SKILLEDTRADES BC

PROGRAM OUTLINE

Residential Steep Roofer

SKILLED TRADES BC

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RESIDENTIAL STEEP ROOFER

PROGRAM OUTLINE

APPROVED BY INDUSTRY

MARCH 2012

Developed by
SkilledTradesBC
Province of British Columbia

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Section 1

INTRODUCTION

Residential Steep Roofer

Foreword

This Residential Steep Roofer 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 the provincial government. The Program Outline reflects updated standards based on the new Residential Steep Roofer Occupational Analysis (2012) and British Columbia industry and instructor subject matter experts.

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

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

This Program Outline was prepared with the advice and assistance of Roofer Review Committee and will form the basis for further updating of the British Columbia Steep Roofing Program and learning resources by the Construction Industry Training Organization 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 measurable 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 [insert ITO name]. Members include:

- Shirley Caldwell – RCABC – Education Manager
- Darran Light – Laing Roofing Ltd. – Vice President
- Rod Parker – Parker Johnston Industries Ltd. – General Manager
- Sean Pepin – Roofix Services Inc. – Operations Manager
- Jeff Reddeman – Totem Roofing and Insulation – Owner and President
- Ivan van Spronsen – RCABC – Executive Director
- Ian Woodason – Nelson Roofing and Sheet Metal Ltd. – Superintendant (Residential Projects)

Industry subject matter experts retained to assist in the development of Program Outline content:

- John Schramm – Laing Roofing Ltd. – Roofing Installer
- Blaine Bruce – Crown Roofing Group of Companies Ltd. – Foreman
- Greg Perry – Parker Johnston Industries Ltd. – Foreman
- Joshua Towns – Roofix Services Inc. – Froeman
- Roger Sove – RCABC – Instructor

SkilledTradesBC would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Steep Roofer Trade

How to Use this Document

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

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
Program Assessment	Communicate program completion requirements and assessment methods	Understand the various assessment requirements for the program	Understand the various assessment requirements for the program	Understand the assessment requirements they would have to fulfill in order to challenge the program
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, measurable 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

Section	Training Providers	Employers/ Sponsors	Apprentices	Challengers
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

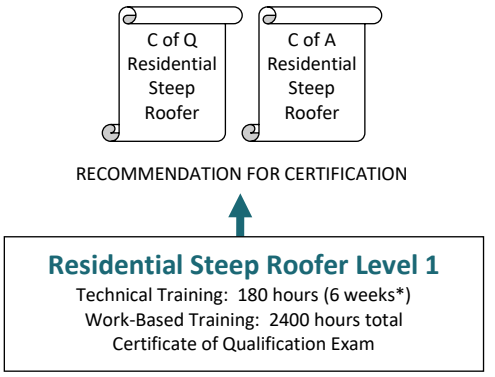
Section 2

PROGRAM OVERVIEW

Residential Steep Roofer

Program Credentialing Model

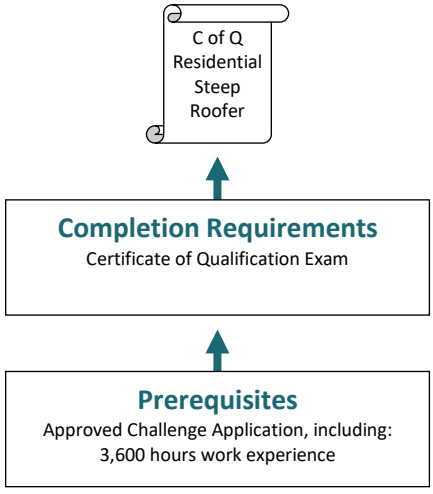
Apprenticeship Pathway



Suggested duration based on 30-hour week

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

Challenge Pathway



Occupational Analysis Chart

RESIDENTIAL STEEP ROOFER

Occupation Description: "Residential Steep Roofer" means a person who covers 1:3 ratio (4 in 12 pitch) roof frames and other steep roofs weatherproofing materials, including unitized materials such as asphalt shingles, cedar shingles and shakes, slate, various types of vinyl roofing products and coatings, various types of clay, metal and concrete tiles.

USE SAFE WORK PRACTICES AND PROCEDURES A	Interpret the WorkSafeBC Regulation A1	Describe safety hazards in the roofing trade A2	Use Workplace Hazardous Materials Information System (WHMIS) A3	Apply personal safety practices A4	Use fall protection A5	Use fire safety procedures A6
	Complete Level 1 First Aid A7					
USE TOOLS AND EQUIPMENT B	Use hand tools B1	Use portable power tools B2	Use hoisting, lifting and rigging equipment B3	Use ladders and work platforms B4		
USE DOCUMENTATION C	Read drawings and specifications C1	Use Building Codes and RCABC Standards C2	Read manufacturers' information C3			
ORGANIZE WORK D	Communicate with others D1	Prepare the worksite D2	Use trade related math D3	Estimate materials D4		
PREPARE ROOFS E	Prepare roofs for replacement E1	Prepare roofs for new installation E2	Prepare built-in gutters E3			

INSTALL STEEP ROOFING **F**	Describe roof types F1	Install built-in gutter membranes F2	Install asphalt shingles F3	Install wood shingles and shakes F4	Install concrete and composite materials F5	Install metallic materials F6
ASSESS AND MAINTAIN ROOFS **G**	Assess roof conditions G1	Maintain and repair roofs G2				

Training Topics and Suggested Time Allocation

Residential Steep Roofer

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line A	**USE SAFE WORK PRACTICES AND PROCEDURES**	**24%**	**100%**	**0%**	**100%**
A1	Interpret the WorkSafeBC Regulation	15	✓		
A2	Describe safety hazards in the roofing trade	5	✓		
A3	Use Workplace Hazardous Materials Information System (WHMIS)	5	✓		
A4	Apply personal safety practices	5	✓		
A5	Use fall protection	50	✓		
A6	Use fire safety procedures	5	✓		
A7	Complete Level 1 First Aid	15	✓		
Line B	**USE TOOLS AND EQUIPMENT**	**7%**	**75%**	**25%**	**100%**
B1	Use hand tools	25	✓		
B2	Use portable power tools	25	✓		
B3	Use hoisting, lifting and rigging equipment	25	✓	✓	
B4	Use ladders and work platforms	25	✓	✓	
Line C	**USE DOCUMENTATION**	**7%**	**100%**	**0%**	**100%**
C1	Read drawings and specifications	34	✓		
C2	Use Building Codes and RCABC Standards	33	✓		
C3	Read manufacturers' information	33	✓		
Line D	**ORGANIZE WORK**	**14%**	**100%**	**0%**	**100%**
D1	Communicate with others	5	✓		
D2	Prepare the worksite	25	✓		
D3	Use trade related math	35	✓		
D4	Estimate materials	35	✓	✓	
Line E	**PREPARE ROOFS**	**3%**	**100%**	**0%**	**100%**
E1	Prepare roofs for replacement	34	✓		
E2	Prepare roofs for new installation	33	✓		
E3	Prepare built-in gutters	33	✓		
Line F	**INSTALL STEEP ROOFING**	**42%**	**30%**	**70%**	**100%**
F1	Describe roof types	5	✓		
F2	Install built-in gutter membranes	15	✓	✓	
F3	Install asphalt shingles	25	✓	✓	
F4	Install wood shingles and shakes	25	✓	✓	
F5	Install concrete and composite materials	15	✓	✓	
F6	Install metallic materials	15	✓	✓	

			% of Time Allocated to:		
		% of Time	Theory	Practical	Total
Line G	**ASSESS AND MAINTAIN ROOFS**	**3%**	**100%**	**0%**	**100%**
G1	Assess roof conditions	50	✓		
G2	Maintain and repair roofs	50	✓		
	Total Percentage for Residential Steep Roofer	**100%**			

Section 3

PROGRAM CONTENT

Residential Steep Roofer

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A1 Interpret the WorkSafeBC Regulation

Objectives

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

- Locate and apply WorkSafeBC Act and Regulations related to work performed by roofers.
- Complete Construction Safety Training System (Computer Based).

LEARNING TASKS	CONTENT
1. Describe the parts of the Workers Compensation Act	• Compensation to Workers and Dependants • Occupational Health and Safety • Appeals

2. Describe "Core Requirements" of the Occupational Health and Safety Regulation and Guidelines related to the roofing trade	• Definitions
	• Application of OHS Regulation
	• Responsibilities of employers
	  ○ Provide a safe worksite
	  ○ Provide training
	  ○ Provide safety equipment
	  ○ Perform job hazard analysis
	  ○ Occupation Health and Safety Program
	  ○ Health and safety programs
	  ○ Workplace inspections
	  ○ Correction of unsafe conditions
	  ○ Occupational first aid requirements
	  ○ Young and new worker orientation and training
	• Responsibilities of supervisors
	  ○ Ensure the health and safety of all workers under their direct supervision
	• Rights and responsibilities of workers
	  ○ Right to receive safety training
	  ○ Right to refuse unsafe work
	  ○ Must follow WorkSafeBC regulations
	• General conditions
	  ○ Building, equipment and site conditions
	  ○ Emergency preparedness and response
	  ○ Impairment
	  ○ Working alone or in isolation
	  ○ Workplace conduct
	  ○ Preventing violence
	  ○ Work area requirements

LEARNING TASKS	CONTENT
	○ Storage and handling of materials ○ Ergonomics ○ Work area guards and handrails ○ Illumination ○ Indoor air quality ○ Smoking ○ Lunchrooms, washrooms and clean water
3. Describe and apply the "General Hazard" requirements of the Occupational Health and Safety Regulation and Guidelines related to the roofing trade	• Chemical and biological substances • Substance specific requirements • Noise, vibration, radiation and temperature • Personal protective clothing and equipment • Confined spaces • De-energization and lockout • Fall protection • Tools, machinery and equipment • Ladders, scaffolds and temporary work platforms • Cranes and hoists • Rigging • Mobile equipment • Transportation of workers • Traffic control • Electrical safety
4. Complete Computer Based Construction Safety Training System	• Benefits of program to workers and employers • Study and check sections • Test section • Certification

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A2 Describe safety hazards in the roofing trade

Objectives

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

- Describe workplace hazards in the roofing trade.
- Locate and use emergency equipment.

LEARNING TASKS	CONTENT

1. Describe hazards in the roofing industry	• Slips, trips and falls
	  ○ Rope organization
	  ○ Airlines
	  ○ Removed vents
	  ○ Loose materials
	• Falling objects
	• Hazards to the public
	• Decks/floor openings
	• Fire
	• Electrical
	• Compressed gas
	• Fuels
	• Poor Housekeeping
	• Tools and equipment
	• High winds
	• Heat stress and heat exhaustion
	• Cold stress
	• Power lines

2. Explain personal responsibilities	• Using safe work practices • Following safe work procedures • Looking out for unsafe conditions and/or practices • Reporting unsafe conditions • Field level hazard assessment • Daily equipment inspection
3. Describe personal hazards	• Personal apparel • Hair and beards • Jewellery • Horseplay

LEARNING TASKS	CONTENT
4. Describe long-term hazards	• Respiratory disease • Skin disease • Asbestosis • Hearing loss
5. Understand emergency procedures	• Fire control systems • Emergency exits • First aid facilities • Emergency contacts and phone numbers • Muster stations • Nearest medical facility

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A3 Use Workplace Hazardous Materials Information System (WHMIS)

Objectives

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

- Describe the purpose of the WHMIS regulation.
- Explain the contents of Material Safety Daya Sheets (MSDSs).
- Explain the contents of WHMIS labels.
- Identify hazard symbols.
- Apply WHMIS regulations.

LEARNING TASKS	CONTENT

1. Describe Federal WHMIS legislation	• Hazardous Product Act
	  ○ Controlled Products Regulations
	  ○ Ingredient Disclosure List
	• Hazardous Materials Information Review Act

2. Describe Provincial WHMIS legislation	• Use of hazardous materials in the workplace

3. Describe 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
	  ○ Workers
	  ○ Employers
	  ○ Suppliers
	  ○ Regulators

4. Describe the key elements of WHMIS	• Material Safety Data Sheets (MSDSs) • Labelling of containers of hazardous materials • Worker education programs
5. Describe the responsibilities of suppliers under WHMIS	• Provide MSDSs • Provide supplier labels
6. Describe the responsibilities of employers under WHMIS	• Provide worker access to MSDSs • Work education programs • Ensure proper storage and handling of materials

LEARNING TASKS	CONTENT
7. Describe the responsibilities of workers	• Understand information of MSDSs and labels • Inform employers of missing or illegible labels
8. Describe information to be disclosed on a MSDS	• Hazardous ingredients • Preparation information • Product information • Physical data • Fire or explosion • Reactivity data • Toxicological properties • Preventive measures • First-aid measures

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

10. Apply WHMIS regulations as they apply to hazardous materials used on site	• Follow WHMIS regulations for use, storage and disposal of materials • Accidental release

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A4 Apply personal safety practices

Objectives

To be competent in this area, the individual must be able to select and use personal protective equipment (PPE).

LEARNING TASKS	CONTENT

1. Describe personal protective equipment requirements	• WorkSafeBC Regulation
	• Fall protection
	  ○ Fall restraint
	  ○ Fall arrest
	  ○ Harnesses, lanyards, lifelines
	• Safety footwear
	  ○ CSA Standards
	• Eye protection
	  ○ Glasses
	  ○ Goggles
	  ○ Face shields
	• Hearing protection
	  ○ Hearing testing
	  ○ Earplugs and canal caps
	  ○ Earmuffs
	  ○ Class/grade selection based on exposure level
	• Head protection
	  ○ CSA and ANSI types
	• Respiratory protection
	  ○ Respirator types
	  ○ Positive and negative seal check
	  ○ Fit testing
	  ○ Types of breathing hazards
	  ▪ Cedar dust
	  ▪ Concrete dust
	  ▪ Asbestos
	  ▪ Silica
	  ▪ Animal droppings
	  ○ Filters and cartridges
	  ○ Protection factors
	  ○ Warning signs of respirator failure
	  ○ Hazard/product specific
	• Clothing

LEARNING TASKS	CONTENT
	○ High visibility ○ Hazard/product specific • Hand protection ○ Gloves ○ Barrier creams • Knee protection
2. Use personal protective equipment	• Selection • Purpose • Training requirements • Inspection • Maintenance • Storage
3. Use safety precautions for various weather conditions	• Hypothermia • Dehydration • Heat stress and heat exhaustion • Slippery surfaces • High winds
4. Lift and move objects safely	• Rules for lifting and moving objects • Procedures for lifting objects • Plywood • Planks and beams • Ladders • Wheelbarrows • Shoveling • Barrels and drums • Boxes

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A5 Use fall protection

Objectives

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

- Understand fall protection requirements.
- Develop a fall protection plan.
- Inspect and use fall protection.

LEARNING TASKS	CONTENT

1. Understand the types of fall protection and how they are used	• WorkSafeBC Regulation and guidelines
	• Responsibilities of employers, supervisors and workers
	• Terminology
	• Fall hazards
	• Dynamics of falling
	• Equipment standards
	  ○ ANSI
	  ○ CSA
	• Equipment inspection and maintenance
	• Guard rail systems
	  ○ Height of rails and toe boards
	  ○ Spacing of uprights
	  ○ Strength
	• Fall restraint/work positioning systems
	• Fall arrest systems
	  ○ Personal fall arrest equipment
	  ○ Safety nets
	• Work procedures
	  ○ Controls zone
	  ○ Other work procedures acceptable to the Board
	• Safe use and limitations of fall protection systems
	• Calculation of fall distance when on a sloped roof
	• Proper use of worksite access such as ladders and scaffolds
	• Protective covers over floor and roof openings and skylights

LEARNING TASKS	CONTENT

	• Requirements when using aerial work platforms
	  ○ Maintenance logs
	  ○ Pre-use inspection
	  ○ Training/certification requirements
	  ○ Manufacture's manual

2. Describe the responsibilities of employers	• Providing a safe worksite • First aid • Training • Supervision • Providing safe equipment • Young and new worker training
3. Responsibilities of supervisors	• Site specific orientation • Supervision of workers • Inspection of equipment • Site specific safe work plan • Hazard assessment
4. Responsibilities of workers	• Following safe work practices • Following safe work procedures • Inspection of equipment • Reporting unsafe conditions to supervisors
5. Describe requirements for vertical and horizontal life lines	• Equipment specifications • Breaking strength • Inspection and storage • Anchorage
6. Install anchorage for life lines	• Compatibility • Connections • Load capacity • Permanent or temporary • Placement • Fall restraint or fall arrest • Manufacturer's instructions
7. Use fall protection	• Safety procedures during installation • Personal fall restraint and fall arrest equipment ○ Rope grabs and shock limiting devices

LEARNING TASKS	CONTENT
	○ Safety harness, lanyard, and lifeline • Chicken ladders/crawl boards • Roofing brackets/roof jacks/side guards • Ridge hooks • Ladder-jack scaffolds • Guardrails • Safety nets
8. Describe personal fall restraint and fall arrest equipment	• Equipment specifications • Ladder systems • Harnesses ○ Classifications • Lanyards ○ Retractable ○ Shock absorbing ○ Rope grabs ○ Proper tie-off slings/cable • Connecting devices
9. Complete a fall protection plan	• Identifying work area and hazards • Methods of reducing or eliminating fall hazards • Eliminating swing hazards • Selecting appropriate fall protection system and set up • Fall clearance requirements • Swing fall • Free fall distance • Total fall distance • Procedures to assemble, maintain, inspect, use and disassemble the fall protection system or systems • Rescue planning and preparedness • Tool box meeting

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A6 Use fire safety procedures

Objectives

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

- Describe the conditions necessary to support a fire.
- Describe classes of fires and methods used to extinguish them.
- Describe the consideration and steps taken prior to deciding to fight a fire.

LEARNING TASKS	CONTENT

1. Describe the conditions necessary to support a fire	• Oxygen
	• Fuel
	• Heat
	  ○ Open flame
	  ○ Sparks
	  ○ Cutting processes
	  ○ Electrical equipment
	  ○ Static discharge

2. Describe the classes of fires and extinguisher selection according to the materials being burned	• Class A • Class B • Class C • Class D
3. Describe types of fire extinguishers	• Water • Foam • Soda acid • CO2 • Dry chemical • Halons

4. Describe the procedure for using fire extinguishers	• P.A.S.S.
	  ○ Pull
	  ○ Aim
	  ○ Squeeze
	  ○ Sweep

5. Describe the considerations and steps to be taken prior to fighting a fire	• Warning others • Personal method of egress • Phoning fire department • Fire contained and not spreading

LEARNING TASKS	CONTENT
6. Identify combustible and flammable materials	• Fuels • Solvents • Flash point • Ignition temperature • Lubricants • Oily rags • Aerosols
7. Describe fire prevention techniques	• Training requirements • Responsibilities • Pre-planning • Evacuation procedures • Hot work permits • Controlling spills • Storage and handling of materials • Application techniques

Line (GAC): A USE SAFE WORK PRACTICES AND PROCEDURES

Competency: A7 Complete Level 1 First Aid

Objectives

To be competent in this area, the individual must be able to demonstrate the basic skills needed to reduce shock and contain injuries.

LEARNING TASKS	CONTENT
1. Complete Level 1 First Aid Training	• Emergency Management • C-Spine Control • Obstructed airways • Artificial respiration and CPR for adults • Major bleeding control • Records and Reporting

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:

- Use layout and marking tools.
- Use roofing hand tools.

LEARNING TASKS	CONTENT
1. Describe and use layout and marking tools	• Chalk line • Squares • Metric and Imperial tape measures • Levels • Builder's levels • Marking tools • Care maintenance and storage • Pencils and graph paper • Calculators
2. Describe roofing hand tools	• Knives • Snips • Hatchet • Staple hammer • Saws • Chisels • Files • Punches • Pliers • Screwdrivers • Hammers • Pry bars • Cat's claw • Wrenches • Scrapers • Shovels • Trowels • Caulking guns • Wheelbarrow

LEARNING TASKS	CONTENT
3. Use roofing hand tools	• Types • Parts • Purpose/Uses • Selection • Procedures/Operations • Safety • Adjustment • Inspection • Maintenance • Storage

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B2 Use portable power tools

Objectives

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

- Select portable power tools appropriate to roofing applications.
- Use and maintain portable power tools.

LEARNING TASKS	CONTENT

1. Describe power tools used in the roofing trade	• GFCI Protection
	• Grounding of tools
	• Circular saws
	• Drills
	• Angle grinders
	• Screw guns
	• Nail guns
	• Masonry saws
	• Blower
	• Power supply
	  ○ Electric
	  ○ Powder-actuated
	  ○ Pneumatic
	  ○ Battery

2. Use roofing power tools	• Safety hazards and precautions
	• Types
	• Parts
	• Purpose/Uses
	• Procedures/Operations
	• Training requirements
	• Adjustments
	• Inspection
	• Maintenance
	  ○ Lubrication
	  ○ Tensioning
	  ○ Refuelling
	  ○ Filter replacement
	• Storage
	• Manufacturer's recommendations

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B3 Use hoisting, lifting and rigging equipment

Objectives

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

- Describe motorized equipment and its purposes.
- Use and maintain motorized equipment.

LEARNING TASKS	CONTENT

1. Describe rigging equipment	• Types
	  ○ Ropes
	  ○ Cables
	  ○ Chains
	  ○ Slings
	  ○ Hooks
	  ○ Shackles
	  ○ Spreader bars
	• Knots, bends and hitches
	• Uses
	• Limitations/ratings/specifications
	  ○ Load
	  ○ Height
	• Inspection
	• Maintenance
	• Storage

2. Describe roofing hoisting equipment	• Types
	  ○ RoofmasterTM hoists
	  ○ Ladder hoists (wheel and platform)
	  ○ Pulley systems
	  ○ Manual hoists
	  ○ Hand Beam Hoist
	  ○ Overhead monorail hoist
	  ○ Conveyor systems
	  ○ Swing beam hoist
	  ○ Hydraulic hoist
	• Safety
	• Uses
	• Limitations/ratings/specifications
	• Parts
	• Counterweights
	• Erection

LEARNING TASKS	CONTENT
	• Dismantling • Inspection • Maintenance • Storage

3. Describe rooftop delivery systems	• Types
	  ○ Cranes
	  ○ Hyabs
	  ○ Conveyors
	• Uses
	• Limitations/ratings/specifications
	• Parts
	• Inspection
	• Maintenance
	• Storage

4. Describe roof top storage practices	• Load distribution • Load location • Storage • Securing material • Material handling • Protection from the elements

5. Use rigging and hoisting equipment	• Barricade hoisting areas
	• Signage
	• Protection of workers and public
	• Regulations
	• Manufacturers' specifications
	• Training and certification requirements
	• Operating procedures
	• Roof protection from equipment
	• Estimating loads and heights
	• Load distribution
	• Load limits
	  ○ Ropes
	  ○ Cables
	  ○ Chains
	  ○ Slings
	  ○ Hooks
	  ○ Shackles
	  ○ Spreader bars

LEARNING TASKS	CONTENT

	• Knots
	  ○ Selection
	  ○ Tying
	• Hand signals
	  ○ Stop
	  ○ Lower and raise
	  ○ Boom in and out
	  ○ Travel/swing
	  ○ Dog everything
	• Radio communications
	• Precautions
	  ○ Slings
	  ○ Tag lines
	  ○ Power lines
	  ○ Knots
	  ○ Equipment specifications
	• Erection/set-up
	• Dismantling
	• Loading
	• Unloading
	• Weight distribution
	• Securing loads
	• Inspection
	  ○ Bird caging
	  ○ Fittings
	  ○ Hooks and eyes
	  ○ Broken strands
	  ○ Crushing
	  ○ Load ratings
	• Maintenance
	• Storage

Achievement Criteria

Performance	The learner will set-up and operate a ladder hoist.
Conditions	The learner will be given: • A ladder hoist • Material to be lifted • Operating instructions
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Inspection of equipment • Safety • Operating procedures • Assembly and disassembly • Barricading • Signage

Line (GAC): B USE TOOLS AND EQUIPMENT

Competency: B4 Use ladders and work platforms

Objectives

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

- Describe types of ladders and work platforms.
- Erect and use ladders and scaffolds.

LEARNING TASKS	CONTENT

1. Use ladders	• Ladder types
	  ○ Extension
	  ○ Straight
	  ○ Step
	• Grade
	• Safety
	  ○ Level firm base
	  ○ Securing
	  ○ Stand-offs/stabilizers
	  ○ Feet
	• Carrying, and using

2. Describe aerial work platforms	• Safety • Scissor • Boomlifts • Operating instructions • Certification requirements • Training requirements

3. Describe ground-based scaffolds	• Safety
	• Types
	  ○ Tube and coupler
	  ○ Steel Frame
	  ○ Wood
	  ○ Ladder jack
	• Components
	• Fall protection

LEARNING TASKS	CONTENT
4. Describe scaffold erection procedures	• Mud sills • Members plumb and level • Stability • Guardrails and toe-boards • Scaffold planks • Work platforms • Plank support • Scaffold loads • Ladder access to scaffolds
5. Use ladders and elevated platforms	• Selection • Fall protection plan • Fall arrest and restraint requirements • Assembly/disassembly • Limitations • Securing • Inspection • Maintenance • Storage

Achievement Criteria

Performance	The learner will assemble, use and disassemble steel scaffolding.
Conditions	The learner will be given: • Scaffolding • Level • Fall protection equipment
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Equipment inspection • Level • Plumb • Assembled to specification • Accessing • Use of fall protection

Line (GAC): C USE DOCUMENTATION

Competency: C1 Read drawings and specifications

Objectives

To be competent in this area, the individual must be able to read and interpret drawings and specifications.

LEARNING TASKS	CONTENT
1. Describe major divisions of working drawings and blueprints	• Architectural drawings • Structural drawings • Mechanical drawings • Electrical drawings • Site plans
2. Describe important elements of drawings and blueprints	• Floor plans • Elevations • Cross-sections • Details • Title block • Scale of drawing • Symbols and notations
3. Describe and identify lines used on blueprints	• Object/visible • Hidden • Extension • Dimension • Centre • Leader • Section/cutting plane • Long and short break
4. Describe types of roofing specifications and codes	• Architectural specifications • Manufacturer's specifications • Regional specifications (e.g., RCABC) • National Building Code • BC Building Code

Line (GAC): C USE DOCUMENTATION

Competency: C2 Use Building Codes and RCABC Standards

Objectives

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

- Locate and interpret sections of the provincial and national Building Codes that apply to the roofing trade.
- Describe guarantee program recommendations that exceed the requirements of other codes.
- Describe municipal requirements that supersede or amend the provincial Building Codes.

LEARNING TASKS	CONTENT
1. Locate and interpret sections of the provincial and national Building Codes that apply to the roofing trade	• Sections • Materials • Flashing • Eaves • Bearing walls • Trusses and rafters • Decking • Insulation and weatherproofing • Installation • Loads (especially snow) • Differences between the codes
2. Describe municipal requirements that supersede or amend the provincial Building Codes	• Materials • Permits • Inspections
3. Describe guarantee program recommendations that exceed the requirements of other codes	• CSA/ISO • RCABC (RGC) • Manufacturers

Line (GAC): C USE DOCUMENTATION

Competency: C3 Read manufacturers' information

Objectives

To be competent in this area, the individual must be able to interpret manufacturers' instructions and specifications.

LEARNING TASKS	CONTENT
1. Interpret roofing system manufacturers' specifications	• Manufacturers' specifications • Manufacturers' installation instructions • Manufacturers' inspection and maintenance information • Manufacturers' troubleshooting documentation
2. Use roofing system manufacturers' application procedures	• Installation • Fastening methods • Handling • Storage • Overlaps • Minimums/maximums

Line (GAC): D ORGANIZE WORK

Competency: D1 Communicate with others

Objectives

To be competent in this area, the individual must be able to use effective communication.

LEARNING TASKS	CONTENT

1. Describe types of communication	• Written
	  ○ Work Orders
	  ○ Inspection reports
	  ○ Manufacturers' documentation
	  ○ Permits
	• Drawings and specifications

2. Describe reasons for communication	• Safety
	• Project coordination
	• Giving instructions
	• Receiving and understanding instructions
	• Clarification
	• Customer relations
	• Project notifications
	  ○ Shutdowns
	  ○ Precautions
	  ○ Noise
	  ○ Fumes/dust
	  ○ Customer safety
	• Training

3. Communicate with others	• Respect • Supervisors • Other workers • Apprentices • Architects • Engineers • Inspectors • Safety officers • Other trades • Customers • Building occupants • General public

Line (GAC): D ORGANIZE WORK

Competency: D2 Prepare the worksite

Objectives

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

- Describe the process of assessing needs at the worksite prior to starting work.
- Prepare a disposal system.
- Set-up protection to the surrounding areas.

LEARNING TASKS	CONTENT

1. Describe worksite assessment prior to starting work	• Starting and finishing points
	• Adequate curb and parapet height
	• Equipment requirements
	  ○ Disposal chutes
	  ○ Emission control kettles
	  ○ Lifting and hoisting equipment
	  ○ Fall protection
	• Deck type
	• Problem areas
	  ○ Mechanical utilities
	  ○ Windows
	  ○ Skylights
	  ○ Roof design
	• Hazards
	• Access and egress
	• Onsite utilities
	  ○ Electrical
	  ○ Water
	  ○ Gas

2. Prepare the material disposal system	• Components
	  ○ Wheel barrows
	  ○ Garbage bags
	  ○ Tarps
	  ○ Chutes
	  ○ Hoists
	  ○ Disposal bins
	• Separation of materials
	  ○ Regulations
	  ○ Penalties
	  ○ Recycling

LEARNING TASKS	CONTENT
	• Erect and disassemble chutes and counterweights

3. Position equipment and material on the ground	• Equipment
	  ○ Compressors
	  ○ Disposal bins
	• Placement
	  ○ Regulations
	  ○ Access
	  ○ Customer convenience
	• Safety equipment
	  ○ Hoses
	  ○ Fire extinguishers
	  ○ Safety cones
	  ○ Caution tape
	  ○ Safety fence
	• Communication with owner, contractor and other trades people

4. Position equipment and material on the roof	• Hoists
	• Sequence of removal and installation
	• Weight distribution
	• Safety
	• Securement
	• Windows
	• Ventilation openings
	• Ease of access
	• Safety equipment
	  ○ Water hoses
	  ○ Fire extinguishers
	• Communication with owner, contractor and other trades people

LEARNING TASKS	CONTENT

5. Protect building finishes and landscaping	• Protection materials
	  ○ Tarps
	  ○ Plywood
	  ○ Blankets
	  ○ Fabric
	• Types of damage
	  ○ Broken glass
	  ○ Fume infiltration
	  ○ Staining
	  ○ Fire
	• Identification of areas of potential damage
	  ○ Windows
	  ○ Walls
	  ○ Skylights
	  ○ Mechanical equipment
	  ○ Vehicles
	  ○ Landscaping
	• Identification of areas of previous damage
	• Barrier erection
	• Placement of materials

Line (GAC): D ORGANIZE WORK

Competency: D3 Use trade related math

Objectives

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

- Perform mathematical calculations using whole numbers, fractions, decimals and ratios.
- Convert between metric and imperial units of measure.
- Solve problems involving area and volume.

LEARNING TASKS	CONTENT
1. Add, subtract, multiply and divide whole numbers	• Operations

2. Solve problems with fractions, ratios and decimals	• Operations
	  ○ Fractions
	  ○ Ratios
	  ○ Decimals
	• Decimal to fraction conversions
	• Fraction to decimal conversions
	• Convert measurements to ratios

3. Add, subtract, multiply and divide using units of linear measure	• Feet and inches • Metric units
4. Convert within the imperial system	• Feet to inches • Inches to feet • Square feet to square inches • Square inches to square feet
5. Convert metric and imperial measurements	• Metric to imperial • Imperial to metric • Weights • Lengths • Volumes • Temperature • Prefixes

LEARNING TASKS	CONTENT

6. Solve plane geometry problems	• Perimeters of shapes
	  ○ Squares
	  ○ Rectangles
	  ○ Rhombus
	  ○ Triangles
	  ○ Law of right triangles/ Pythagoras theorem
	  ○ Pentagons and higher order polygons
	  ○ Circles
	• Areas of shapes
	  ○ Squares
	  ○ Rectangles
	  ○ Triangles
	  ○ Pentagons and higher order polygons
	  ○ Circles
	• Angular measurements
	• Practical word problems

Line (GAC): D ORGANIZE WORK

Competency: D4 Estimate materials

Objectives

To be competent in this area, the individual must be able to estimate materials for a steep roof.

LEARNING TASKS	CONTENT
1. Create roof sketch for estimating area	• Taking measurements • Slope calculations • Roof heights
2. Describe venting requirements	• Building Code • Types of vents • Net free area • Sizing
3. Estimate materials required for a steep roof	• Eave protection • Underlay • Starter course • Shingles • Wastage • Flashing • Built-in gutter material • Valley material • Capping • Fasteners

Achievement Criteria

Performance	The individual will create a roof sketch for a steep roof and determine material requirements.
Conditions	The learner will be given: • A roof area to measure • Specifications • Calculator
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Correct calculations

Line (GAC): E PREPARE ROOFS

Competency: E1 Prepare roofs for replacement

Objectives

To be competent in this area, the individual must be able to prepare a roof for replacement.

LEARNING TASKS	CONTENT

1. Protect windows, walls, skylights and mechanical equipment	• Types of protection material
	  ○ Tarps
	  ○ Plywood
	  ○ Blankets
	  ○ Fabric
	  ○ Chute
	• Types of damage
	  ○ Broken glass
	  ○ Staining
	  ○ Fire
	  ○ Scratches and dents
	  ○ Punctures
	• Areas of potential damage
	  ○ Decks
	  ○ Landscaping
	  ○ Windows
	  ○ Walls
	  ○ Building finishes
	  ○ Eavestroughs
	  ○ Drainage
	  ○ Skylights
	  ○ Mechanical equipment
	  ○ Vehicles
	• Areas of previous damage
	  ○ Pre-start walk through
	  ○ Documentation (photos)
	• Erection of protection barriers
	• Placement of equipment and materials

LEARNING TASKS	CONTENT

2. Describe the removal of loose debris	• Types of debris
	  ○ Vegetation
	  ○ Gravel
	  ○ Dust
	  ○ Construction materials
	  ○ Environmental concerns
	• Hazards
	  ○ Cedar dust
	  ○ Asbestos
	  ○ Mould
	  ○ Animal droppings
	  ○ Coal tar pitch
	  ○ Used needles
	  ○ Flying debris
	• Safety precautions
	• Gathering
	• Storing
	• Disposing
	• Notification to authorities of hazardous materials

3. Describe the removal of roofing and metal flashings	• System types
	  ○ Components
	• Effect of weather conditions
	• Removal sequence
	• Materials to be removed
	• Extra care when removing metal
	• Hazards
	  ○ Rotten deck
	  ○ Nails
	  ○ Electric wiring
	  ○ Cuts on sharp metal
	  ○ Slipping
	  ○ Wildlife
	• Recyclable materials
	• Regulated and hazardous materials
	• Removal equipment selection
	• Removal techniques
	• Amount of tear-off in a work period
	• Removal and disposal of materials

LEARNING TASKS	CONTENT

4. Describe the preparation of the roof substrate	• Types of deck substrates
	  ○ Steel
	  ○ Wood
	• Substrate defects
	  ○ Dents
	  ○ Rotten wood
	  ○ Corrosion
	  ○ Knot holes
	  ○ Deflection of plywood
	  ○ Warping
	  ○ Checking
	  ○ Broken boards
	• Structural defects
	  ○ Cornices
	  ○ Weak supporting structure and/or overhangs
	• Cleaning substrate
	• Vapour barriers
	  ○ Repair
	  ○ Replacement
	• Insulation
	  ○ Repair
	  ○ Replacement
	• Securing loose substrate components

5. Describe the adjustment of heights of penetrations and parapets	• New roof composition
	• Changes to roof mounted equipment
	• Adjustments
	  ○ Adding slope to coping
	  ○ Extending methods for various materials
	  ▪ Pipes
	  ▪ Drains
	• Height calculations
	  ○ Penetrations
	  ○ Parapets
	• Building extensions
	• Material selection to suit new construction
	• Dismantling existing construction
	• Adding material to existing construction

LEARNING TASKS	CONTENT

6. Describe the installation temporary waterproofing	• Materials
	  ○ Shingles
	  ○ Underlay
	  ○ Tarps
	• Material compatibility
	• Determining integrity
	• Removal

Line (GAC): E PREPARE ROOFS

Competency: E2 Prepare new roofs for installation

Objectives

To be competent in this area, the individual must be able to prepare new roofs for installations.

LEARNING TASKS	CONTENT

1. Describe requirements/procedures for inspecting decks	• Deck types
	  ○ Wood
	  ○ Steel
	• When to inspect
	• Defects
	  ○ Height
	  ○ Irregularities
	  ○ Unfinished substrate
	  ○ Plywood not staggered
	  ○ Unfastened substrate
	  ○ Trusses not trimmed
	  ○ Orientation of substrate
	  ○ Deck deflection
	  ○ Corrosion
	• Notification of responsible parties
	  ○ Severity
	  ○ Timeline

2. Verify the placement of roof penetrations and parapets and prepare roof deck	• Required penetrations and parapets
	• Covering roof openings
	• Height and fastening requirements
	• Required components
	  ○ Drains
	  ○ Flashing and counter flashing
	  ○ Skylights
	  ○ Chimneys
	  ○ Plumbing stacks
	  ○ Vents
	  ○ Anti-ponding boards
	  ○ Hip and ridge trees
	  ○ Open lath sheathing
	• Clearances and placement
	• Deck types
	• Compatibility of components with roofing system

Line (GAC): E PREPARE ROOFS

Competency: E3 Prepare built-in gutters

Objectives

To be competent in this area, the individual must be able to prepare built-in gutters.

LEARNING TASKS	CONTENT
1. Describe preparation of an existing built-in gutter for new installation	• Safe access • Determining existing waterproofing membrane • Removing cap • Removing drains • Removing waterproofing membrane • Re-securing the substrate • Ensuring clean and dry substrate
2. Inspect existing or new built-in gutters	• Slope to drain • Drain locations • Proper substrate • Cant strips • Suitable substrate • Vertical terminations

3. Describe installation of water cut-offs and temporary seals	• Water cut-offs for built-in gutters
	• Requirements
	  ○ Temporary seals
	  ○ Temporary drains

Line (GAC): F INSTALL STEEP ROOFING

Competency: F1 Describe roof types

Objectives

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

- Describe types of roof structures and designs.
- Describe roof structural components.

LEARNING TASKS	CONTENT
1. Identify types of roof structures and designs	• Hip • Gable • Gambrel • A-frame • Mansard • Shed • Dormer • Flat • Vaulted • Saw-toothed • Domed • Serpentine • Barrel • Conical
2. Describe roof construction features	• Trusses and rafters • Beams • Ridges • Valleys • Eaves • Hips • Guttering • Gables/Rakes/Barge • Cornice • Decking/substrate • Open lath/strapping • Insulation
3. Describe roof slopes	• Rise • Run • Slope/pitch

Line (GAC): F INSTALL STEEP ROOFING

Competency: F2 Install built-in gutter membranes

Objectives

To be competent in this area, the individual must be able to install built-in gutter membranes.

LEARNING TASKS	CONTENT
1. Describe membrane types	• Modified bituminous membrane (Mod Bit) • Single ply

2. Install EPDM gutter membrane	• Safety hazards and precautions
	• Inspection of substrate
	• Installation methods
	  ○ Drains
	  ○ Seaming
	  ○ Fully adhered
	• Manufacturer's documentation
	• Building Codes
	• Tools and equipment
	• Terminations
	  ○ Corners
	  ○ Slope side
	  ○ Fascia side
	  ○ Under cap flashing
	  ○ Fasteners

Achievement Criteria

Performance: The learner will install EPDM in a built-in gutter.

Conditions: The learner will be given:

- Materials
- Tools
- Specifications
- Personal protective equipment

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

- Safety
- Application
- Removal

Line (GAC): F INSTALL STEEP ROOFING

Competency: F3 Install asphalt shingles

Objectives

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

- Describe asphalt shingles and their purpose.
- Install asphalt shingles.

LEARNING TASKS	CONTENT

1. Describe components and considerations	• Decks
	  ○ Wood
	  ○ Steel
	• Roof slope
	• Types of eave protection
	• Types of underlayment
	• Insulation
	• Ventilation
	  ○ Types
	  ○ Application
	• Shingles
	  ○ Styles
	  ○ Composition
	  ○ Purpose
	  ○ Advantages of asphalt products
	  ○ Storage requirements
	• Fasteners
	• Details
	• Flashings
	• Effect of weather on installation

2. Inspect and repair deck	• Building Code requirements • RCABC, architectural and manufacturers' specifications • Fastening • Clean • Defects • Details
3. Install insulation and venting	• Cathedral/vaulted • Cold systems • Insulated roof assemblies • Baffles/stops

LEARNING TASKS	CONTENT

4. Install eave protection and underlayments	• Types/composition
	  ○ Felt
	  ○ Self adhered
	  ○ Mineral surfaced
	  ○ Synthetic
	• Purpose
	• Building Code requirements
	• RCABC, architectural and manufacturers' specifications
	• Fastening methods
	• Overlaps

5. Install flashing details	• Types
	  ○ Drip edge
	  ○ Rake edge
	  ○ Step
	  ○ Base
	  ○ Counter
	  ○ Through-wall
	  ○ Back pan
	  ○ Apron
	  ○ Saddles or crickets
	  ○ Valley
	  ○ Plumbing stacks
	  ○ Air vents
	• Compatibility between materials
	• Materials
	  ○ Metal
	  ○ Neoprene
	  ○ Plastic
	• Gauge
	• Selection
	• Forming
	• Fasteners
	  ○ Types
	  ○ Location
	• Methods
	  ○ Flashing at valley
	  ○ Flashing at vertical walls
	  ○ Flashing at chimneys and vent pipes
	  ○ Flashing at skylights

LEARNING TASKS	CONTENT
	• Caulking and sealants

6. Install shingles	• Building Code requirements
	• RCABC, architectural and manufacturers' specifications
	• Mastic sealing of cut shingles
	• Styles
	• Applications
	• Details
	• Hips
	• Valleys
	• Starting point
	• Overhangs
	• Layout
	  ○ Chalk line
	  ○ Starter course
	  ○ Exposure and overlap
	  ○ Patterns
	  ○ Alignment
	• Fasteners
	  ○ Type
	  ○ Length
	  ○ Number
	  ○ Location
	• Cap shingles
	  ○ Hips
	  ○ Ridges
	• Wind considerations
	  ○ Adhesives/sealants
	  ○ Nailing patterns

Achievement Criteria

Performance	The learner will install an asphalt shingle roof with flashing details.
Conditions	The learner will be given: • Roof deck • Materials • Tools • Specifications • Personal protective equipment
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Application • Removal

Line (GAC): F INSTALL STEEP ROOFING

Competency: F4 Install wood shingles and shakes

Objectives

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

- Describe wood shingles and shakes and their application.
- Install wood shingles and shakes and their application.

LEARNING TASKS	CONTENT

1. Describe components of wood shingle and shake roofs	• Decks
	  ○ Wood
	• Slope
	• Eave protection
	• Underlayment
	• Insulation
	• Ventilation
	  ○ Types
	  ○ Application
	• Shingles and shakes
	  ○ Grades
	  ○ Purpose
	  ○ Treatments
	• Fasteners
	• Details
	• Metal flashing

2. Install insulation	• Cathedral • Insulated roof assemblies • Cold system

3. Install eave protection and underlayments	• Types
	  ○ Felt
	  ○ Self adhered
	  ○ Synthetics
	• Purpose
	• Building Code requirements
	• RCABC, architectural and manufacturers' specifications
	• Materials
	• Fastening methods
	• Overlaps

LEARNING TASKS	CONTENT

4. Install flashing details	• Types
	  ○ Drip edge
	  ○ Rake edge
	  ○ Step
	  ○ Base
	  ○ Counter
	  ○ Through-wall
	  ○ Back pan
	  ○ Apron
	  ○ Saddles or crickets
	  ○ Valley
	  ○ Plumbing stacks
	  ○ Air vents
	• Materials
	  ○ Metal
	  ○ Neoprene
	  ○ Plastic
	• Selection
	• Forming
	• Fasteners
	  ○ Types
	  ○ Location
	• Methods
	• Caulking and sealants

5. Install shingles/shakes	• Building Code requirements
	• RCABC, architectural and manufacturers' specifications
	• Inspection of material
	• Grades
	• Applications
	• Details
	• Starting point
	• Layout
	  ○ Chalk line
	  ○ Starter courses
	  ○ Exposure and overlap
	  ○ Patterns
	  ○ Spacing
	  ○ Open lath
	  ○ Interwoven/inter-coursing for shakes

LEARNING TASKS	CONTENT
	○ Alignment • Fasteners ○ Type ○ Length ○ Number ○ Location • Capping ○ Hips ○ Ridges ○ Underlayment • Environmental considerations

Achievement Criteria

Performance	The learner will install a wood shingle/shake roof with flashing details.
Conditions	The learner will be given: • Roof deck • Materials • Tools • Specifications • Personal protective equipment
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Application • Removal

Line (GAC): F INSTALL STEEP ROOFING

Competency: F5 Install concrete and composite materials

Objectives

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

- Describe concrete and composite materials and their application.
- Install concrete and composite materials.

LEARNING TASKS	CONTENT

1. Describe components of concrete and composite roofs	• Decks
	  ○ Wood
	  ○ Slope
	• Eave protection
	• Underlayment
	• Insulation
	• Ventilation
	  ○ Types
	  ○ Application
	• Tiles
	  ○ Styles
	  ○ Purpose
	• Strapping/lath
	• Anti-ponding boards
	• Fasteners
	• Details
	• Flashings
	• Effect of weather in installation

2. Inspect and repair deck	• Building Code requirements • RCABC, architectural and manufacturers' specifications • Fastening • Clean • Defects • Details
3. Install insulation and ventilation	• Cold systems • Vaulted/cathedral • Insulated roof assemblies

LEARNING TASKS	CONTENT

4. Install eave protection and underlayments	• Types
	  ○ Felt
	  ○ Self adhered
	  ○ Synthetics
	  ○ Proprietary purpose
	• Building Code requirements
	• RCABC, architectural and manufacturers' specifications
	• Materials
	• Fastening methods
	• Overlaps

5. Install flashing details	• Types
	  ○ Channel
	  ○ Drip edge
	  ○ Rake edge
	  ○ Step
	  ○ Base
	  ○ Counter
	  ○ Through-wall
	  ○ Back pan
	  ○ Apron
	  ○ Saddles or crickets
	  ○ Valley
	  ○ Plumbing stacks
	  ○ Air vents
	• Materials
	  ○ Metal
	  ○ Lead
	  ○ Neoprene
	  ○ Plastic
	• Selection
	• Forming
	  ○ Fasteners
	  ○ Types
	  ○ Location
	• Methods
	• Caulking and sealants

LEARNING TASKS	CONTENT

6. Install tiles	• Building Code requirements
	• RCABC, architectural and manufacturers' specifications
	• Styles
	• Applications
	• Details
	• Starting point
	• Layout
	  ○ Lath/strapping
	  ○ Spacing
	  ○ Chalk line
	  ○ Starter course (for composites)
	  ○ Exposure and overlap
	  ○ Patterns
	  ○ Alignment
	• Fasteners
	  ○ Type
	  ○ Length
	  ○ Number
	  ○ Location
	• Cap tiles
	  ○ Hips
	  ○ Ridges
	  ○ Mastic
	  ○ Dentils and frogs
	• Environmental considerations

Achievement Criteria

Performance	The learner will install a concrete or composite roof with flashing details.
Conditions	The learner will be given: • Roof deck • Materials • Tools • Specifications • Personal protective equipment
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Application • Removal

Line (GAC): F INSTALL STEEP ROOFING

Competency: F6 Install metallic materials

Objectives

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

- Describe components of metallic roofing and their application.
- Describe metal flashing and seams.
- Install preformed metal tiles.

LEARNING TASKS	CONTENT

1. Describe components of metallic roofing and considerations	• Decks
	  ○ Wood
	  ○ Steel
	• Slope
	• On-site storage
	• Eave protection
	• Underlayment
	  ○ Proprietary
	• Insulation
	• Ventilation
	  ○ Types
	  ○ Application
	• Metal roof systems
	  ○ Metallic coated steel
	  ○ Natural weathering metals
	  ○ Painted and laminated metals
	  ○ Galvanic series
	  ○ Expansion and contraction
	  ○ Potential problems
	• Compatibility of components
	• Metal panel systems
	  ○ Panel configurations
	  ○ Profiles
	  ○ Hook strips
	  ○ Fasteners clips and closures
	• Preformed metal tiles
	  ○ Styles
	  ○ Purpose
	• Strapping
	• Battens
	• Fasteners and clips
	• Details
	• Metal flashing
	  ○ Cap flashing
	  ○ Wall flashings

LEARNING TASKS	CONTENT
	○ Seaming methods • Tools and equipment • Proprietary equipment • Effect of weather during installation
2. Inspect and repair deck	• Building Code requirements • RCABC, architectural and manufacturers' specifications • Fastening • Cleaning • Defects • Details
3. Install insulation	• Requirements ○ Insulated roof assemblies
4. Install eave protection and underlayments	• Types ○ Felt ○ Self adhered ○ Synthetic ○ Proprietary • Purpose • Building Code requirements • RCABC, architectural and manufacturers' specifications • Materials • Fastening methods • Overlaps
5. Install flashing details	• Types ○ Closures ○ Channels ○ Drip edge ○ Rake edge ○ Step ○ Base ○ Counter ○ Through-wall ○ Back pan ○ Apron ○ Saddles or crickets ○ Valley ○ Plumbing stacks

LEARNING TASKS	CONTENT
	○ Air vents • Materials ○ Metal ○ Lead ○ Neoprene ○ Plastic • Selection • Forming ○ Cutting and marking ○ Bending • Fasteners ○ Types ○ Location • Methods • Caulking and sealants
6. Install preformed a metal roof system	• Building Code requirements • RCABC, architectural and manufacturers' specifications • Styles • Applications • Details • Starting point • Layout ○ Chalk line ○ Starter course ○ Exposure and overlap ○ Patterns ○ Alignment ○ Calculating angles • Fasteners ○ Type ○ Length ○ Number ○ Location ○ Drag screws • Metal cap ○ Hips ○ Ridges • Environmental considerations

Achievement Criteria

Performance	The learner will install a metal roof system with flashing details.
Conditions	The learner will be given: • Materials • Tools and equipment • Plans and specifications
Criteria	The learner will score 70% or better on a rating sheet that reflects the following criteria: • Safety • Layout • Installation

Line (GAC): G ASSESS AND MAINTAIN ROOFS

Competency: G1 Assess roof conditions

Objectives

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

- Describe the importance of inspection and maintenance.
- Perform a maintenance inspection.
- Write inspection and maintenance reports.

LEARNING TASKS	CONTENT

1. Describe assessment of roof conditions	• Safety hazards and precautions
	• Inspection
	  ○ Historical records
	  ○ Installation deficiencies
	  ○ Types of defects
	  ○ Causes of defects
	  ○ Signs of deterioration
	  ○ Maintenance items
	  ○ Life expectancy
	  ○ Checklist
	  ○ Environmental occurrences
	• Other occurrences
	• Roof types
	• Detailed roof plan
	• Guarantee programs
	• Testing
	  ○ Destructive/non-destructive
	  ○ Thermographic imaging/infrared scanning
	  ○ Radioisotopic detection/nuclear surveying

2. Write a maintenance report	• Purpose • Tools • Detailed plan • Checklist • Observations • Recommendations

Line (GAC): G ASSESS AND MAINTAIN ROOFS

Competency: G2 Maintain and repair roofs

Objectives

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

- Describe the maintenance and repair of roofs.
- Maintain and repair roofs.

LEARNING TASKS	CONTENT

1. Describe the maintenance and repair of steep roofs	• Inspections
	• Maintenance
	• Causes of failure
	  ○ Moisture
	  ○ Ultra violet
	  ○ Thermal cycling
	  ○ Vegetation
	  ○ Ventilation
	  ○ Underlayment
	  ○ Ice damming
	  ○ Insects
	  ○ Wildlife
	  ○ Traffic
	  ○ Aging
	  ○ Wind
	  ○ Impacts
	  ○ Improper design
	  ○ Improper installation
	  ○ Structural movement
	  ○ Contamination
	  ○ Mechanical damage
	  ○ Drainage failure
	• Solutions to failures

2. Maintain and repair steep roofs	• Materials
	• Repair methods
	  ○ Valleys
	  ○ Nails backing out of deck
	  ○ Broken shingles
	  ○ Details
	  ○ Defective flashing
	  ○ Vents

Section 4

TRAINING PROVIDER STANDARDS

Facility Requirements

Classroom Area

- Comfortable seating and tables suitable for learning
- Compliance with the local and national fire code and occupational safety requirements
- Overhead and multimedia projectors with a projection screen
- Whiteboard with marking pens and erasers
- Lighting controls to allow easy visibility of the projection screen while allowing students to take notes
- Windows must have shades or blinds to adjust sunlight
- Heating/air conditioning for comfort all year round
- In-room temperature control to ensure comfortable room temperature
- Acoustics in the room must allow the instructor to be heard
- Library complete with reference material for student and instructor use

Shop Area

- 1,100 square foot sheet metal workshop with ceiling height sufficient to allow safe movement of materials
- 13,600 square foot mock-up/storage area which includes:
  - 5,000 square foot steep roofing area
  - 1,300 square foot flat roofing area
  - 120 square foot sheet metal roofing area
  - Tool crib
  - Lockers
- Adequate lighting and lighting control
- Ventilation as per WorkSafeBC standards
- Refuse and recycling bins for used shop materials
- First-aid facilities

Lab Requirements

- Computer lab complete with 16 computers and internet access

Student Facilities

- Adequate lunch room as per WorkSafeBC requirements
- Adequate washroom facilities as per WorkSafeBC requirements
- Personal storage lockers

Instructor's Office Space

- Desk and filing space
- Computer

Other

- N/A

Tools and Equipment

Shop Equipment

Required

- Forklift
- Hydraulic Swing hoist
- Ladder hoist
- Roof cutter
- Rotary spudder
- Ladders
- Fall protection

Recommended

- N/A

Shop (Facility) Tools

Standard Tools

- 12 Electrical cord
- 12 Field and detail torches
- 4 Hand drills
- 1 Industrial vacuum
- Adhesive spreader
- Adjustable spanner
- Axe
- Broom
- Caulking guns
- Chalk line
- Chisels
- Flashlight
- 1 Pallet jack
- 2 Power saws (circular)
- Hacksaw
- Hammer
- Hammer stapler
- Hand saw
- Hand spudder
- Hand roller
- Hatchet
- Infrared heat gun
- 1 Pressure washer
- 1 Roll carrier
- 6 Screw guns
- 2 Strikers
- 2 Pipe wrenches
- 1 Pop riveter
- 6 Pry bars
- 1 rake
- 12 Roof jack
- 12 Roofer knives
- 6 Saw horses
- 16 Scissors
- 2 Scoop shovel
- 1 Scraper
- 3 Screwdrivers
- 1 Seam folder
- 2 Seam rollers
- Shovel
- 1 Slater punch
- 1 Sliding T-bevel
- 1 Squeegee
- 12Trowel

- Measuring tape
- Metal shear
- Pan and box brake
- 4 T-squares
- 1 Wheelbarrow
- 1 Water extractor
- 2 Sheet metal brakes (8 ft)
- 1 Slitter machine

Specialty Tools

- N/A

Student Equipment (supplied by school)

Required

16 Hand Tool Kits

- Aviation snips set
- Claw hammer
- Felt markers
- Scratch awl
- Tape measure
- Tinners hammer
- Tool box
- Vice grips (Bull nose)
- Vice grips (Regular)

Safety Equipment

- Ear muffs
- 1 Eye wash bottle
- 4 Face shields
- 2 First aid kits
- First aid room
- Box of masks
- 6 Portable fire extinguishers
- 32 Safety glasses
- 6 Safety harnesses
- Eye wash station

Recommended

- N/A

Student Tools (supplied by student)

Required

- Pouch
- Hammer
- Hatchet
- Tape measure
- Chalk line
- Nail puller
- Snips
- Coveralls
- Safety foot wear
- Hard hats
- Light duty work gloves

Recommended

- N/A

Reference Materials

Required Reference Materials

The following two textbooks are supplied to the students for use during technical training:

- RCABC Roofing Practices Manual
- A Guide to Roofing (RCABC)

Recommended Resources

The following resources are available for student use at the Roofing Contractor's Association of BC.

- Canadian Roofing Reference Manual (Canadian Roofing Contractors Association)
- Occupational Health and Safety Regulation and WCB Standards
- Residential Blueprint Reading
- Soprema Specification Manual (Soprema Inc.)
- Firestone Specifications Manual (Firestone Building Products Canada)
- Carlisle Specification Manual (Carlisle SynTec Systems Canada)
- IKO Specification Manual (IKO Industries Limited)
- Decra Systems Specifications Manual (DECRA Roofing Systems)
- BC and National Building Codes
- National Standards or Canada for Concrete Roof Tile (CSA A220 M91)
- NRCA Roofing and Waterproofing Manual (National Roofing Contractors Association)
- NRCA Repair Manual for Low-slope Membrane Roof Systems (National Roofing Contractors Association)
- WHMIS Publications (WorkSafeBC)
- The Science and Technology of Traditional and Modern Roofing Systems (Dr. H. O. Laaly)
- Cedar Shake and Shingle Specifications Manual (Cedar Shake and Shingle Bureau)
- WorkSafeBC Safety Video Clips
- Manufacturer's Application Videos

Instructor Requirements

Occupation Qualification

The instructor must possess:
1. A BC Certificate of Qualification as a Residential Steep Roofer or a Roofing Damp and Waterproofing Red Seal Certificate.
2. Equivalent Certificate of Qualification from another Canadian jurisdiction.

Work Experience

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

Instructional Experience and Education

The instructor must possess one of the following:
1. The B.C. Instructors Diploma or equivalent (individuals that are actively working towards the Instructors Diploma with a clearly defined completion goal may instruct this program)
2. A Bachelors Degree in Education
3. A Masters Degree in Education