Criteria

Performance The learner will fabricate Roof Jack.

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Proper tools usage
- Proper materials usage

Achievement Criteria

Performance The learner will fabricate Scupper.

Conditions The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Proper tools usage
- Proper materials usage

Line (GAC): G INSTALL PRODUCTS

Competency: G1 Use Hoisting, Lifting and Rigging Equipment

Objectives

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

- Describe and demonstrate tying knots.
- Describe tie-downs.
- Describe hoisting safety.
- Describe slings and rigging equipment.
- Describe and demonstrate the use of hand signals.

LEARNING TASKS	CONTENT
1. Describe and/or demonstrate tying knots used in rigging	• Double figure eight • Bowline • Hitches • Reef and sheet bend
2. Describe tie-downs to secure materials	• Ropes • Cables • Banding • Ratchet straps
3. Describe hoisting safety	• As per WorkSafeBC Regulations • Centre of gravity • Wind • Stay clear of the load
4. Describe slings and rigging equipment	• Types of slings • Sling angles and configurations • Shackles • Turn buckles • Spreader bars • Cable clips • Eye bolts • Tag lines • Types of hoists
5. Describe and/or demonstrate the use of hand signals to control hoist operations	• As per WorkSafeBC Regulations • Types of hand signals

Line (GAC): G INSTALL PRODUCTS

Competency: G2 Install Roofing, and Wall Components

Objectives

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

- Describe roofing, wall and decking systems.
- Install roofing and wall systems.

LEARNING TASKS	CONTENT

1. Describe roofing, wall and decking systems	• Layout and mitre techniques
	• Types of roof and wall panels
	  o Standing beam
	  o Batten
	  o Snap lock
	• Types of fasteners
	  o Concealed and exposed
	  o Screws
	  o Washer nails
	  o Cleats
	• Consideration for thermal expansion and contraction of materials
	• Effect of weather conditions
	• Components
	  o Expansion joints
	  o Flashings
	  o Drainage
	• Cut, fit and secure components
	• Openings and penetrations
	• Sealant usage
	• Plumb level and square

2. Install roofing and wall systems	• Standing seam roof panel
	  o Mitre valley and hip
	  o Related flashings
	• Single skin wall panel
	  o Inside and outside corner
	  o Related flashings

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will install common types of roofing and wall systems.
Conditions	The learner will be given: • Tools and equipment • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to specifications • Mitre development accuracy (skew) • Proper tools usage • Proper materials usage

Line (GAC): G INSTALL PRODUCTS

Competency: G3 Prepare Substrate

Objectives

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

- Describe substrate.
- Describe substrate surface penetration.

LEARNING TASKS	CONTENT
1. Describe substrate	• Concrete surfaces • Stone and/or brick surfaces • Metal (structural steel and stud) surfaces • Wood (plywood and stud) surfaces • Composite gypsum product surfaces
2. Describe substrate surfaces penetration	• Primer (if required) • Membranes • Sub girt fastening and leveling of surfaces • Sealants

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H1 Use Drafting Equipment for Geometric Construction

Objectives

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

- Describe drafting equipment.
- Use architect's scale.
- Describe geometric shapes used in pattern development.
- Develop geometric construction.

LEARNING TASKS	CONTENT
1. Describe drafting equipment	• Types
2. Use architect's scale	• Imperial • Metric
3. Describe geometric shapes used in pattern development	• Circle • Types of angles • Ellipses • Polygons • Types of triangles

4. Develop geometric constructions	• Draw, bisect and divide
	  o Lines
	  o Arcs
	  o Angles
	• Parts of a circle
	• Ellipses
	• Polygons

Achievement Criteria

Performance: The learner will develop geometric construction.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H2 Draw Orthographic and Pictorial Drawings

Objectives

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

- Describe and develop pictorial drawings.
- Describe and develop orthographic projections and drawings.

LEARNING TASKS	CONTENT
1. Describe pictorial drawings	• Perspective • Isometric • Oblique
2. Develop pictorial drawings	• Simple three dimensional shape
3. Describe orthographic projections	• 3rd angle
4. Develop orthographic drawings	• Simple three dimensional shape

Achievement Criteria

Performance: The learner will develop a pictorial drawing.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning

Achievement Criteria

Performance: The learner will develop an orthographic drawing.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to specifications
- Title block
- Proper line usage
- Proper dimensioning

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H3 Produce Patterns Using Parallel Line Development

Objectives

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

- Describe and develop patterns using parallel line method

LEARNING TASKS	CONTENT
1. Describe and develop patterns using parallel line method	• Element lines • Views • Pattern fabrication requirements • Math

Achievement Criteria

Performance	The learner will develop patterns using parallel lines.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Conforms to specifications • Title block • Proper line usage • Proper dimensioning

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H4 Produce Patterns Using Radial Line Development

Objectives

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

- Describe and develop patterns using radial line development.

LEARNING TASKS	CONTENT
1. Describe and develop patterns using radial line development	• Element lines • Views • Patterns fabrication requirements • Math

Achievement Criteria

Performance	The learner will develop patterns using radial lines.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Conforms to specifications • Title block • Proper line usage • Proper dimensioning

Line (GAC): I WELD AND SOLDER MATERIALS

Competency: I1 Cutting Techniques

Objectives

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

- Describe general safety precautions when cutting.
- Describe and demonstrate different types of cutting processes.

LEARNING TASKS	CONTENT
1. Describe general safety precautions	• Electrical shock • UV • Heat-light (burn/fire potential) • Gas cylinders • Ventilation
2. Describe and demonstrate the different types of cutting processes	• Oxy fuel • Plasma cutter

Achievement Criteria

Performance: The learner will demonstrate cutting using oxy fuel.

Conditions: The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
  - Waviness
  - Spatter
- Material usage
- Equipment usage

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will demonstrate cutting using a plasma cutter.
Conditions	The learner will be given: • Materials • Tools and equipment • Project specifications

Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria:
	• Safety
	• Conforms to specifications:
	  o Waviness
	  o Spatter
	• Material usage
	• Equipment usage

Line (GAC): I WELD AND SOLDER

Competency: I2 Select and Use Welding Equipment for SMAW

Objectives

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

- Describe equipment for SMAW.
- Set-up and maintain SMAW equipment.
- Interpret welding symbols.
- Demonstrate puddle welding.

LEARNING TASKS	CONTENT
1. Describe equipment for SMAW	• Safety • Electrode selection • Settings
2. Set-up and maintain equipment for SMAW	• Maintenance o Check stinger o Check cables and connection o Check ground clamp
3. Interpret welding symbols	• Fillet weld • Spot/puddle weld
4. Demonstrate puddle welding	• As per CWB certification requirements for W47.1

Achievement Criteria (8 hours to 16 hours)

Performance: The learner will demonstrate puddle welding.

Conditions: The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to specifications
- Material usage
- Equipment usage
- Conforms with WCB requirements for W47.1

Line (GAC): I WELD AND SOLDER MATERIALS

Competency: I4 Demonstrate Soldering Techniques

Objectives

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

- Describe general safety precautions when soldering.
- Describe soldering.
- Demonstrate soldering techniques.

LEARNING TASKS	CONTENT
1. Describe the general safety precautions for soldering	• Gas • Electric • Acids/flux • Lead • MSDS • Ventilation
2. Describe soldering	• Hard solder • Soft solder • Irons (copper) • Acid/flux • Sal ammoniac • Sweating • Tinning • Forging
3. Demonstrate soldering techniques	• Pre-tinning • Sweating • Tacking

Achievement Criteria

Performance	The learner will demonstrate soldering different types of seams.

Conditions	The learner will be given:
	• Materials
	  o Solder
	  o Acid/flux
	• Tools and equipment
	• Project specifications

Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to specifications • Aesthetics • Adhesion (sweating) • Material usage • Equipment usage

Level 2

Architectural Sheet Metal Worker

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B1 Use Hand Tools

Objectives

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

- Describe the use of specialty hand tools.

LEARNING TASKS	CONTENT
1. Describe the use of specialty hand tools	• Layout tools • Cutting tools • Forming tools • Clamping tools • Hammers • Measuring tools • Care and maintenance • **

**See Tools and Equipment list in Section 4

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B2 Use Power Tools

Objectives

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

- Describe the use of power tools.

LEARNING TASKS	CONTENT
1. Describe the use of power tools	• Safety • Maintenance • Types • Cutting • Seaming • Fastening • Drilling • **

**See Tools and Equipment list in Section 4

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B4 Use Shop Equipment

Objectives

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

- Describe the use of shop equipment.

LEARNING TASKS

1. Describe the use of shop equipment

CONTENT

- Safety
- Maintenance
- Types
  - Cutting
    - Shear
    - Slitter
    - Notcher
    - Punching
    - Saws
    - Drilling
  - Forming
    - Rotary
    - Hand brakes
    - Roll formers
    - Slip rolls
    - Bar folder
    - Stakes
  - Spot welder
  - Computer assissted
- **

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B5 Use Ladders, Scaffolds and Platforms

Objectives

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

- Describe different types of mobile work platforms.
- Describe material lifting equipment.

LEARNING TASKS	CONTENT

1. Describe different types of mobile work platforms	• As per WorkSafeBC Regulations
	• As per manufacturer specifications
	• Scissor
	• Boom
	• Man lift
	• Proper training of workers
	  o pratical and theory
	  o certification
	• Manufacturer, employer and employee responsibilities

2. Describe material lifting equipment	• As per WorkSafeBC Regulations
	• As per manufacturer specifications
	• Proper training of workers
	  o practical and theory
	  o certification
	• Manufacturer, employer and employee responsibiliities

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B6 Use Fasteners and Sealants

Objectives

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

- Describe fasteners and their applications.
- Describe sealants and their applications.
- Describe specialty applications for fasteners.

LEARNING TASKS	CONTENT
1. Describe common fasteners and their applications	• Loads • General fasteners • Concrete anchors • Decking fasteners • Cladding fasteners • Roofing fasteners

2. Describe common sealants and their applications	• Types of sealants
	  o Silicon
	  o Butyl
	  o Butyl tape
	  o Mastic
	  o Acrylic
	  o Polyurethane
	• Applications
	  o Joints
	  o Edges
	  o Reveals
	  o Penetrations
	  o Flashings

3. Describe specialty applications for fasteners	• Stainless steel fasteners • Corrosive resistant fastener coatings • Compatibilities for sealants and adjacent materials

Line (GAC): C ORGANIZE WORK

Competency: C1 Interpret Drawings and Specifications

Objectives

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

- Describe the format of specifications.
- Describe types of plans.
- Describe types of lines, symbols and abbreviations.
- Identify sections and elements of a set of plans.
- Use shop drawings and plans.

LEARNING TASKS	CONTENT

1. Describe the format of specifications and the information contained within	• Format
	  o CSI Divisions
	  o Master format
	  o Sections
	  o RFI (Request for Information)
	  o Addenda/change orders
	• Information contained

2. Describe types of plans	• Civil • Architectural • Structural • Mechanical • Shop drawings

3. Describe the types of lines, symbols and abbreviations commonly used in the trade	• Lines
	  o Object
	  o Hidden
	  o Dimensional
	  o Section
	  o Direction
	• Symbols
	• Abbreviations

4. Identify sections and elements of a set of plans	• Title sheet • Detail drawings • Schedules • Sectional views • Elevation views • Title block information
5. Use shop drawings and plans	• Determine measurements for layout • Extract information from reference (IFC) drawings

Achievement Criteria

Performance	The learner will use shop drawings and plans to determine measurements for layout.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Accuracy • Proper measurements • Proper layout • Proper line usage • Title block

Line (GAC): C ORGANIZE WORK

Competency: C3 Communicate with Others

Objectives

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

- Describe various methods of communication.
- Describe personal conduct.

LEARNING TASKS	CONTENT

1. Describe methods of communication	• Listening
	• Critical thinking
	• Verbal
	• Written
	• Drawings
	• Use of technology
	  o Two-way radios
	  o Cell phones
	  o Fax machines
	  o Computers
	• Trade terminology

2. Describe personal conduct	• Interpersonal skills • Ethics • Harassment • Customers • Industry people • General public

Line (GAC): C ORGANIZE WORK

Competency: C4 Measure and Sketch Shop Project Components

Objectives

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

- Measure and sketch shop projects.

LEARNING TASKS	CONTENT
1. Measure and sketch shop projects	• Flashings • Components

Achievement Criteria

Performance	The learner will measure and sketch a shop project.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Accuracy • Proper dimensioning • Proper line usage • Title block

Line (GAC): C ORGANIZE WORK

Competency: C5 Identify Metals and Properties

Objectives

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

- Describe metals and their properties.
- Identify specific properties of stainless steel.
- Identify specific properties of aluminum.
- Identify specific properties of zinc.

LEARNING TASKS	CONTENT
1. Describe common metals and their properties	• Steel • Aluminum • Stainless steel • Copper • Zinc • Brass • Tin • Lead • Titanium

2. Identify specific properties of stainless steel	• Alloy composition
	  o 304
	  o 316
	  o 430
	• Alloy finishes
	  o 2B
	  o #4
	  o #8
	• Passivation
	• Terne coating

3. Identify specific properties of aluminum	• Alloy composition
	• Finishes
	  o Brushed
	  o Painted
	  o Anodized
	• Compatibility with other materials

LEARNING TASKS	CONTENT
4. Identify specific properties of zinc	• Finishes • Malleability (stamped or formed) • Ductility • Temperature limitations • Durability • Specialty notching • Compatibility with other materials o Back coating • Storage considerations • White rust • Alloy composition • Expansion and contraction

Line (GAC): D USE TRADE MATH

Competency: D1 Use Basic Trade Math

Objectives

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

- Describe basic trade math.
- Solve problems using basic trade math.

LEARNING TASKS	CONTENT
1. Describe basic trade math	• Imperial • Metric • Fractions • Decimals • Conversions • Percentages
2. Solve problems using basic trade math	• Imperial • Metric • Fractions • Decimals • Conversions • Percentages

Line (GAC): D USE TRADE MATH

Competency: D2 Solve Problems Using Formulas

Objectives

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

- Describe formulas using imperial and metric units.
- Explain formula variations
- Solve problems using math formulas

LEARNING TASKS	CONTENT
1. Describe formulas using imperial and metric units	• Perimeter • Areas • Volume o Liquid measure • Formula variations
2. Describe formula variations	• Solve for unknowns using formula variations
3. Solve problems using math formulas	• Sample problems incorporating various formulas • Attic ventilation calculations

Line (GAC): D USE TRADE MATH

Competency: D3 Solve Problems Using Pythagorean Theorem

Objectives

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

- Describe the Pythagorean Theorem.
- Solve problems using Pythagorean Theorem.

LEARNING TASKS	CONTENT
1. Describe the Pythagorean Theorem	• Pythagorean Theorem
2. Solve problems using Pythagorean Theorem	• Formula variations • Slope calculations • Checking for square

Line (GAC): D USE TRADE MATH

Competency: D4 Solve Problems Using Trigonometry

Objectives

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

- Describe trigonometric functions.
- Describe practical layout problems using trigonometry.
- Solve practical problems using trigonometry.

LEARNING TASKS	CONTENT
1. Describe trigonometric functions	• Tangent • Sine • Cosine
2. Describe practical layout problems using trigonometry	• Roof calculations • Fabrication calculations
3. Solve practical problems using trigonometry	• A selection of problems requiring trigonometry functions

Line (GAC): E EXAMINE SYSTEMS

Competency: E1 Identify Systems

Objectives

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

- Identify systems.

LEARNING TASKS

1. Identify systems

CONTENT

- Foam panel
  - Freezer and cold storage applications
  - Continuous vapour barrier tie-ins
  - Insulations
  - Installation method
    - Sealant
    - Side laps
    - Fastening
  - Finishes
- Wall cladding
  - Sandwich panel
    - Liner
    - Sub girts
    - Insulations
    - Clips and fasteners
    - Thermal break
    - Exterior cladding/weather sheet
    - Honeycomb core
  - Span conditions
  - Weather applications
  - Special material
    - Fiberglass
    - PVC
- Roof cladding
  - Self spanning profiles
  - Insulated roof systems

Line (GAC): E EXAMINE SYSTEMS

Competency: E2 Identify Support Structures

Objectives

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

- Identify steel stud frame systems.
- Identify wood frame systems.

LEARNING TASKS	CONTENT
1. Identify steel stud frame systems	• Standard steel stud framed structures • Deflection track • Thermal bridging
2. Identify wood frame systems	• Standard wood framed structures • Shrinkage (EMC)

Line (GAC): E EXAMINE SYSTEMS

Competency: E3 Identify Building Envelope

Objectives

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

- Describe factors for building envelope.
- Describe specific wall and roof systems and tie-ins.
- Describe building envelope materials.

LEARNING TASKS	CONTENT

1. Describe the factors for building envelope	• Moisture control
	  o Capillary action
	  o Wind driven rain
	  o Dew point
	• Air movement
	• Pressure differentials
	• Temperature control

2. Describe specific wall and roof systems and tie-ins	• Rainscreens o Sandwich panel wall systems

3. Describe common building envelope materials	• Underlayment
	• Vapour barriers
	• Air barriers
	• Membrane systems
	  o Peel and stick
	  o Primers and adhesives
	  o Spray applied
	• Insulations
	• Liner panels

Line (GAC): E EXAMINE SYSTEMS

Competency: E5 Examine Roof Systems

Objectives

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

- Describe types of roof systems and drainage.
- Identify types of exterior finishes.
- Identify roof drainage components.
- Describe roof slopes and design criteria.

LEARNING TASKS	CONTENT

1. Describe types of roof systems	• Through fastener
	• Hidden fastener
	  o Clip
	  o Seamed
	  – Batten
	  – Flat
	  – Standing
	  – Single seam
	  – Double seam
	• Metal shingles
	  o Bermuda tiles
	  o Interlocking
	  o Deck tile
	  o Stamped
	  o Granulated coated
	• Insulated
	  o Pre-engineered
	• Structural spanning profiles

2. Identify types of exterior finishes	• Alu-zinc coating • Galvanized • Painted • PVC coated • Natural finishes

3. Identify roof drainage system and components	• Valley
	• Down spouts
	• Leaders
	• Conductor heads
	• Built in gutters
	  o Styles
	  o Components

LEARNING TASKS	CONTENT

	• Exposed gutter
	  o Styles
	  o Components
	• Drains
	• Sumps
	• Overflow scuppers

4. Describe roof slopes and design criteria	• Low pitch (less than 3 in 12)
	  o Soldered flat seam roof
	  o High side lap standing seam
	• Mid-pitch (3 in 12 to 6 in 12)
	  o Standing seam
	  o Batten seam
	  o Through fastener (exposed)
	  o Tile
	  o Shingles
	• Steep pitch (greater than 6 in 12)
	  o Standing seam
	  o Batten seam
	  o Through fastener (exposed)
	  o Tile
	  o Shingles

Line (GAC): E EXAMINES SYSTEMS

Competency: E6 Examine Specialty Products

Objectives

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

- Decribe zinc and copper systems

LEARNING TASKS

1. Describe zinc and copper systems

CONTENT

- Expansion and contraction
- Properties
- Working considerations
- Handling and storage applications

Line (GAC): E EXAMINE SYSTEMS

Competency: E7 Examine Specialty System Components

Objectives

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

- Identify specialty system components.

LEARNING TASKS	CONTENT

1. Identify specialty system components and their characteristics	• Types of louvers
	• Types of snow guards
	• Sky lights
	• Roof curbs
	• Expansion joints
	• Flashings
	  o Sill
	  o Jamb
	  o Header
	  o Base
	  o J-trim
	  o Vent
	  o Corner
	  o Closures
	  o Overlap
	  o Through wall

Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F1 Seams, Locks, Edges and Joints

Objectives

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

- Describe types of seams, locks, edges and joints.
- Calculate allowances.
- Fabricate seams, locks, edges and joints.

LEARNING TASKS	CONTENT
1. Describe types of seams, locks, edges and joints	• Grooved • Transverse • Loose lock expansion • Back-up with cover plate • Drip edge • Hem • Pittsburgh
2. Calculate allowances	• Seams • Locks • Edges • Joints
3. Fabricate seams, locks, edges and joints	• Select appropriate tools • Select appropriate materials

Achievement Criteria

Performance: The learner will fabricate seams, locks, edges and/or joints.

Conditions: The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Proper material usage
- Proper tools usage

Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F2 Fabricate Components

Objectives

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

- Fabricate components.

LEARNING TASKS	CONTENT

1. Fabricate components	• Flashings
	  o End dams
	  o Cricket (coping)
	  o Saddles (coping)
	• Components
	  o Goose neck
	  o Louvre
	• Wall shingles

Achievement Criteria

Performance	The learner will fabricate flashings and/or components.
Conditions	The learner will be given: • Materials • Tools and equipment • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to project specifications • Material usage • Equipment usage

Achievement Criteria

Performance	The learner will fabricate wall shingle.
Conditions	The learner will be given: • Materials • Tools and equipment • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to project specifications • Material usage • Equipment usage

Line (GAC): G INSTALL PRODUCTS

Competency: G1 Use Hoisting, Lifting and Rigging Equipment

Objectives

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

- Describe hoisting and rigging equipment and its uses.

LEARNING TASKS	CONTENT

1. Describe hoisting and rigging equipment	• Types of equipment:
	  o Cranes
	  o Material lifts
	  o Crane falls
	• Rigging equipment components:
	  o Slings
	  o Cables
	  o Hooks
	  o Shackles
	  o Spreader bars

2. Describe the use of hoisting and rigging equipment	• Operating procedures
	• Moving and lifting techniques:
	  o Safety
	  o Standards
	  o Rolling equipment
	  o Hoisting equipment
	  o Skidding
	  o Warning signals
	• Applications
	• Limitations
	• Safe lifting locations
	• Maintain equipment
	• Recognize defective rigging equipment
	• Safe working load limits

Line (GAC): G INSTALL PRODUCTS

Competency: G2 Install Roofing and Wall Components

Objectives
To be competent in this area, the individual must be able to:
- Install roofing and wall systems.

LEARNING TASKS

1. Install roofing and wall systems

CONTENT

- Types of wall panels
  - Tiles and/or shingles
  - Standing seam
  - Roll formed products
  - Shop formed products
- Types of fasteners
  - Concealed and exposed
  - Screws
  - Washer nails
  - Cleats
- Layout install techniques for wall and roof penetrations
  - Applicable seals
- Mitre profile sheet
- Consideration for thermal expansion and contraction of materials
- Effect of weather conditions
- Components
  - Expansion joints
  - Flashings
- Openings and penetrations
- Sealant usage

Achievement Criteria

Performance	The learner will install roofing and wall systems.
Conditions	The learner will be given: • Materials • Tools and equipment • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to project specifications • Material usage • Equipment usage

Line (GAC): G INSTALL PRODUCTS

Competency: G3 Prepare Substrate

Objectives

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

- Describe substrate.
- Describe substrate surface preparation.
- Install sub girts.

LEARNING TASKS	CONTENT
1. Describe substrate	• Concrete surfaces • Stone and/or brick surfaces • Metal (structural steel and stud) surfaces • Wood (plywood and stud) surfaces • Composite gypsum products and surfaces
2. Describe substrate surface preparation	• Primer (if required) • Membranes • Sub grit fastening and leveling of surfaces • Penetrations • Sealants • Insulation
3. Install sub girts	• Plum • Level • Square

Achievement Criteria

Performance: The learner will install sub girts.

Conditions: The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage
- Layout

Line (GAC): G INSTALL PRODUCTS

Competency: G4 Install Specialty Components

Objectives

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

- Install specialty components.

LEARNING TASKS	CONTENT
1. Install specialty components	• Placement • Cut • Flash • Seal
2. Install flashings for openings and penetrations	• Windows • Doors • Mechanical • Structural • End dams • Stripping in • Peel and stick

Achievement Criteria

Performance: The learner will install specialty components.

Conditions: The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will install flashings for opening and penetrations.
Conditions	The learner will be given: • Materials • Tools and equipment • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to project specifications • Material usage • Equipment usage

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H2 Draw Orthographic and Pictorial Drawings

Objectives

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

- Describe and develop pictorial drawings.
- Describe and develop orthographic drawings.

LEARNING TASKS	CONTENT
1. Describe pictorial drawings	• Isometric • Perspective • Oblique
2. Describe orthographic projection	• 3rd angle
3. Develop pictorial drawings	• Isometric
4. Develop orthographic projections	• Orthographic views

Achievement Criteria

Performance: The learner will develop pictorial drawings.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Dimensioning usage
- Line usage

Achievement Criteria

Performance: The learner will develop an orthographic projection drawing.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Conforms to project specifications
- Title block
- Dimensioning usage
- Line usage

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H3 Produce Patterns Using Parallel Line Development

Objectives

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

- Develop patterns incorporating parallel line.

LEARNING TASKS	CONTENT
1. Develop a pattern incorporating parallel line	• Gutter mitres • Goose neck • Mitre down spout • Round elbow

Achievement Criteria

Performance	The learner will develop patterns using parallel line.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Conforms to project specifications • Title block • Line usage • Dimensioning usage

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H4 Produce Patterns Using Radial Line Development

Objectives

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

- Develop patterns using radial line development.

LEARNING TASKS	CONTENT
1. Develop a pattern using radial line development techniques	• Round roof jack on a pitch

Achievement Criteria

Performance	The learner will develop patterns using radial line development.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Conforms to project specifications • Title block • Line usage • Dimensioning usage

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H5 Produce Patterns Using Triangulation

Objectives

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

- Develop patterns using triangulation.

LEARNING TASKS	CONTENT
1. Develop a pattern incorporating triangulation techniques	• Rectangular ventilator cap

Achievement Criteria

Performance	The learner will develop patterns using triangulation.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Conforms to project specifications • Title block • Line usage • Dimensioning usage

Line (GAC): I WELD AND SOLDER

Competency: I1 Cutting Techniques

Objectives

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

- Describe general safety cutting precautions.

LEARNING TASKS	CONTENT
1. Describe general safety cutting precautions	• Electrical shock • UV • Heat-light (burn/fire potential) • Gas cylinders
2. Describe different types of cutting processes	• Oxy fuel • Plasma

Line (GAC): I WELD AND SOLDER

Competency: I2 Select and Use Welding Equipment for SMAW

Objectives

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

- Describe equipment for SMAW.
- Set-up and maintain equipment for SMAW.
- Demonstrate SMAW.

LEARNING TASKS	CONTENT
1. Describe equipment for SMAW	• Safety • Electrode selection • Settings

2. Set-up and maintain equipment for SMAW	• Maintenance
	  o Check stinger
	  o Check cables and connection
	  o Check ground clamp
	• Polarity
	• Position
	• Prepare material
	• Amperage

3. Demonstrate SMAW	• Lap • Filet • Outside corner • Weld coupons of different gauges • Weld coupons of different positions

Achievement Criteria

Performance The learner will demonstrate a lap weld, filet weld and/or outside corner using weld using coupons of different gauges and positions.

Conditions The learner will be given:

- Materials
- Tools and equipment
- Project specifications

Criteria The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conforms to project specifications
- Material usage
- Equipment usage
- Conforms with CWB

Line (GAC): I WELD AND SOLDER

Competency: I4 Demonstrate Soldering Techniques

Objectives

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

- Describe the general safety precautions for soldering.
- Describe soldering.
- Demonstrate soldering techniques for zinc.

LEARNING TASKS	CONTENT
1. Describe the general safety precautions for soldering	• Gas • Electric • Acids/flux • Lead • MSDS • Ventilation
2. Describe soldering	• Hard solder • Soft solder • Irons (copper) • Acid/flux • Sal ammoniac • Sweating • Tinning • Forging
3. Demonstrate soldering techniques for zinc	• Select appropriate irons for various positions • Solder vertical joints • Solder overhead joints

Achievement Criteria

Performance	The learner will solder different type of seams.

Conditions	The learner will be given:
	• Materials
	  o Solder
	  o Acid/flux
	• Tools and equipment
	• Project specifications

Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to project specifications • Material usage • Equipment usage • Aesthetics • Adhesion (sweating)

Level 3

Architectural Sheet Metal Worker

Line (GAC): C ORGANIZE WORK

Competency: C1 Interpret Drawings and Specifications

Objectives

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

- Use a set of manufacturers' shop drawings
- Identify sections and elements of a set of plans
- Describe the format of specifications and the information contained within
- Interpret a set of plans and specifications

LEARNING TASKS	CONTENT
1. Use a set of manufacturers' and/or shop drawings	• Determine measurements for layout • Extract information from reference (IFC) drawings
2. Identify sections and elements of a set of plans	• Title sheet • Detail drawings • Schedules • Sectional views • Elevation views • Title block information
3. Describe the format of specifications and the information contained within	• Format o CSI Divisions o Master format o Sections o RFI (request for information) o Addenda/change orders • Information contained • Scope of work
4. Interpret a set of plans and specifications	• Use a set of current project plans and specifications

Line (GAC): C ORGANIZE WORK

Competency: C2 Estimate Materials

Objectives

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

- Estimate materials.

LEARNING TASKS

1. Estimate materials

CONTENT

- Use information taken from plans
- Use information taken from job site
- Use information taken from specifications
- Use material taken off sheets
- Identify drawing component parts
- Use colour coding to mark up a drawing
- Determine scope of work
- Use estimating material guidelines
- Use calculations and formulas

Achievement Criteria

Performance	The learner will estimate materials.
Conditions	The learner will be given: • Materials • Specifications/blueprints
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Accuracy of estimate

Line (GAC): C ORGANIZE WORK

Competency: C3 Communicate with Others

Objectives

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

- Describe various methods of communication.
- Describe personal conduct.

LEARNING TASKS	CONTENT

1. Describe methods of communication	• Listening
	• Critical thinking
	• Verbal
	• Written
	• Drawings
	• Use of technology
	  o Two-way radios
	  o Cell phones
	  o Fax machines
	  o Computers
	• Trade terminology
	• Project coordination
	• Giving instructions

2. Describe personal conduct	• Interpersonal skills • Ethics • Harassment • Customers • Industry people • Apprentice mentoring/monitoring • General public

Line (GAC): C ORGANIZE WORK

Competency: C4 Measure and Sketch Shop Project Components

Objectives

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

- Measure and sketch components.

LEARNING TASKS	CONTENT
1. Measure and sketch components	• ACM panels • Flashings

Achievement Criteria

Performance	The learner will measure and sketch shop components.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Accuracy • Proper dimensioning • Proper line usage • Title block

Line (GAC): C ORGANIZE WORK

Competency: C5 Identify Metals and Properties

Objectives

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

- Describe common metals and their properties.
- Identify specific properties of copper.

LEARNING TASKS	CONTENT
1. Describe common metals and their properties	• Steel • Aluminum • Stainless steel • Copper • Zinc • Brass • Tin • Lead • Titanium

2. Identify specific properties of copper	• Alloy composition
	  o Brass
	  o Bronze
	• Finishes
	  o Patina (aging treatments)
	  o Painted
	  o Factory finishes
	• Other properties:
	  o Malleability (stamped and/or formed)
	  – Lead coating
	  o Durability
	  o Resistance to weathering
	  o Resistance to chemicals
	  o Compatability with other materials

Line (GAC): D USE TRADE MATH

Competency: D1 Use Basic Trade Math

Objectives

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

- Describe basic trade math.

LEARNING TASKS	CONTENT
1. Describe basic trade math	• Imperial • Metric • Fractions • Decimals • Conversions • Percentages

Line (GAC): D USE TRADE MATH

Competency: D2 Solve Problems Using Formulas

Objectives

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

- Desribe math formulas using imperial and metric units.
- Solve problems using math formulas.

LEARNING TASKS	CONTENT
1. Describe math formulas using imperial and metric units	• Perimeter • Area • Volume o Liqud measure • Formula variations • Arc calculations

2. Solve problems using math formulas	• Trade related math appications
	  o Perimeter
	  o Area
	  o Volume
	• Attic ventilation calculations

Line (GAC): D USE TRADE MATH

Competency: D3 Solve Problems Using Pythagorean Theorem

Objectives

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

- Describe Pythagorean Theorem.
- Solve problems using Pythagorean Theorem.

LEARNING TASKS

1. Describe the Pythagorean Theorem
2. Solve problems using Pythagorean Theorem

CONTENT

- Pythagorean Theorem
- Formula variations
- Slope calculations
- Fabrication calculations
- Roof calculations
- Check for square

Line (GAC): D USE TRADE MATH

Competency: D4 Solve Problems Using Trigonometry

Objectives

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

- Describe and use trigonometry functions.

LEARNING TASKS	CONTENT
1. Describe trigonometry functions	• Tangent • Sine • Cosine
2. Use trigonometry functions	• Solve problems using trigonometry functions

Line (GAC): E EXAMINE SYSTEMS

Competency: E1 Identify Systems

Objectives

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

- Identify composite panel systems.
- Identify copper and zinc applications.
- Identify other specialty metal applications.

LEARNING TASKS	CONTENT
1. Identify composite panel systems	• Metal • Plastics • Concretes • Wood • Rainscreen applications
2. Identify copper and zinc applications	• Roof • Walls • Accessory applications
3. Identify other specialty metal applications	• Titanium • Stainless • Aluminum

Line (GAC): E EXAMINE SYSTEMS

Competency: E2 Identify Support Structures

Objectives

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

- Identify concrete support systems.
- Identify expansion joints.

LEARNING TASKS	CONTENT

1. Identify concrete support systems	• Typical concrete support structures
	• Typical concrete issues
	  o Spalling
	  o Moisture content
	  o Settling

2. Identify expansion/contraction joints	• Different expansion/contraction joint system
	  o Structural steel
	  o Steel stud frame
	  o Wood frame
	  o Concrete

Line (GAC): E EXAMINE SYSTEMS

Competency: E3 Identify Building Envelope

Objectives

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

- Describe the factors for building envelope.
- Describe specific wall and roof systens and tie-ins.
- Identify specific building materials.

LEARNING TASKS	CONTENT

1. Describe the factors for building envelope	• Moisture control
	  o Capillary action
	  o Wind driven rain
	  o Dew point/ condensation
	• Air movement
	• Pressure differentials
	• Temperature control

2. Describe specific wall and roof systems and tie-ins	• Rainscreens
	  o Modular panel wall system
	  o Custom formed wall system
	• Non-structural insulated roof systems
	  o Zinc roof system
	  o Copper roof system
	• Wall to roof tie-in

3. Identify specific building materials	• Vapour barriers
	• Slip-sheets
	  o Woven
	  o Red rosin
	  o Manufacturers' specified
	• Membrane systems
	  o Peel and stick
	  o Primers and adhesives
	  o Spray applied
	  o Troweled
	• Accompanying insulation

Line (GAC): E EXAMINE SYSTEMS

Competency: E4 Identify Wall Systems

Objectives

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

- Describe composite panel systems.
- Describe custom profiled wall systems.

LEARNING TASKS	CONTENT

1. Describe composite panel systems	• Types of composite panels
	  o Aluminum composite materials
	  o Plastic
	  o Porcelain enamel
	  o Wood fibre reinforced panel
	  o Cement fiber reinforced panel
	  o Steel or aluminum panels
	  o Aluminum honeycombed panel
	  o Stone
	• Fastening system
	  o Perimeter extrusion and frames
	  o Clips
	  o Rivets, screws and adhesives
	  o Sealants
	• Finishes
	• Application
	  o Internal support system (sub girts)
	  o Glazing shims

2. Describe custom profiled wall systems	• Membrane • Sub girts • Insulations o Insulation adhesives • Clips and fasteners • Thermal break • Custom profiled exterior panels

Line (GAC): E EXAMINE SYSTEMS

Competency: E7 Examine Specialty System Components/Accessories

Objectives

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

- Identify specialty system components and their characteristics.

LEARNING TASKS	CONTENT
1. Identify specialty system components and their characteristics	• Finial • Cupola • Spire • Cornice • Crickets • Chimney caps • Sun shades and eye brows

Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F1 Seams, Locks, Edges and Joints

Objectives

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

- Describe seams, locks, edges and joints.
- Fabricate ACM panels.

LEARNING TASKS	CONTENT
1. Describe common seams, locks, edges and joints	• Allowances • Forming • Layout • Tools • Materials
2. Fabricate ACM panels	• Calculate allowances • Derive information from drawings

Achievement Criteria

Performance: The learner will fabricate ACM panels.

Conditions: The learner will be given:

- Tools
- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following criteria:

- Safety
- Conformity to specifications
- Tools usage
- Materials usage

Line (GAC): F FABRICATE PRODUCTS AND COMPONENTS

Competency: F2 Fabricate Components

Objectives

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

- Identify fabrication techniques for zinc and copper.
- Fabricate components.

LEARNING TASKS	CONTENT

1. Identify fabrication techniques for zinc and copper	• Cutting
	• Notching
	• Forming
	• Handling
	• Soldering
	  o Changing fluxes
	  o Cleaning methods
	• Environmental conditions
	  o Temperature

2. Fabricate component	• Trianglulation
	  o Cricket
	  o Square to round on pitch
	  o Square to round on ridge
	  o Round to round off center roof jack
	  o Square weather cap
	• Parallel line
	  o Gutter mitre
	  o Mitre down spout
	  o Cap flashing
	  o Finial structure
	  o Conductor head
	  o Ridge vent
	• Radial line
	  o Weather cap
	  o On centre round taper roof jack on a pitch
	  o Storm collar

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will fabricate component(s).
Conditions	The learner will be given: • Tools and equipment • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Conforms to project specifications • Tools usage • Materials usage

Line (GAC): G INSTALLS PRODUCTS

Competency: G2 Install Roofing and Wall Components

Objectives

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

- Identify installation techniques for zinc and copper.
- Install roofing and wall systems.

LEARNING TASKS	CONTENT

1. Identify installation techniques for zinc and copper	• Soldering
	  o Changing fluxes
	  o Cleaning methods
	• Environmental conditions
	  o Temperature
	• Detailing
	• Tie-in with other components
	• Expansion cleats
	• Handling and storage
	• Compatibility

2. Install roofing and wall systems	• Types of cladding panels
	  o Tiles and/or shingles
	  o Standing seam
	  o Roll formed products
	  o Press/stamp formed products
	  o Shop formed products
	• Types of fasteners
	  o Concealed and exposed
	  o Through fastener
	  o Cleats
	• Layout install techniques for wall and roof penetrations
	  o Applicable seals
	• Mitre profile sheet
	• Consideration for thermal expansion and contraction of materials
	• Effect of weather conditions
	• Cladding components
	  o Expansion joints
	  o Flashings
	• Openings/penetrations
	• Sealant usage
	• Organize job site

Achievement Criteria

Performance	The learner will install roofing and/or wall systems.
Conditions	The learner will be given: • Tools and equipment • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following: • Safety • Conforms to project specifications • Materials usage • Tools usage • Mitre development accuracy (skew)

Line (GAC): G INSTALL PRODUCTS

Competency: G3 Prepare Substrate

Objectives

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

- Describe substrate.
- Describe substrate surface preparation.

LEARNING TASKS	CONTENT
1. Describe substrate	• Concrete surfaces • Stone and/or brick surfaces • Metal (structural and steel stud) surfaces • Wood (plywood and stud) surfaces • Composite gypsum products surfaces
2. Describe substrate surfaces preparation	• Primer (if required) • Membranes • Sub grit fastening and leveling of surfaces • Penetrations • Sealants • Compatibility issues o Isolation • Insulations • Organize job site

Line (GAC): G INSTALL PRODUCTS

Competency: G4 Install Specialty Components

Objectives

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

- Describe closure strips for pre-formed metal roofing.
- Describe ridge venting.
- Describe snow guards and/or snow fence.
- Describe dormer.
- Describe a cricket.
- Install a specialty component.

LEARNING TASKS	CONTENT
1. Describe openings and penetrations	• Cut • Flash • Seal

2. Describe closure strips for pre-formed metal roofing	• Types
	  o Foam
	  o Metal
	• Purpose
	• Location
	• Cut, fit and place
	• Fasteners
	  o Screws
	  o Caulking
	  o Pop rivets
	  o Staples

3. Describe ridge venting	• Types
	  o Pre-formed
	  o Hood
	  o Custom
	• Purpose
	• Techniques used
	• Determining amount of venting required
	• Problems

4. Describe snow guards and/or snow fence	• Types
	  o Metal
	  o Plastics
	• Purpose
	• Fastening methods
	• Installation specifications

LEARNING TASKS	CONTENT
5. Describe a dormer	• Forming • Layout • Flashing tie-ins
6. Describe a cricket	• Forming • Layout • Flashing tie-ins
7. Install a specialty component	• Triangulation o Cricket o Square to round on pitch o Square to round on ridge o Round to round off centre roof jack o Square weather cap • Parallel line o Gutter mitre o Mitre down spout o Cap flashing o Finial structure o Conductor head o Ridge vent • Radial line o Weather cap o On centre round taper roof jack on a pitch o Storm collar • Organize job site

Achievement Criteria

Performance: The learner will install a specialty component.

Conditions: The learner will be given:

- Tools and equipment
- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following:

- Safety
- Conforms to project specifications
- Materials usage
- Tools usage

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H2 Draw Orthographic and Pictorial Drawings

Objectives

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

- Draw pictorial drawings with circular openings.
- Draw complex objects in orthographic projection.

LEARNING TASKS	CONTENT
1. Draw pictorial drawings with circular openings	• Isometric • Isometric circle
2. Draw complex object in orthographic projection	• Auxiliary views

Achievement Criteria

Performance: The learner will draw pictorial drawings with circular openings.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning

Achievement Criteria

Performance: The learner will draw complex objects in orthographic projection.

Conditions: The learner will be given:

- Materials
- Project specifications

Criteria: The learner will score 70% or better on a rating sheet that reflects the following:

- Conforms to project specifications
- Title block
- Line usage
- Dimensioning

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H3 Produce Patterns Using Parallel Line Development

Objectives

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

- Develop drawings using parallel line development.

LEARNING TASKS	CONTENT
1. Develop drawings using parallel line development techniques	• Gutter mitre • Mitre down spout • Cap flashing • Finial structure • Conductor head • Ridge vent

Achievement Criteria

Performance	The learner will develop drawings using parallel line development techniques.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following: • Conforms to project specifications • Title block • Line usage • Dimensioning

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H4 Produce Patterns Using Radial Line Development

Objectives

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

- Develop drawings using radial line development techniques.

LEARNING TASKS	CONTENT
1. Develop drawings using radial line development techniques	• Weather cap • On centre round taper roof jack on a pitch • Storm collar

Achievement Criteria

Performance	The learner will develop drawings using radial line techniques.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following: • Conforms to project specifications • Title block • Line usage • Dimensioning

Line (GAC): H LAYOUT AND DEVELOP PATTERNS

Competency: H5 Produce Patterns Using Triangulation

Objectives

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

- Develop drawings using triangulation techniques.

LEARNING TASKS	CONTENT
1. Develop drawings using triangulation techniques	• Cricket • Square to round on pitch • Square to round on ridge • Round to round off centre roof jack • Square weather cap

Achievement Criteria

Performance	The learner will develop drawings using triangulation.
Conditions	The learner will be given: • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following: • Conforms to project specifications • Title block • Line usage • Dimensioning

Line (GAC): I WELD AND SOLDER

Competency: I1 Cutting Techniques

Objectives

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

- Describe general safety precautions for cutting techniques.

LEARNING TASKS	CONTENT
1. Describe general safety precautions for oxy fuel and plasma	• Electrical shock • UV • Heat light (burn/fire potential) • Gas cylinders • Ventilation
2. Describe different types of cutting processes	• Oxy fuel • Plasma

Line (GAC): I WELD AND SOLDER

Competency: I3 Select and Use Welding Equipment for GMAW

Objectives

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

- Select equipment for GMAW.
- Set up and maintain GMAW equipment.
- Weld using GMAW.

LEARNING TASKS	CONTENT

1. Select equipment	• Safety
	  o PPE
	  o Lens selection
	  o Review safety procedures
	• Material
	• Wire/gas selection
	• Location/position

2. Set-up and maintain equipment	• Polarity
	• Voltage
	• Wire speed
	• Wire size
	• Drive rolls
	• Material preparation
	• Maintenance
	  o Clean gas cup
	  o Prepare/replace tip
	  o Check whip
	  o Check ground clamp

3. Weld using GMAW	• Lap • Filet • Outside corner • Weld coupons of different gauges • Weld coupons of different positions

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will weld a lap, filet and/or outside corner using weld coupons of different gauges and positions.
Conditions	The learner will be given: • Tools and equipment • Materials • Project specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following: • Safety • Conforms to project specifications • Tools usage • Materials usage

Line (GAC): I WELD AND SOLDER

Competency: I4 Demonstrate Soldering Techniques

Objectives

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

- Describe general safety precautions.
- Describe soldering.
- Demonstrate positional soldering techniques for copper.

LEARNING TASKS	CONTENT
1. Describe general safety precautions	• Gas • Electric • Acids/flux • Lead • MSDS • Ventilation
2. Describe soldering	• Hard solder • Soft solder • Acid/flux • Sal ammoniac • Sweating • Tinning • Forging
3. Demonstrate positional soldering techniques for copper	• Select appropriate irons for various positions • Prepare irons • Solder vertical joints • Solder overhead joints

Achievement Criteria continued next page

Achievement Criteria

Performance	The learner will demonstrate positional soldering techniques with copper.

Conditions	The learner will be given:
	• Tools and equipment
	• Materials
	  o Solder
	  o Acid/flux
	• Project specifications

Criteria	The learner will score 70% or better on a rating sheet that reflects the following: • Safety • Conforms to project specifications • Tools usage • Materials usage • Aesthetics • Adhesion (sweating)

Section 4

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Area

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

Shop Area

- Minimum 7,000 square feet of shop area including a tool crib and work stations
- 14 foot high ceilings
- Adequate heating, lighting and ventilation
- Refuse and recycling bins for used shop materials
- First-aid facilities
- Portable fire extinguisher as per WorkSafeBC requirements
- Ventilation as per WorkSafeBC requirements
- Posted evacuation plans
- Eye wash stations
- First aid facilities
- One work table per two students
- Outside storage fenced area of 4,000 square feet (or areas suitable for mock-ups)

Lab Requirements

- N/A

Student Facilities

- Adequate lunch room as per WorkSafeBC requirements (4.84 OHS Regulation and Guidelines)
- Adequate washroom facilities per WorkSafeBC requirements (4.85 OHS Regulation and Guidelines)
- Personal storage lockers

Instructor's Office Space

- Desk and filing space
- Computer
- Phone

Tools and Equipment

Shop Tools and Equipment

Required

- Abrasive cut-off saw
- Adjustable wrench
- Allen hex keys
- Angle finder
- Angle grinder
- Aviation snips R.H. and L.H.
- Band saw
- Bar folder
- Beading machine
- Beak horn
- Beam Compass
- Bench grinder
- Blind riveter
- Blow horn
- Box and pan brake
- Burring machine
- Cable
- Candle mould
- Caulking gun
- C-clamp
- Center punch
- Chalk line
- Chipping hammer
- Chisels
- Chokers
- Circular saw
- Circumference Rule
- Claw hammer
- Combination square
- Come-Along
- Common square
- Compass
- Compound mitre saw
- Copper smith
- Cordless drill
- Creasing stake
- Crimping machine
- Divider
- Divider
- Double cutter
- Double seaming
- Drafting Table
- Drill index
- Easy edger
- Electric drill
- Eraser Shield
- Eye Protection
- Eye Wash Station
- Face Shield
- Fall Arrest Equipment
- Files
- Fire Extinguisher
- First Aid Kit
- Folding pliers
- Framing Square
- Gloves
- Groove seamer - hand groover
- Hacksaw
- Hammer drill
- Hand brake
- Hand crimpers
- Hand dollies
- Hand notcher
- Hand Punch
- Hard Hat
- Hatchet
- Hearing Protection
- Hollow mandrel
- Jigsaw
- Ladders
- Laser level
- Levels
- Locking pliers
- Mallet

- Manual shear
- MIG Welding Equipment (GMAW)
- Nibbler
- Oxy-acetylene Welding Equipment
- Parallel Bar/T-square
- Pelican snips (Bavarian Snips)
- Pittsburgh machine
- Plasma cutter
- Pliers
- Plumb bob
- Portable band saw
- Portable plasma cutter
- Power shear
- Prick punch
- Protractor
- Reciprocating saw
- Reflective Vest
- Respiratory Protection
- Rivet set
- Rope
- Router
- Router jig
- Safety Boots
- Scaffolds
- Scale Ruler
- Scraper/ Pry bar
- Scratch awl
- Screwdriver
- Scriber
- Set Square/Triangles
- Setting hammer (Sheet Metal)
- Shackles
- Shielded Metal Arc Welding (SMAW)
- Side cutters
- Slings
- Slip roll former
- Socket set
- Soldering copper
- Soldering equipment
- Spot welder
- Square
- Straight edge
- Tape measure
- Trammel Points
- Turning Machine
- Unishear
- Welding Curtain
- Welding Jacket
- Wire brushes
- Wiring Machine
- Wrenches
- Wuko bending machine

All PPE must comply with WorkSafeBC regulations and facility must supply all equipment for students to complete proper training excluding boots, which shall be the responsibility of the students.

Recommended

- Air compressor
- Angle drill
- Angle ruler
- Ball peen hammer
- Banding tools
- Bench rule
- Biscuit jointer
- Bulldog snips
- Bumping hammer
- Caliper
- Combination snip
- Crimper (decking)
- Die-grinder
- Drafting Pencil
- Drift pin
- Drill press
- Elbow Seaming
- Electric seamer
- Fork Lift
- Hydraulic press
- Impact wrench
- Leather Apron
- Micrometer
- Notcher
- Nylon hammer
- Pneumatic drill
- Pneumatic hammer
- Pneumatic riveter
- Powder actuated tool
- Power notcher
- Ring and circle shears
- Riveting hammer
- Roll forming machines
- Slitter
- Trifor
- Turret punch

Reference Materials

Required Reference Materials

- SMACNA Architectural Sheet Metal Manual
- RCABC Roofing Practices Manual
- Sheet Metal, Leo A Myer
- Sheet Metal – Shop Practices, Leo A. Myer
- Mathematics for Sheet Metal Fabrication, Delmar Learners

Recommended Resources

- N/A

Suggested Texts

- Training Provider Learning Resources
- Construction Sector Council – Cladding and Decking
- Alberta Modules

NOTE:

This list of Reference Materials is for training providers. Apprentices should contact their preferred training provider for a list of recommended or required texts for this program.

Instructor Requirements

Occupation Qualification

The instructor must possess:

- Architectural Sheet Metal Worker – Certificate of Qualification Work Experience
- A minimum of five years experience working in the industry as a journeyperson.
- Diverse experience in the industry (incl. residential, commercial and industrial fabrication and installation)

Instructional Experience and Education

It is preferred that the instructor also possesses:

- Canadian Welding Bureau – Welding Supervisor Card (W47.1) or equivalent
- Instructors certificate (minimum 30 hour course); and/or
- Must have or be registered in an Instructor's Diploma program (to be completed within a five year period) or hold a Barchelors or Masters degree in education

APPENDIX A

Assessment Guidelines

Program: Architectural Sheet Metal Worker

Training providers delivering Architectural Sheet Metal Worker apprenticeship in-school technical training are required to enter the following information in SkilledTradesBC Portal for each apprentice:

- An in-school mark in the form of a percentage

The in-school mark for each level is the result of a combination of theory and practical assessments. This mark is then combined with the SkilledTradesBC Standard Level Examination to determine a final mark for the level.

Training Provider Component: In-School Technical Training

Calculation tables showing the subject competencies, level percentage weightings and level examination weightings are shown in the *Grading Sheet: "Subject Competencies and Weightings"* section of this document.

Architectural Sheet Metal Worker Level 1, 2 & 3 in-school marks are calculated by:

- Totaling the level *theory* competency results as noted in the competencies and weightings tables and multiplying the total by 25% to produce a weighted *theory* result;
- Totaling the level *practical* competency results as noted in the competencies and weightings tables and multiplying the total by 75% to produce a weighted *practical* result; and
- Adding the theory and practical competency results together to determine the final in-school result.

SkilledTradesBC Component: SkilledTradesBC Standardized Level Examinations - Level 1 & 2

SkilledTradesBC Portal automatically calculates the final mark for a level once the in-school training and standard level exam marks are entered into the system. This mark is calculated by blending the standardized exam percentage score and the in-school technical training percentage score to determine the final mark for the level.

In-school technical training (combined theory & practical) is weighted at 80% and the SkilledTradesBC standardized exam is weighted at 20%. These two scores are combined to determine the final level mark. This result is the final mark that is recorded in SkilledTradesBC Portal.

- A mark of 70% or greater is required to pass the level when combining the final in-school percentage score and the final SkilledTradesBC standardized level exam percentage score.

Architectural Sheet Metal Worker Level 3 - Examinations

Until further notice, apprentices taking Architectural Sheet Metal Worker Level 3 will write the SkilledTradesBC Architectural Sheet Metal Worker Certificate of Qualification (CofQ) examination as the final examination for the Architectural Sheet Metal Worker program.

The instructor is responsible for calculating and reporting the final in-school mark for Level 3 to ITADA.

Refer to the *Grading Sheet Subject Competencies and Weightings* Level 3 table at the end of this document to determine the calculation process for completing the Level 3 in-school final mark.

In order to be eligible to write the SkilledTradesBC Certification of Qualification exam, apprentices must receive a Level 3 in-school technical training final mark of 70% or greater.

A score of 70% or greater is required for a pass on the Architectural Sheet Metal Worker SkilledTradesBC Certificate of Qualification exam.

Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING: SkilledTradesBC PORTAL CODE:	ARCHITECTURAL SHEET METAL WORKER LEVEL 1 0153CL01

LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	Use Safe Work Practices	8%	8%
B	Use Tools and Equipment	12%	12%
C	Organize Work	5%	5%
D	Use Trade Math	9%	9%
E	Examine Systems	10%	10%
F	Fabricate Products and Components	13%	13%
G	Install Products	20%	20%
H	Layout and Develop Patterns	14%	14%
I	Weld and Solder	9%	9%
	Total	100%	100%
Calculated by the Training Provider **ARCHITECTURAL SHEET METAL WORKER** in-school theory & practical subject competency weighting		25%	75%
Training Provider enters final in-school mark into SkilledTradesBC Portal		IN-SCHOOL%	

Calculated by SkilledTradesBC: In-school Mark SkilledTradesBC Portal calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by SkilledTradesBC: Standard Level Exam Mark SkilledTradesBC Portal will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by SkilledTradesBC: Final Mark The final mark for determining credit is calculated by SkilledTradesBC Portal.	FINAL%

PROGRAM: IN-SCHOOL TRAINING: SkilledTradesBC PORTAL CODE:	ARCHITECTURAL SHEET METAL WORKER LEVEL 2 0153CL02

LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
B	Use Tools and Equipment	5%	5%
C	Organize Work	6%	6%
D	Use Trade Math	8%	8%
E	Examine Systems	9%	9%
F	Fabricate Products and Components	20%	20%
G	Install Products	28%	28%
H	Layout and Develop Patterns	13%	13%
I	Weld and Solder	11%	11%
	Total	100%	100%
Calculated by the Training Provider **ARCHITECTURAL SHEET METAL WORKER** in-school theory & practical subject competency weighting		25%	75%
Training Provider enters final in-school mark into SkilledTradesBC Portal		IN-SCHOOL%	

Calculated by SkilledTradesBC: In-school Mark SkilledTradesBC Portal calculates the percentage weighting once the in-school mark is entered. Combined theory and practical subject competency multiplied by	80%
Calculated by SkilledTradesBC: Standard Level Exam Mark SkilledTradesBC Portal will calculate the percentage weighting once the standard level exam marks have been entered. The exam score is multiplied by	20%
Calculated by SkilledTradesBC: Final Mark The final mark for determining credit is calculated by SkilledTradesBC Portal.	FINAL%

PROGRAM: IN-SCHOOL TRAINING: SkilledTradesBC PORTAL CODE:	ARCHITECTURAL SHEET METAL WORKER LEVEL 3 0153CL03

LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
C	Organize Work	12%	12%
D	Use Trade Math	5%	5%
E	Examine Systems	7%	7%
F	Fabricate Products and Components	15%	15%
G	Install Products	34%	34%
H	Layout and Develop Patterns	15%	15%
I	Weld and Solder	12%	12%
	Total	100%	100%

Calculated by the Training Provider:		
ARCHITECTURAL SHEET METAL WORKER in-school theory & practical subject competency weighting	25%	75%
In-school Mark Combined theory and practical subject competency (Minimum 70%)	IN-SCHOOL FINAL %	

All apprentices who complete Level 3 of the Architectural Sheet Metal Worker program with a FINAL level mark of 70% or greater will write the SkilledTradesBC Architectural Sheet Metal Worker Certificate of Qualification (CofQ) examination as their final assessment.

SkilledTradesBC will enter the apprentices' SkilledTradesBC Architectural Sheet Metal Worker Certificate of Qualification (CofQ) examination mark in SkilledTradesBC DA. A minimum mark of 70% on the examination is required for a pass.