

PROGRAM OUTLINE

Automotive Glass Technician



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AUTOMOTIVE GLASS TECHNICIAN PROGRAM OUTLINE

APPROVED BY INDUSTRY

APRIL 2017

**Developed by
Industry Training Authority
Province of British Columbia**



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Section 1

INTRODUCTION

Automotive Glass Technician



Foreword

This revised Automotive Glass Technician 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 as developed by 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.

The Program Outline was prepared with the advice and assistance of the Automotive Glass Technician Review Committee and will form the basis for further updating of the British Columbia Automotive Glass Technician Program by the Industry Training Authority (ITA).

Competencies are to be evaluated through written exams and practical assessments. A passing grade is achieved by getting an overall mark of 70%. See the Assessment Guidelines in the Appendix for more details. 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 assessment. The intent of including Achievement Criteria in the Program Outline is to ensure consistency in training across the many training institutions in British Columbia. Their purpose is to reinforce the theory and to provide a mechanism for evaluation of the learner's ability to apply 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 journeyman. 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 evaluation criteria.

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

SAFETY ADVISORY

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



Acknowledgements

Industry and Instructor Subject Matter Experts retained to assist in the development of the Occupational Analysis Chart and the Program Profile:

- Anthony Breuker Novus Glass
- Jim Cervo Glass Doctor
- Darren Cox Automotive Retailers Association
- Stuart Doctor Broco Glass
- Gary Gottschling All-West Glass
- Dennis Hertslet Insurance Corporation of BC
- Richard Walker Family Glass

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

- Jim Cervo Glass Doctor
- Darren Cox Automotive Retailers Association
- Gord Fraser Auto Glass Consultant
- Gary Gottschling All-West Glass
- Dennis Hertslet Insurance Corporation of BC
- Paul Klarenbeek Okanagan College
- Robin Popow Vancouver Community College

The Industry Training Authority would like to acknowledge the dedication and hard work of all the industry representatives appointed to identify the training requirements of the Automotive Glass Technician 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



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
Appendix – Glossary			Defines program specific terminology and acronyms	



Section 2

PROGRAM OVERVIEW

Automotive Glass Technician

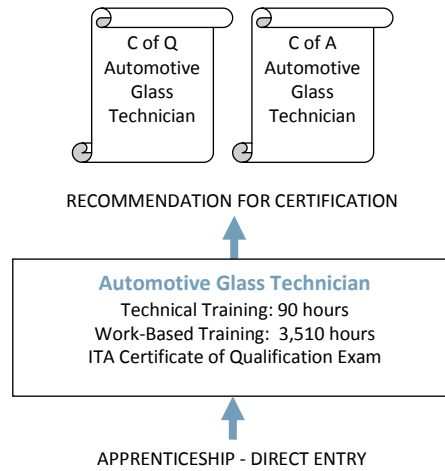


Program Credentialing Model

Apprenticeship Pathway

This graphic provides an overview of the Automotive Glass Technician apprenticeship pathways.

C of Q = Certificate of Qualification
C of A = Certificate of Apprenticeship
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

None



Occupational Analysis Chart

AUTOMOTIVE GLASS TECHNICIAN

Occupation Description: "Automotive Glass Technician" means a person who removes, installs, repairs and generally services all types of stationary and movable glass in motor vehicles and associated equipment.

PERFORM SAFETY-RELATED FUNCTIONS A	Use personal protective equipment (PPE) and safety equipment A1	Maintain safe work environment A2	Adhere to requirements of federal vehicle safety standards A3	
	1	1	1	
USE TOOLS, EQUIPMENT, AND SUPPLIES B	Use tools and equipment B1	Use setting and lifting equipment B2	Use supplies B3	
	1	1	1	
ORGANIZE WORK AND USE DOCUMENTATION C	Communicate with others C1	Interpret technical information C2	Contribute to preparation of estimates and supplements C3	Organize parts, materials and work area C4
	1	1	1	1
PREPARE VEHICLE D	Identify supplemental restraint systems D1	Remove contaminants D2	Protect undamaged areas D3	
	1	1	1	
PERFORM WINDSHIELD REPAIR E	Prepare surface for repair E1	Repair laminated glass E2		
	1	1		



REMOVE, REPAIR AND INSTALL COMPONENTS
F

Remove components				
F1				
1				

Install components				
F2				
1				

REMOVE AND INSTALL GLASS/MATERIALS
G

Remove non-bonded glass/materials				
G1				
1				

Remove bonded glass/materials				
G2				
1				

Prepare surfaces for bonding				
G3				
1				

Fabricate template				
G4				
1				

Cut glass/material				
G5				
1				

Install non-bonded glass/materials				
G6				
1				

Install bonded glass/materials				
G7				
1				

PREPARE VEHICLE FOR DELIVERY
H

Verify system calibration				
H1				
1				

Perform final inspection				
H2				
1				

PERFORM TROUBLE SHOOTING PROCEDURES
I

Diagnose water leaks				
I1				
1				

Diagnose glass-related issues				
I2				
1				



Training Topics and Suggested Time Allocation

AUTOMOTIVE GLASS TECHNICIAN

		% of Time Allocated to:			
		% of Time	Theory	Shop Tasks	Total
Line A	PERFORM SAFETY-RELATED FUNCTIONS	7%	75%	25%	100%
A1	Use personal protective equipment (PPE) and safety equipment		✓	✓	
A2	Maintain safe work environment		✓		
A3	Adhere to requirements of federal vehicle safety standards		✓		
Line B	USE TOOLS, EQUIPMENT, AND SUPPLIES	5%	50%	50%	100%
B1	Use tools and equipment		✓	✓	
B2	Use setting and lifting equipment		✓	✓	
B3	Use supplies		✓		
Line C	ORGANIZE WORK AND USE DOCUMENTATION	17%	75%	25%	100%
C1	Communicate with others		✓		
C2	Interpret technical information		✓	✓	
C3	Contribute to preparation of estimates and supplements		✓	✓	
C4	Organize parts, materials and work area		✓	✓	
Line D	PREPARE VEHICLE	4%	50%	50%	100%
D1	Identify supplemental restraint systems		✓		
D2	Remove contaminants		✓	✓	
D3	Protect undamaged areas		✓	✓	
Line E	PERFORM WINDSHIELD REPAIR	9%	50%	50%	100%
E1	Prepare surface for repair		✓	✓	
E2	Repair laminated glass		✓	✓	
Line F	REMOVE, REPAIR AND INSTALL COMPONENTS	7%	50%	50%	100%
F1	Remove components		✓	✓	
F2	Install components		✓	✓	
Line G	REMOVE AND INSTALL GLASS/MATERIALS	39%	50%	50%	100%
G1	Remove non-bonded glass/materials		✓	✓	
G2	Remove bonded glass/materials		✓	✓	
G3	Prepare surfaces for bonding		✓	✓	
G4	Fabricate template		✓	✓	
G5	Cut glass/material		✓	✓	
G6	Install non-bonded glass/materials		✓	✓	
G7	Install bonded glass/materials		✓	✓	



Line H	PREPARE VEHICLE FOR DELIVERY	5%	50%	50%	100%
H1	Verify system calibration		✓		
H2	Perform final inspection		✓	✓	
Line I	PERFORM TROUBLESHOOTING PROCEDURES	7%	50%	50%	100%
I1	Diagnose water leaks		✓	✓	
I2	Diagnose glass-related issues		✓	✓	
Total Percentage for Automotive Glass Technician		100%			



Section 3

PROGRAM CONTENT

Automotive Glass Technician



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

Objectives

To be competent in this area, the individual must be able to use PPE and safety equipment.

LEARNING TASKS

CONTENT

- | | |
|---|---|
| <p>1. Identify health risks</p> | <ul style="list-style-type: none"> • Effects • Irritants • Toxins • Carcinogens • Biohazards • Routes of entry • Other hazards <ul style="list-style-type: none"> ○ Noise ○ Vibration ○ Materials ○ Particulate matter ○ Cuts ○ Musculoskeletal injuries |
| <p>2. Describe PPE and safety equipment</p> | <ul style="list-style-type: none"> • PPE <ul style="list-style-type: none"> ○ Glasses ○ Gloves and gauntlets ○ Respirator ○ Steel toes ○ Ear protection ○ Face shield • Safety equipment <ul style="list-style-type: none"> ○ Emergency shutoffs ○ Fire control ○ Eye-wash facilities ○ Spill kit ○ Emergency exits ○ First aid facilities ○ Outside meeting place |
| <p>3. Use PPE and safety equipment</p> | <ul style="list-style-type: none"> • Inspection • Fit and adjustments • Maintenance • Storage • Safety for mobile units |



LEARNING TASKS

4. Apply personal safety practices

CONTENT

- Responsibility for self and others
- Personal safety rules
- Attention to surroundings
- Clear communication
- Lifting and carrying

Achievement Criteria

Performance The learner will apply personal safety practices during all shop activities.

Conditions The learner will be given the following:

- Workplace orientation
- Clear expectations
- Access to OHS regulations and WorkSafeBC Standards
- Access to PPE

Criteria The learner will start with 100% and a demerit system will be applied for safety infractions.



Line (GAC): A PERFORM SAFETY-RELATED FUNCTIONS

Competency: A2 Maintain safe work environment

Objectives

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

- Identify safety issues in a work environment.
- Apply safe work practices in a work environment.

LEARNING TASKS

1. Describe WorkSafeBC and OHS regulations
2. Assess hazards
3. Describe fire safety procedures
4. Use Workplace Hazardous Materials Information System (WHMIS)

CONTENT

- Occupational health and safety regulations
- Role of WorkSafeBC
 - Inspections
 - Prevention
 - Insurance
- Rights and responsibilities
- Bullying/harassment
- Risk (location-specific) assessment
- Materials
 - Corrosives and explosives
 - Flammable materials
 - Spills
 - Tripping hazards
 - Lifting
- Hazards from vehicle
 - Hood props
 - Trailer hitch, tail lift and canopy gates, racks
 - Collision damage
 - Biohazards and debris
 - Supplemental Restraint Systems (SRS)
 - Hybrids and electric vehicles
- Types and causes of fire
- Fire prevention
- Fire extinguisher use
- Evacuation
- WHMIS legislation
- Labelling and symbols
- MSDS
 - Hazards
 - Handling



LEARNING TASKS

5. Apply safe work practices

CONTENT

- Ingredients
- Storage
- Materials storage and disposal
- Lockout procedures
- Tool and equipment inspection
- Clean and organized work area
- Reporting safety issues



Line (GAC): **A** **PERFORM SAFETY-RELATED FUNCTIONS**
Competency: **A3** **Adhere to requirements of federal vehicle safety standards**

Objectives

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

- Describe requirements of federal vehicle safety standards.
- Describe obligations and liabilities associated with auto glass installation.

LEARNING TASKS

1. Describe federal vehicle safety standards

2. Describe obligations and liabilities

CONTENT

- Original Equipment Manufacturer (OEM)
- Federal motor vehicle safety standards
- Structural integrity of vehicle
- Supplemental restraint systems (SRS)
- Crash mitigation systems

- Technician’s role
- Employer’s role
- Insurer’s role
- Vehicle owner’s role



Line (GAC): B USE TOOLS, EQUIPMENT, AND SUPPLIES

Competency: B1 Use tools and equipment

Objectives

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

- Use tools and equipment.
- Maintain tools and equipment.

LEARNING TASKS

1. Describe tools and equipment

2. Describe trade-specific tools and equipment

3. Use tools and equipment

CONTENT

- Types and functions
 - Basic hand tools (wrenches, sockets, pliers, screwdrivers)
 - Sanders
 - Air compressors
 - Multimeter (Dual Voltage Ohm Meter)
 - Electric and pneumatic

- Types and functions
 - Rock chip repair
 - Trim removal
 - Glass removal
 - Urethane trimming
 - Caulking guns
 - Suction cups
 - Scan tool
 - Advanced driver assisted (ADAS) calibration

- Inspection and maintenance
 - Cords
 - Sharpening
 - Lubrication
 - Repair

- Tool selection
- Use
- Storage



Achievement Criteria

Performance The learner will use tools and/or equipment as part of a shop task.

Conditions The learner will be given:

- Access to tools
- A shop task

Criteria The learner will be evaluated on

- Safety
- Tool selection
- Tool use



Line (GAC): **B** **USE TOOLS, EQUIPMENT, AND SUPPLIES**
Competency: **B2** **Use setting and lifting equipment**

Objectives

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

- Use setting and lifting equipment.
- Maintain setting and lifting equipment.

LEARNING TASKS

1. Describe setting and lifting equipment

2. Use setting and lifting equipment

CONTENT

- Types and functions
 - One person windshield setting and lifting assist
 - Suction cups
 - Pump
 - Lever
- Inspection and maintenance
 - Lubrication
- Tool selection
- Technique
- Storage

Achievement Criteria

- | | |
|-------------|---|
| Performance | The learner will use setting and lifting equipment including cups and one person setting and lifting assist as part of a shop task. |
| Conditions | The learner will be given: <ul style="list-style-type: none"> • Access to equipment • A shop task |
| Criteria | The learner will be evaluated on <ul style="list-style-type: none"> • Safety • Equipment selection • Equipment use |



Line (GAC): **B** **USE TOOLS, EQUIPMENT, AND SUPPLIES**
Competency: **B3** **Use supplies**

Objectives

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

- Select supplies.
- Use supplies.

LEARNING TASKS

1. Describe supplies

CONTENT

- Types and functions
 - Adhesives
 - Urethane systems
 - Mirror button adhesive
 - Epoxies
 - Spray adhesive
 - Two-sided tape
 - Sealants
 - Foam core butyl
 - Butyl (tape kit)
 - Trim and attachments
 - Gels
 - Mouldings
 - Fasteners (clips)
 - Cleaners
 - Glass
 - Lubricants
 - Emulsions
 - Windshield repair resins

2. Use supplies

- Manufacturer's specifications
- Supply selection
- Inspection
- Storage
- Inventory management



Line (GAC): C **ORGANIZE WORK AND USE DOCUMENTATION**
Competency: C1 **Communicate with others**

Objectives

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

LEARNING TASKS

1. Describe effective workplace communication

CONTENT

- Customer service best practices
- Internal/external customers
 - Following instructions
 - Clarifying
 - Asking for more details
 - Confirming comprehension
- Setting expectations



Line (GAC): C **ORGANIZE WORK AND USE DOCUMENTATION**
Competency: C2 **Interpret technical information**

Objectives

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

- Use national auto glass specifications (NAGS).
- Describe vehicle manufacturer’s specifications.
- Describe procedure to manage diagnostic trouble codes.

LEARNING TASKS

CONTENT

- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Describe industry terminology
 2. Describe types and characteristics of glass
 3. Describe vehicle construction
 4. Use NAGS
 5. Describe vehicle manufacturers’ specifications | <ul style="list-style-type: none"> • Auto industry terms • Insurance industry terms
 • Laminates • Tempered • Annealed • Acrylics • Polycarbonates • Thickness • Classification (AS1/AS2/AS3) • Colour • Hazards
 • Structure <ul style="list-style-type: none"> ○ Unibody ○ Conventional (full) frame • Components <ul style="list-style-type: none"> ○ Structural ○ Non-structural ○ Trim • Terminology • Calculators <ul style="list-style-type: none"> ○ Labour hours ○ Part pricing ○ Options • Catalogue <ul style="list-style-type: none"> ○ Part numbers ○ Options ○ Tint/shade
 • Fixed glass height/depth • Retention • OEM requirements • Determine if vehicle can be powered up |
|--|---|



LEARNING TASKS

- 6. Describe diagnostic trouble (error) codes

Achievement Criteria

Performance	The learner will use NAGS.
Conditions	The learner will be given <ul style="list-style-type: none"> • NAGS catalogue • NAGS calculator • Task sheet • A vehicle
Criteria	The learner will be evaluated on <ul style="list-style-type: none"> • Accuracy of results

CONTENT

- during repair
- Original equipment (OE) repair manual
- Technical service bulletin
- Hybrids and EVs
- Causes and preventions
- Identification
- Risk of added cost re: code reset
- Resolution of codes



Line (GAC): C **ORGANIZE WORK AND USE DOCUMENTATION**
Competency: C3 **Contribute to preparation of estimates and supplements**

Objectives

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

- Perform pre-inspection.
- Identify repair-related damage.
- Identify damage / condition unrelated to the repair.

LEARNING TASKS

1. Describe estimates and supplements

2. Assess damage

CONTENT

- Types and purposes
- Required information
- Who prepares it
- Pre-inspection
- On-going inspection during repair or replacement
- Repair or replacement
- Windshield repair
 - Age of damage
 - Location of damage
 - Size
 - Quantity
 - Repairability
- Identification and documentation of
 - Issue
 - Parts and components
 - After-market accessories
 - Tinting
 - Vent shades
 - Sun shades
 - Remote starters
 - Decals
 - Antennas
 - Condition of vehicle
 - Safety concerns
 - Diagnostic trouble codes
 - Damage related to the repair
 - Corrosion
 - Broken regulators
 - Damage unrelated to the repair
 - Glass front channel wear



LEARNING TASKS

CONTENT

3. Identify and communicate needs

- Rock chips (on a vandalism claim)
- Taking pictures
- Testing
 - Wiper function/rain sensors
 - ADAS (advanced driver assist system)
 - Heater grids
 - Remote starters
- Scope of repair
- Components and other parts needed to do the repair
- Communication with CSR (Customer Service Representative)

Achievement Criteria

Performance The learner will perform a pre-inspection.
 Conditions The learner will be given

- A vehicle
- A pre-inspection checklist

 Criteria The learner will be evaluated on accuracy of pre-inspection.



Line (GAC):	C	ORGANIZE WORK AND USE DOCUMENTATION
Competency:	C4	Organize parts, materials and work area

Objectives

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

- Plan work flow.
- Organize parts, materials and work area.

LEARNING TASKS

1. Prepare work procedures

2. Prepare tools, equipment and supplies

CONTENT

- Determine scope of work
- Determine procedure
- Plan work flow
 - Manage system calibration
 - Determine environment/location
 - Temperature/humidity
 - Staffing
- Tool selection and gathering
- Selection of vehicle protection
- Urethane systems
 - Batch numbers
 - Expiry dates
 - Open dates
- Inspect, verify and prepare parts
 - Moulding
 - Glass
 - Trim
 - Mechanical parts
 - Regulators
 - Fasteners (clips)
- PPE and safety equipment



Achievement Criteria

Performance The learner will organize parts, materials and work area for a specific task.

- Conditions The learner will be given
- PPE
 - Vehicle
 - Work order
 - Access to parts, tools and supplies

- Criteria The learner will be evaluated on
- Safety
 - Preparation for specific task



Line (GAC): D **PREPARE VEHICLE**
Competency: D1 **Identify supplemental restraint systems**

Objectives

To be competent in this area, the individual must be able to describe supplemental restraint systems (SRS).

LEARNING TASKS

1. Describe SRS

CONTENT

- Technical information
- Air bag deployment
- Risks
 - Caustic powder from SRS deployment
 - Working around SRS
- Wire colour
- Sensors
- Determine location



Line (GAC): **D** **PREPARE VEHICLE**
Competency: **D2** **Remove contaminants**

Objectives

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

- Identify contaminants.
- Remove contaminants.

LEARNING TASKS

1. Remove contaminants to prepare to work on the vehicle

CONTENT

- From vehicle
 - Water/snow
 - Leaves/debris/sap
 - Broken glass
- From parts/work area
- Methods
 - Vacuum
 - Compressed air
 - Water
 - Cleaning agents
- Biohazard
 - Identification
 - Safe removal

Achievement Criteria

Performance The learner will remove contaminants to prepare to work on the vehicle.
Conditions The learner will be given

- Vehicle
- Access to removal equipment

Criteria The learner will be evaluated on effectiveness of contaminant removal.



Line (GAC): D **PREPARE VEHICLE**
Competency: D3 **Protect undamaged areas**

Objectives

To be competent in this area, the individual must be able to protect vehicle from damage during service.

LEARNING TASKS

CONTENT

- | | |
|---|--|
| <p>1. Identify areas requiring protection</p> | <ul style="list-style-type: none"> • Defrost/heat vents • Vent shades • Speakers • Dash • Parcel shelf • Upholstery • Body panels • Trim • Wipers • OEM sunshades • Seat belts • Damage from clothing <ul style="list-style-type: none"> o Buckles o Rivets |
| <p>2. Select protection method</p> | <ul style="list-style-type: none"> • Fender covers • Hood covers • Door sill covers • Floor mats • Seat covers • Masking/taping <ul style="list-style-type: none"> o Vehicle o Tool |

Achievement Criteria

Performance The learner will protect undamaged areas of vehicle when performing shop task.

Conditions The learner will be given

- Vehicle
- Access to protection materials

Criteria The learner will be evaluated on

- Selection of protection method
- Application of protection



Line (GAC): E **PERFORM WINDSHIELD REPAIR**
Competency: E1 **Prepare surface for repair**

Objectives

To be competent in this area, the individual must be able to prepare surface and impact area for repair.

LEARNING TASKS

1. Identify type of break

2. Identify environmental conditions

3. Remove contaminants

4. Prepare break

CONTENT

- Star
- Bulls eye
- Combination
- Bee's wing

- Temperature
- Sunlight
- Precipitation

- Moisture
 - Acetone
 - Heat
 - Vacuum
- Hydrophobic coating
 - Razor blades
 - Acetone
- Glass debris
 - Air duster
 - Brushes

- Open impact area to receive resin
 - Probe
 - Drill

- Final contaminant removal



Line (GAC): E **PERFORM WINDSHIELD REPAIR**
Competency: E2 **Repair laminated glass**

Objectives

To be competent in this area, the individual must be able to repair glass.

LEARNING TASKS

1. Select resin

2. Repair glass

CONTENT

- Thin
- Regular
- Pit fill

- Inject resin
- Verify repair is filled
- Pit fill
- Mylar
- UV light
- Polish
- Clean

Achievement Criteria

Performance The learner will repair laminated glass.
Conditions The learner will be given

- Laminated glass
- Windshield repair (WSR) kit

Criteria The learner will be evaluated on

- Adherence to procedure
- Completed repair



Line (GAC): F **REMOVE, REPAIR AND INSTALL COMPONENTS**
Competency: F1 **Remove components**

Objectives

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

- Determine if component(s) require removal.
- Remove components with minimal or no damage.

LEARNING TASKS

1. Describe components

2. Remove components

CONTENT

- Mouldings
 - Applique
 - Belt
 - Windshield
 - Side
- Run channels
- Cowling
- Fasteners (clips)
- Hoses
- Interior trim panels
- Sensors
- Regulators
- Rear view mirrors
- Wipers
- Antennas/satellite
- Door panels
- Remote start
- Alarms
- Procedure
 - Removal
 - Avoiding damage
 - Inspection
 - Labelling
- Temporary storage



Achievement Criteria

- Performance The learner will remove components as part of a glass replacement task.
- Conditions The learner will be given
- Vehicle
- Criteria The learner will be evaluated on
- Removal of components with minimal or no damage



Line (GAC): F **REMOVE, REPAIR AND INSTALL COMPONENTS**
Competency: F2 **Install components**

Objectives

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

- Determine if component requires replacement or reinstallation.
- Prepare and install components.
- Test component functionality.

LEARNING TASKS

1. Determine if component will be replaced or reinstalled.

2. Prepare components

3. Install components

CONTENT

- Sensors
- Decals
- Antennas
- Fasteners (clips)
- Mouldings
- Clean-up
- Adhesives and 2-sided tape
- Primers
- Antennas
- Sensors
- Fasteners (clips)
- Mouldings
- Install/Fit
- Test functionality

Achievement Criteria

Performance The learner will prepare, install and test components as part of a glass replacement task.
Conditions The learner will be given

- Vehicle

Criteria The learner will be evaluated on

- Installation of components



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G1** **Remove non-bonded glass/materials**

Objectives

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

- Select removal method.
- Remove non-bonded glass and materials.

LEARNING TASKS

1. Identify fastening method and materials

3. Remove non-bonded glass and materials

CONTENT

- Gaskets
 - Bonded
- Sealants
- Fasteners
 - Bolts
 - Fasteners (clips)
 - Rivets
 - Everseal
 - 2-part epoxy
- Select removal method
- Mark fastener locations and positions
- Clean up

Achievement Criteria

Performance The learner will remove non-bonded glass as part of a glass replacement task.
Conditions The learner will be given

- Vehicle

Criteria The learner will be evaluated on

- Non-bonded glass removal



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G2** **Remove bonded glass/materials**

Objectives

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

- Select removal method.
- Remove bonded glass and materials.

LEARNING TASKS

1. Select removal method

2. Remove bonded glass and materials

CONTENT

- Vehicle construction
 - Exposed pinchweld
 - Encapsulated
- Replace vs. reinstall
- Wire cutout
- Cold knife cutout
- Reciprocating tool
- Mark fastener locations and positions
- Clean up
- Storage

Achievement Criteria

Performance The learner will remove bonded glass or material as part of a glass replacement task.
 Conditions The learner will be given

- Vehicle

 Criteria The learner will be evaluated on

- Bonded glass removal



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G3** **Prepare surfaces for bonding**

Objectives

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

- Identify pinchweld conditions.
- Prepare pinchweld surface for bonding.
- Prepare glass surface for bonding.

LEARNING TASKS

1. Describe pinchweld conditions

2. Prepare pinchweld

3. Prepare glass and material

CONTENT

- Substrate integrity
 - Collision/other repair considerations
 - Corrosion
 - Paint conditions
 - New paint
 - Curing/off-gassing
 - Adhesion
 - Cohesion
- Pinchweld surface materials
 - Aluminum
 - Fiberglass reinforced plastics (FRP)
 - Sheet metal
 - Magnesium
- Previous repair materials
- Urethane conversion (tape to urethane)
- Contamination
- Trim urethane
- Substrate integrity restoration as required
- Test integrity of existing urethane bead
- Adhesive manufacturers' specifications
 - Cleaning
 - Remove contaminants
 - Trim laminate
 - Moulding
 - Encapsulation prep
 - Flash times
- Clean recycled glass



Achievement Criteria

- Performance The learner will prepare surfaces for bonding as part of a glass replacement task.
- Conditions The learner will be given
- Vehicle
 - Manufacturers' specifications
- Criteria The learner will be evaluated on
- Surfaces prepared for bonding according to manufacturers' specifications



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G4** **Fabricate template**

Objectives

To be competent in this area, the individual must be able to measure, lay out and fabricate a template.

LEARNING TASKS

1. Describe need for templates

2. Prepare to fabricate template

3. Fabricate template

CONTENT

- Availability of part
- Older vehicles
- Heavy equipment
- Custom vehicles
- Recreational vehicles
- Material selection
 - Cardboard
 - Paper
- Installation method
- Cut size/opening size
 - Tape measure reading
 - Fractions
 - Calculations
- Drawing
- Cutting
- Interior/exterior
- Marking
 - Inside/outside
 - Special considerations
 - Bevel
 - Radius corners
 - Allowances
 - Hole size and placement
 - Finishing edges



Achievement Criteria

Performance	The learner will fabricate a template.
Conditions	The learner will be given <ul style="list-style-type: none">• Aperture• Template materials• Measuring, marking and cutting tools
Criteria	The learner will be evaluated on accuracy of fit.



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G5** **Cut glass/material**

Objectives

To be competent in this area, the individual must be able to describe glass fabrication.

LEARNING TASKS

- 1. Select glass/material

- 2. Fabricate glass/material

- 3. Finish glass/material

CONTENT

- Characteristics
 - Type
 - Thickness
 - Tint
- Manufacturers' specifications
- Tool/material selection
 - Oil
 - Methyl hydrate
 - Razor blade
 - Cutting table
 - Straight edge
 - Glass pliers
 - Glass cutter
 - Carbide blade
- Methods/techniques
 - Running a cut
 - Snapping
 - Using a glass cutter
- Edge work
- Frit band



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G6** **Install non-bonded glass/materials**

Objectives

To be competent in this area, the individual must be able to install non-bonded glass/materials

LEARNING TASKS

1. Install non-bonded glass/materials

2. Adjust fit and function

CONTENT

- Manufacturers' specifications
- Tool selection
- Fasteners
- Cups
- Dry fit
- Installation sequence
- Alignment
- Function
 - Power slider
 - Lift gate latch
 - Anti-pinch
- Testing methods
 - Paper
 - Leak

Achievement Criteria

Performance The learner will install non-bonded glass/material.
Conditions The learner will be given

- Vehicle
- Glass/material

Criteria The learner will be evaluated on fit and function.



Line (GAC): **G** **REMOVE AND INSTALL GLASS/MATERIALS**
Competency: **G7** **Install bonded glass/materials**

Objectives

To be competent in this area, the individual must be able to install bonded glass/materials.

LEARNING TASKS

1. Install bonded glass/materials

2. Adjust and secure bonded glass/material

3. Record installation and drive away time

CONTENT

- Manufacturers' specifications
- Adhesive application techniques
 - V-bead
 - Application surface
- Tool selection
 - Cups
 - One person setting assist device
- Placement techniques
- Tape
- Setting blocks
- Locator pins
- Height
- Rationale for recording safe drive away times
 - Federal vehicle safety standards
- Impacts on drive away time
 - Temperature
 - Humidity
 - Product
- Shop-specific documentation
 - Work order
 - Technician's data sheet
 - Inspection form

Achievement Criteria

Performance The learner will install bonded glass/material.

Conditions The learner will be given

- Vehicle
- Glass/material

Criteria The learner will be evaluated on following recommended procedure and part fit.



Line (GAC): **H** **PREPARE VEHICLE FOR DELIVERY**
Competency: **H1** **Verify system calibration**

Objectives

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

- Identify advanced technology systems
- Determine calibration requirements

LEARNING TASKS

1. Describe advanced technology systems

2. Identify presence of advanced technology system

3. Determine calibration requirements

CONTENT

- Advanced Driver Assist Systems (ADAS)
 - Static vs. dynamic
 - Lane departure warning
 - Park assist
 - Blind spot detection
 - Crash mitigation
- Vision assist systems
 - Forward facing cameras
 - 360° cameras
- Convenience systems
 - Rain sensors
 - Smart phone connectivity
 - Passive entry
- Manufacturers' specifications
- Consult National Automotive Glass Standards (NAGS)
- Vehicle Identification Number (VIN) decode
- Visual inspection
- Warning lights
- In-house
- Dealer
- Sublet
- Plan calibration
- Documentation of calibration



Line (GAC): **H** **PREPARE VEHICLE FOR DELIVERY**
Competency: **H2** **Perform final inspection**

Objectives

To be competent in this area, the individual must be able to perform final inspection.

LEARNING TASKS

1. Inspect for quality of service

2. Contribute to final documentation

CONTENT

- Cleanliness
 - Final glass cleaning
 - Vacuuming
- Functionality
 - Wiper park
 - Rain sensor
 - Anti-pinch
- Repair/installation
- Providing technical data
 - Safe drive away time
 - Technician name and trade qualification number
 - Adhesive batch numbers



Line (GAC):	I	PERFORM TROUBLESHOOTING PROCEDURES
Competency:	I1	Diagnose water leaks

Objectives

To be competent in this area, the individual must be able to describe troubleshooting techniques for water leaks.

LEARNING TASKS

1. Describe water leaks
2. Diagnose water leaks
3. Repair water leak

CONTENT

- Adhesion failure
- Paint failure
- Human error
- Body construction
- Drain holes
- Gaskets
- Vapour barriers
- Fresh air systems
- Interview customer
- Tests
 - Air
 - Ultrasonic
 - Water
- Check
 - Warranties
 - Recalls
 - Technical service bulletins (TSBs)
- Sealant
- Parts removal and install to assist



Line (GAC):	I	PERFORM TROUBLESHOOTING PROCEDURES
Competency:	I2	Diagnose glass-related issues

Objectives

To be competent in this area, the individual must be able to describe troubleshooting techniques for glass-related issues.

LEARNING TASKS

1. Describe glass-related issues

2. Diagnose glass-related issues

3. Repair glass-related issues

CONTENT

- Electrical failures
 - Circuit integrity
 - Faulty ground
 - Auto up/down
- Mechanical failure
 - Door handles
 - Locks
 - Hinges
 - Latches
- Wind noise/vibration

- Interview customer
- Test functionality
- Test drive
- Visual inspection
 - Fuses
 - Leads plugged in
- Check
 - Warranties
 - Recalls
 - Technical service bulletins (TSBs)
- Correct deficiency
 - In-house
 - Sublet



Section 4

TRAINING PROVIDER STANDARDS



Facility Requirements

Overall facility

- Comply with WorkSafe BC
- Comply with municipal building codes
- Comply with municipal bylaws and zoning law
- Comply with municipal and provincial environmental laws
- Provide adequate climate control

Shop Area

- Adequate demonstration area
- Adequate space for learners to work on and around vehicles
- Adequate lighting and heating

Classroom Area

- Comfortable seating and tables suitable for teaching and learning
- Adequate control of lighting to allow for visibility of projection screen
- Acoustics in the room must allow audibility of the instructor
- Whiteboard with markers and eraser (optional: flipchart)
- Projection screen or projection area
- Overhead projector and/or multi-media projector



Tools and Equipment

Safety Tools and Equipment

- Coveralls
- Eye wash station
- Hearing protection
- Face shield
- Fire protection
- First aid kit
- Methyl hydrate safety dispenser
- Protective gloves
 - anti-cut (laceration)
 - anti-vibration
 - anti-chemical
- Respirators
 - Particulate
 - Vapour
- Safety glasses
- Steel toed boots/shoes

Standard Tools

- Awls
- Blow gun
- Caulking gun
- Centre punch
- Chisels, punches
- Die grinder
- Door trim panel tools
- Drill and bits
- Files
- Flash lights
- Gasket locking strip insertion tool
- Glass cutting square
- Hacksaw
- Hammers – ball peen/dead blow/rubber
- Hex (allen) keys – sae and metric
- Hood/seat covers
- Hook tool
- Impact driver and bits
- Impact socket set – ½” drive, sae and metric
- Inspection mirror
- Jumper lead
- Magnetic pick up tool
- Measuring and marking tools
- Mechanic’s pick set
- Multimeter (dvom) and test/jumper leads
- Nut driver set – sae and metric
- Pliers – slip joint, needle nose, adjustable, wheel weight, side cutter, snap ring, locking, hog ring and battery types
- Pry bar
- Ratchet and sockets – ¼”, ⅜” drive – sae and metric, swivel, extensions and adapters
- Rivet guns – large and small
- Scrapers
- Screwdriver sets
- Soldering tools
- Tap and die set – sae and metric
- Test lamp –electronics safe (powered and non-powered)
- Tin snips – centre, left and right cut
- Torx bits/sockets
- Utility knife
- Windshield moulding removal tool
- Wiper arm puller
- Wire stripper/crimping tool
- Wrench set – sae and metric/various designs



Shop Tools and Equipment

- Air compressor – hoses – inline filter and water separators
- Battery charger/boosting equipment
- Bench grinders
- Bench vises
- Dash covers
- Fender covers
- Glass cutting table
- Glass storage rack
- Heat gun
- Propane torch
- Seat covers
- Scan tool
- Temperature/humidity gauge
- Trouble light
- Ultrasonic tester
- Vacuum cleaner
- Water hose
- Windshield stand

Specialty Tools and Equipment

- Carbide cutter
- Caulking guns
- Cut out tools
 - Knife (cold knife)
 - Reciprocating (Equalizer™, Extractor™)
 - Manual wire system
 - Wire/cord system (Spyder™, Cobra™)
- Fibre stick
- Glass cutter
- Glass pliers

One person lift assist (Lil Buddy™, SOLO®NEO™)

- Rear view mirror tools
- Windshield repair kit



Reference Materials

Required Reference Materials

- National Auto Glass Specifications (NAGS) - calculator and catalogue, including Advanced Driver Assistance Systems (ADAS)

Suggested Texts

- Beranek, B. (2011) *The Complete Guide to Auto Glass Installation: A Textbook*. ISBN-13: 978-1463441487 / ISBN-10: 1463441487.
- Erjavec, J. (2005). *Automotive technology: a systems approach*. ISBN-10: 0176531521 / ISBN-13: 978-0176531522. (See page 568 Photo Sequence Grid Wire Repair)
- Mills, W. (2011) *Auto Glass Technical Training Manual*. ISBN-10: 1300751282 / ISBN-13: 978-1300751281

Resource materials

- Industry Conference on Auto Collision Repair (I-CAR) training modules (<https://www.i-car.com/>):

TRM02 Removing and Installing Hardware and Interior Trim

DAM01 Vehicle Identification, Estimation Systems, and Terminology

GLA01 Movable Glass

GLA02 Stationary Glass

WNW01 Wind Noise and Water Leaks



Instructor Requirements

Occupation Qualification

The instructor must possess:

- Automotive Glass Technician with a British Columbia Certificate of Qualification endorsement

Work Experience

- Must have a minimum of 5 years' experience as an Automotive Glass journeyman.
- Must have diverse Auto Glass industry experience including that which would cover scope of trade.
- Must have recent Auto Glass trade experience.

Instructional Experience and Education

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

- Instructors' Certificate
- Provincial Instructors' Diploma Program
- Bachelors or Master's degree in Education



Appendices



APPENDIX A

Assessment Guidelines



Appendix A: Assessment Guidelines

Program: Automotive Glass Technician

Training providers delivering Automotive Glass Technician apprenticeship in-school technical training are required to enter the following information in ITA Direct Access for each apprentice:

- An in-school mark in the form of a percentage
(Minimum 70% is required for a pass)

The in-school mark for each level is the result of a combination of theory and practical assessments.

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.

Automotive Glass Technician 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 X% 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 X% to produce a weighted practical result;
- Adding the weighted theory and practical competency results together to determine the final in-school result.

ITA Certificate of Qualification Exam

In order to achieve certification, Automotive Glass Technician apprentices are required to write the ITA Certificate of Qualification exam after completing in-school technical training. Apprentices must have passed in-school technical training or be approved challengers to sit the exam. A score of 70% or greater is required for a pass.

ITA Certificate of Qualification exams should be requested by training providers via the usual ITA procedure.

The ITA will administer and invigilate ITA Certificate of Qualification exams and score and record exam results in ITA Direct Access.



Grading Sheet: Subject Competency and Weightings

PROGRAM: IN-SCHOOL TRAINING:		AUTOMOTIVE GLASS TECHNICIAN	
LINE	SUBJECT COMPETENCIES	THEORY WEIGHTING	PRACTICAL WEIGHTING
A	PERFORM SAFETY-RELATED FUNCTIONS	15%	10%
B	USE TOOLS, EQUIPMENT AND SUPPLIES	5%	5%
C	ORGANIZE WORK AND USE DOCUMENTATION	5%	5%
D	PREPARE VEHICLE	5%	5%
E	PERFORM WINDSHIELD REPAIR	15%	15%
F	REMOVE, REPAIR AND INSTALL COMPONENTS	15%	20%
G	REMOVE AND INSTALL GLASS/MATERIALS	30%	40%
H	PREPARE VEHICLE FOR DELIVERY	5%	0%
I	PERFORM TROUBLESHOOTING PROCEDURES	5%	0%
	Total	100%	100%
In-school theory / practical subject competency weighting		50%	50%
Final in-school mark Apprentices must achieve a minimum 70% for the final in-school mark to be eligible to write the Automotive Glass Technician Certificate of Qualification exam.		IN-SCHOOL%	

C of Q Exam Mark A score of 70% or higher is required for a pass.	EXAM%
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All apprentices who complete the Automotive Glass Technician program with a FINAL in-school mark of 70% or greater will write the Automotive Glass Technician Certificate of Qualification examination as their final assessment. A minimum mark of 70% on the examination is required for a pass.



APPENDIX B

Glossary



Appendix B: Glossary

ADAS	Advanced driver assist system are systems to help the driver in the driving process.
AS1/AS2/AS3	American Standard followed by a number indicates where on the vehicle that type of glass can be used. It also indicates the clarity of the glass, with AS1 being the clearest.
Describe	To explain or give an account of an item or concept. This means an introduction to a topic area that will include terminology, safety as it pertains to the topic, types and uses of the item. For example, describing steering columns will include types, such as tilt and telescoping, steering wheel locks and combination switches.
FRP	Fiberglass reinforced plastic
Identify	Establish or indicate what something is. This is the most basic level of learning and typically precedes all others, including describing. In the case of a lengthy learning period (such as an apprenticeship), it is often adequate to identify a tool or procedure well in advance of actually describing and using the tool.
Interpret	To explain or understand the meaning of something. This primarily refers to using wiring diagrams and data.
Maintain	To keep a tool or an area in good condition by performing regular maintenance such as lubrication or cleaning, as well as making repairs and correcting problems.
MSDS	A Material Safety Data Sheet is a document that contains information on the potential hazards and how to work safely with a chemical product.
NAGS	National Auto Glass Specifications publishes catalogues, calculators and guides every four months with the latest data for the auto glass industry.
OEM	Original Equipment Manufacturer
OHS	Occupational Health and Safety regulations contain legal requirements that must be met by all workplaces under the inspectional jurisdiction of WorkSafeBC.
Options	Features originally equipped at time of manufacture.
Pneumatic	Operated by compressed air.
PPE	Personal Protective Equipment
SRS	Supplemental restraint systems
Systems	A set of components working together as parts of a mechanism or an interconnecting network.
TSB	Technical service bulletins
Use	The act of using something. This typically involves the safe and proper operation of a tool or system.



UV

Ultraviolet light

VIN

The vehicle identification number is the unique identifying code for a specific automobile.

WHMIS

The Workplace Hazardous Materials Information System is Canada's national hazard communication standard.

WSR

Windshield repair



APPENDIX C

Previous Contributors



Appendix C: Previous Contributors

The Program Outline was prepared with the advice and direction of an industry steering committee convened initially by the Automotive Training Standards Organization.

Industry Representatives:

- Gord Hemrich
- Terry Hislop
- Tim Owens

Automotive Training Standards Organization:

- Lloyd Stamm
- Kevin Cudmore
- Lee Bouchard