



**Skilled
Trades**
Ontario

**Métiers
spécialisés**
Ontario

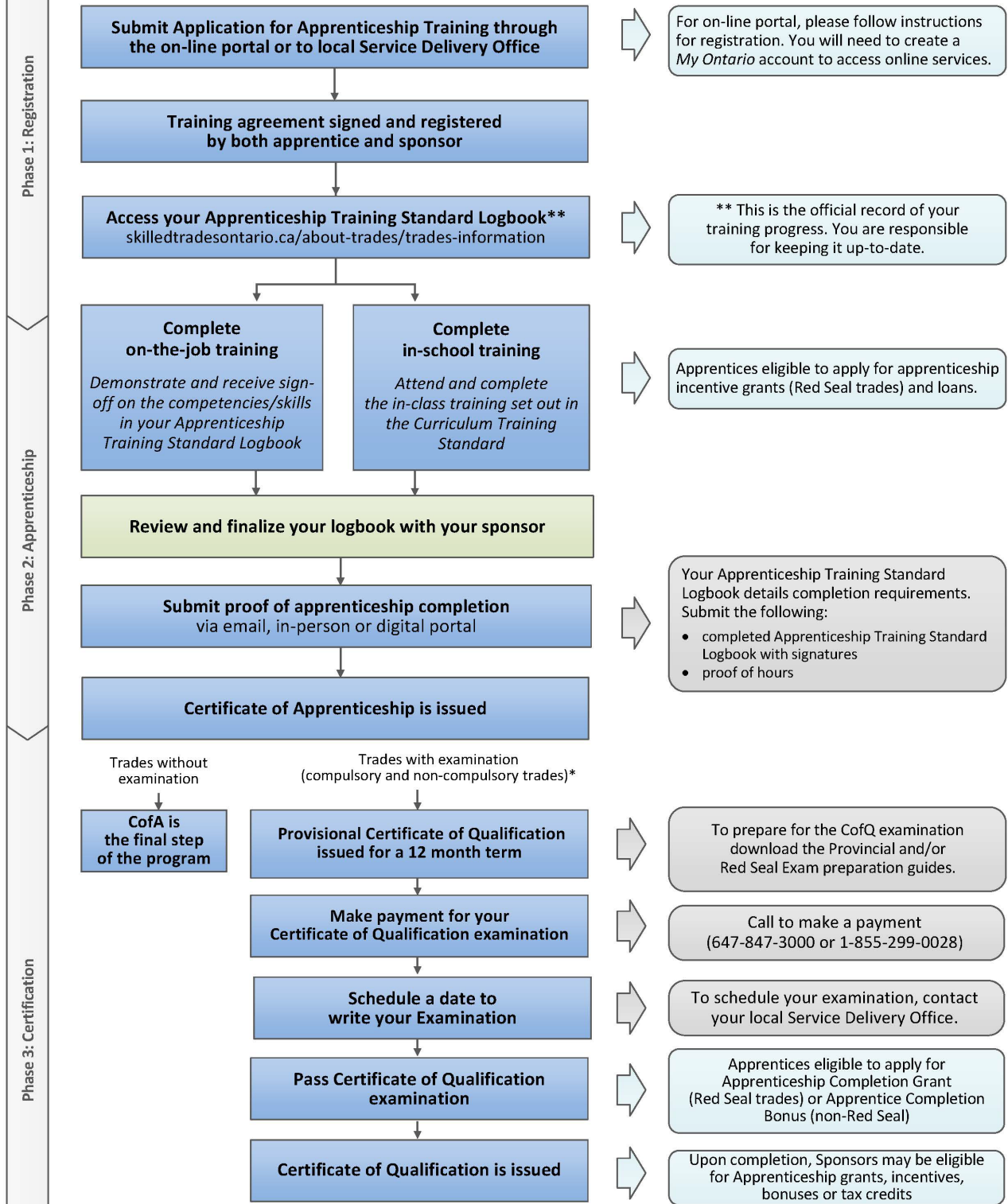
Apprenticeship
Curriculum Standard

Automotive
Glass Technician

274L

2005

Apprenticeship Pathway to a Certificate of Qualification



* For a list of trades subject to a certification examination, visit: skilledtradesontario.ca

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Please Note: This Standard has been revised to reflect the visual identity of Skilled Trades Ontario (STO) which replaced the Ontario College of Trades on January 1, 2022. The content of this Standard may refer to the former organization; however, all trade specific information or content remains relevant and accurate based on the original date of publishing.

Please refer to STO's website: skilledtradesontario.ca for the most accurate and up to date information. For information about BOSTA and its regulations, please visit [Building Opportunities in the Skilled Trades Act, 2021 \(BOSTA\)](#).

Any updates to this publication are available on-line; to download this document in PDF format, please follow the link: [Skilled Trades Ontario.ca](https://skilledtradesontario.ca).

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Maintained with transfer to Skilled Trades Ontario 2005 (V100)

Preface

This curriculum standard for the Automotive Glass Technician trade program is based upon the on-the-job performance objectives, located in the industry-approved training standard.

The curriculum is organized into 12 reportable subject levels of training. The Reportable Subjects Summary chart (located on page 5) summarizes the training hours for each reportable subject.

The curriculum identifies the learning that takes place in-school. The in-school program focuses primarily on the theoretical knowledge and the essential skills required to support the performance objectives of the Apprenticeship Training Standards.

Employers/Sponsors are expected to extend the apprentice's knowledge and skills through practical training on a work site. Regular evaluations of the apprentice's knowledge and skills are conducted throughout training to verify that all apprentices have achieved the learning outcomes identified in the curriculum standard.

It is not the intent of the in-school curriculum to perfect on-the-job skills. The practical portion of the in-school program is used to reinforce theoretical knowledge. Skill training is provided on the job.

Please refer to Skilled Trades Ontario website (www.skilledtradesontario.ca) for the most accurate and up-to-date information about Skilled Trades Ontario. For information on *Building Opportunities in the Skilled Trades Act, 2021 (BOSTA)* and its regulations, please visit [Building Opportunities in the Skilled Trades Act, 2021, S.O. 2021, c. 28 - Bill 288 \(ontario.ca\)](http://www.skilledtradesontario.ca/building-opportunities-in-the-skilled-trades-act-2021)

Hours Disclaimer (if applicable)

It is agreed that Training Delivery Agents (TDAs) may need to make slight adjustments (with cause) according to particular apprentice needs and may deviate from the unit sequencing and the prescribed practical and theoretical hours shown within the standard. However, all TDAs will comply with the hours at the reportable subject level.

Suggested Equipment for Training Delivery Agencies

The listing of tools on page 60 and page 61 does not list minimum quantities based on the understanding that the delivering TDA is in the best position to determine the need based on its delivery methodology.

Personal and Safety Equipment: Personal protective equipment is at the discretion of the TDA who must conform to Ontario Provincial Health and Safety Regulations.

Introduction

The Automotive Glass Technician curriculum has been developed in keeping with the prescribed Ministry of Labour, Immigration, Training and Skills Development (MLITSD) Training Standards. The curriculum design provides an opportunity to cross-reference the in-school learning outcomes to the specific workplace Training Standards.

For easy reference, a time allocation has been included for each reportable subject and unit, along with the Theory/Practical breakdown for the delivery of the Learning Content. More detailed time allocations for the instructor have been provided for each topic area to assure consistency for each apprentice intake.

The continual introduction of innovative techniques and more complex equipment is resulting in increasing demands for tradespersons who are not only skilled in the practical aspects of the trade, but who also have a sound theoretical knowledge of the inspecting, diagnosing, repair, and servicing requirements. The curriculum has been developed to provide this theoretical knowledge and to offer some practical applications to complement the on-the-job work experiences of the Automotive Glass Technician apprentices.

The objectives of the curriculum, therefore, are to provide a basis for:

- a) Sound theoretical training to meet the challenges presented by the increasingly more complex designs and testing techniques.
- b) A reinforcement of fundamental skills of the trade through the exposure to practical applications.
- c) Developing in the apprentices high standards of craftsmanship, problem-solving skills and personal pride in their trade.
- d) Developing desirable work attitudes and a keen sense of responsibility, particularly concerning public and personal safety.

The curriculum has been designed to give the instructor every reasonable opportunity for flexibility and innovation without deviating to any significant degree from the subject requirements, as determined by the Steering Committee. Since the scope of the prescribed curriculum is quite extensive, the apprentices must be expected to reinforce the acquired knowledge through regular independent out-of-classroom assignments. The curriculum has been presented in a chronological sequence in keeping with sound teaching methodologies. However, the actual application of the sequence may differ somewhat between colleges because of scheduling, staffing, and facilities utilization.

The curriculum includes specific references to the Ministry of Labour, Immigration, Training and Skills Development Apprenticeship Training Standards. While these references to various performance objectives in the Training Standards have been linked to the respective in-school outcomes, employers should not assume complete coverage to a journeyman level. The in-school delivery focuses primarily on the knowledge required to master the respective objectives outlined in the Training Standards. Employers, therefore, are expected to complete the training of these respective objectives by applying the prescribed in-school knowledge to the required practical learning experienced in the work setting.

To ensure that apprentices will be able to successfully demonstrate the learning outcomes according to performance criteria, specific times have been allocated in the respective areas to allow for some applications enhancement. It is of utmost importance that all application assignments relate to prescribed experiences only. Time constraints will not permit engaging apprentices in tasks of limited learning benefit that are unrelated to the curriculum outcomes. In the Learning Content section, whenever an assigned operation for an applied test or repair procedure indicates that a demonstration should be performed, there is only enough time allocated for the instructor to perform the activity. If the statement in the assigned operations begins with “perform,” “outline,” “describe,” or “explain,” the apprentice is expected to complete the activity.

Regular evaluations of the apprentices' learning achievements must be performed in both theory and practical applications throughout the program to ensure consistency with learning outcome expectations. Testing of apprentice knowledge and skills will take place during the allotted delivery hours for each unit. In addition to providing an evaluation of apprentice competency, the review of test question answers is considered to be a valuable learning opportunity.

In all practical activities, the apprentices will observe the Occupational Health and Safety Act and the applicable regulations including use of personal protective equipment. Institutional regulations and policies may also apply.

Participation by Stakeholders

A consortium of five colleges of applied arts and technology, working in collaboration with the Ministry of Labour, Immigration, Training and Skills Development and industry stakeholders, participated in the development of this document. The development and subsequent revisions were based on the new training standards. The development was completed using a process and format approved by MLITSD.

The first step in the development process was to assemble a Project Steering Committee (PSC), consisting of both industry representatives and apprenticeship in-school deliverers. The PSC initiated the plan for the project development that followed. The PSC established a working team, responsible for the development of the in-school apprenticeship curriculum document.

The working team worked with advisory groups during the development of the curriculum. The advisory groups were industry representatives who ensured content validity. During various stages of the process, the PSC and participating industry advisory groups evaluated the draft curriculum documents and provided feedback and recommendations for revisions.

Implementation Date:
September 2005

Automotive Glass Technician

Reportable Subject Summary

Number	Reportable Subjects	Hours Total	Hours Theory	Hours Practical
1	Health and Safety	12	9	3
2	Glass Identification	18	15	3
3	Motorized Vehicle Glass Adhesives	12	9	3
4	Removal and Installation of Structurally Bonded Stationary Glass	33	6	27
5	Removal and Installation of Mechanically Fastened Stationary Glass	27	6	21
6	Windshield Chip Repair	18	9	9
7	Removal and Installation of Mechanically Fastened Moveable Glass	33	6	27
8	Removal and Installation of Gasket Mounted Glass	18	6	12
9	Cutting and Fitting Laminated Safety Glass	24	6	18
10	Customer Service and Professionalism in the Workplace	12	3	9
11	Diagnosis and Troubleshooting for Automotive Glass Related Problems	18	6	12
12	Estimating Repair or Replacement Costs	15	6	9
	Total	240	87	153

Number:	1		
Title:	Health and Safety		
Duration:	Total Hours: 12	Theory: 9	Practical: 3
Prerequisites:	None		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard: 6085.01, 6085.02, 6085.03, 6085.04, 6085.05, 6085.06			

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to identify the requirements for compliance with manufacturers' recommendations and specifications and for occupational health and safety procedures and workplace related legislation.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

1.1 Define the purpose and fundamentals of safe work practices.

1.1.1 Wear prescribed personal protective equipment.

- Safety glasses
- Gloves
- Respiratory protection
- Hard hat
- Clothing
- Work boots
- Ear muffs/plugs

1.1.2 Describe the Workplace Hazardous Materials Information System (WHMIS).

- Interpret labels.
 - Types of labels
 - Symbols
 - Colour codes
 - Borders

- Interpret information found on Material Safety Data Sheets (MSDS).
 - Product identification
 - Physical data
 - Ingredients
 - Fire and explosion hazards
 - Health hazard and first aid data
 - Reactivity data
 - Preventive measures
 - Special precautions
 - Preparation information

1.1.3 Comply with workplace-related legislation.

- Describe the Occupational Health and Safety Act.
 - Identify the personal and legal liabilities/obligations.
 - Employer
 - Employee
- Describe the Environmental Protection Act.
 - Hazardous waste storage/removal

1.1.4 Describe safe handling procedures for hand and power tools.

- Visually inspect all tools for damage and wear.
- Tag or report damaged or dysfunctional tools.
- Follow manufacturer's operating recommendations.
- Adhere to scheduled tool maintenance.
- Identify required personal protective equipment specific to the tool.

1.1.5 Describe safe handling procedures for Safety Restraint Systems (SRS).

- Identify SRS symbol locations.
- Explain the function of air bags and curtains, seat belt pre-tensioners, sensors, etc.
- Explain the disabling and enabling procedures for SRS.
- Explain the dangers of working around SRS.
- Identify the legal liability associated with disabling/enabling SRS.

1.1.6 Practice good housekeeping in the work environment.

- Maintain a clean and orderly work area.
 - Ensure work area is free of obstructions.
 - Prevent or clean up spills or leaks.
- Identify location of first aid stations.
- Identify potential work hazards.
- Remove and dispose of potential fire hazards.
 - Fire classifications
 - Extinguishing media
 - Use and inspection of fire extinguishers
 - Location of fire extinguishers

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Glass Association (NGA) Manuals
- Automotive Manufacturers' Manuals
- Industry Standards Reference Documentation
- Internet
- Adhesive manufacturers' websites
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Repair and Replacement (AGRR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- Inter-Industry Conference on Auto Collision Repair (I-CAR). Glass Replacement Course Manual. (1994).
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. See Appendix 1

Evaluation Structure		
Written Assignment	Theory Test	Labs
20%	40%	40%

Number:	2		
Title:	Glass Identification		
Duration:	Total Hours: 18	Theory: 15	Practical: 3
Prerequisites:	Reportable Subject 1		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6087.01, 6088.01, 6089.01, 6090.01, 6091.01, 6092.01, 6093.01, 6094.01, 6095.01, 6096.01		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to identify the construction, design, and application of automotive glass and alternative materials.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

2.1 Identify various types of safety glass and alternative materials.

2.1.1 Explain the construction of laminated glass.

- Inner and outer layers
- Centre layer of vinyl
 - Types of vinyl
 - Thicknesses
 - Purpose
- Heat and pressure (laminating process)
- Breaking characteristics
- Common uses

2.1.2 Explain the construction of tempered glass.

- Heat treating process
- Strength characteristics
- Breaking characteristics
- Common uses

2.1.3 Explain the construction of polycarbonate and acrylic.

- Composite characteristics
 - Flexibility
 - Strength
 - Design flexibility
- Common uses

2.1.4 Explain the various grades of glass.

- AS1
 - Uses in compliance with Highway Traffic Act
 - Optical clarity (distortion)
 - Light transmission
 - UV deflection
 - Thickness of vinyl (.030 inches/.8 mm)
- AS2
 - Uses in compliance with Highway Traffic Act
 - Optical clarity (distortion)
 - Light transmission
 - UV deflection
 - Thickness of vinyl (.015 inches/.4 mm)
- AS3
 - Uses in compliance with Highway Traffic Act
 - Optical clarity (distortion)
 - Light transmission
 - UV deflection
 - Dark tint or privacy glass
 - Tempered or laminated
 - Thickness of vinyl (.4 mm)
- Specialty glass
 - Bullet resistant
 - FR rated (trains)
 - Inner shield protection

2.1.5 Explain the variation and purpose of glass tints.

- Regular
- Shaded
- Privacy
- Solar
- After-market

2.1.6 Explain the auto glass monogram.

- Manufacturers' logo or brand name
- Manufacturer plant code
- Type of glass (laminated or tempered)
- Manufacturer date code
- M number
- Department of Transport (DOT) certification number
- E-mark
- Glass code, i.e., AS1, AS2, or AS3

2.2 Identify various design applications.

2.2.1 Categorize various glass components.

- Modular
 - Reaction Injection Moulding (RIM)
 - Pre-Applied Adhesive System (PAAS)
- Mouldings attached
- Hinged
- Moveable

2.2.2 Identify various design features and attachments.

- Rain sensors
- Global Positioning System (GPS)
- Mirror brackets
- Head Up Display (HUD)
- Antennas
- Heater or defroster lines
- Ceramic frit bands

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- Ontario Highway Traffic Act
- Federal Motor Vehicle Safety Standards

Minimum Equipment List:

1. Safety Equipment (see Appendix 1 for list)
2. Demonstration materials (i.e., glass and polycarbonate)

Evaluation Structure			
Written Assignment	Theory Test	Practical Assignment	Final Assessment
20%	30%	10%	40%

Number:	3		
Title:	Motorized Vehicle Glass Adhesives		
Duration:	Total Hours: 12	Theory: 9	Practical: 3
Prerequisites:	Reportable Subject 1 & 2		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6087.03, 6088.04, 6089.03, 6090.04, 6091.03, 6092.04, 6093.03, 6094.04		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to identify the common types, uses, and specifications of various adhesives.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

3.1 Identify types of glass structural adhesives.

3.1.1 Identify the properties of urethane adhesives.

- Common uses
 - Structurally bonded stationary glass installation
 - Mechanically fastened stationary glass
 - Gasket mounted glass
- Specifications
 - Urethane adhesive manufacturer
 - Product mixing incompatibility
 - Manufacturer testing procedures
 - Vehicle manufacturer
 - Federal Motor Vehicle Safety Standards (FMVSS)
 - Regulation 205 – Unrestrained passenger retention
 - Regulation 208 – Airbag deployment platform
 - Regulation 212 – Glass retention pertaining to structural integrity
 - Regulation 216 – Rollover roof crush resistance
 - Shelf life

- Types
 - Fast cure
 - Two-part
 - Heat activated
 - Regular cure
 - High modulus
 - Low conductivity
 - High viscosity
 - Low viscosity
 - Primerless to glass

3.1.2 Identify the properties of urethane adhesive primers.

- Common uses
 - Structurally bonded stationary glass installation
 - Mechanically fastened stationary glass
 - Gasket mounted glass
- Specifications
 - Urethane adhesive manufacturer
 - Product mixing incompatibility
 - Manufacturer testing procedures
 - Vehicle manufacturer
 - Federal Motor Vehicle Safety Standards (FMVSS)
 - Shelf life (opened and unopened)
- Types
 - Glass primer/prep
 - Body/pinch weld primer
 - Encapsulation primer
 - Corrosion treatment

3.2 Identify adhesives used for mechanically fastened glass.

3.2.1 Identify the properties of foam core butyl.

- Common uses
 - Mechanically fastened stationary glass
- Specifications
 - Foam core butyl adhesive manufacturer
 - Vehicle manufacturer
 - Federal Motor Vehicle Safety Standards (FMVSS)
 - Foam core butyl adhesive manufacturer testing procedures
- Types
 - 6 mm
 - 8 mm

- 3.3 Test the adhesion performance and characteristics of various glass adhesives.
 - Cure times
 - Effect of temperature and humidity
 - Primer application
 - Contaminants
 - Preparation
 - Use of cleaning products
- 3.4 Identify recent technological advancements in adhesives.
 - 3.4.1 Identify the common uses of the new adhesives.
 - 3.4.2 Identify the specifications of the new adhesives.
 - 3.4.3 Identify the types of new adhesives.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Manufacturers' Resource Materials
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Federal Motor Vehicle Safety Standards

Minimum Equipment List:

1. Safety Equipment (see Appendix 1 for list)
2. Product samples
3. Caulking guns
4. Applicators
5. Rags
6. Glass cleaner
7. Recommended cleaning solvents
8. Tongue depressors or steel ribbons for direct pull adhesion test
9. Hygrometer
10. Fire extinguishers
11. Emergency spill kit
12. Demonstration materials (i.e., glass, polycarbonate, adhesive products)

Evaluation Structure			
Written Assignment	Theory Test	Practical Assignment	Final Assessment
20%	30%	20%	30%

Number:	4		
Title:	Removal and Installation of Structurally Bonded Stationary Glass		
Duration:	Total Hours: 33	Theory: 6	Practical: 27
Prerequisites:	Reportable Subject 1, 2, 3		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6087.01, 6087.02, 6087.03, 6087.04, 6088.01, 6088.02, 6088.03, 6088.04, 6088.05, 6097.01, 6097.02, 6097.03		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to remove and install structurally bonded stationary glass to Original Equipment Manufacturer's (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 4.1 Visually inspect the vehicle for pre-existing interior and exterior damage prior to repair.
- 4.2 Verify information on work order.
 - 4.2.1 Verify customer and vehicle information.
 - Vehicle Identification Number (VIN)
 - Licence plate
 - Vehicle make and model
 - Authorizing signature
 - Phone number
 - 4.2.2 Verify work to be performed.

4.3 Visually inspect the affected area.

4.3.1 Inspect the glass for pre-existing damage.

- Identify cause of damage.
 - Stress
 - Impact
 - Corrosion
 - Delamination
 - Improper prior installation

4.3.2 Inspect mouldings and attachments for pre-existing damage and fit.

- Identify cause of damage.
 - Debris impact
 - Deterioration
 - Corrosion
 - Abuse
 - Collision impact
 - Shrinkage
 - Improper prior installation

4.3.3 Inspect electrical and electronic components and connections.

- Wiper operation
- Rain sensor
- Antenna
- Head Up Display (HUD)
- Rear defroster
- Heated windshield
- Washer system
- Global Positioning System (GPS)
- Safety Restraint Systems (SRS) locations

4.4 Remove structurally bonded stationary glass.

4.4.1 Identify the steps required to remove structurally bonded stationary glass.

4.4.2 Ensure availability and condition of replacement parts.

- Like kind and quality to OEM glass and attachments

- 4.4.3 Protect vehicle.
 - Seat covers
 - Dash covers
 - Fender protectors
 - Hood protectors
 - Roof protectors
 - Sill plate covers
- 4.4.4 Select required tools and safety equipment according to condition of glass to be removed.
 - Prepare required tools and safety equipment for damaged or undamaged glass.
- 4.4.5 Remove mouldings, trim, and accessories.
- 4.4.6 Remove dirt and debris surrounding the glass.
- 4.4.7 Cut urethane seal using appropriate glass removal tools.
- 4.4.8 Remove and dispose of broken glass.
- 4.4.9 Clean debris and broken glass from interior and exterior of vehicle.
- 4.5 Prepare for installation.
 - 4.5.1 Inspect size and footprint (location) of OEM urethane bead.
 - 4.5.2 Trim existing urethane bead to approximately 2 mm. in height.
 - 4.5.3 Inspect glass aperture for damage, corrosion, or adhesion failure.
 - 4.5.4 Repair or sublet glass aperture damage.
 - 4.5.5 Repair minor corrosion as per sealant manufacturers' recommendations.
 - 4.5.6 Treat cause of adhesion failure.
 - 4.5.7 Dry fit and mark proper alignment of the replacement glass.
 - 4.5.8 Select a urethane and/or primers that meet or exceed OEM specifications.

- 4.5.9 Prepare vehicle body according to urethane manufacturer's procedures and specifications.
- 4.5.10 Prepare new glass for installation as per urethane manufacturer's specifications.
- 4.6 Install glass.
 - 4.6.1 Lower door glass slightly to relieve cabin pressure.
 - 4.6.2 Install required mouldings and attachments to the glass prior to installation.
 - 4.6.3 Back seal moulding when required.
 - 4.6.4 Trim nozzle tip in V shape to proper size bead.
 - 4.6.5 Apply urethane bead on glass or body following OEM height and footprint, overlapping bead joint.
 - 4.6.6 Position glass according to dry fit setting marks and press fit.
 - 4.6.7 Tape and/or block glass into position for proper curing time as per urethane manufacturer's specifications.
 - 4.6.8 Install and check fit and finish of glass, moulding, and accessories.
- 4.7 Verify installation of structurally bonded stationary glass.
 - 4.7.1 Check operation of any electrical/electronic components.
 - 4.7.2 Clean and detail vehicle.
 - Remove protective covers and tapes.
 - Clean tape marks as required.
 - Remove excess sealant from body and glass.
 - Check for additional debris, marks, and fingerprints and clean accordingly.
 - Vacuum affected areas.
 - Leak test (mist only).
 - Dry vehicle as required.
 - Clean glass.

4.7.3 Complete work order.

- Record batch number of urethane products and primers used.
- Record brand and DOT number of glass.
- Record materials used.
- Record additional required information.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety Equipment (see Appendix 1 for list)
2. Demonstration materials (i.e., glass, adhesive products)
3. Basic hand tools
4. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
5. Test vehicles
6. Replacement glass and related hardware
7. Vehicle protection devices

Evaluation Structure		
Written Assignment	Practical Assignment/ Labs	Final Assessment
20%	60%	20%

Number:	5		
Title:	Removal and Installation of Mechanically Fastened Stationary Glass		
Duration:	Total Hours: 27	Theory: 6	Practical: 21
Prerequisites:	Reportable Subject 1, 2, 3		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6089.01, 6089.02, 6089.03, 6089.04, 6090.01, 6090.02, 6090.03, 6090.04, 6090.05, 6097.01, 6097.02, 6097.03		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to remove and install or replace mechanically fastened stationary glass to Original Equipment Manufacturer's (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 5.1 Visually inspect the vehicle for pre-existing interior and exterior damage prior to repair.
- 5.2 Verify information on work order.
 - 5.2.1 Verify customer and vehicle information.
 - Vehicle Identification Number (VIN)
 - Licence plate
 - Vehicle make and model
 - Authorizing signature
 - Phone number
 - 5.2.2 Verify work to be performed.

5.3 Visually inspect the affected area.

5.3.1 Inspect the glass for pre-existing damage.

- Identify cause of damage.
 - Stress
 - Impact
 - Corrosion
 - Delamination
 - Improper prior installation

5.3.2 Inspect mouldings and attachments for pre-existing damage and fit.

- Identify cause of damage.
 - Debris impact
 - Deterioration
 - Corrosion
 - Abuse
 - Collision impact
 - Shrinkage
 - Improper prior installation

5.3.3 Inspect electrical and electronic components and connections.

- Wiper operation
- Antenna
- Rear defroster
- Washer system
- Global Positioning System (GPS)
- Safety Restraint Systems (SRS) locations

5.4 Remove mechanically fastened stationary glass.

5.4.1 Identify the steps required to remove mechanically fastened stationary glass, including procedures for specialty windows.

- Convertible rear windows
- Partitioned windows

5.4.2 Ensure availability and condition of replacement parts.

- Like kind and quality to OEM glass and attachments

- 5.4.3 Protect vehicle.
 - Seat covers
 - Dash covers
 - Fender protectors
 - Hood protectors
 - Roof protectors
 - Sill plate covers
- 5.4.4 Select required tools and safety equipment according to condition of glass to be removed.
 - Prepare required tools and safety equipment for damaged or undamaged glass.
- 5.4.5 Remove mouldings, interior and exterior trim, and accessories.
- 5.4.6 Remove dirt and debris surrounding the glass.
- 5.4.7 Remove mechanical fastening devices.
- 5.4.8 Remove and dispose of broken glass.
- 5.4.9 Clean debris and broken glass from interior and exterior of vehicle.
- 5.5 Prepare for installation.
 - 5.5.1 Inspect size and footprint (location) of foam core butyl.
 - 5.5.2 Remove foam core butyl.
 - 5.5.3 Inspect glass aperture for damage, corrosion, or adhesion failure.
 - 5.5.4 Dry fit and mark proper alignment of the replacement glass.
 - 5.5.5 Select a foam core butyl and/or primers that meet or exceed OEM specifications.
 - 5.5.6 Prepare vehicle body according to sealant manufacturer's procedures and specifications.
 - 5.5.7 Prepare new glass for installation as per sealant manufacturer's specifications.

- 5.6 Install glass.
 - 5.6.1 Install required mouldings and attachments to the glass prior to installation.
 - 5.6.2 Apply foam core butyl on glass or body following OEM height and footprint, overlapping bead joint.
 - 5.6.3 Position glass according to dry fit setting marks and press fit.
 - 5.6.4 Install and tighten all fastening devices in correct sequence.
 - 5.6.5 Install and check fit and finish of glass, moulding, and accessories.
- 5.7 Verify installation of mechanically fastened stationary glass.
 - 5.7.1 Check operation of any electrical/electronic components.
 - 5.7.2 Clean and detail vehicle.
 - Remove protective covers and tapes
 - Clean tape marks as required
 - Remove excess sealant from body and glass
 - Check for additional debris, marks, and fingerprints and clean accordingly
 - Vacuum affected areas
 - Leak test (mist only)
 - Dry vehicle as required
 - Clean glass
 - 5.7.3 Complete work order.
 - Record brand and DOT number of glass
 - Record materials used
 - Record additional required information

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
4. Test vehicles
5. Replacement glass and related hardware
6. Vehicle protection devices

Evaluation Structure		
Written Assignment	Practical Assignment/ Labs	Final Assessment
20%	60%	20%

Number:	6		
Title:	Windshield Chip Repair		
Duration:	Total Hours: 18	Theory: 9	Practical: 9
Prerequisites:	Reportable Subject 1, 2		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard: 6087.01, 6087.02, 6087.03, 6087.04, 6089.01, 6089.02, 6089.03, 6089.04, 6091.01, 6091.02, 6091.03, 6091.04, 6093.01, 6093.02, 6093.03, 6093.04, 6097.01, 6097.02, 6097.03			

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to complete various windshield chip repairs according to product manufacturers' recommendations.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

6.1 Define the purpose and fundamentals of windshield chip repair.

6.1.1 Identify the reasons for repairing a windshield chip.

- Reduce potential future expense
- Maintain structural integrity
- Improve optical clarity
- Create smooth surface
- Prevent spread of damage
- Retain existing seal
- Reduce environmental impact
- Reduce insurance claims

6.1.2 Describe types of repairable damage.

- Bull's-eye
- Bee's wing
- Star break
- Combination
- Half moon
- Cloverleaf

6.1.3 Identify repair limitations.

- Size
- Location
- Depth
- Heated glass
- Solar coated glass
- Laminate damage
- Age of damage
- Contamination
- Exterior only
- Multi-layer laminates
- Environmental conditions
 - Temperature
 - Humidity
 - Direct sunlight

6.2 Perform windshield chip repairs.

6.2.1 Select required tools and equipment.

- Personal protective equipment
 - Nitrile gloves
 - Safety glasses
- Windshield repair kit
- Required resins and materials

6.2.2 Protect vehicle.

- Seat covers
- Fender protectors
- Hood protectors
- Roof protectors
- Sill plate covers
- Wiper protection

6.2.3 Complete windshield chip repairs following equipment manufacturer's procedure.

- Access damage through probing and/or drilling.
- Remove moisture and contamination from the area.
- Adjust windshield temperature as necessary.
- Evacuate air from repair area.
- Protect resin from premature curing.
- Inject resin under pressure.
- Fill pit.
- Cure resin.
- Remove excess resin and pit filler.
- Polish.

6.2.4 Clean and detail vehicle.

- Remove protective covers.
- Check for additional debris, marks, and fingerprints and clean accordingly.
- Blow/vacuum affected areas.
- Clean glass.

6.2.5 Complete work order.

- Record materials used.
- Record additional required information.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Product manufacturer's documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Glass Chip Repair Kit
4. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
5. Windshield samples
6. Vehicle protection devices

Evaluation Structure			
Written Assignment	Theory Test	Practical Assignment/Labs	Final Assessment
20%	20%	40%	20%

Number:	7		
Title:	Removal and Installation of Mechanically Fastened Moveable Glass		
Duration:	Total Hours: 33	Theory: 6	Practical: 27
Prerequisites:	Reportable Subject 1, 2, 3		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6091.01, 6091.02, 6091.03, 6091.04, 6092.01, 6092.02, 6092.03, 6092.04, 6092.05, 6097.01, 6097.02, 6097.03		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to remove and install or replace mechanically fastened moveable glass to Original Equipment Manufacturers' (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 7.1 Identify the types of moveable glass operating systems.
 - 7.1.1 Identify the characteristics of wind up/power operating systems.
 - Regulator types
 - Anti-pitch protection
 - Auto down feature
 - Power motor removal hazards
 - 7.1.2 Identify the characteristics of flip out operating systems.
 - Manual vs. power latches
 - Vent glass (handles, pivots)
 - 7.1.3 Identify the characteristics of flip up operating systems.
 - Lift shocks
 - Lift gate extensions
 - Wiper motors

- 7.2 Visually inspect the vehicle for pre-existing interior and exterior damage prior to repair.
- 7.3 Verify information on work order.
 - 7.3.1 Verify customer and vehicle information.
 - Vehicle Identification Number (VIN)
 - License plate
 - Vehicle make and model
 - Authorizing signature
 - Phone number
 - 7.3.2 Verify work to be performed.
- 7.4 Visually inspect the affected area.
 - 7.4.1 Inspect the glass for pre-existing damage.
 - Identify cause of damage when possible.
 - Stress
 - Impact
 - Corrosion
 - Delamination
 - Improper prior installation
 - 7.4.2 Inspect mouldings and attachments for pre-existing damage and fit.
 - Identify cause of damage.
 - Debris impact
 - Deterioration
 - Corrosion
 - Abuse
 - Collision impact
 - Shrinkage
 - Improper prior installation

7.4.3 Inspect and verify operation and condition of mechanical, electrical, and electronic components, connections, and switches.

- Wiper operation
- Antenna
- Rear defroster
- Washer system
- Global Positioning System (GPS)
- Safety Restraint Systems (SRS) locations
- Power mirrors
- Power door locks
- Lights
- Speakers
- Tail gate/deck lid release
- Power seats
- Hinges, handles, lift shocks, etc.

7.5 Remove mechanically fastened moveable glass.

7.5.1 Identify the steps required to remove mechanically fastened moveable glass.

7.5.2 Ensure availability and condition of replacement parts.

- Like kind and quality to OEM glass and attachments

7.5.3 Protect vehicle.

- Seat covers
- Dash covers
- Fender protectors
- Hood protectors
- Roof protectors
- Sill plate covers

7.5.4 Select required tools and safety equipment according to condition of glass to be removed.

- Prepare required tools and safety equipment for damaged or undamaged glass.

- 7.5.5 Disable supplemental restraint systems where necessary as per vehicle manufacturer's specifications.
 - Air bags
 - Seat belt assemblies
- 7.5.6 Remove dirt and debris surrounding the glass.
- 7.5.7 Remove mouldings, interior and exterior trim, and accessories.
 - Sound and water barriers
 - Disconnect electrical and electronic devices as required.
- 7.5.8 Remove and clean mechanical fastening devices.
- 7.5.9 Remove and dispose of broken glass.
 - Clean debris and broken glass from interior and exterior of vehicle.
 - Inspect components and fixtures for glass fragments.
 - Retrieve all glass-related attachments and hardware.
- 7.5.10 Check operation and function of manual and powered components.
 - Remove control switches from interior trim panel.
 - Connect bypass kit to wiring harness.
- 7.6 Prepare for installation.
 - 7.6.1 Test fit trim and attachments.
 - 7.6.2 Check fit of glass.
 - To opening
 - To door/glass run channels
 - To door frames
 - Determine dry fit setting mark locations for bonded attachments.
 - 7.6.3 Prepare glass and opening for installation.
 - Install necessary mechanical hardware to glass
 - Choose required bonding materials
 - Bond channels to glass according to dry fit setting marks
 - Install necessary mouldings and attachments to the glass
 - Lubricate channels and hardware as required

- 7.7 Install glass.
 - 7.7.1 Place glass into aperture and adjust as necessary.
 - 7.7.2 Install all fastening devices.
 - 7.7.3 Check fit, finish, and operation of glass.
 - 7.7.4 Reinstall all vapour and sound barriers.
 - 7.7.5 Reinstall all required mouldings and trim.
 - 7.7.6 Reinstall trim panels and related components.
- 7.8 Verify installation of mechanically fastened moveable glass.
 - 7.8.1 Check operation of any manual or electrical/electronic components.
 - 7.8.2 Enable SRS.
 - 7.8.3 Clean and detail vehicle.
 - Remove protective covers and tapes
 - Clean tape marks as required
 - Remove excess sealant from body and glass
 - Check for additional debris, marks, and fingerprints and clean accordingly
 - Vacuum affected areas
 - Leak test
 - Dry vehicle as required
 - Clean glass
 - 7.8.4 Complete work order.
 - Record materials used.
 - Record additional required information.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
4. Test vehicles and/or components
5. Replacement glass and related hardware
6. Vehicle protection devices

Evaluation Structure		
Written Assignment	Practical Assignment/ Labs	Final Assessment
20%	60%	20%

Number:	8		
Title:	Removal and Installation of Gasket Mounted Glass		
Duration:	Total Hours: 18	Theory: 6	Practical: 12
Prerequisites:	Reportable Subject 1, 2, 3		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6093.01, 6093.02, 6093.03, 6093.04, 6094.01, 6094.02, 6094.03, 6094.04, 6094.05, 6097.01, 6097.02, 6097.03		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to remove and install or replace gasket mounted glass to Original Equipment Manufacturers' (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 8.1 Visually inspect the vehicle for pre-existing interior and exterior damage prior to repair.
- 8.2 Verify information on work order.
 - 8.2.1 Verify customer and vehicle information.
 - Vehicle Identification Number (VIN)
 - Licence plate
 - Vehicle make and model
 - Authorizing signature
 - Phone number
 - 8.2.2 Verify work to be performed.
- 8.3 Visually inspect the affected area.
 - 8.3.1 Inspect the glass for pre-existing damage.
 - Identify cause of damage.
 - Stress
 - Impact
 - Corrosion
 - Delamination
 - Improper prior installation

8.3.2 Inspect mouldings and attachments for pre-existing damage and fit.

- Identify cause of damage.
 - Debris impact
 - Deterioration
 - Corrosion
 - Abuse
 - Collision impact
 - Shrinkage
 - Improper prior installation

8.3.3 Inspect electrical and electronic components and connections.

- Wiper operation
- Rain sensor
- Antenna
- Head Up Display (HUD)
- Rear defroster
- Heated windshield
- Washer system
- Global Positioning System (GPS)
- Safety Restraint Systems (SRS) locations

8.4 Remove gasket mounted glass.

8.4.1 Identify the steps required to remove gasket mounted glass.

8.4.2 Ensure availability and condition of replacement parts.

- Like kind and quality to OEM glass and attachments
- OEM quality gaskets
- Lock strips

8.4.3 Protect vehicle.

- Seat covers
- Dash covers
- Fender protectors
- Hood protectors
- Roof protectors
- Sill plate covers

- 8.4.4 Select required tools and safety equipment according to condition of glass to be removed.
 - Prepare required tools and safety equipment for damaged or undamaged glass.
- 8.4.5 Disable supplemental restraint systems where necessary as per vehicle manufacturer's specifications.
 - Air bags
 - Seat belt assemblies
- 8.4.6 Remove dirt and debris surrounding the glass.
- 8.4.7 Remove mouldings, interior and exterior trim, and accessories.
 - Sound and water barriers
 - Disconnect electrical and electronic devices as required.
 - Remove gasket-locking strip
 - Unlock self-locking gasket
- 8.4.8 Separate adhesive bond between gasket and glass and gasket and body using appropriate glass removal tools.
- 8.4.9 Remove and dispose of broken glass.
 - Clean debris and broken glass from interior and exterior of vehicle.
 - Inspect components and fixtures for glass fragments.
 - Retrieve all glass-related attachments and hardware.
- 8.5 Prepare for installation.
 - 8.5.1 Trim existing adhesive sealant from body and gasket.
 - 8.5.2 Inspect glass aperture for damage, corrosion, or adhesion failure.
 - 8.5.3 Compare glass contour and size to opening, with or without gasket.
 - 8.5.4 Select a sealant/urethane and/or primers that meet or exceed OEM specifications.
 - 8.5.5 Prepare vehicle body according to sealant/urethane manufacturer's procedures and specifications.
 - 8.5.6 Prepare new glass for installation as per sealant/urethane manufacturer's specifications.

- 8.6 Install glass.
 - 8.6.1 Lower door glass slightly to relieve cabin pressure, if necessary.
 - 8.6.2 Install gasket, mouldings, and attachments to the glass prior to installation when necessary.
 - 8.6.3 Trim nozzle tip as required.
 - For pre-sealing
 - For glass to gasket sealing
 - 8.6.4 Pre-seal gasket when necessary.
 - 8.6.5 Seat and install glass.
 - 8.6.6 Check fit and finish of glass and related components.
 - 8.6.7 Apply urethane/sealant between gasket and glass and gasket and body.
 - 8.6.8 Remove excess sealant.
- 8.7 Verify installation of gasket-mounted glass.
 - 8.7.1 Check operation of any electrical/electronic components.
 - 8.7.2 Clean and detail vehicle.
 - Remove protective covers and tapes
 - Clean tape marks as required
 - Remove excess sealant from body and glass
 - Check for additional debris, marks, and fingerprints and clean accordingly
 - Vacuum affected areas
 - Leak test
 - Dry vehicle as required
 - Clean glass
 - 8.7.3 Complete work order.
 - Record batch number of urethane products and primers used
 - Record brand and DOT number of glass
 - Record materials used
 - Record additional required information

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
4. Test vehicles
5. Replacement glass and related hardware
6. Vehicle protection devices

Evaluation Structure		
Written Assignment	Practical Assignment/ Labs	Final Assessment
20%	60%	20%

Number:	9		
Title:	Cutting and Fitting Laminated Safety Glass		
Duration:	Total Hours: 24	Theory: 6	Practical: 18
Prerequisites:	Reportable Subject 1, 2, 3, 4, 7, 8		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6095.01, 6095.02, 6095.03, 6095.04, 6095.05, 6095.06		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to produce templates and cut and fit laminated safety glass to Original Equipment Manufacturers' (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 9.1 Visually inspect the vehicle for pre-existing interior and exterior damage prior to repair.
- 9.2 Produce a template.
 - 9.2.1 Identify method of installation.
 - Bonded
 - Gasket
 - Moveable
 - 9.2.2 Select template material.
 - Rigid paper product (e.g., corrugated cardboard)
 - 9.2.3 Remove glass.
 - 9.2.4 Draw template according to body opening and installation method.
 - Modify template as required to accommodate installation method.

9.3 Prepare for glass cutting.

9.3.1 Select glass type as per application.

- Windshields (AS1)
- Sidelights (AS2 and AS3)
- Backlights (AS2 and AS3)
- Clear
- Tinted
- Shaded

9.3.2 Select tools and safety equipment required for glass cutting.

- Safety equipment
 - Goggles
 - Glass handling gloves
 - Dust mask
 - Protective clothing
- Tools
 - Glass cutter
 - Glass pliers
 - Methyl hydrate
 - Glass rule
 - Glass square
 - Single-edge blade
 - Glass cutting table
 - Glass polisher

9.4 Cut glass.

9.4.1 Position glass on top of template.

9.4.2 Cut glass following approved procedures.

- Score straight lines.
- Start and run the fissure by hand or with glass pliers.
- Score curved corners.
- Start and run the fissure by hand or with glass pliers.
- Repeat on other side.
- Apply gentle pressure to open fissure.
- Apply methyl hydrate – do not ignite.
- Use a single-edge blade to cut vinyl.

- 9.4.3 Grind/polish glass to finish edges.
- 9.4.4 Prepare glass according to installation method.
 - Apply frit band if required.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Vehicle Manufacturers' Specifications
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
4. Laminated glass
5. Template materials
6. Test vehicles and/or components

Evaluation Structure		
Written Assignment	Practical Assignment/ Labs	Final Assessment
20%	60%	20%

Number:	10		
Title:	Customer Service and Professionalism in the Workplace		
Duration:	Total Hours: 12	Theory: 3	Practical: 9
Prerequisites:	None		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6098.01, 6098.02		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to act professionally with, and provide quality assistance to customers, colleagues, supervisors, and industry, according to established policies, procedures, and standards.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 10.1 Communicate effectively.
 - 10.1.1 Utilize business language in the workplace.
 - 10.1.2 Develop good listening skills.
 - Basic listening modes
 - Elements of communication
 - 10.1.3 Apply effective writing and speaking skills.
 - 10.1.4 Demonstrate telephone etiquette.
 - 10.1.5 Write an incident report.
 - 10.1.6 Interpret instructions and procedures.
- 10.2 Develop positive values and attitudes.
 - 10.2.1 Dress appropriately in the workplace.
 - 10.2.2 Adhere to personal hygiene practices.
 - 10.2.3 Demonstrate a positive attitude.

- 10.3 Work effectively with others.
 - 10.3.1 Co-operate with peers.
 - 10.3.2 Demonstrate willingness to speak and ask questions.
- 10.4 Describe ethical issues encountered in the workplace.
 - 10.4.1 Recognize personal and professional ramifications of unethical practices.
- 10.5 Demonstrate time management skills.
 - 10.5.1 Explain the importance of time management systems.
 - 10.5.2 Prioritize and schedule tasks.
- 10.6 Resolve conflicts effectively.
 - 10.6.1 Identify causes of conflict.
 - 10.6.2 Describe strategies for dealing with conflict.
 - 10.6.3 Demonstrate effective workplace conflict management skills.
 - 10.6.4 Use negotiation skills for everyday life.
- 10.7 Provide quality customer service.
 - 10.7.1 Define customer service.
 - 10.7.2 Identify resources available to assist in problem resolution.
 - 10.7.3 Use available resources to assist in problem resolution.
 - 10.7.4 Follow an escalation procedure for problem resolution.
 - Take ownership of incident.
 - 10.7.5 Describe various methods for measuring customer service.
 - 10.7.6 Communicate with the customer through all phases of problem resolution.

Instructional / Delivery Strategies:

- Lectures
- Labs
- Role Play/Games
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Reebok.com (Office Linebacker)
- Industry Documentation
- Internet

Minimum Equipment List:

N/A

Evaluation Structure			
Theory Test	Practical Assignment 1	Practical Assignment 2	Final Assessment
20%	30%	30%	20%

Number:	11
Title:	Diagnosis and Troubleshooting for Automotive Glass Related Problems
Duration:	Total Hours: 18 Theory: 6 Practical: 12
Prerequisites:	Reportable Subject 1, 2, 3, 4, 5, 7, 8, 9
Co-requisites:	None
Cross-Reference to Learning Outcomes/Training Standard: 6086.01, 6086.02, 6086.03, 6086.04, 6087.01, 6087.02, 6087.03, 6087.04, 6088.01, 6088.02, 6088.03, 6088.04, 6088.05, 6089.01, 6089.02, 6089.03, 6089.04, 6090.01, 6090.02, 6090.03, 6090.04, 6090.05, 6091.01, 6091.02, 6091.03, 6091.04, 6092.01, 6092.02, 6092.03, 6092.04, 6092.05, 6093.01, 6093.02, 6093.03, 6093.04, 6094.01, 6094.02, 6094.03, 6094.04, 6094.05	

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to diagnose, troubleshoot problems related to automotive glass according to Original Equipment Manufacturers' (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

- 11.1 Visually inspect the vehicle for pre-existing interior and exterior damage prior to repair.
- 11.2 Verify information on work order.
 - 11.2.1 Verify customer and vehicle information.
 - Vehicle Identification Number (VIN)
 - Licence plate
 - Vehicle make and model
 - Authorizing signature
 - Phone number

11.3 Identify typical problems related to automotive glass.

11.3.1 List typical problems related to glass.

- Air and water leaks
- Window regulator malfunction
- Improperly fitting trim
- Glass misalignment
- Defroster/defogger malfunction
- Heated windshield malfunction
- Antenna malfunction
- Rearview mirror detachment
- Rain sensor malfunction
- Detached moveable glass hardware
- Aperture misalignment
- Wind noise
- Squeaks and rattles
- Corrosion or body damage

11.4 Identify troubleshooting methods.

11.4.1 Select appropriate testing methods for troubleshooting.

- Water
- Air
- Road test
- Light
- Sonic detectors
- Paper strip
- Chalk dust
- Electrical continuity
- Dry fit

11.4.2 Perform appropriate testing methods to diagnose the problem.

11.5 Repair diagnosed problems.

11.5.1 Replace or repair weather stripping.

11.5.2 Reseal glass.

11.5.3 Clear sunroof drainage tubes.

11.5.4 Remove and reinstall glass.

- 11.5.5 Repair and/or reattach electrical connections.
 - Repair defroster grid.
- 11.5.6 Repair and/or replace mechanical components.
- 11.5.7 Repair, replace, and/or reattach moveable glass hardware.
- 11.5.8 Align and adjust moveable glass.
- 11.5.9 Rebond rearview mirrors.
- 11.6 Identify diagnosed problems that require subletting.
 - Corrosion.
 - Body damage.
 - Body seams.
- 11.7 Verify repair.
 - 11.7.1 Retest using original testing methods to confirm repair of diagnosed problem.
 - 11.7.2 Complete work order.
 - Record batch number of urethane products and primers used.
 - Record materials used.
 - Record additional required information.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Industry Standards Reference Documentation
- Manufacturer’s technical bulletins
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
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- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
4. Test vehicles and components
5. Replacement glass and related hardware
6. Electrical/electronic testing equipment
7. Testing equipment as identified in learning outcomes
8. Vehicle protection devices

Evaluation Structure		
Written Assignment	Practical Assignment/ Labs	Final Assessment
20%	60%	20%

Number:	12		
Title:	Estimating Repair or Replacement Costs		
Duration:	Total Hours: 15	Theory: 6	Practical: 9
Prerequisites:	Reportable Subject 1, 2, 3, 4, 5, 6, 7, 8, 9, 10		
Co-requisites:	None		
Cross-Reference to Learning Outcomes/Training Standard:	6096.01, 6096.02, 6096.03, 6096.04		

General Learning Outcome

Upon successful completion of the reportable subject, the apprentice is able to estimate/invoice for repair or replacement costs of glass and related components for automotive and motorized vehicles according to Original Equipment Manufacturers' (OEM) specifications.

Learning Outcomes and Content

Upon successful completion, the apprentice is able to:

12.1 Define the purpose and fundamentals of estimating.

12.1.1 Identify the purpose of an estimate.

12.1.2 Define estimating terms and concepts.

- Flat rate
- Deductible
- Sublet
- Comprehensive
- All perils
- Third party
- Adjuster
- Appraiser
- Depreciation
- Down time
- Betterment
- Tax implications
 - Commercial
 - Personal
 - Farm
 - Aboriginal

12.1.3 Define estimating trade terms.

- Remove and Replace
- Remove and Install
- Supply and Install
- Direct Dealer Purchase
- Overlap
- Additional
 - Access time
 - Corrosion treatment
 - Free up frozen/corroded parts
- Detailing
- Visible damage quote
- Replaced part retention

12.1.4 Identify types of estimates.

- Verbal estimate
- Insurance estimate
- Fleet estimate
- Trade estimate
- Retail estimate

12.1.5 Explain the essential legal requirements of a written estimate.

- Motor Vehicle Repair Act
- Warranty
- Liability
 - Drive-away times
- Disclaimer

12.2 Identify vehicle and parts look-up procedures.

12.2.1 Decode Vehicle Identification Numbers (VIN).

12.2.2 Explain the National Automotive Glass Specifications (NAGS) numbering system.

- Terms
- Abbreviations
- Colour codes

12.2.3 Use NAGS book/software to look up parts.

12.3 Explain the use of estimating resources.

12.3.1 Identify resources used in preparing estimates.

- National Automotive Glass Specifications (NAGS) book.
- Automotive dealers
- Industry-related software
- Service/parts manuals
- Technical support

12.4 Prepare an estimate.

12.4.1 Visually inspect the vehicle for pre-existing interior and exterior damage.

12.4.2 Identify work required to be sublet.

- Corrosion
- Body damage
- Convertible rear windows
- Trim
- Paint to match

12.4.3 Verify customer and vehicle information.

- Vehicle Identification Number (VIN)
- Licence plate
- Vehicle year, make, and model
- Body type
- Vehicle type
- Production date
- Glass identification
- Insurance information
- Authorizing signature
- Phone number

12.4.4 Identify the pricing components of an estimate.

- Parts
- Materials
- Labour
- Additional
- Sublet items
- Taxes
- Deductibles
- Betterments
- Totals

12.4.5 Complete written estimates.

12.5 Prepare an invoice.

12.5.1 Identify the types of invoices.

- Insurance
- Deductible
- Cash sale
- Account billing
- Manual
- Electronic

12.5.2 Use estimate/work order information to complete an invoice.

Instructional/Delivery Strategies:

- Lectures
- Labs
- Case Studies/Scenarios
- Multimedia/Demonstration
- Review
- Class Participation/Recall
- Online

Reference Materials:

- Manuals
- National Automotive Glass Specifications (NAGS)
- Mitchell Collision Manuals
- Industry Standards Reference Documentation
- Internet
- www.glassbytes.com
- Multimedia
- Textbooks
- Trade magazines
 - Auto Glass Magazine
 - Auto and Flat Glass Journal
 - Auto Glass Replacement (AGR)
- Duffy, James E. I-Car Professional Automotive. Collision Repair 2nd Edition. Delmar Publishers Inc. ISBN 0-8273-1398-3
- WHMIS
- MSDS
- Occupational Health and Safety Act
- Environmental Protection Act

Minimum Equipment List:

1. Safety equipment as required (see Appendix 1 for list)
2. Basic hand tools
3. Specialty Automotive Glass tools and equipment (see Appendix 2 for list)
4. Test vehicles

Evaluation Structure			
Written Assignment	Theory Test	Practical Assignment/Labs	Final Assessment
20%	20%	40%	20%

Appendix 1: Safety Equipment

Safety glasses/goggles
Nitrile gloves
Work gloves
Glass handling gloves
Respiratory protection
Hardhat
Protective clothing

Face protection
Safety boots
Ear muffs/plugs
First Aid station
Eye wash station
Fire extinguishers
Emergency spill kit

Appendix 2: Technician's Tool List

Commons Tools

Sealant scraper
Hammers (metal and rubber)
Magnetic screw driver set
(regular and stubby)
Small and large screw drivers for prying
and probing
Magnetic tips
(Phillips, slotted, Pozidrive, and torx)
Standard and metric 1/4" and 3/8" drive
socket set
Standard and metric wrench set
Standard and metric Allen wrenches
(long)
Adjustable wrench
Utility knives (short and long)

Pliers (needle nose, regular, and locking)
Sharpening stone and file
Wire brush
Wisk broom
Rivet gun (standard)
Standard and metric tape measures
Awl
Metal punch
Pry bar
Small penlight
Magnetic screw retriever
Butane torch
Volt meter/test light
Trouble light
Extension cord

Specialty Hand Tools and Equipment

Caulking gun (manual)	Channel cleaning tool
Cold knife	Windshield stand
Panel remover tool	Glass rack
Glass pliers	Door glass support tool
Glass cutter	Sash cord
Gasket locking tool (assorted)	Windshield wire
Hook tool	Power window bypass kit
Fiber stick	Nozzle cutter
Moulding removal tools (assorted)	Glass rule
Rear view mirror removal tool (assorted)	Glass cutting table
Windshield wire grips	Hand seamer
Windshield wire insert tool	Tote tool tray
Wiper puller	Single or two-step platform
Sash nut socket	Seat protectors
Vacuum cups	Dash protectors
Peel rivet gun	Fender protectors
Banana knife or similar	Hood protectors
Door handle clip remover	

Power Tools

Caulking gun (power)	Windshield repair kit
Oscillating windshield knife	Urethane oven
Power windshield sealant chopper knife	Bench grinder
Reciprocating knife	Air compressor
Wet belt sander	Sonic leak tester
Vacuum cleaner	Battery booster
Small body grinder	Cordless drill
Heat gun	



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